Atlantic City High School

Mathematics Curriculum

Mathematics Task Force Members

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Mathematics Curriculum Task for Summer 2016

Don Coleman (Math)

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The focus of the task force this summer was to continue to adjust each curricula and the benchmarks to suit the needs of all levels of students at Atlantic City High School. The task force developed and created assessments with the new Instructional Improvement System edConnect NJ. The team also became knowledgeable with the new curricular frameworks released by the state in order to align with the student learning objectives that are used to create the PARCC test. Working with the special education department, as we do during the school year, has been an excellent experience. The team was able to adjust and modify all the documents for Algebra 1, Geometry and Algebra 2 to align with the State Curricular Frameworks; adjustments included the team creating all new unit assessments and aligning them with the new curriculum documents including a pre-test and benchmarks.

Pacing guides were made for Algebra 1, Geometry, and Algebra 2 in order to guide teachers on what needs to be covered and where to find the topics and objectives in the board approved textbooks.

In the end, we hope to continue to get input from all math teachers, including special education, on the scope and sequence of the math curriculum. The mathematical skills our students will need at the varying levels to successfully complete the standardized testing fluctuates year to year, so these documents will continue to change to suit the ever changing needs of the ACHS students.

Below are the recommended sequence of courses for the Secondary Levels of Mathematics in the Atlantic City School District.

Typical Sequences			
Grade 9	**Grade 10**	**Grade 11**	**Grade 12**
Honors Algebra II/ Trig	Honors Pre- Calculus	AP Calculus AB AP Calculus BC AP Statistics Honors Calculus	AP Calculus AB AP Calculus BC AP Statistics Honors Probability & Statistics
Honors Geometry	Honors Algebra II/ Trig	Honors Pre-Calculus AP Statistics	AP Calculus AB AP Calculus BC AP Statistics Honors Probability & Statistics
Geometry	Honors Algebra II/ Trig Algebra II	Pre- Calculus Honors Probability & Statistics AP Statistics Algebra II/ Trig	AP Calculus AB AP Calculus BC AP Statistics Pre-Calculus Honors Probability & Statistics
Algebra I	Honors Geometry Geometry	Honors Algebra II/ Trig Algebra II	AP Statistics Honors Pre-Calculus Algebra III/ Trig Honors Probability & Statistics

High School Graduation Requirements

Updated May 2016

In this document, you will find charts containing the current list of New Jersey assessment requirements in both English language arts (ELA) and mathematics for high school graduation for the Class of 2016, the Classes of 2017, 2018, and 2019, and the proposed requirements for the Classes of 2020 and 2021.

With the transition to PARCC last year, the Department of Education has continually explained that students graduating as members of the classes of 2016 through 2019 can meet graduation requirements through a variety of ways, including (1) achieving passing scores on certain PARCC assessments; (2) achieving certain scores on alternative assessments such as the SAT, ACT, or Accuplacer; or (3) the submission by the district of a student portfolio through the Department's portfolio appeals process. (Special Education students whose Individualized Education Plans (IEPs) specify an alternative way to demonstrate proficiencies will continue to follow the graduation requirements set forth in their IEPs.)

The State Board of Education is currently reviewing proposed changes to state regulations on the high school graduation requirements for the classes of 2020 and 2021 and beyond.

Proposed changes for the Class of 2020 would permit students to demonstrate graduation proficiency through the same alternative means as those in the classes of 2016 through 2019, provided that students in the Class of 2020 take all end-of-course PARCC assessments for which they are eligible as of the effective date of the proposed amendments.

For the Class of 2021 and thereafter, the proposed changes would allow students who have not demonstrated proficiency on ELA and mathematics through the end-of-course PARCC assessments by their senior year to demonstrate graduation proficiency by meeting the criteria of the portfolio appeals process.

It is important to note there has always been a system for students to demonstrate and meet graduation requirements through an alternative assessment or pathway to graduation throughout New Jersey's forty-year history with a statewide assessment program.

Class of 2016

ENGLISH LANGUAGE ARTS (ELA)

PARCC ELA Grade 9 >= 750 (Level 4)

or

PARCC ELA Grade 10 >=750 (Level 4)

or

PARCC ELA Grade 11 >= 725 (Level 3)

or

SAT Reading* >= 400

or

ACT Reading or ACT PLAN Reading >= 16

or

Accuplacer WritePlacer >= 6

or

Accuplacer WritePlacer ESL >= 4

or

PSAT10 Reading or PSAT/NMSQT Reading** >= 40

or

PSAT10 Reading or PSAT/NMSQT Reading*** >= 22

or

ACT Aspire Reading >= 422

or

ASVAB-AFQT Composite >=31

or

Meet the Criteria of the NJDOE Portfolio Appeal

MATHEMATICS

PARCC Algebra I >= 750 (Level 4)

or

PARCC Geometry >= 725 (Level 3)

or

PARCC Algebra II >= 725 (Level 3)

or

SAT Math* >= 400

or

ACT or ACT PLAN Math >= 16

or

Accuplacer Elementary Algebra >= 76

or

PSAT10 Math or PSAT/NMSQT Math** >= 40

or

PSAT10 Math or PSAT/NMSQT Math*** >= 22

or

ACT Aspire Math >= 422

or

ASVAB-AFQT Composite >= 31

or

Meet the Criteria of the NJDOE Portfolio Appeal

*Note: * SAT taken prior to March 2016; ** PSAT taken prior to October 2015; ***PSAT taken after October 2015. The College Board will establish new 'threshold scores' in May 2016 for the new SAT.*

Class of 2017, 2018 and 2019

ENGLISH LANGUAGE ARTS (ELA)

PARCC ELA Grade 9

or

PARCC ELA Grade 10

or

PARCC ELA Grade 11

or

SAT Reading

or

ACT Reading or ACT PLAN Reading

or

Accuplacer WritePlacer

or

Accuplacer WritePlacer ESL

or

PSAT10 Reading or PSAT/NMSQT Reading

or

PSAT10 Reading or PSAT/NMSQT Reading

or

ACT Aspire Reading

or

ASVAB-AFQT Composite

or

Meet the Criteria of the NJDOE Portfolio Appeal

MATHEMATICS

PARCC Algebra I

or

PARCC Geometry

or

PARCC Algebra II

or

SAT Math

or

ACT or ACT PLAN Math

or

Accuplacer Elementary Algebra

or

PSAT10 Math or PSAT/NMSQT Math

or

PSAT10 Math or PSAT/NMSQT Math

or

ACT Aspire Math

or

ASVAB-AFQT Composite

or

Meet the Criteria of the NJDOE Portfolio Appeal

(Proposed) Class of 2020

ENGLISH LANGUAGE ARTS (ELA)

***(Must Take)* PARCC ELA Grade 9**

and

***(Must Take)* PARCC ELA Grade 10**

and

***(Must Take)* PARCC ELA Grade 11**

If passing score not met on any of the three, then the student can use the following

SAT Reading

or

ACT Reading or ACT PLAN Reading

or

Accuplacer WritePlacer

or

Accuplacer WritePlacer ESL

or

PSAT10 Reading or PSAT/NMSQT Reading

or

PSAT10 Reading or PSAT/NMSQT Reading

or

ACT Aspire Reading

or

ASVAB-AFQT Composite

or

Meet the Criteria of the NJDOE Portfolio Appeal

MATHEMATICS

***(Must Take)* PARCC Algebra I**

and

***(Must Take)* PARCC Geometry**

and

***(Must Take)* PARCC Algebra II**

If passing score not met on any of the three, then the student can use the following

SAT Math

or

ACT or ACT PLAN Math

or

Accuplacer Elementary Algebra

or

PSAT10 Math or PSAT/NMSQT Math

or

PSAT10 Math or PSAT/NMSQT Math

or

ACT Aspire Math

or

ASVAB-AFQT Composite

or

Meet the Criteria of the NJDOE Portfolio Appeal

(Proposed) Class of 2021

ENGLISH LANGUAGE ARTS (ELA)

(Must Take) **PARCC ELA Grade 9**

and

(Must Take and Pass) **PARCC ELA Grade 10**

and

(Must Take) **PARCC ELA Grade 11**

If passing score not met on PARCC ELA Grade 10, then the student can use the following

Meet the Criteria of the NJDOE Portfolio Appeal

MATHEMATICS

(Must Take and Pass) **PARCC Algebra I**

and

(Must Take) **PARCC Geometry**

and

(Must Take) **PARCC Algebra II**

If passing score not met on PARCC Algebra 1, then the student can use the following

Meet the Criteria of the NJDOE Portfolio Appeal

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Algebra 1 Curriculum

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Algebra 1 Pacing Guide

Date Range	Teachers have approximately 39 school days to complete the suggested sequences of Chapters from the board approved textbook. Adjustments should be made accordingly for varying levels.
9/6/16 – 9/16/16	Complete Algebra 1 Pre-Test Benchmark
9/6/16 – 11/4/16	Unit 1: Chapters 1, 2, 3, 4, 5
10/31/16 – 11/4/16	Complete Algebra 1 Unit 1 Benchmark 1
11/7/16 – 1/13/17	Unit 2: Chapters 6, 7, 8
1/9/17 – 1/13/17	Complete Algebra 1 Unit 2 Benchmark 2
1/17/17 – 3/17/17	Unit 3: Chapters 9, 11
3/13/17 – 3/17/17	Complete Algebra 1 Unit 3 Benchmark 3
3/20/17 – 5/26/17	Unit 4: Chapter 12 Prepare students for PARCC testing using Performance Tasks
5/22/17 – 6/9/17	Complete Algebra 1 Unit 4 Benchmark 4

All students must complete the pre-test and all 4 benchmarks on the edConnect website. (Benchmark tests are aligned to curricular frameworks, so teachers should be aware of the content of the benchmarks to ensure student success.)

Each teacher may decide to use Benchmark 4 as their final exam as in the past. However, it must be completed by all students (no exemptions from any benchmarks). A cumulative final exam is provided in the appendix of the curriculum for use by teachers that choose to use it.

Suggested Open Educational Resources are available in the Curricular Frameworks for each Unit, which can assist teachers and students with PARCC test preparation.

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 1 **Modeling with Linear Equations and Inequalities**	□ N.Q.A.1 □ N.Q.A.2 □ N.Q.A.3 ■ A.REI.B.3 ■ A.REI.A.1 ■ A.CED.A.4 ■ A.SSE.A.1 ■ A.CED.A.1 ■ A.REI.A.1 ■ A.CED.A.2 ■ A.REI.D.10 □ S.ID.B.6 ■ S.ID.C.7 ■ S.ID.C.8 ■ S.ID.C.9 ■ A.REI.D.11	• Reason quantitatively and use units to solve problems • Solve [linear] equations and inequalities in one variable • Understand solving equations as a process of reasoning and explain the reasoning • Create equations that describe numbers or relationships • Interpret the structure of expressions • Represent and solve equations graphically • Summarize, represent, and interpret data on quantitative variables. • Interpret linear models	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 1: Suggested Open Educational Resources	N.Q.A.1 Runners' World N.Q.A.2 Giving Raises N.Q.A.3 Calories in a Sports Drink A.REI.B.3, A.REI.A.1 Reasoning with linear inequalities A.CED.A.4 Equations and Formulas	A.SSE.A.1 Kitchen Floor Tiles A.CED.A.1 Planes and wheat A-CED.A.1 Paying the rent A.REI.A.1 Zero Product Property 1 A.CED.A.2 Clea on an Escalator S.ID.B.6,S.ID.C.7-9 Coffee and Crime	
Unit 2 **Modeling with Linear Functions, Linear Systems, & Exponential Functions**	○ A.REI.C.6 ■ A.CED.A.3 ○ A.REI.C.5 ■ A.REI.D.12 ■ F.IF.A.1 ■ F.IF.A.2 □ F.LE.A.1 □ F.LE.A.2 ■ F.IF.A.3 □ F.BF.A.1 ■ A.SSE.A.1 □ A.SSE.B.3 ■ F.IF.B.4 □ F.LE.B.5 ■ F.IF.B.5 ■ F.IF.B.6 □ F.IF.C.9 □ F.IF.C.7	• Solve linear systems of equations • Create equations that describe numbers or relationships • Interpret the structure of expressions • Represent and solve equations and inequalities graphically • Construct & compare linear & exponential models • Interpret expressions for functions in terms of the situation • Build a function that models a relationship between two quantities • Understand the concept of a function and use function notation • Interpret functions that arise in applications in terms of the context • Analyze functions using different representations	
Unit 2: Suggested Open Educational Resources	A.REI.C.6 Cash Box A.CED.A.3 Dimes and Quarters A.REI.C.5 Solving Two Equations in Two Unknowns A.REI.D.12 Fishing Adventures 3 F.IF.A.1 The Parking Lot F.IF.A.2 Yam in the Oven F.LE.A.1 Finding Linear and Exponential Models F.LE.A.2 Interesting Interest Rates	F.BF.A.1a Skeleton Tower A.SSE.A.1 Mixing Candies F.IF.B.4 Warming and Cooling F.IF.B.4, F.IF.B.5 Average Cost F.LE.B.5 US Population 1982-1988 F.IF.B.6 Temperature Change F.IF.C.7b Bank Account Balance	

Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

<table>
<tr><th>Overview</th><th>Standards for Mathematical Content</th><th>Unit Focus</th><th>Standards for Mathematical Practice</th></tr>
<tr><td>Unit 3

Quadratic Equations, Functions & Polynomials</td><td>■ A.APR.A.1
■ A.SSE.A.2
■ A.REI.B.4
■ A.CED.A.1
■ F.IF.B.4*
■ F.IF.B.5*
□ A.SSE.B.3
□ F.BF.A.1
□ F.IF.C.7*
□ F.IF.C.8*
□ F.IF.C.9*
■ F.IF.B.6
□ F.LE.A.3
◎ F.BF.B.3
■ A.REI.D.11
□ A.APR.B.3
◎ N.RN.B.3</td><td>• Perform arithmetic operations on polynomials
• Understand the relationship between zeros and factors
• Interpret the structure of expressions
• Solve equations and inequalities in one variable
• Create equations that describe numbers or relationships
• Interpret functions that arise in applications in terms of the context
• Represent and solve equations and inequalities graphically
• Build a function that models a relationship between two quantities
• Construct & compare linear, quadratic, & exponential models
• Build new functions from existing functions
• Analyze functions using different representations
• Use properties of rational and irrational numbers</td><td rowspan="4">MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments & critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.</td></tr>
<tr><td>Unit 3:
Suggested Open Educational Resources</td><td colspan="2">A.APR.A.1 Powers of 11
A.SSE.A.2 Equivalent Expressions
A.REI.B.4 Visualizing Completing the Square
A.REI.B.4 Braking Distance
A.REI.B.4 Two Squares are Equal
F.IF.B.4 Words – Tables - Graphs
F.IF.B.5 The restaurant
A.SSE.B.3 Profit of a company
A.SSE.B.3 Rewriting a Quadratic Expression
F.IF.C.7a Graphs of Quadratic Functions
F.IF.C.8a Springboard Dive
F.IF.C.8a Which Function?
F.IF.B.9 Throwing Baseballs
F.IF.B.6 Mathemafish Population
F.LE.A.3 Population and Food Supply
F.BF.B.3 Identifying Even and Odd Functions
F.BF.B.3 Transforming the graph of a function
A.REI.D.11 Introduction to Polynomials – College Fund
A.APR.B.3 Graphing from Factors 1
N.RN.B.3 Operations with Rational and Irrational Numbers</td></tr>
<tr><td>Unit 4

Modeling with Statistics</td><td>◎ S.ID.A.1
◎ S.ID.A.2
◎ S.ID.A.3
□ S.ID.B.5
□ S.ID.B.6
■ F.IF.B.4*
■ F.IF.B.5*</td><td>• Summarize, represent, and interpret data on a single count or measurement variable
• Summarize, represent, and interpret data on two categorical and quantitative variables
• Interpret functions that arise in applications in terms of the context</td></tr>
<tr><td>Unit 4:
Suggested Open Educational Resources</td><td colspan="2">S.ID.A.1-3 Haircut Costs
S.ID.A.1-3 Speed Trap
S.ID.A.2-3 Measuring Variability in a Data Set
S.ID.A.3 Identifying Outliers
S.ID.B.5 Support for a Longer School Day?
S.ID.B.6 Laptop Battery Charge 2
F.IF.B.4 The Aquarium
F.IF.B.4 Containers
F.IF.B.4-5 The Canoe Trip, Variation 2</td></tr>
</table>

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Algebra 1	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Teachers should create summative assessments in order to collect data and drive day to day instruction. For example, tests, quizzes and constructed response tasks.	*edConnect Department Wide Quarterly Benchmark Testing*
Focus Mathematical Concepts	
Prerequisite skills: Successfully Complete Secondary Geometry	
District/School Tasks	**District/School Primary and Supplementary Resources**
Complete Benchmarking and constructed response tasks to prepare for PARCC testing.	*Pearson Textbook and Online Resources are available to all staff and students.*
Instructional Best Practices and Exemplars	
Teachers should differentiate instruction, create lessons and integrate technology into the classroom whenever possible.	

Unit 1 Algebra 1

Content & Practice Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
N.Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays. N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling. N.Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): • Units are associated with variables in expressions and equations in context. • Quantities may be used to model attributes of real world situations. • Measurement tools have an inherent amount of uncertainty in measurement. Students are able to: • use units to understand real world problems. • use units to guide the solution of multi-step real world problems (e.g. dimensional analysis). • choose and interpret units while using formulas to solve problems. • identify and define appropriate quantities for descriptive modeling. • choose a level of accuracy when reporting measurement quantities. Learning Goal 1: Solve multi-step problems, using units to guide the solution,	2-5 CB 2-5 2-6 2-7 2-10 4-4 4-5 5-2 5-7 6-4 9-5 9-6 12-2 12-3 12-4

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		interpreting units consistently in formulas and choosing an appropriate level of accuracy on measurement quantities. Develop descriptive models by defining appropriate quantities.	
■ A.REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. ■ A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. ■ A.CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s). • Literal equations can be rearranged using the properties of equality. Students are able to. • solve linear equations with coefficients represented by letters in one variable. • use the properties of equality to justify steps in solving linear equations. • solve linear inequalities in one variable. • rearrange linear formulas and literal equations, isolating a specific variable. Learning Goal 2. Solve linear equations and inequalities in one variable (including literal equations); justify each step in the process.	2-1 2-2 2-3 2-4 2-5 2-7 2-8 3-2 3-3 3-4 3-5 3-6 9-3 9-5
■ A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context. A.SSE.A.1a. Interpret parts of an expression, such as terms, factors, and coefficients.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively.	Concept(s): No new concept(s) introduced Students are able to: • identify different parts of an expression, including terms, factors and constants. • explain the meaning of parts of an expression in context. Learning Goal 3: Interpret terms, factors, coefficients, and other parts of expressions in terms of a context .	1-1 1-2 3-7 4-5 4-7 5-3 5-4 7-6 7-7 7-8 8-7 8-8 9-1 9-2 9-5 9-6

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A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions. A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Equations and inequalities describe relationships. • Equations can represent real-world and mathematical problems. Students are able to: • identify and describe relationships between quantities in word problems. • create linear equations in one variable. • create linear inequalities in one variable. • use equations and inequalities to solve real world problems. • explain each step in the solution process. Learning Goal 4: Create linear equations and inequalities in one variable and use them in contextual situations to solve problems. Justify each step in the process and the solution.	1-8 2-1 2-2 2-3 2-4 2-5 2-7 2-8 3-2 3-3 3-4 3-6 3-7 3-8 9-3 9-4 9-5 9-6 11-5
A.CED.A.2. Create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales. N.Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays. A.REI.D.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [Focus on linear equations.]	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Equations represent quantitative relationships. Students are able to: • create linear equations in two variables, including those from a context. • select appropriate scales for constructing a graph. • interpret the origin in graphs. • graph equations on coordinate axes, including labels and scales. • identify and describe the solutions in the graph of an equation. Learning Goal 5: Create linear equations in two variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	1-9 2-5 CB 2-5 2-6 2-7 4-2 4-3 4-4 4-5 5-2 5-3 5-4 5-5 5-7 7-6 7-7 9-1 9-2 CB 9-4 10-5 11-6 11-7 CB 11-7 12-2 12-4

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◻ S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.B.6a. Fit a function to the data (including the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. S.ID.B.6c. Fit a linear function for a scatter plot that suggests a linear association. ■ S.ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. ■ S.ID.C.8. Compute (using technology) and interpret the correlation coefficient of a linear fit. ■ S.ID.C.9. Distinguish between correlation and causation.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Scatter plots represent the relationship between two variables. • Scatter plots can be used to determine the nature of the association between the variables. • Linear models may be developed by fitting a linear function to approximately linear data. • The correlation coefficient represents the strength of a linear association. Students are able to: • distinguish linear models representing approximately linear data from linear. equations representing "perfectly" linear relationships. • create a scatter plot and sketch a line of best fit. • fit a linear function to data using technology. • solve problems using prediction equations. • interpret the slope and the intercepts of the linear model in context. • determine the correlation coefficient for the linear model using technology. • determine the direction and strength of the linear association between two variables. Learning Goal 6: Represent data on a scatter plot, describe how the variables are related and use technology to fit a function to data. Learning Goal 7: Interpret the slope, intercept, and correlation coefficient of a data set of a linear model; distinguish between correlation and causation.	5-7 CB 5-7 9-7 CB 9-7 CB 12-5
■ A.REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically.	Concept(s): • y = f(x), y=g(x) represent a system of equations. • Systems of equations can be solved graphically (8.EE.C.8). Students are able to: • explain the relationship between the x-coordinate of a point of intersection and the solution to the equation f(x) = g(x) for linear equations y = f(x) and y = g(x).	CB 4-4 CB 6-1 7-6 9-8

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value, exponential, and logarithmic functions.* [Focus on linear equations.]		• find approximate solutions to the system by making a table of values, graphing, and finding successive approximations. Learning Goal 8: Explain why the solutions of the equation f(x) = g(x) are the x-coordinates of the points where the graphs of the linear equations y=f(x) and y=g(x) intersect. ** function notation is not introduced here Learning Goal 9: Find approximate solutions of f(x) = g(x), where f(x) and g(x) are linear functions, by making a table of values, using technology to graph and finding successive approximations.	
Unit 2 Algebra 1			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
◎ A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. ■ A.CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. ◎ A.REI.C.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics.	Concept(s): • Systems of equations can be solved exactly (algebraically) and approximately (graphically). Students are able to: • identify and define variables representing essential features for the model. • model real world situations by creating a system of linear equations. • solve systems of linear equations using the elimination or substitution method. • solve systems of linear equations by graphing. • interpret the solution(s) in context. Learning Goal 1: Solve multistep contextual problems by identifying variables, writing equations, and solving systems of linear equations in two variables algebraically and graphically.	6-1 6-2 6-3 6-4 6-5 6-6 CB 6-6 9-8
■ A.REI.D.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • model real world situations by creating a system of linear inequalities given a context. • interpret the solution(s) in context.	6-5 6-6 CB 6-6 9-8

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Unit 2 Algebra 1

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
the intersection of the corresponding half-planes. ■ A.CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*.		Learning Goal 2: Graph linear inequalities and systems of linear inequalities in two variables and explain that the solution to the system.	
■ F.IF.A.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). ■ F.IF.A.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • F(x) is an element in the range and x is an element in the domain. Students are able to: • use the definition of a function to determine whether a relationship is a function. • use function notation once a relation is determined to be a function. • evaluate functions for given inputs in the domain. • explain statements involving function notation in the context of the problem. Learning Goal 3: Explain the definition of a function, including the relationship between the domain and range. Use function notation, evaluate functions and interpret statements in context.	4-6
□ F.LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. F.LE.A.1a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. F.LE.A.1b. Recognize situations in which one quantity changes at a	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • Linear functions grow by equal differences over equal intervals. • Exponential functions grow by equal factors over equal intervals. Students are able to: • identify and describe situations in which one quantity changes at a constant rate. • identify and describe situations in which a quantity grows or decays by a constant percent.	5-1 7-7 9-7

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constant rate per unit interval relative to another. F.LE.A.1c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.		• show that linear functions grow by equal differences over equal intervals. • show that exponential functions grow by equal factors over equal intervals. Learning Goal 4: Distinguish between and explain situations modeled with linear functions and with exponential functions.	
◻ F.LE.A.2. Construct linear and exponential functions - including arithmetic and geometric sequences - given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). *[Algebra 1 limitation: exponential expressions with integer exponents] ■ F.IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by f(0) = f(1) = 1, f(n+1) = f(n) + f(n-1) for n ≥ 1.*	MP 2 Reason abstractly and quantitatively. MP 4. Model with mathematics MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Sequences are functions, sometimes defined and represented recursively. • Sequences are functions whose domain is a subset of integers. Students are able to: • create arithmetic and geometric sequences from verbal descriptions. • create arithmetic sequences from linear functions. • create geometric sequences from exponential functions. • identify recursively defined sequences as functions. • create linear and exponential functions given – a graph; – a description of a relationship; – a table of values. Learning Goal 5: Write linear and exponential functions given a graph, table of values, or written description; construct arithmetic and geometric sequences.	4-7 5-3 5-4 5-5 7-6 7-8 9-7
◻ F.BF.A.1. Write a function that describes a relationship between two quantities. 1a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics	Concept(s): No new concept(s) introduced Students are able to: • given a context, write an explicit expressions, a recursive process or steps for calculation for linear and exponential relationships. • interpret parts of linear and exponential functions in context.	1-1 1-2 1-7 3-7 4-5 4-7 5-3 5-4

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context A.SSE.A.1a: Interpret parts of an expression, such as terms, factors, and coefficients. A.SSE.A.1b: Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P*. *[Algebra 1 limitation: exponential expressions with integer exponents]		Learning Goal 6: Write explicit expressions, recursive processes and steps for calculation from a context that describes a linear or exponential relationship between two quantities.	5-5 7-7 7-8 8-5 8-6 8-7 8-8 9-1 9-2 9-5 9-6
A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. A.SSE.B.3c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%*. *[Algebra 1: limit to exponential expressions with integer exponents]	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure	Concept(s): No new concept(s) introduced Students are able to: • use the properties of exponents to simplify or expand exponential expressions, recognizing these are equivalent forms. Learning Goal 7: Use properties of exponents to produce equivalent forms of exponential expressions in one variable.	7-7 9-4 9-5
F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums;*	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • given a verbal description of a relationship, sketch linear and exponential functions. • identify intercepts and intervals where the function is positive/negative. • interpret parameters in context. • determine the *practical* domain of a function. Learning Goal 8: Sketch graphs of linear and exponential functions expressed	4-2 4-3 4-4 5-3 5-4 5-5 5-7 7-6 7-7 9-1 9-2

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Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
symmetries; end behavior; and periodicity. *[Focus on exponential functions] F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context. F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function*		symbolically or from a verbal description. Show key features and interpret parameters in context.	9-7 11-6 11-7
F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* *[Limit to linear and exponential] F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Rate of change of non-linear functions varies. *Students are able to:* • compare key features of two linear functions represented in different ways. • compare key features of two exponential functions represented in different ways. • calculate the rate of change from a table of values or from a function presented symbolically. • estimate the rate of change from a graph. Learning Goal 9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Learning Goal 10: Calculate and interpret the average rate of change of a function presented symbolically or as a table; estimate the rate of change from a graph.	5-1 5-5 7-6 9-2 CB 9-2
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Piecewise-defined functions may contain discontinuities.	5-3 5-4 5-5 5-8

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
and using technology for more complicated cases. F.IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima. F.IF.C.7b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.		• Absolute value functions are piecewise functions. Students are able to: • graph linear, square root, cube root, and piecewise-defined functions. • graph more complicated cases of functions using technology. • identify and describe key features of the graphs of square root, cube root, and piecewise-defined functions . Learning Goal 11: Graph linear, square root, cube root, and piecewise-defined functions (including step and absolute value functions) expressed symbolically. Graph by hand in simple cases and using technology in more complex cases, showing key features of the graph.	CB 5-8 7-6 7-7 9-1 9-2 10-5

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
■ A.APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. ■ A.SSE.A.2. Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$*, thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$*.*	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): • Polynomials form a system analogous to the integers. • Polynomials are closed under the operations of addition, subtraction, and multiplication. Students are able to: • add and subtract polynomials. • multiply polynomials. • recognize numerical expressions as a difference of squares and rewrite the expression as the product of sums/differences. • recognize polynomial expressions in one variable as a difference of squares and rewrite the expression as the product of sums/differences.	5-3 5-4 5-5 8-7 8-8 8-1 8-2 8-3 8-4

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
		Learning Goal 1: Add, subtract, and multiply polynomials, relating these to arithmetic operations with integers. Factor to produce equivalent forms of quadratic expressions in one variable.	
■ A.REI.B.4. Solve quadratic equations in one variable. A.REI.B.4a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. A.REI.B.4b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Multiple methods for solving quadratic equations. • Transforming a quadratic equation into the form $(x - p)^2 = q$ yields an equation having the same solutions. Students are able to: • use the method of completing the square to transform a quadratic equation in x into an equation of the form $(x - p)^2 = q$. • derive the quadratic formula from $(x - p)^2 = q$. • solve a quadratic equations in one variable by inspection. • solve quadratic equations in one variable by taking square roots. • solve a quadratic equations in one variable by completing the square. • solve a quadratic equations in one variable using the quadratic formula. • solve a quadratic equations in one variable by factoring. • strategically select, as appropriate to the initial form of the equation, a method for solving a quadratic equation in one variable. • write complex solutions of the quadratic formula in $a \pm bi$ form.	9-3 9-4 9-5 9-6

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
		• analyze the quadratic formula, recognizing the conditions leading to complex solutions (discriminant). Learning Goal 2: Derive the quadratic formula by completing the square and recognize when there are no real solutions. Learning Goal 3: Solve quadratic equations in one variable using a variety of methods (including inspection, taking square roots, factoring, completing the square, and the quadratic formula) and write complex solutions in $a \pm bi$ form.	
■ A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • create quadratic equations in one variable. • use quadratic equations to solve real world problems. Learning Goal 4: Create quadratic equations in one variable and use them to solve problems.	1-8 2-1 2-2 2-3 2-4 2-5 2-7 2-8 3-2 3-3 3-4 3-6 3-7 3-8 9-3 9-4 9-5 9-6 11-5
■ F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the*	MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • interpret maximum/minimum and intercepts of quadratic functions from graphs and tables in the context of the problem. • sketch graphs of quadratic functions given a verbal description of the relationship between the quantities.	4-2 4-3 4-4 5-3 5-4 5-5 7-6 7-7 9-1

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Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ■ F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function*		• identify intercepts and intervals where function is increasing/decreasing • determine the practical domain of a function. Learning Goal 5: Interpret key features of quadratic functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a quadratic function, showing key features and relating the domain of the function to its graph.	9-2 9-7 11-6 11-7
□ A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. A.SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines. A.SSE.B.3b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Alternate, equivalent forms of a quadratic expression may reveal specific attributes of the function that it defines. Students are able to: • factor a quadratic expression for the purpose of revealing the zeros of a function. • complete the square for the purpose of revealing the maximum or minimum of a function. Learning Goal 6: Use factoring and completing the square to produce equivalent forms of quadratic expressions in one variable that highlight particular properties such as the zeros or the maximum or minimum value of the function.	9-4 9-5
□ F.BF.A.1. Write a function that describes a relationship between two quantities. F.BF.A.1a: Determine an explicit expression, a recursive process, or steps for calculation from a context.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concept(s): No new concept(s) introduced Students are able to: • given a context, write explicit expressions, a recursive process or steps for calculation for quadratic relationships. Learning Goal 7: Given a context, write an explicit expression, a recursive process or steps for calculation for quadratic relationships.	4-7 5-3 5-4 5-5 7-7 7-8 9-2

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima. *[emphasize quadratic functions] F.IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. F.IF.C.8a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): No new concept(s) introduced Students are able to: • graph quadratic functions expressed symbolically. • graph more complicated cases of quadratic functions using technology. • identify and describe key features of the graphs of quadratic functions. • given two quadratic functions, each represented in a different way, compare the properties of the functions. Learning Goal 8: Graph quadratic functions by hand in simple cases and with technology in complex cases, showing intercepts, extreme values and symmetry of the graph. Compare properties of two quadratic functions, each represented in a different way.	5-3 5-4 5-5 5-8 7-6 7-7 9-1 9-2 9-4 9-5
F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. F.LE.A.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity	MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • A quantity increasing exponentially eventually exceeds a quantity increasing quadratically. Students are able to: • calculate the rate of change of a quadratic function from a table of values or from a function presented symbolically. • estimate the rate of change from a graph of a quadratic function.	5-1 CB 9-2 9-7

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Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
increasing linearly, quadratically, or (more generally) as a polynomial function.		• analyze graphs and tables to compare rates of change of exponential and quadratic functions. Learning Goal 9: Calculate and interpret the average rate of change of a quadratic function presented symbolically or as a table. Estimate and compare the rates of change from graphs of quadratic and exponential functions.	
◯ F.BF.B.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Characteristics of even and odd functions in graphs and algebraic expressions • Vertical and horizontal shifts Students are able to: • perform transformations on graphs of linear and quadratic functions. • identify the effect on the graph of replacing f(x) by – $f(x) + k$; – $k\,f(x)$; – $f(kx)$; – *and* $f(x + k)$ for specific values of k (both positive and negative). • identify the effect on the graph of combinations of transformations. • given the graph, find the value of k. • illustrate an explanation of the effects on linear and quadratic graphs using technology. • recognize even and odd functions from their graphs and from algebraic expressions for them. Learning Goal 10: Identify the effects of transformations and combinations of transformations [$f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$] on a function; find the value of k given the graph.	5-3 CB 5-3 5-4 5-8 7-7 9-1 9-2
■ A.REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	Concept(s): No new concept(s) introduced Students are able to: • approximate the solution(x) to a system of equations comprised of a linear and a quadratic	CB 4-4 CB 6-1 7-6 9-8

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*		function by using technology to graph the functions, by making a table of values and/or by finding successive approximations. Learning Goal 11: Find approximate solutions of f(x) = g(x), where f(x) is a linear function and g(x) is a quadratic function by making a table of values, using technology to graph and finding successive approximations.	
A.APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. *[Algebra 1: limit to quadratic and cubic functions in which linear and quadratic factors are available]	MP.7 Look for and make use of structure.	Concept(s): • General shape(s) and end behavior of cubic functions Students are able to: • find the zeros of a polynomial (quadratic and cubic). • test domain intervals to determine where f(x) is greater than or less than zero. • use zeros of a function to sketch a graph. Learning Goal 12: Identify zeros of cubic functions when suitable factorizations are available and use the zeros to construct a rough graph of the function. (*cubic functions are presented as the product of a linear and a quadratic factor)	9-3 CB 9-3
N.RN.B.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • The sum or product of two rational numbers is rational. • The sum of a rational number and an irrational number is irrational. • The product of a nonzero rational number and an irrational number is irrational. Students are able to: • explain and justify conclusions regarding sums and products of two rational numbers.. • explain and justify conclusions regarding the sum of a rational and irrational number. • explain and justify conclusions regarding the product of a nonzero rational and irrational number.	CB 1-6

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
		Learning Goal 13: Explain and justify conclusions about sums and products of rational and irrational numbers.	

Unit 4 Algebra 1

Content & Practice Standards		Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
S.ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • represent data with dot plots on the real number line. • represent data with histograms on the real number line. • represent data with box plots on the real number line. Learning Goal 1: Represent data with plots (dot plots, histograms, and box plots) on the real number line.	12-2 12-4
S.ID.A.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. S.ID.A.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Appropriate use of a statistic depends on the shape of the data distribution. • Standard deviation Students are able to: • represent two or more data sets with plots and use appropriate statistics to compare their center and spread. • interpret differences in shape, center, and spread in context. • explain possible effects of extreme data points (outliers) when summarizing data and interpreting shape, center and spread. Learning Goal 2: Compare center and spread of two or more data sets, interpreting differences in shape, center, and spread in the context of the data, taking into account the effects of outliers.	12-3 CB 12-3 12-4

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Content & Practice Standards		Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
S.ID.B.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Categorical variables represent types of data which may be divided into groups. Students are able to: • construct two-way frequency tables for categorical data. • interpret joint, marginal and conditional relative frequencies in context. • explain possible associations between categorical data in two-way tables. • identify and describe trends in the data. Learning Goal 3: Summarize and interpret categorical data for two categories in two-way frequency tables; explain possible associations and trends in the data.	CB 12-5
S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.B.6a. Fit a function to the data (including the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • fit a function to data using technology. • solve problems using functions fitted to data (prediction equations). • interpret the intercepts of models in context. • plot residuals of linear and non-linear functions. • analyze residuals in order to informally evaluate the fit of linear and non-linear functions. Learning Goal 4: Fit functions to data using technology, plot residuals and informally assess the fit of linear and non-linear functions by analyzing residuals.	5-7 CB 5-7 9-7 CB 9-7 12-2 12-4

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Content & Practice Standards		Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
S.ID.B.6b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.			
■ F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*. ■ F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.	MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • interpret maximum/minimum and intercepts of functions from graphs and tables in the context of the problem. • sketch graphs of functions given a verbal description of the relationship between the quantities. • identify intercepts and intervals where function is increasing/decreasing. • determine the practical domain of a function . Learning Goal 5: Interpret key features of functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a function, showing key features and relating the domain of the function to its graph.	4-2 4-3 4-4 5-3 5-4 5-5 7-6 7-7 9-1 9-2 9-7 11-6 11-7

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Unit 4 Algebra 1			
Content & Practice Standards		**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.			

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Algebra 1 Unit Benchmarks

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TEST NAME: **2016-2017 ALG1 Pretest**
TEST ID: **64096**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

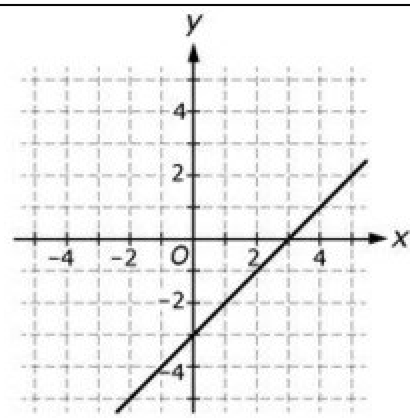
1. Indicate whether each statement about linear functions A and B is True or False.

Drag and drop each statement to the correct container.

Function A

x	y
1	3
2	7
3	11
4	15
5	19

Function B



The rates of change for both function A and function B are positive.

The rate of change for function A is 3 times the rate of change for function B.

The y-intercepts for both function A and function B are positive.

True

False

2. Simplify $\frac{6^9}{6^3}$.

A. 6^3

B. 6^6

C. 6^{12}

D. 6^{27}

3. According to surveys, about 60,300,000 Americans enjoy swimming as a sport. What is this number written in scientific notation?

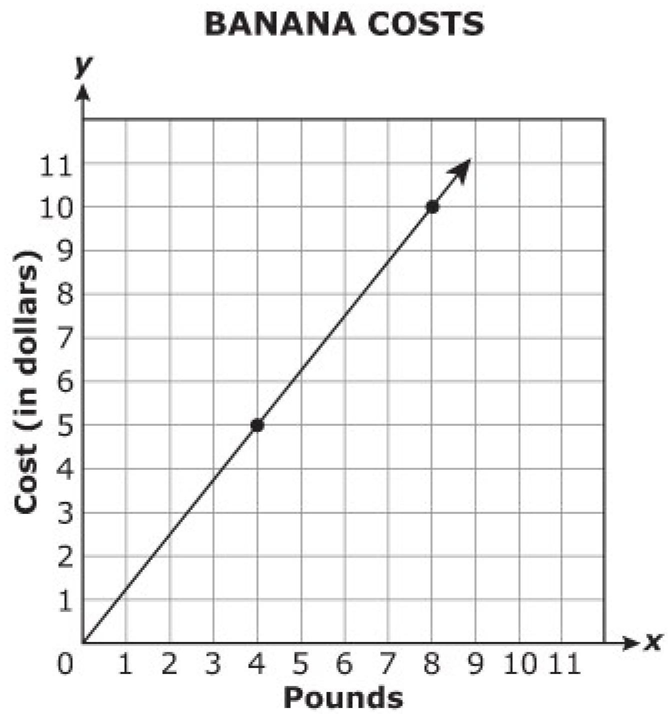
A. 6.03×10^8

B. 6.03×10^7

C. 6.03×10^{-7}

D. 6.03×10^{-8}

4. The graph below shows that the cost of bananas depends on the number of pounds purchased.



What is the unit rate of the bananas?

A. \$5.00 per pound

B. \$1.25 per pound

C. \$1.00 per pound

D. \$0.80 per pound

5. What equation has a line that passes through points (-2, 0) and (3, 1) in the coordinate plane?

A. $y = 5x$

B. $y = 5x - 2$

C. $y = \frac{1}{5}x - 2$

D. $y = \frac{1}{5}x + \frac{2}{5}$

6. How many solutions does each equation have? Click and drag each equation into a box.

$2(m + 3) - m = 2m + 6$

$3a + 4 = 10$

$3d + 7 = 3(d - 3)$

$6f + 5 = 5(f + 1) + f$

$2(p + 3) + p - 6 = 3p$

One Solution

No Solutions

Infinitely Many Solutions

7. The point (2,3) is the solution to a system of two equations. Which equations are in this system? Click on the equations you want to select.

$y = x - 1$

$2y = -x + 8$

$4y = -3x - 1$

$7y = 3x + 5$

$y = .5x + 2$

$-2y = x + 4$

8. The perimeter of a rectangle is 48 inches. The rectangle is twice as long as it is wide. What is the length of the rectangle?

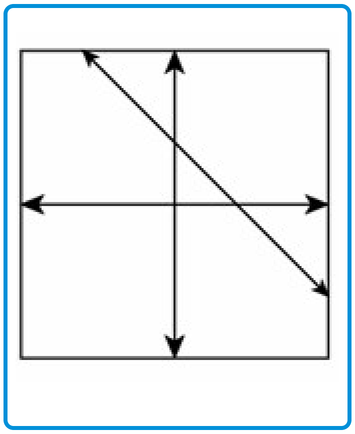
A. 8 inches

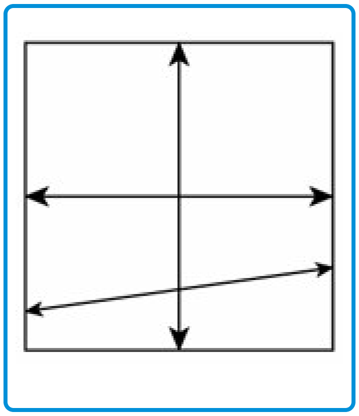
B. 16 inches

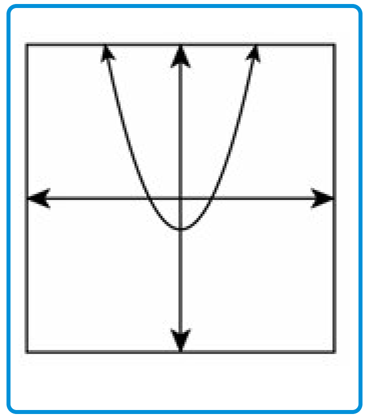
C. 24 inches

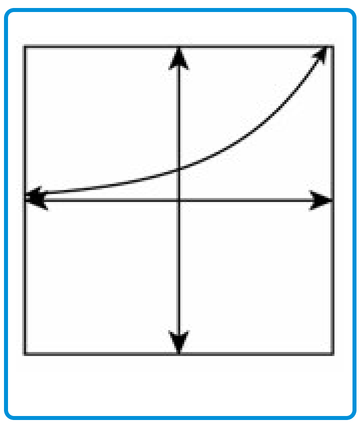
D. 32 inches

9. Classify each graph as a linear function or as a nonlinear function. Click and drag each graph into the correct box.



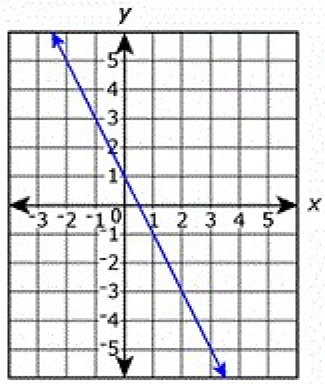






Linear Function	Nonlinear Function

10. Use the graph to answer the question.



Which description is true about the graph? Select all the descriptions that apply.

Increasing function	Decreasing function
Linear function	Non-linear function
Initial value of zero	Not a function

11. Directions: Click and drag each number into the correct box.

Classify each of the numbers as rational or irrational.

-5	$\sqrt{5}$	$\frac{3}{5}$
4.5	$\sqrt{25}$	

Rational Numbers	Irrational Numbers

12. Which integers, when placed in the boxes shown below, make the inequality **true**?

$\square < -\sqrt{60} < \square$

A. 7 and 8

B. 6 and 7

C. -7 and -6

D. -8 and -7

13. The student council is selling cupcakes at the school play. The cost to make the cupcakes is a fixed \$75 plus \$0.17 per cupcake made. Each cupcake sells for \$2.00.

How many cupcakes must be sold to make a profit?

14. The federal tax on a \$28,000 salary was 8 times the state tax. If the combined taxes were \$6,720, which system of equations could be used to find *s*, the amount of state tax, and *f*, the amount of federal tax?

A. $\begin{cases} f + s = 6{,}720 \\ s = 8f \end{cases}$

B. $\begin{cases} f + s = 6{,}720 \\ 9f = 6{,}720 \end{cases}$

C. $\begin{cases} f + s = 6{,}720 \\ f = 8s \end{cases}$

D. $\begin{cases} f + 6{,}720 = 28{,}000 \\ f = 8s \end{cases}$

15. The steps show how Marcelo correctly solved the equation $-\frac{1}{2}(8m+6)=17$.

$$\begin{aligned} &\text{Step 1: } 8m+6=-34 \\ &\text{Step 2: } \quad 8m=-40 \\ &\text{Step 3: } \quad\ \ m=-5 \end{aligned}$$

Which list shows the correct sequence of the properties of equality Marcelo used to solve the equation?

A. distributive, addition, division

B. distributive, multiplication, subtraction

C. multiplication, distributive, division

D. multiplication, subtraction, division

16. Knowing $f(x) = \sqrt{x-2}$ and $g(x) = |x-4|$, drag and drop all the solution sets for $f(x) = g(x)$.

$x = 2$	$x = 3$	$x = 4$
$x = 5$	$x = 6$	

Solution sets for *f(x)* = *g(x)*

17. In a triathlon, Agnes swims 400 meters, bikes 30 kilometers, and runs 6 kilometers. She bikes 12 times as fast as she swims and runs 5 times as fast as she swims. The expression below represents the time it took her to complete the triathlon.

$$\frac{400}{x} + \frac{30{,}000}{12x} + \frac{6{,}000}{5x}$$

Which expression represents the time it took her to complete the swimming and biking portions of the triathlon?

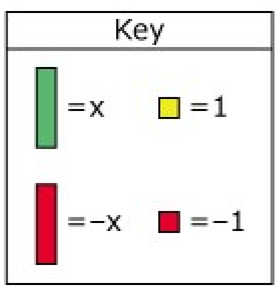
A. $\frac{4{,}100}{x}$

B. $\frac{2{,}900}{x}$

C. $\frac{1{,}600}{x}$

D. $\frac{1{,}200}{x}$

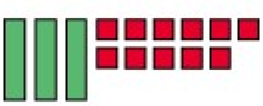
18.



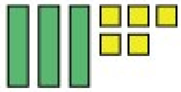
Which model best represents the following expression?

(5x – 8) – (2x – 3)

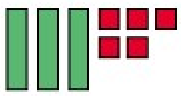
A.



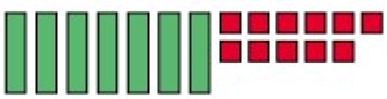
B.



C.



D.



19. Blake is graphing the average rainfall for each month. The rainfall amounts range from 0.6 inches (in.) to 4.5 inches. Which scale will best display the average rainfall?

A. 0 in. to 5 in. with intervals of 0.2 in.

B. 0 in. to 5 in. with intervals of 1.0 in.

C. 0 in. to 10 in. with intervals of 0.2 in.

D. 0 in. to 10 in. with intervals of 1.0 in.

Read the passage - 'alg 1-1-1' - and answer the question below:

Concrete will be poured into a form in the shape of a rectangular prism to make a patio.

The measurements of the dimensions of the form are shown in the table below.

Dimension	**Measurement**
Length	10 feet
Width	8 feet
Height	6 inches

20. How many cubic yards of concrete are needed to fill the form?

Round off your answer to the nearest hundreth of a cubic yard.

TEST NAME: **2016-2017 ALG1 BM1**
TEST ID: **64099**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. Which algebraic expression represents the phrase below?

"one-third of the difference of *y* and 5"

A. $\frac{1}{3} - 5y$

B. $3(y - 5)$

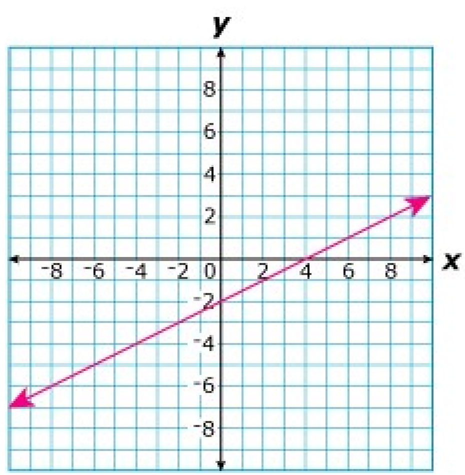
C. $\frac{y-5}{3}$

D. $y - \frac{5}{3}$

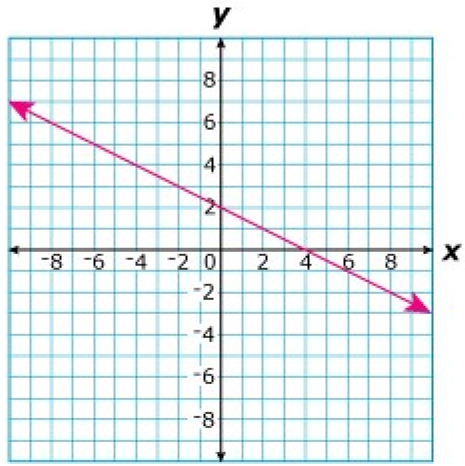
2. Which graph best represents the following equation?

$\frac{1}{2}x - y = 2$

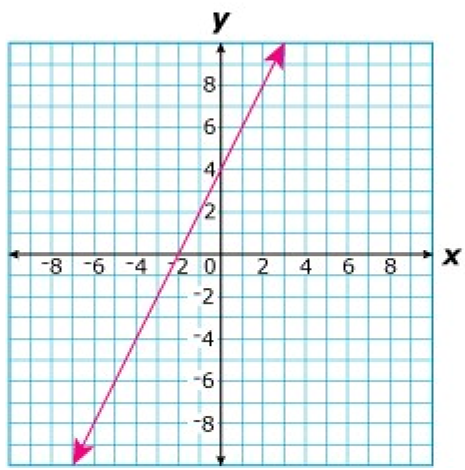
A.



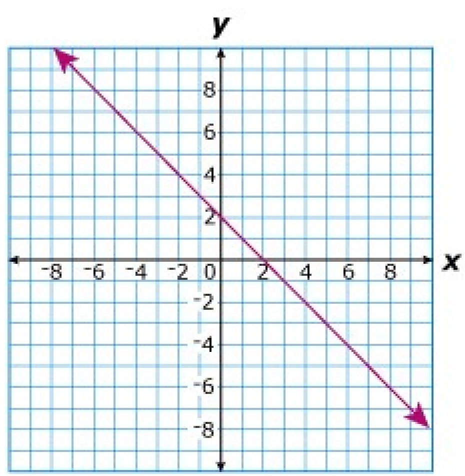
B.


y
x
8
6
4
2
-8 -6 -4 -2 0 2 4 6 8
-2
-4
-6
-8

C.


y
x
8
6
4
2
-8 -6 -4 -2 0 2 4 6 8
-2
-4
-6
-8

D.


y
x
8
6
4
2
-8 -6 -4 -2 0 2 4 6 8
-2
-4
-6
-8

3. A set production designer creates a right circular cylindrical piller. The designer knows the amount of material used for the surface of the pillar and needs to find the height for a reinforcement rod.

Use $A = (2\pi r)h + \pi r^2$, where r represents the radius, h represents the height or the pillar, and A represents the surface area of the pillar.

What is a formula for h in terms of the other variables that can be used to find the height?

A. $$h = \frac{A - \pi r^2}{2\pi r}$$

B. $$h = \frac{A + \pi r^2}{2\pi r}$$

C. $$h = \frac{A}{3\pi r^2}$$

D. $$h = \frac{A}{2\pi r} - \frac{1}{2}$$

4. The steps used to solve the equation $x-2(2x-5)=8$ are shown below.

Step 1: $x-2(2x)+2(-5)=8$
Step 2: $x-4x-10=8$
Step 3: $-3x-10=8$
Step 4: $-3x-10+10=8+10$
Step 5: $-3x=18$
Step 6: $-3x\div(-3)=18\div(-3)$
Step 7: $x=-6$

Which property is **incorrectly** used?

A. distributive property

B. division property of equality

C. addition property of equality

D. subtraction property of equality

5. What is the solution of the inequality $-2(2x+3)+2\leq -x+5$?

A. $x\leq -3$

B. $x\geq -3$

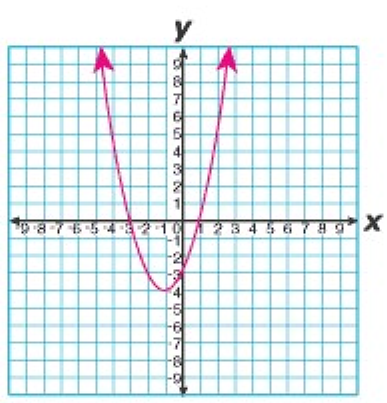
C. $x\geq 3$

D. $x\leq 3$

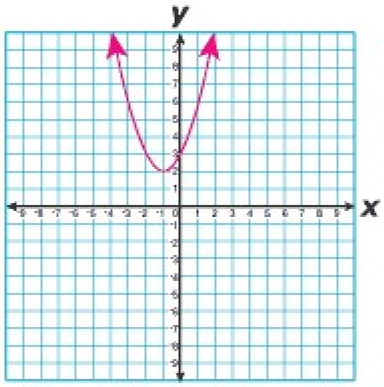
6. Which graph could be used to find the solution set for the following equation?

$x^2-4x+3=0$

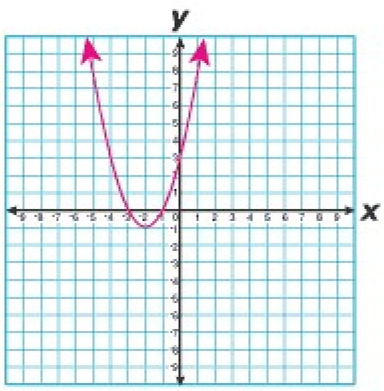
A.



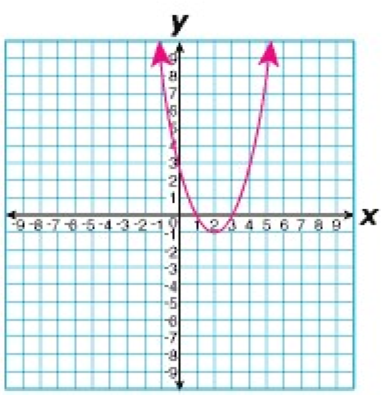
B.



C.



D.



7. What is the greatest common monomial factor of the following polynomial?

$12a^4b^3 + 18a^5b^2 - 24a^2b$

A. $4a^2b$

B. $3a^2b^2$

C. $2a^4b^2$

D. $6a^2b$

8. Erin is planning the remainder of a week-long bike ride.

- The entire distance she will travel is 260 miles.
- She rode her bicycle at a rate of 13 mph a total of 9 hours by the end of the third day.

At this rate, what is a reasonable estimate for the number of hours Erin will ride her bicycle for the remaining distance?

A. 7 hours

B. 11 hours

C. 20 hours

D. 29 hours

Read the passage - 'alg 1-1-1' - and answer the question below:

alg 1-1-1

Concrete will be poured into a form in the shape of a rectangular prism to make a patio.

The measurements of the dimensions of the form are shown in the table below.

Dimension	Measurement
Length	10 feet
Width	8 feet
Height	6 inches

9. How many cubic yards of concrete are needed to fill the form?

Round off your answer to the nearest hundredth of a cubic yard.

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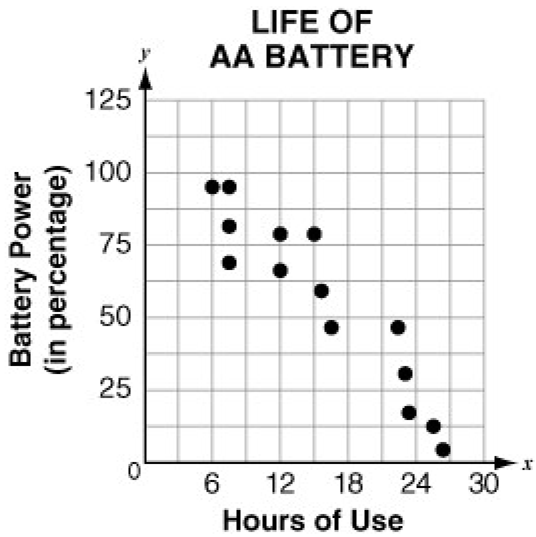
10. **A muscle's strength is directly proportional to its cross-sectional area. Muscle A and muscle B each have a circular cross-sectional area. The radius of each muscle is shown in the table below.**

Muscle	Cross-Sectional Radius
A	3 in.
B	0.5 ft

How many times stronger is the larger muscle than the smaller muscle?

A. 2
B. 4
C. 6
D. 36

11. The life of a AA battery can be predicted by the number of hours of use. As the number of hours of use increases, the remaining battery power decreases. The linear association is demonstrated in the scatter plot below.



If Tyler used 20% of the battery power in his AA battery, for approximately how many hours has he used the battery?

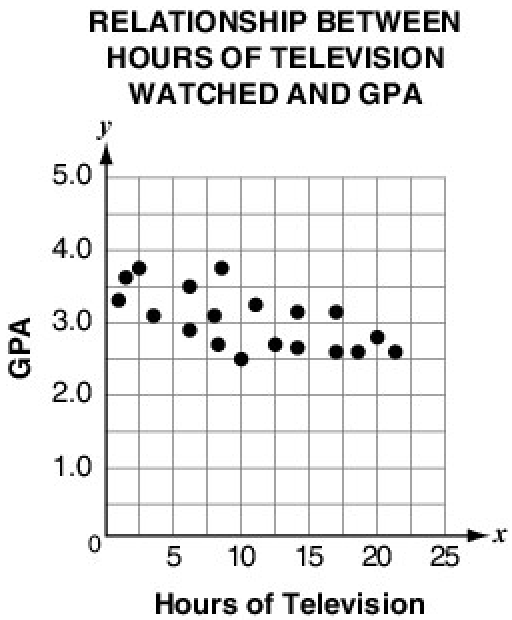
A. 6 hours

B. 24 hours

C. 27 hours

D. 40 hours

12. The scatter plot below represents the relationship between the number of hours of television watched per week and grade point average (GPA).



Which function **best** fits the data?

A. $y = -3.7x + 0.05$

B. $y = -0.05x + 3.7$

C. $y = 0.05x + 3.7$

D. $y = 3.7x - 0.05$

13. As a part of a science experiment, Gary makes a small hole in the bottom of a bottle full of water. He records the amount of water left in the bottle at the end of each minute. He repeats this experiment several times and uses the data to develop the linear model $w = -50m + 1200$, which describes the amount of water remaining in the water bottle, in *w* milliliters, after *m* minutes. Which statement is a correct interpretation of this linear model?

A. The water bottle holds 1,200 milliliters of water and loses 50 milliliters per minute.

B. The water bottle starts with 1,200 milliliters of water and ends with 24 milliliters of water.

C. The water bottle holds 1,200 milliliters of water and loses 1 milliliter of water every 50 minutes.

D. The water bottle starts with 1,200 milliliters of water and loses exactly 50 milliliters of water.

14. Which list places the correlation coefficients in order from weakest to strongest?

A. $-0.8, -0.2, 0.3, 0.7$

B. $0.7, 0.3, -0.2, -0.8$

C. $-0.8, 0.7, 0.3, -0.2$

D. $-0.2, 0.3, 0.7, -0.8$

15. Which of these is the **best** example of correlation but NOT causation?

A. the time of year and the toy sales of a department store

B. the amount of food an animal eats daily and the height of the animal

C. the number of fruits placed in a grocery basket and the weight of the basket

D. the amount of gas a car’s tank can hold and the number of times the car stops at a gas station to fill up the tank

16. Miguel and Jacob started a rock collection on the same day.

- Miguel started with 10 rocks and each day thereafter he added 2 rocks. Each of these rocks was separately added sometime during the day.
- Jacob started his collection with 1 rock and each day thereafter he added 4 rocks. Each of these rocks was separately added sometime during the day.

The table shows the number of rocks each boy had in their collection at the end of each day.

Number of Rocks in Collections

Day	Miguel	Jacob
0	10	1
1	12	5
2	14	9
3	16	13
4	18	17
5	20	21
6	22	25

Based on the information in the table, which statement describes a time when Miguel and Jacob could possibly have the same number of rocks in each of their collections?

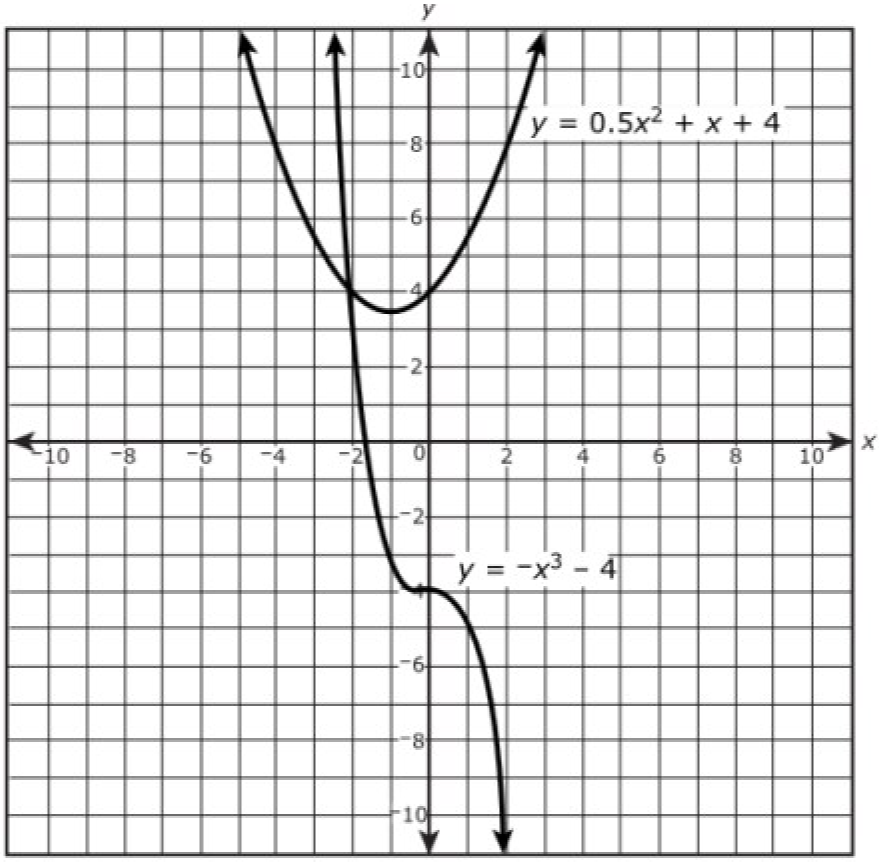
A. Miguel and Jacob have the same number of rocks at the end of day 4.

B. Miguel and Jacob have the same number of rocks sometime during day 4.

C. Miguel and Jacob have the same number of rocks at the end of day 5.

D. Miguel and Jacob have the same number of rocks sometime during day 5.

17. The graph of $f(x) = -x^3 - 4$ and $g(x) = 0.5x^2 + x + 4$ are given.



Use the graphs to find the solution to the equation
$-x^3 - 4 = 0.5x^2 + x + 4.$

Enter your answer in the box

Answer: x= _________

18. A company has developed a new video game console. After completing cost analysis and demand forecasts, the company has determined that the profit function for the new console is

$f(g) = -250g^2 + 70,000g - 4,570,000$

where *g* is the number of consoles sold. What is the domain of the profit function?

A. all integers

B. all rational numbers

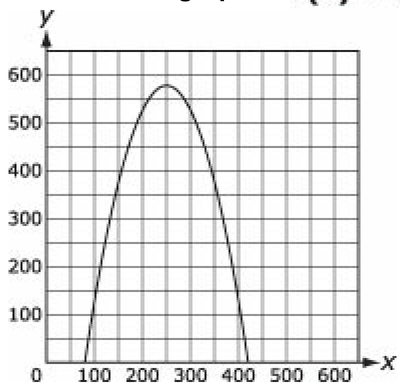
C. all intergers greater than or equal to 0

D. all rational numbers greater than or equal to 0

19. **What is the real zero of the graph of $f(x) = x^3 + x^2 + 2x + 2$?**

A. -2
B. -1
C. 0
D. 1

20. **Consider the graph of $f(x) = -0.02(x - 80)(x - 420)$ shown below.**



Within the first quadrant, over which interval is $f(x)$ increasing?

A. $0 < x < 250$
B. $0 \leq x \leq 250$
C. $80 < x < 250$
D. $80 \leq x \leq 250$

TEST NAME: **2016-2017 ALG1 BM2**

TEST ID: **64100**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. An amusement park charges $17 for each adult ticket and $6 for each child ticket. One day, the park earned $3,640 in ticket sales. Let *x* represent the number of adult tickets sold. Let *y* represent the number of child tickets sold. If 400 tickets were sold on this day, which system of equations can be used to find the number of each type of ticket sold?

A. $x + y = 400$
$6x + 17y = 3{,}640$

B. $x + y = 400$
$17x + 6y = 3{,}640$

C. $x + y = 3{,}640$
$6x + 17y = 400$

D. $x + y = 3{,}640$
$17x + 6y = 400$

2. $$\begin{cases} x \geq 0 \\ y \leq 8 \\ y \geq x \\ y \geq -\frac{1}{2}x + 6 \end{cases}$$

Which table includes all the vertices of the feasibility region defined by the system shown above?

A.

x	*y*
6	0
4	4
8	8
0	8

B.

x	*y*
6	0
4	4
8	8
8	0

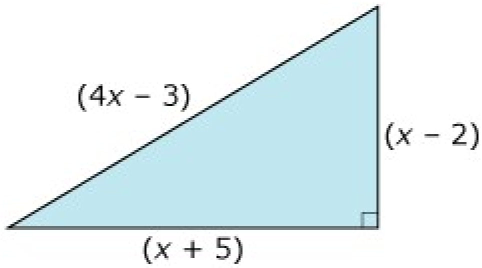
C.

x	*y*
0	6
4	4
8	8
0	8

D.

x	*y*
0	6
4	4
8	8
8	0

3.



Which expression represents the area of the triangle drawn above?

A. $x^2 - 10$

B. $4x^2 - \frac{11}{2}x + 3$

C. $2x^2 + \frac{17}{2}x - \frac{15}{2}$

D. $\frac{1}{2}x^2 + \frac{3}{2}x - 5$

4. What are the x-intercepts of the graph of $y = -3(x - 7)(x + 12)$?

A. –36 and 21

B. –21 and 37

C. –12 and 7

D. –7 and 12

5. What is $f(g(x))$ if $f(x) = x^3 - 8$ and $g(x) = -5x$?

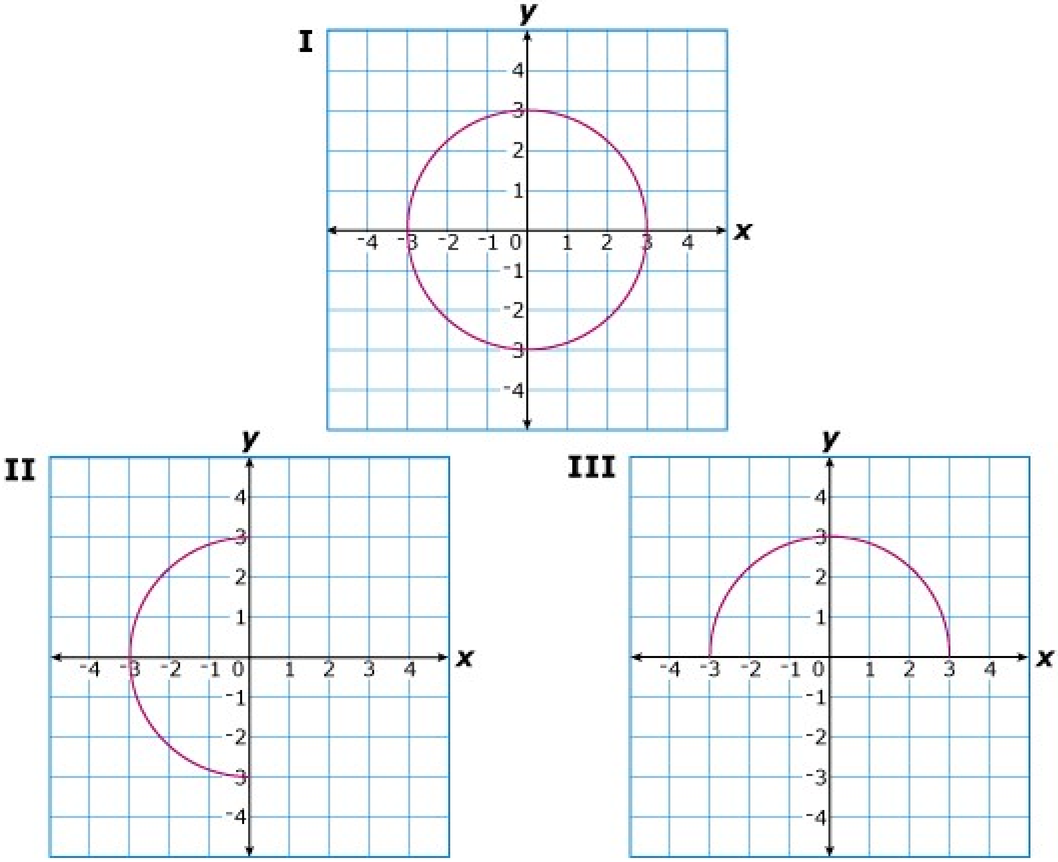
A. $-5x^3 - 8$

B. $-125x^3 - 8$

C. $125x^3 - 8$

D. $25x^3 - 8$

6.



Which graphs above represent a function of *x*?

A. I only

B. II only

C. III only

D. I, II, and III

7. Directions: Click on each number you want to select. You must select all correct numbers.

The domain of this function is given as $\{-2, 0, 1, 2, 3\}$.

$$f(x) = x^2 - 3x + 5$$

What numbers are in the range of the function?

1	**3**	**5**	**7**	**9**	**11**	**15**

8. What are the first 4 terms of a sequence defined by $a_n = 2n^2 - 2$?

A. –2, 0, 2, 4

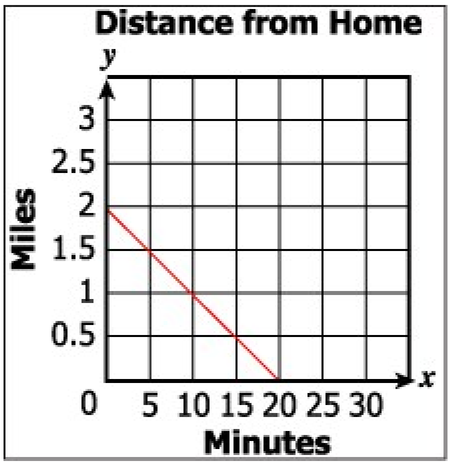
B. –2, 0, 6, 16

C. 0, 6, 16, 30

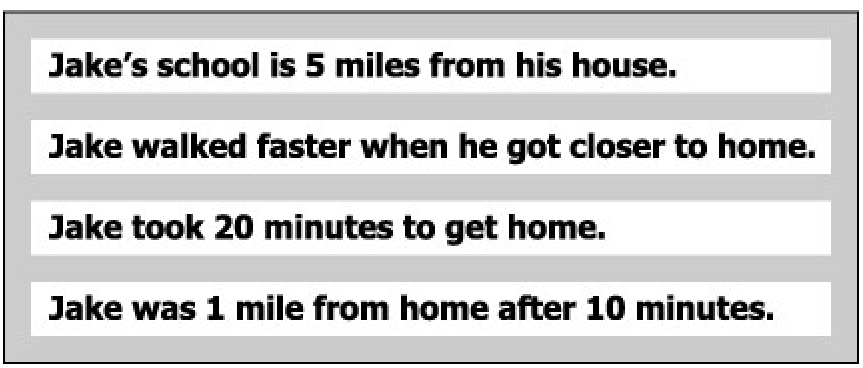
D. 2, 8, 18, 36

9. Directions: Click on each statement you want to select. You must select all correct statements.

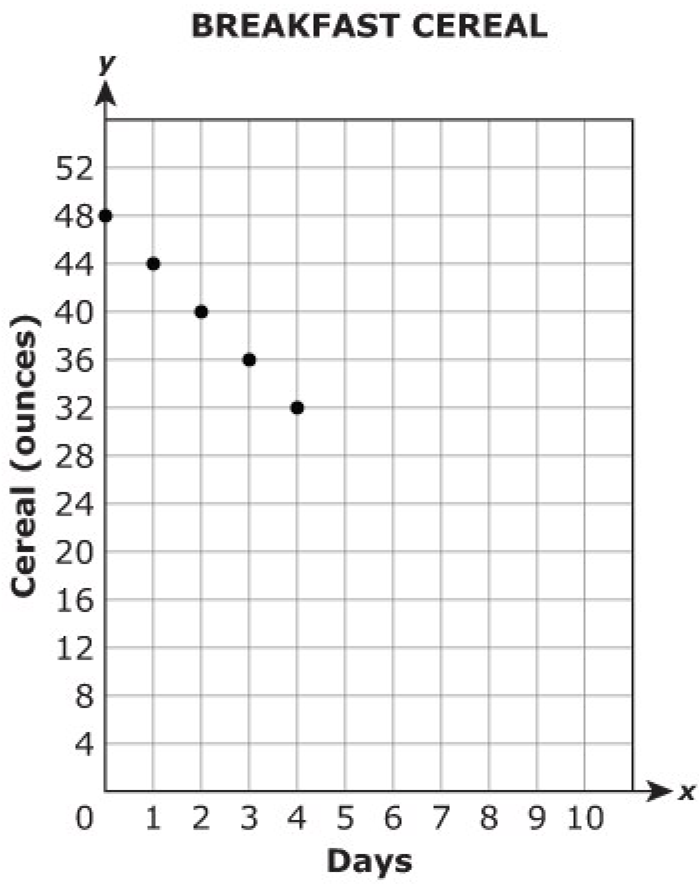
This graph represents *d*, Jake's distance from home in miles, *t* minutes after he left school.



Based on the information displayed in the graph, which statements are true?



10. Amy has a bowl of cereal for breakfast. The amount of cereal in the box *(y)* is determined by the number of days *(x)* that have passed since she purchased the cereal. The graph below shows that this relationship is a linear function:



Consider an appropriate domain for this situation. What would be the greatest value for this domain?

11. The table below records the median salary at United Construction over a period of 4 years.

Year	Salary
2009	$35,000
2010	$36,000
2011	$38,000
2012	$40,000
2013	$43,000

What is the average annual increase in the median salary from 2009 to 2013?

A. $2,000

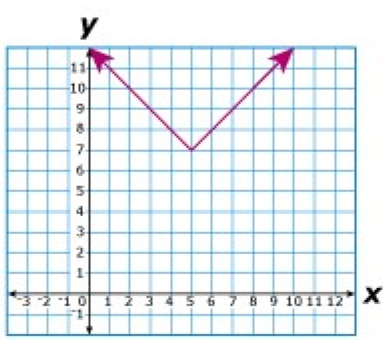
B. $8,000

C. $38,000

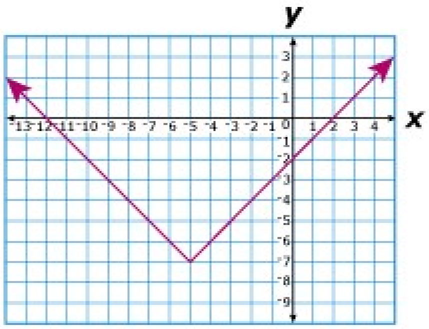
D. $38,400

12. Which graph best represents $y + 7 = |x + 5|$?

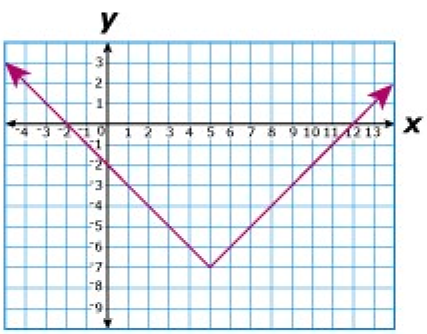
A.



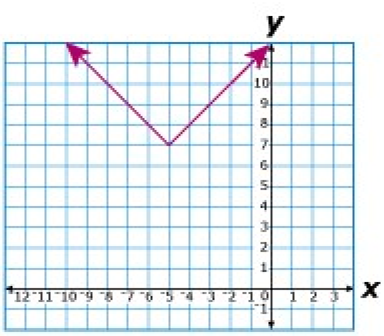
B.


y
x
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
4
3
2
1
-1
-2
-3
-4
-5
-6
-7
-8
-9

C.


y
x
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
3
2
1
-1
-2
-3
-4
-5
-6
-7
-8
-9

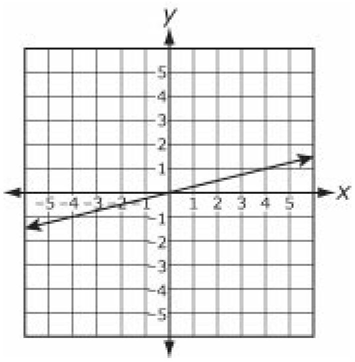
D.


y
x
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
-1
0
1
2
3
10
9
8
7
6
5
4
3
2
1
-1

13. **The graph of which linear function has the greatest slope?**

A. $f(x) = 3x + 2$

B.



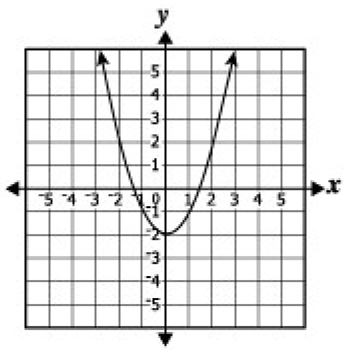
C.

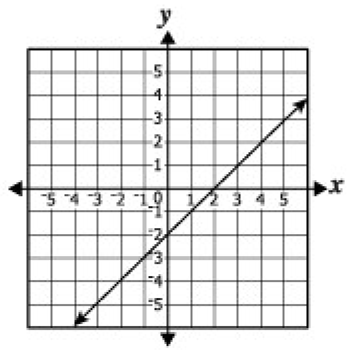
x	$f(x)$
−2	5
−1	6
0	7
1	8
2	9

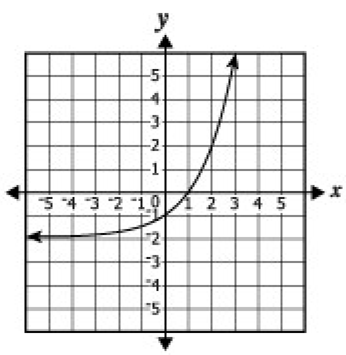
D. A linear function whose graph passes through the points $(0, 2)$ and $(1, 6)$.

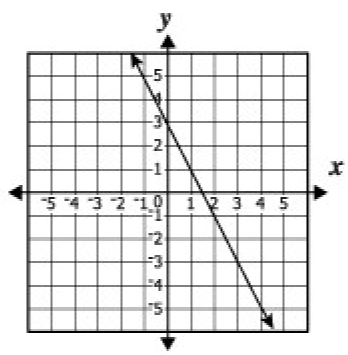
14. Click on the graphs you want to select.

Which graphs represent a quantity that changes at a constant rate per unit relative to another quantity?



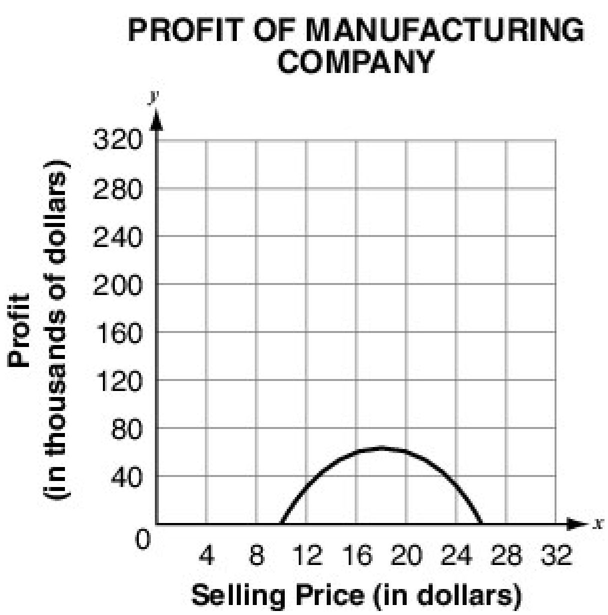




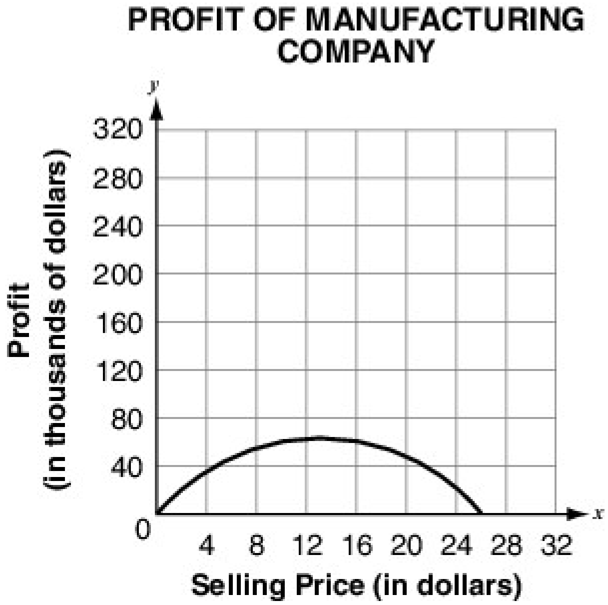


15. The total profit of a manufacturing company in thousands of dollars is modeled by the function $f(x) = -4x^2 + 144x - 1040$, where x represents the selling price of each product in dollars. Which graph best represents the total profit the company earns on different selling prices of its product?

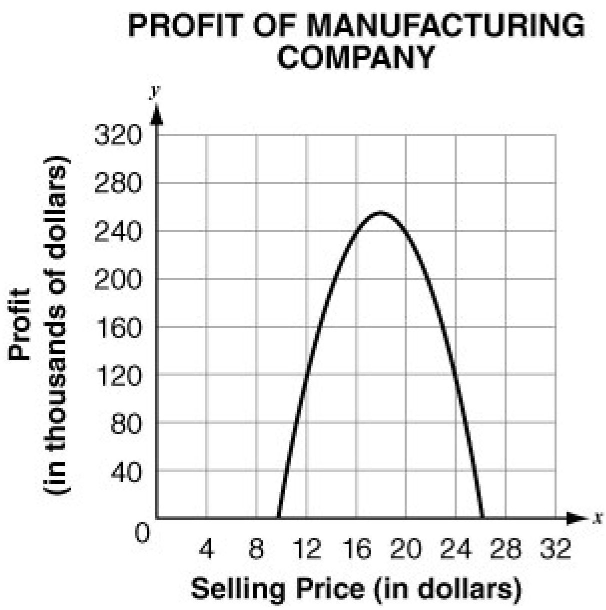
A.



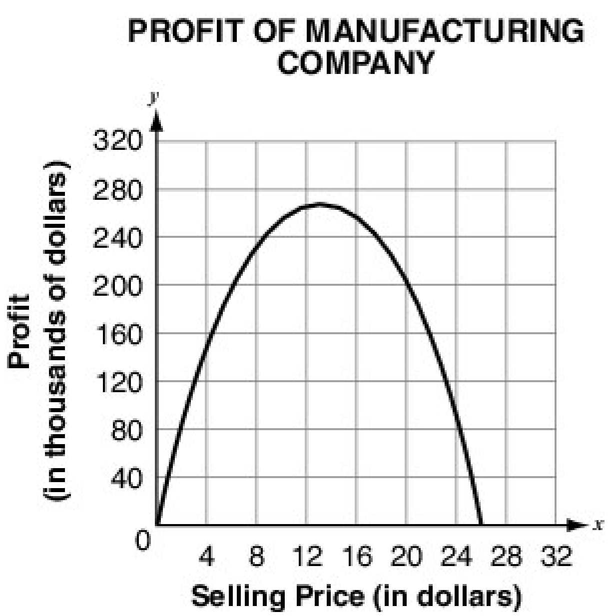
B.


PROFIT OF MANUFACTURING COMPANY
y
320
280
240
200
160
120
80
40
0
Profit (in thousands of dollars)
x
4 8 12 16 20 24 28 32
Selling Price (in dollars)

C.


PROFIT OF MANUFACTURING COMPANY
y
320
280
240
200
160
120
80
40
0
Profit (in thousands of dollars)
x
4 8 12 16 20 24 28 32
Selling Price (in dollars)

D.


PROFIT OF MANUFACTURING COMPANY
y
320
280
240
200
160
120
80
40
0
Profit (in thousands of dollars)
x
4 8 12 16 20 24 28 32
Selling Price (in dollars)

16. Robert is collecting books to donate to the library. The number of books he collects, *n,* is defined by $n = 14d + 21$, where d is the number of days he spends collecting books.

Based on this information, use the drop down choices to correctly complete each sentence.

The 14 in the equation represents 1 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day. (C) the number of books Robert started with.

The 21 in the equation represents 2 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day. (C) the number of books Robert started with.

17. What is the solution for the system of equations below?

$$\begin{cases} y = 4x + 20 \\ -x = 2y - 4 \end{cases}$$

A. $(-2, 12)$

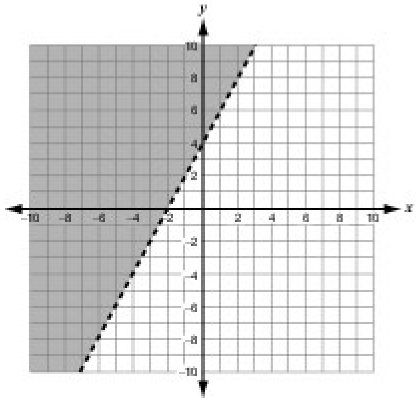
B. $(4, -4)$

C. $(-4, 4)$

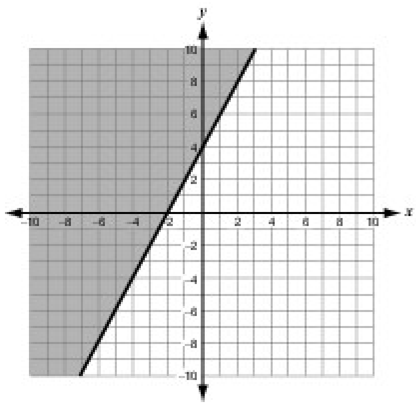
D. $(-8, -12)$

18. Which graph represents the solution of $y < 2x + 4$?

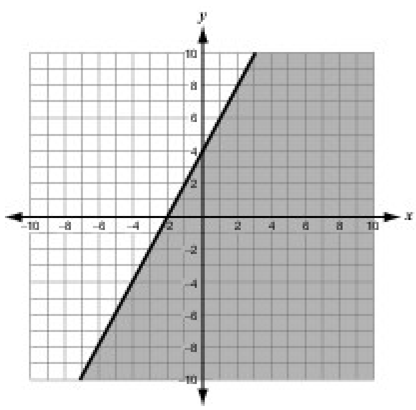
A.



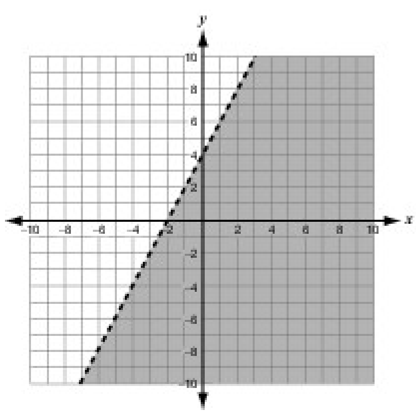
B.



C.



D.



19. Michael has a jar of dimes and nickels. There are 152 dimes and nickels in the jar that total \$11. If *d* represents the number of dimes and *n* represents the number of nickels, which system of equations below represents the situation?

A. $\begin{cases} d+n=11 \\ 0.05d+0.10n=152 \end{cases}$

B. $\begin{cases} d+n=11 \\ 0.10d+0.5n=152 \end{cases}$

C. $\begin{cases} d+n=152 \\ 0.05d+0.10n=11 \end{cases}$

D. $\begin{cases} d+n=152 \\ 0.10d+0.05n=11 \end{cases}$

20. One day an e-mail is sent to 7 people. That day each person who receives the e-mail sends the e-mail to two friends. Each friend who receives the e-mail sends it to two more people on the following day. Consider an expression used to determine the number of people who receive the e-ail on day *n,* if the pattern continues.

Parts of the expression are shown. Interpret the meaning of each part of the expresssion by dragging it to the appropriate box. (Not all parts will be used.)

Drag and drop parts of the expression into the appropriate boxes.

2	7	2^n
	$7(2^n)$	

Intital number of people who receive the e-mail

The factor by which the number of people who receive the e-mail increases each day

The number of people who recieve the e-mail on day *n,* where $n \geq 2$

TEST NAME: **2016-2017 ALG1 BM3**

TEST ID: **64116**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1.

Isaac is given the following equation:

$$26 = 4 + \frac{1}{2}(2x - 4)$$

His solution is represented by the table to the right:

Each step of work is listed in **Question Parts.**

Select the correct reason from the **Answer Choices.**

Work	Reason
1. $26 = 4 + \frac{1}{2}(2x - 4)$	1. Given
2. $22 = \frac{1}{2}(2x - 4)$	2.
3. $22 = x - 2$	3.
4. $24 = x$	4.
5. $x = 24$	5.

Questions

1. $26 = 4 + \frac{1}{2}(2x - 4)$

2. $22 = \frac{1}{2}(2x - 4)$

3. $22 = x - 2$

4. $24 = x$

5. $x = 24$

Answer Choices

A. Reflexive property of equality

B. Symmetric property of equality

C. Transitive property of equality

D. Addition/subtraction property of equality

E. Multiplication/division property of equality

F. Distributive property

G. Given

2. Which function has zeros at $-4, 2,$ and 0?

A. $f(x) = x^3 + 2x^2 - 8x$

B. $f(x) = x^3 - 2x^2 - 8x$

C. $f(x) = x^2 + 2x - 8$

D. $f(x) = x^2 - 2x - 8$

3. What are the solutions to the equation $(2x+1)^2 - (x+13) = 3x^2 - 2x + 2$?

Choose your answers from the drop down options.

x= 1 - (A) 1 (B) 2 (C) 3 (D) 4 (E) 5 (F) 6 (G) 7 (H) 8 (I) 9

x= 2 - (A) -1 (B) -2 (C) -3 (D) -4 (E) -5 (F) -6 (G) -7 (H) -8 (I) -9

4. Which algebraic expression is equivalent to $(b^2)^7$?

A. $b^2 \cdot b^7$

B. b^{2+7}

C. $\left((b^2)^5 \right)^2$

D. $(b^2)^5 \cdot (b^2)^2$

5. What are the solutions to the following equation?

$x^2 - 8x + 15$

A. $x = -5$ or $x = -3$

B. $x = -15$ or $x = -8$

C. $x = 3$ or $x = 5$

D. $x = 8$ or $x = 15$

6. On average, graduates of College A earn a salary of $25,000 plus $1,500 for every year after completing their degrees and pay $1,050 minus $100 for every year after completing their degrees to pay for their student loans.

Which function represents $y(t)$, the difference between the average salary graduates of College A earn and the average amount of money they pay for their student loans *t* years after completing their degrees?

A. $y(t) = 25{,}350t$

B. $y(t) = 25{,}000 + 350t$

C. $y(t) = 26{,}000 + 950t$

D. $y(t) = 23{,}950 + 1{,}600t$

7. **The graph of function $y = |x + 3|$ is translated up 4 units on a coordinate plane. Which equation describes the resulting graph?**

A. $y = |x + 7|$

B. $y = 4|x + 3|$

C. $y = |x + 3| - 4$

D. $y = |x + 3| + 4$

8. **Over which interval is the graph of the function $f(x) = -|x - 6| + 2$ increasing?**

A. $x < 6$

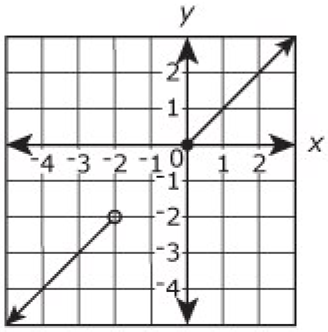
B. $x > 6$

C. $4 < x < 8$

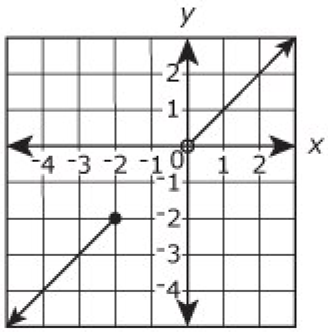
D. $6 < x < 8$

9. Which graph has a domain of $-2 < x \leq 0$?

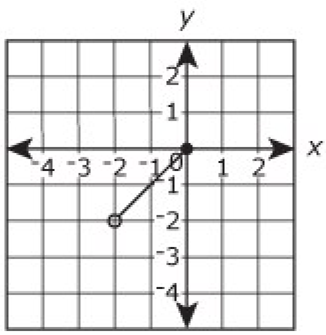
A.



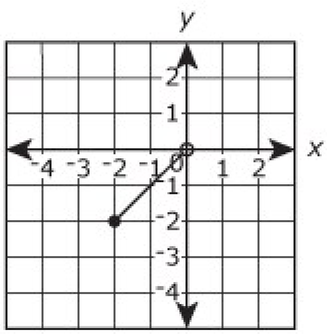
B.



C.



D.

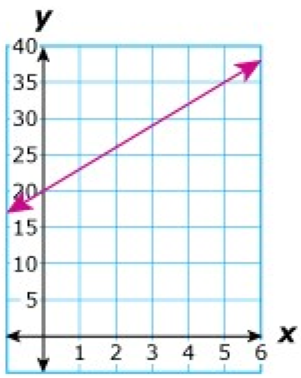


10. **The average rate of change of $f(x) = 3x^2 - x + 2$ over $[-2, x]$ is -4. What is the value of *x*?**

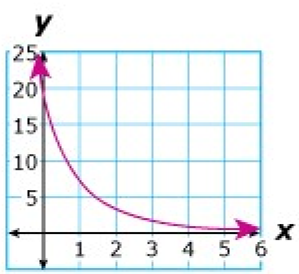
A. -6
B. -4
C. 1
D. 4

11. A particular bacteria triples its population each day. The population growth of 20 bacteria can be found using the equation $B = 20(3)^t$ where *B* is the number of bacteria and *t* is the time in days. Which of the following shows the graph of $B = 20(3)^t$?

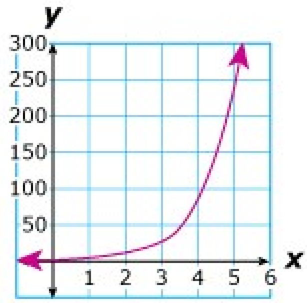
A.



B.

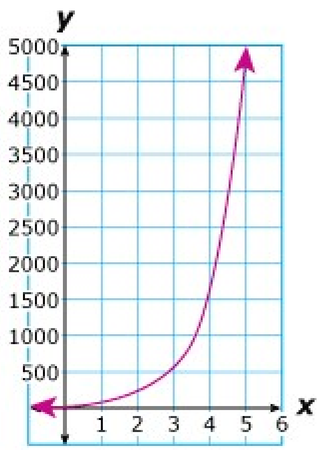


C.



y
300
250
200
150
100
50
x
1 2 3 4 5 6

D.



y
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
x
1 2 3 4 5 6

12. A grain silo is in the shape of a right circular cylinder with a hemisphere on top. The volume, V, of the silo is given by $V = \frac{2}{3}\pi r^3 + \pi r^2 h$, where r is the radius of the silo and h is the height of its cylindrical portion. Which of the following is an equivalent form of the volume function that can be used to find a silo's height when its volume and radius are known?

A. $h = \frac{V}{\pi r^2} - \frac{2}{3}r$

B. $h = \frac{V}{\pi r^2} - \frac{2}{3}\pi r^3$

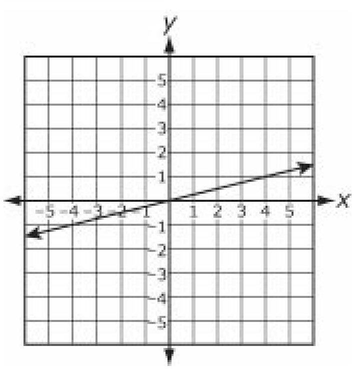
C. $h = \frac{\pi r^2}{V} - \frac{2}{3}r$

D. $h = \frac{\pi r^2}{V} - \frac{2}{3}\pi r^3$

13. **The graph of which linear function has the greatest slope?**

A. $f(x) = 3x + 2$

B.

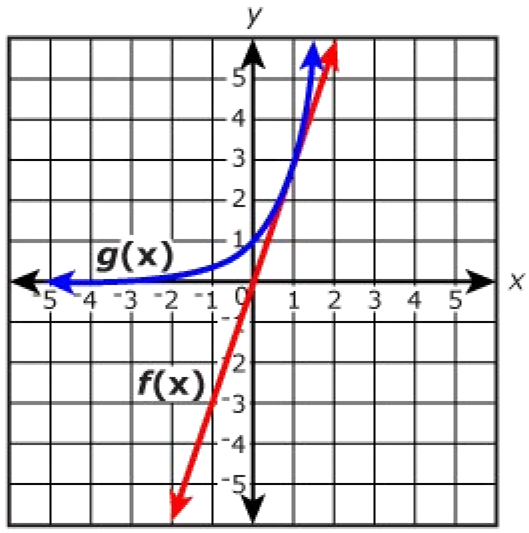


C.

x	$f(x)$
−2	5
−1	6
0	7
1	8
2	9

D. A linear function whose graph passes through the points $(0, 2)$ and $(1, 6)$.

14. The functions $f(x) = 3x$ and $g(x) = 3^x$ intersect at the point $(1, 3)$.



Which statement is true?

A. $f(x)$ and $g(x)$ increase at the same rate beginning at their intersection.

B. $f(x)$ increases at a slower rate beginning at their intersection.

C. $f(x)$ increases at a faster rate beginning at their intersection.

D. $f(x)$ increases at a slower rate until the functions intersect.

15. Directions: Click on all the numbers you want to select.

Which numbers, when added to 23, will result in an irrational number?

$\frac{5}{6}$	π	3.2	3^2	$\sqrt{4}$	$\sqrt{5}$	14

16. **Four times the larger of two consecutive even integers is ten less than the smaller. What is the larger of these two numbers?**

A. -6
B. -4
C. 4
D. 6

17. The table below provides the values of the functions $f(x)$ and $g(x)$ for several values of x.

x	$f(x)$	$g(x)$
−3	−1	12
−2	0	3
−1	1	1
0	5	0
1	9	−1
2	2	−3
3	0	−12

Which of the following is a solution to the equation $f(x) = g(x)$?

A. $x = -1$

B. $x = 0$

C. $x = 1$

D. $x = 2$

18. Simplify the expression.

$$(12s^4 - 6s^2 + 4s) + (6s^4 - 4s + 27) - (4s^4 + s^2 + 12)$$

A. $14s^4 - 9s^2 + 4s + 15$

B. $14s^4 - 5s^2 + 39$

C. $14s^4 - 7s^2 + 15$

D. $14s^4 - 6s^2 - 8s + 15$

19. Which method could **not** be used to solve the following equation?

$x^2 + 14x = 15$

A. Quadratic formula

B. Complete the square

C. Factor into a product of two linear factors

D. Take the square root of both sides of the equation

20. Below are three quadratic equations and three methods of solving quadratic equations.

Equations

$x^2 + 8x - 9 = 0$	$x^2 - 5x + 1 = 0$	$x^2 = 20$

Methods of Solving

Take the square root of both sides	Use the quadratic formula	Factor the left side of the equation

Which grouping correctly matches each equation with its **best** method of solving?

A.

$x^2 + 8x - 9 = 0$	Take the square root of both sides
$x^2 - 5x + 1 = 0$	Factor the left side of the equation
$x^2 = 20$	Use the quadratic formula

B.

$x^2 + 8x - 9 = 0$	Use the quadratic formula
$x^2 - 5x + 1 = 0$	Take the square root of both sides
$x^2 = 20$	Factor the left side of the equation

C.

$x^2 + 8x - 9 = 0$	Factor the left side of the equation
$x^2 - 5x + 1 = 0$	Use the quadratic formula
$x^2 = 20$	Take the square root of both sides

D.

$x^2 + 8x - 9 = 0$	Take the square root of both sides
$x^2 - 5x + 1 = 0$	Use the quadratic formula
$x^2 = 20$	Factor the left side of the equation

TEST NAME: **2016-2017 ALG1 BM4**

TEST ID: **64169**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. Which statement describes the graph of $f(x) = -(x+1)^2 + 4$?

   A. A minimum at $(-1, 4)$ and a zero at $(0, 3)$

   B. A maximum at $(-1, 4)$ and a zero at $(0, 3)$

   C. A minimum at $(-1, 4)$ and a zero at $(-3, 0)$

   D. A maximum at $(-1, 4)$ and a zero at $(-3, 0)$

2. What is the range of $f(x) = x^2 - 10x + 8$ if $0 \leq x \leq 5$?

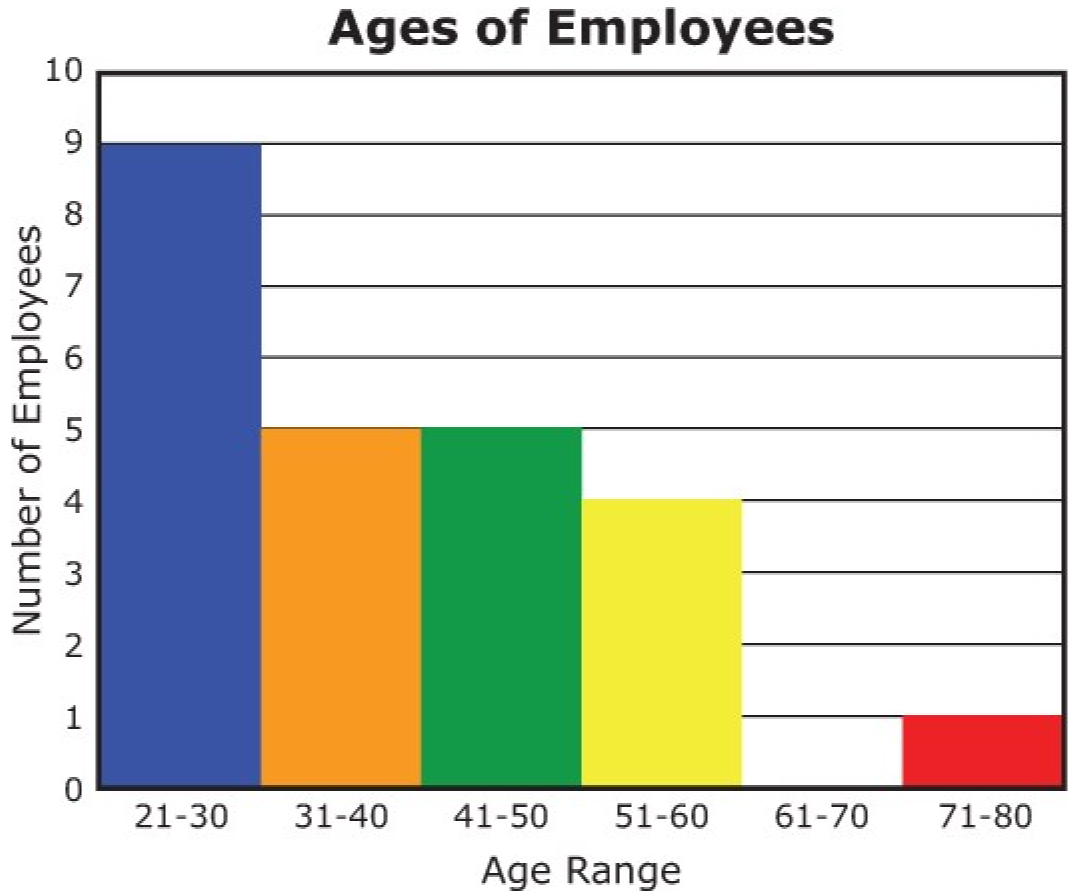
   A. $0 \leq y \leq 5$

   B. $0 \leq y \leq 8$

   C. $-17 \leq y \leq 8$

   D. $8 \leq y \leq 17$

3. The histogram below displays the ages of a company's employees.



The company hires 7 new employees. The ages of the new employees are 48, 51, 60, 61, 63, 70, and 71. What should the height of the bar for age range 61-70 be to represent the ages of the new employees?

A. 2

B. 3

C. 4

D. 5

4. What is the median for the following set of data?

{60, 68, 72, 79, 61, 62, 80, 83, 72, 74, 69, 80}

A. 71

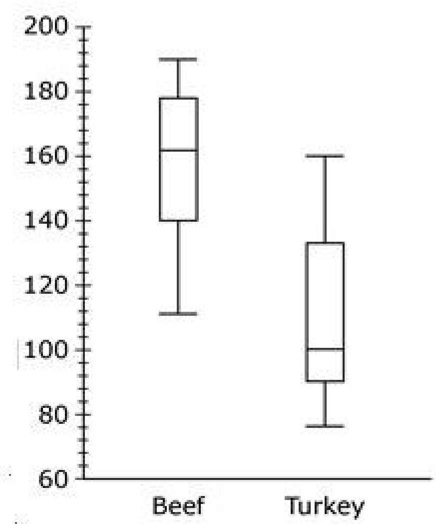
B. 72

C. 72.5

D. 73

5. The table and boxplots below shows summary statistics for two distributions of calories in 10 brands of beef hot dogs and 10 brands of turkey hot dogs

Value	Beef	Turkey
Minimum	111	76
Lower quartile	140	90
Median	162	100
Upper quartile	178	133
Maximum	190	160



Below are statements about the shape, center and spread of the distributions.

Select **all** that are true.

A. The beef distribution is skewed to the left.

B. The beef distribution is skewed to the right.

C. The turkey distribution is skewed to the left.

D. The turkey distribution is skewed to the right.

E. The median is higher for beef than for beef.

F. The median is higher for beef than for turkey.

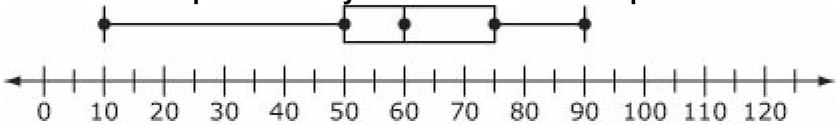
G. The spread is slightly more for beef.

H. The spread is slightly more for turkey.

I. The interquartile range for turkey is greater than the interquartile range for beef.

J. The interquartile range for turkey is less than the interquartile range for beef.

6. **A data set is represented by the box-and-whisker plot below.**



Between which two values does 50% of the data lie?

A. 10 and 120
B. 50 and 60
C. 50 and 75
D. 60 and 75

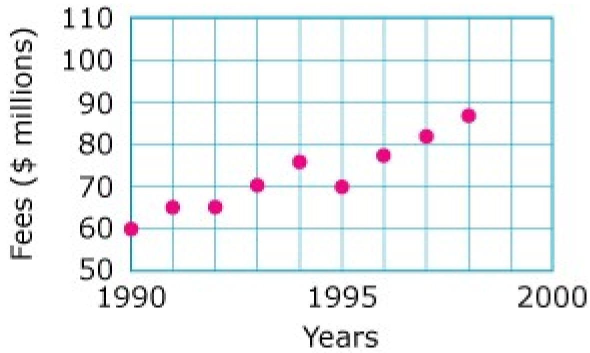
7. The table below shows the number of students in each grade at Lincoln High School and whether they attended a football game.

	Freshman	Sophomore	Junior	Senior
Attended	48	90	224	254
Did NOT Attend	182	141	36	8

Which of these statements can be concluded based on the table?

A. Of the students who did not attend the game, 8.0% are seniors.
B. Of the students who attended the game, 22.8% are juniors.
C. Of the students who attended the game, 46.9% are freshmen or sophomores.
D. Of the students who attended the game, 77.6% are juniors or seniors.

8. The scatter plot below shows the amount collected from automobile registration fees, in millions of dollars, for different years.



Based on a line of best fit for the data, when will registration fees most likely reach $105 million?

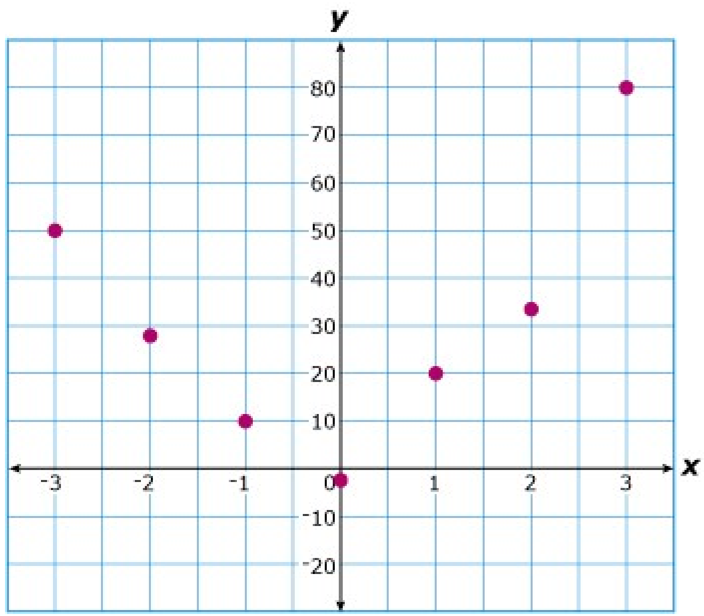
A. 2000

B. 2005

C. 2010

D. 2015

9.



x	*y*
-3	50
-2	28
-1	10
0	-2
1	20
2	33
3	80

Which quadratic regression equation best fits the scatter plot and table shown above?

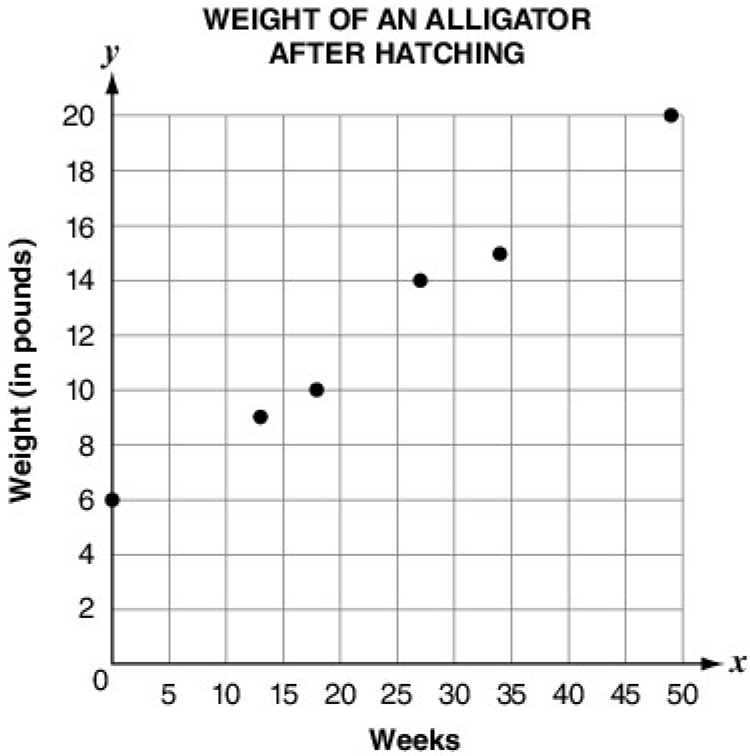
A. $y = 7x^2 + 4x + 4$

B. $y = 4x^2 - 3$

C. $y = 7x^2 + 16x - 2$

D. $y = 4x^2 + 4x - 2$

10. The scatter plot below shows how the weight of a baby alligator changed after hatching.



Which equation **best** represents the weight, *w,* of this alligator *n* weeks after hatching?

A. $w = 0.25n + 6$

B. $w = 0.65n + 6$

C. $w = 6n + 0.25$

D. $w = 6n + 0.65$

11. Click on the equations you want to select.

Jackie is solving this system of linear equations.

$3x + 2y = 20$

$4x - y = 30$

Which equations could be part of the process of solving this system?

$\mathbf{4}x + \mathbf{6}y = \mathbf{20}$

$\mathbf{12}x + \mathbf{8}y = \mathbf{80}$

$\mathbf{8}x - y = \mathbf{60}$

$\mathbf{8}x - \mathbf{2}y = \mathbf{60}$

12. What is the sum of the roots of the equation $2x^2 + 5x - 3 = 0$?

A. -3.5

B. -2.5

C. -1.5

D. 2.5

13. Find the equation that is equivalent to the quadratic equation shown.

$x^2 - 6x - 27 = 0$

A. $x(x - 3) = 27$

B. $(x - 6)^2 = 63$

C. $(x - 3)^2 = 36$

D. $(x - 3)^2 = 28$

14. The student council is selling cupcakes at the school play. The cost to make the cupcakes is a fixed \$75 plus \$0.17 per cupcake made. Each cupcake sells for \$2.00.

How many cupcakes must be sold to make a profit?

15. **Four times the larger of two consecutive even integers is ten less than the smaller. What is the larger of these two numbers?**

A. -6
B. -4
C. 4
D. 6

Read the passage - 'An Expression' - and answer the question below:

An Expression

An expression is shown.

$-3a(a - b - 5) + 4(-2a + 2b) + b(a + 3b - 7)$

16. Which expression is equivalent to the one shown?

A. $-11a^2 + 3b^2 - 2ab + 7a + b$
B. $-11a^2 + 3b^2 - 4ab + 7a + b$
C. $-3a^2 + 3b^2 - 2ab + 7a + b$
D. $-3a^2 + 3b^2 - 4ab + 7a + b$

---

17. Which expression is equivalent to $\frac{3x}{x-5} - \frac{2}{x+5} + \frac{4x-1}{x^2-25}$?

A. $\frac{3x^2+2x-1}{(x-5)(x+5)}$

B. $\frac{3x^2+2x+14}{(x-5)(x+5)}$

C. $\frac{3x^2+17x-16}{(x-5)(x+5)}$

D. $\frac{3x^2+17x+9}{(x-5)(x+5)}$

18. Choose the expressions that are equivalent to x^2+4x+3.

Select all that apply.

A. $(x+2)^2-1$

B. $(x+2)^2+1$

C. $(x-1)(x-3)$

D. $(x+1)\ (x+3)$

E. $(x-1)(x+4)$

19. Solve for x.

$$2x - 3 = \frac{x^2}{3}.$$

20. **Directions: Click on each factor you want to select. You must select all correct factors.**

Which expressions are factors of $9x^4 - 4y^4$?

$(3x + 2y)$	$(3x - 2y)$
$(3x^2 + 2y^2)$	$(3x^2 - 2y^2)$
$(9x^2 + 4y^2)$	$(9x^2 - 4y^2)$

Atlantic City High School

Modified Algebra 1 Curriculum

Mathematics Task Force Members

Don Coleman

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Donald Harris

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Lina Gil

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Modified Algebra 1 Pacing Guide

Date Range	Teachers have approximately 50 school days to complete the suggested sequences of Chapters from the board approved textbook which align with the curricular frameworks. Please refer to the frameworks for specific learning goals that must be covered in your lessons. ***Adjustments should be made accordingly for varying levels.***
9/6/16 – 9/16/16	Complete Modified Algebra 1 Pre-Test Benchmark
9/6/16 – 12/12/16	Unit 1: Chapters 1, 2, 3, 4, 5
12/6/16 – 12/12/16	Complete Modified Algebra 1 Unit 1 Benchmark 1
12/13/16 – 3/8/17	Unit 2: Chapters 6, 7, 8
3/1/17 – 3/8/17	Complete Modified Algebra 1 Unit 2 Benchmark 2
3/9/17 – 5/22/17	Unit 3: Chapters 9, 11
5/23/17 – 6/9/17	Complete Modified Algebra 1 Unit 3 Benchmark 3

All students must complete the pre-test and all 3 benchmarks on the edConnect website. (Benchmark tests are aligned to curricular frameworks, so teachers should be aware of the content of the benchmarks to ensure student success.)

Each teacher may decide to use Benchmark 3 as their final exam as in the past. However, it must be completed by all students (no exemptions from any benchmarks). A cumulative final exam is provided in the appendix of the curriculum for use by teachers that choose to use it.

Suggested Open Educational Resources are available in the Curricular Frameworks for each Unit, which can assist teachers and students with PARCC test preparation.

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 1 **Modeling with Linear Equations and Inequalities**	■ A.REI.A.1 ■ A.CED.A.2 ■ A.REI.D.10 □ S.ID.B.6 ■ S.ID.C.7 ■ S.ID.C.8 ■ S.ID.C.9 ■ A.REI.D.11 □ N.Q.A.1 □ N.Q.A.2 □ N.Q.A.3 ■ A.REI.B.3 ■ A.REI.A.1 ■ A.CED.A.4 ■ A.SSE.A.1 ■ A.CED.A.1	• Reason quantitatively and use units to solve problems • Solve [linear] equations and inequalities in one variable • Understand solving equations as a process of reasoning and explain the reasoning • Create equations that describe numbers or relationships • Interpret the structure of expressions • Represent and solve equations graphically • Summarize, represent, and interpret data on quantitative variables. • Interpret linear models	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 1: Suggested Open Educational Resources	N.Q.A.1 Runners' World N.Q.A.2 Giving Raises N.Q.A.3 Calories in a Sports Drink A.REI.B.3, A.REI.A.1 Reasoning with linear inequalities A.CED.A.4 Equations and Formulas A.SSE.A.1 Kitchen Floor Tiles A.CED.A.1 Planes and wheat A-CED.A.1 Paying the rent A.REI.A.1 Zero Product Property 1 A.CED.A.2 Clea on an Escalator S.ID.B.6,S.ID.C.7-9 Coffee and Crime		
Unit 2 **Modeling with Linear Functions, Linear Systems, & Exponential Functions**	○ A.REI.C.6 ■ A.CED.A.3 ○ A.REI.C.5 ■ A.REI.D.12 ■ F.IF.A.1 ■ F.IF.A.2 □ F.LE.A.1 □ F.LE.A.2 ■ F.IF.A.3 □ F.BF.A.1 ■ A.SSE.A.1 □ A.SSE.B.3 ■ F.IF.B.4 □ F.LE.B.5 ■ F.IF.B.5 ■ F.IF.B.6 □ F.IF.C.9 □ F.IF.C.7	• Solve linear systems of equations • Create equations that describe numbers or relationships • Interpret the structure of expressions • Represent and solve equations and inequalities graphically • Construct & compare linear & exponential models • Interpret expressions for functions in terms of the situation • Build a function that models a relationship between two quantities • Understand the concept of a function and use function notation • Interpret functions that arise in applications in terms of the context • Analyze functions using different representations	
Unit 2: Suggested Open Educational Resources	A.REI.C.6 Cash Box A.CED.A.3 Dimes and Quarters A.REI.C.5 Solving Two Equations in Two Unknowns A.REI.D.12 Fishing Adventures 3 F.IF.A.1 The Parking Lot F.IF.A.2 Yam in the Oven F.LE.A.1 Finding Linear and Exponential Models F.LE.A.2 Interesting Interest Rates F.BF.A.1a Skeleton Tower A.SSE.A.1 Mixing Candies F.IF.B.4 Warming and Cooling F.IF.B.4, F.IF.B.5 Average Cost F.LE.B.5 US Population 1982-1988 F.IF.B.6 Temperature Change F.IF.C.7b Bank Account Balance		

Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

Overview	Standards for Mathematical Content		Unit Focus	Standards for Mathematical Practice
Unit 3 **Quadratic Equations, Functions & Polynomials**	■ A.APR.A.1 ■ A.SSE.A.2 ■ A.REI.B.4 ■ A.CED.A.1 ■ F.IF.B.4* ■ F.IF.B.5* □ A.SSE.B.3 □ F.BF.A.1	□ F.IF.C.7* □ F.IF.C.8* □ F.IF.C.9* ■ F.IF.B.6 □ F.LE.A.3 ○ F.BF.B.3 ■ A.REI.D.11 □ A.APR.B.3 ○ N.RN.B.3	• Perform arithmetic operations on polynomials • Understand the relationship between zeros and factors • Interpret the structure of expressions • Solve equations and inequalities in one variable • Create equations that describe numbers or relationships • Interpret functions that arise in applications in terms of the context • Represent and solve equations and inequalities graphically • Build a function that models a relationship between two quantities • Construct & compare linear, quadratic, & exponential models • Build new functions from existing functions • Analyze functions using different representations • Use properties of rational and irrational numbers	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 3: Suggested Open Educational Resources	A.APR.A.1 Powers of 11 A.SSE.A.2 Equivalent Expressions A.REI.B.4 Visualizing Completing the Square A.REI.B.4 Braking Distance A.REI.B.4 Two Squares are Equal F.IF.B.4 Words – Tables - Graphs F.IF.B.5 The restaurant A.SSE.B.3 Profit of a company A.SSE.B.3 Rewriting a Quadratic Expression F.IF.C.7a Graphs of Quadratic Functions	F.IF.C.8a Springboard Dive F.IF.C.8a Which Function? F.IF.B.9 Throwing Baseballs F.IF.B.6 Mathemafish Population F.LE.A.3 Population and Food Supply F.BF.B.3 Identifying Even and Odd Functions F.BF.B.3 Transforming the graph of a function A.REI.D.11 Introduction to Polynomials – College Fund A.APR.B.3 Graphing from Factors 1 N.RN.B.3 Operations with Rational and Irrational Numbers		

Modified Algebra 1	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Teachers should create summative assessments in order to collect data and drive day to day instruction. For example, tests, quizzes and constructed response tasks.	*edConnect Department Wide Quarterly Benchmark Testing*
Focus Mathematical Concepts	
Prerequisite skills: Successfully Complete Secondary Geometry	

Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

District/School Tasks	District/School Primary and Supplementary Resources
Complete Benchmarking and constructed response tasks to prepare for PARCC testing.	*Pearson Textbook and Online Resources are available to all staff and students.*

Instructional Best Practices and Exemplars
Teachers should differentiate instruction, create lessons and integrate technology into the classroom whenever possible.

Unit 1 Modified Algebra 1			
Content & Practice Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
◘ N.Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays. ◘ N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling. ◘ N.Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concept(s): • Units are associated with variables in expressions and equations in context. • Quantities may be used to model attributes of real world situations. • Measurement tools have an inherent amount of uncertainty in measurement. Students are able to: • use units to understand real world problems. • use units to guide the solution of multi-step real world problems (e.g. dimensional analysis). • choose and interpret units while using formulas to solve problems. • identify and define appropriate quantities for descriptive modeling. • choose a level of accuracy when reporting measurement quantities. Learning Goal 1: Solve multi-step problems, using units to guide the solution, interpreting units consistently in formulas and choosing an appropriate level of accuracy on measurement quantities. Develop descriptive models by defining appropriate quantities.	2-5 CB 2-5 2-6 2-7 2-10 4-4 4-5 5-2 5-7 6-4 9-5 9-6 12-2 12-3 12-4

Key: ■ Major Clusters | ◘ Supporting | ◎ Additional Clusters | * Benchmarked Standard

■ A.REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters. ■ A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. ■ A.CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law V = IR to highlight resistance R.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s). • Literal equations can be rearranged using the properties of equality. Students are able to. • solve linear equations with coefficients represented by letters in one variable. • use the properties of equality to justify steps in solving linear equations. • solve linear inequalities in one variable. • rearrange linear formulas and literal equations, isolating a specific variable. Learning Goal 2. Solve linear equations and inequalities in one variable (including literal equations); justify each step in the process.	2-1 2-2 2-3 2-4 2-5 2-7 2-8 3-2 3-3 3-4 3-5 3-6 9-3 9-5
■ A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context. A.SSE.A.1a. Interpret parts of an expression, such as terms, factors, and coefficients.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively.	Concept(s): No new concept(s) introduced Students are able to: • identify different parts of an expression, including terms, factors and constants. • explain the meaning of parts of an expression in context. Learning Goal 3: Interpret terms, factors, coefficients, and other parts of expressions in terms of a context .	1-1 1-2 3-7 4-5 4-7 5-3 5-4 7-6 7-7 7-8 8-7 8-8 9-1 9-2 9-5 9-6

Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

■ A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions. ■ A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Equations and inequalities describe relationships. • Equations can represent real-world and mathematical problems. Students are able to: • identify and describe relationships between quantities in word problems. • create linear equations in one variable. • create linear inequalities in one variable. • use equations and inequalities to solve real world problems. • explain each step in the solution process. Learning Goal 4: Create linear equations and inequalities in one variable and use them in contextual situations to solve problems. Justify each step in the process and the solution.	1-8 2-1 2-2 2-3 2-4 2-5 2-7 2-8 3-2 3-3 3-4 3-6 3-7 3-8 9-3 9-4 9-5 9-6 11-5
■ A.CED.A.2. Create equations in two or more variables to represent relationships between quantities; Graph equations on coordinate axes with labels and scales. □ N.Q.A.1. Use units as a way to understand problems and to guide the solution of multi-step problems; Choose and interpret units consistently in formulas; Choose and interpret the scale and the origin in graphs and data displays. ■ A.REI.D.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line). [Focus on linear equations.]	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Equations represent quantitative relationships. Students are able to: • create linear equations in two variables, including those from a context. • select appropriate scales for constructing a graph. • interpret the origin in graphs. • graph equations on coordinate axes, including labels and scales. • identify and describe the solutions in the graph of an equation. Learning Goal 5: Create linear equations in two variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	1-9 2-5 CB 2-5 2-6 2-7 4-2 4-3 4-4 4-5 5-2 5-3 5-4 5-5 5-7 7-6 7-7 9-1 9-2 CB 9-4 10-5 11-6 11-7 CB 11-7 12-2 12-4

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S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.B.6a. Fit a function to the data (including the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. S.ID.B.6c. Fit a linear function for a scatter plot that suggests a linear association. S.ID.C.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data. S.ID.C.8. Compute (using technology) and interpret the correlation coefficient of a linear fit. S.ID.C.9. Distinguish between correlation and causation.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Scatter plots represent the relationship between two variables. • Scatter plots can be used to determine the nature of the association between the variables. • Linear models may be developed by fitting a linear function to approximately linear data. • The correlation coefficient represents the strength of a linear association. Students are able to: • distinguish linear models representing approximately linear data from linear. equations representing "perfectly" linear relationships. • create a scatter plot and sketch a line of best fit. • fit a linear function to data using technology. • solve problems using prediction equations. • interpret the slope and the intercepts of the linear model in context. • determine the correlation coefficient for the linear model using technology. • determine the direction and strength of the linear association between two variables. Learning Goal 6: Represent data on a scatter plot, describe how the variables are related and use technology to fit a function to data. Learning Goal 7: Interpret the slope, intercept, and correlation coefficient of a data set of a linear model; distinguish between correlation and causation.	5-7 CB 5-7 9-7 CB 9-7 CB 12-5
A.REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically.	Concept(s): • $y = f(x)$, $y=g(x)$ represent a system of equations. • Systems of equations can be solved graphically (8.EE.C.8). Students are able to: • explain the relationship between the x-coordinate of a point of intersection and the solution to the equation $f(x) = g(x)$ for linear equations $y = f(x)$ and $y = g(x)$.	CB 4-4 CB 6-1 7-6 9-8

Key: Major Clusters \| Supporting \| Additional Clusters \| * Benchmarked Standard

value, exponential, and logarithmic functions.* [Focus on linear equations.]		• find approximate solutions to the system by making a table of values, graphing, and finding successive approximations. Learning Goal 8: Explain why the solutions of the equation f(x) = g(x) are the x-coordinates of the points where the graphs of the linear equations y=f(x) and y=g(x) intersect. ** function notation is not introduced here Learning Goal 9: Find approximate solutions of f(x) = g(x), where f(x) and g(x) are linear functions, by making a table of values, using technology to graph and finding successive approximations.	

Unit 2 Modified Algebra 1

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. A.CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*. A.REI.C.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics.	Concept(s): • Systems of equations can be solved exactly (algebraically) and approximately (graphically). Students are able to: • identify and define variables representing essential features for the model. • model real world situations by creating a system of linear equations. • solve systems of linear equations using the elimination or substitution method. • solve systems of linear equations by graphing. • interpret the solution(s) in context. Learning Goal 1: Solve multistep contextual problems by identifying variables, writing equations, and solving systems of linear equations in two variables algebraically and graphically.	6-1 6-2 6-3 6-4 6-5 6-6 CB 6-6 9-8
A.REI.D.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • model real world situations by creating a system of linear inequalities given a context. • interpret the solution(s) in context.	6-5 6-6 CB 6-6 9-8

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Unit 2 Modified Algebra 1

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
the intersection of the corresponding half-planes. ■ A.CED.A.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods*.		Learning Goal 2: Graph linear inequalities and systems of linear inequalities in two variables and explain that the solution to the system.	
■ F.IF.A.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then f(x) denotes the output of f corresponding to the input x. The graph of f is the graph of the equation y = f(x). ■ F.IF.A.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • F(x) is an element in the range and x is an element in the domain. Students are able to: • use the definition of a function to determine whether a relationship is a function. • use function notation once a relation is determined to be a function. • evaluate functions for given inputs in the domain. • explain statements involving function notation in the context of the problem. Learning Goal 3: Explain the definition of a function, including the relationship between the domain and range. Use function notation, evaluate functions and interpret statements in context.	4-6
□ F.LE.A.1. Distinguish between situations that can be modeled with linear functions and with exponential functions. F.LE.A.1a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals. F.LE.A.1b. Recognize situations in which one quantity changes at a	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • Linear functions grow by equal differences over equal intervals. • Exponential functions grow by equal factors over equal intervals. Students are able to: • identify and describe situations in which one quantity changes at a constant rate. • identify and describe situations in which a quantity grows or decays by a constant percent.	5-1 7-7 9-7

Key: ■ Major Clusters | □ Supporting | ◎ Additional Clusters | * Benchmarked Standard

Unit 2 Modified Algebra 1

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
constant rate per unit interval relative to another. F.LE.A.1c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.		• show that linear functions grow by equal differences over equal intervals. • show that exponential functions grow by equal factors over equal intervals. Learning Goal 4: Distinguish between and explain situations modeled with linear functions and with exponential functions.	
F.LE.A.2. Construct linear and exponential functions - including arithmetic and geometric sequences - given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). *[Algebra 1 limitation: exponential expressions with integer exponents] F.IF.A.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. *For example, the Fibonacci sequence is defined recursively by* $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ *for* $n \geq 1$.	MP 2 Reason abstractly and quantitatively. MP 4. Model with mathematics MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Sequences are functions, sometimes defined and represented recursively. • Sequences are functions whose domain is a subset of integers. Students are able to: • create arithmetic and geometric sequences from verbal descriptions. • create arithmetic sequences from linear functions. • create geometric sequences from exponential functions. • identify recursively defined sequences as functions. • create linear and exponential functions given – a graph; – a description of a relationship; – a table of values. Learning Goal 5: Write linear and exponential functions given a graph, table of values, or written description; construct arithmetic and geometric sequences.	4-7 5-3 5-4 5-5 7-6 7-8 9-7
F.BF.A.1. Write a function that describes a relationship between two quantities. 1a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics	Concept(s): No new concept(s) introduced Students are able to: • given a context, write an explicit expressions, a recursive process or steps for calculation for linear and exponential relationships. • interpret parts of linear and exponential functions in context.	1-1 1-2 1-7 3-7 4-5 4-7 5-3 5-4

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

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■ A.SSE.A.1. Interpret expressions that represent a quantity in terms of its context A.SSE.A.1a: Interpret parts of an expression, such as terms, factors, and coefficients. A.SSE.A.1b: Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.* *[Algebra 1 limitation: exponential expressions with integer exponents]		Learning Goal 6: Write explicit expressions, recursive processes and steps for calculation from a context that describes a linear or exponential relationship between two quantities.	5-5 7-7 7-8 8-5 8-6 8-7 8-8 9-1 9-2 9-5 9-6
□ A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. A.SSE.B.3c. Use the properties of exponents to transform expressions for exponential functions. *For example the expression 1.15^t can be rewritten as $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* *[Algebra 1: limit to exponential expressions with integer exponents]	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure	Concept(s): No new concept(s) introduced Students are able to: • use the properties of exponents to simplify or expand exponential expressions, recognizing these are equivalent forms. Learning Goal 7: Use properties of exponents to produce equivalent forms of exponential expressions in one variable.	7-7 9-4 9-5
■ F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums;*	MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • given a verbal description of a relationship, sketch linear and exponential functions. • identify intercepts and intervals where the function is positive/negative. • interpret parameters in context. • determine the *practical* domain of a function. Learning Goal 8: Sketch graphs of linear and exponential functions expressed	4-2 4-3 4-4 5-3 5-4 5-5 5-7 7-6 7-7 9-1 9-2

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Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
symmetries; end behavior; and periodicity. *[Focus on exponential functions] ◻ F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context. ■ F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function*		symbolically or from a verbal description. Show key features and interpret parameters in context.	9-7 11-6 11-7
◻ F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*. *[Limit to linear and exponential] ■ F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Rate of change of non-linear functions varies. *Students are able to:* • compare key features of two linear functions represented in different ways. • compare key features of two exponential functions represented in different ways. • calculate the rate of change from a table of values or from a function presented symbolically. • estimate the rate of change from a graph. Learning Goal 9: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). Learning Goal 10: Calculate and interpret the average rate of change of a function presented symbolically or as a table; estimate the rate of change from a graph.	5-1 5-5 7-6 9-2 CB 9-2
◻ F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Piecewise-defined functions may contain discontinuities.	5-3 5-4 5-5 5-8

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
and using technology for more complicated cases. F.IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima. F.IF.C.7b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.		• Absolute value functions are piecewise functions. Students are able to: • graph linear, square root, cube root, and piecewise-defined functions. • graph more complicated cases of functions using technology. • identify and describe key features of the graphs of square root, cube root, and piecewise-defined functions . Learning Goal 11: Graph linear, square root, cube root, and piecewise-defined functions (including step and absolute value functions) expressed symbolically. Graph by hand in simple cases and using technology in more complex cases, showing key features of the graph.	CB 5-8 7-6 7-7 9-1 9-2 10-5

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
■ A.APR.A.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials. ■ A.SSE.A.2. Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): • Polynomials form a system analogous to the integers. • Polynomials are closed under the operations of addition, subtraction, and multiplication. Students are able to: • add and subtract polynomials. • multiply polynomials. • recognize numerical expressions as a difference of squares and rewrite the expression as the product of sums/differences. • recognize polynomial expressions in one variable as a difference of squares and rewrite the expression as the product of sums/differences.	5-3 5-4 5-5 8-7 8-8 8-1 8-2 8-3 8-4

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
		Learning Goal 1: Add, subtract, and multiply polynomials, relating these to arithmetic operations with integers. Factor to produce equivalent forms of quadratic expressions in one variable.	
■ A.REI.B.4. Solve quadratic equations in one variable. A.REI.B.4a. Use the method of completing the square to transform any quadratic equation in x into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form. A.REI.B.4b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Multiple methods for solving quadratic equations. • Transforming a quadratic equation into the form $(x - p)^2 = q$ yields an equation having the same solutions. Students are able to: • use the method of completing the square to transform a quadratic equation in x into an equation of the form $(x - p)^2 = q$. • derive the quadratic formula from $(x - p)^2 = q$. • solve a quadratic equations in one variable by inspection. • solve quadratic equations in one variable by taking square roots. • solve a quadratic equations in one variable by completing the square. • solve a quadratic equations in one variable using the quadratic formula. • solve a quadratic equations in one variable by factoring. • strategically select, as appropriate to the initial form of the equation, a method for solving a quadratic equation in one variable. • write complex solutions of the quadratic formula in $a \pm bi$ form.	9-3 9-4 9-5 9-6

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
		• analyze the quadratic formula, recognizing the conditions leading to complex solutions (discriminant). Learning Goal 2: Derive the quadratic formula by completing the square and recognize when there are no real solutions. Learning Goal 3: Solve quadratic equations in one variable using a variety of methods (including inspection, taking square roots, factoring, completing the square, and the quadratic formula) and write complex solutions in $a \pm bi$ form.	
■ A.CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear functions and quadratic functions, and simple rational and exponential functions.	MP 2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • create quadratic equations in one variable. • use quadratic equations to solve real world problems. Learning Goal 4: Create quadratic equations in one variable and use them to solve problems.	1-8 2-1 2-2 2-3 2-4 2-5 2-7 2-8 3-2 3-3 3-4 3-6 3-7 3-8 9-3 9-4 9-5 9-6 11-5
■ F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the*	MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • interpret maximum/minimum and intercepts of quadratic functions from graphs and tables in the context of the problem. • sketch graphs of quadratic functions given a verbal description of the relationship between the quantities.	4-2 4-3 4-4 5-3 5-4 5-5 7-6 7-7 9-1

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Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ■ F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function*		• identify intercepts and intervals where function is increasing/decreasing • determine the practical domain of a function. Learning Goal 5: Interpret key features of quadratic functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a quadratic function, showing key features and relating the domain of the function to its graph.	9-2 9-7 11-6 11-7
□ A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression. A.SSE.B.3a. Factor a quadratic expression to reveal the zeros of the function it defines. A.SSE.B.3b. Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concept(s): • Alternate, equivalent forms of a quadratic expression may reveal specific attributes of the function that it defines. Students are able to: • factor a quadratic expression for the purpose of revealing the zeros of a function. • complete the square for the purpose of revealing the maximum or minimum of a function. Learning Goal 6: Use factoring and completing the square to produce equivalent forms of quadratic expressions in one variable that highlight particular properties such as the zeros or the maximum or minimum value of the function.	9-4 9-5
□ F.BF.A.1. Write a function that describes a relationship between two quantities. F.BF.A.1a: Determine an explicit expression, a recursive process, or steps for calculation from a context.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concept(s): No new concept(s) introduced Students are able to: • given a context, write explicit expressions, a recursive process or steps for calculation for quadratic relationships. Learning Goal 7: Given a context, write an explicit expression, a recursive process or steps for calculation for quadratic relationships.	4-7 5-3 5-4 5-5 7-7 7-8 9-2

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Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 1 Common Core Textbook Chapters
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7a. Graph linear and quadratic functions and show intercepts, maxima, and minima. *[emphasize quadratic functions] F.IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. F.IF.C.8a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum*.	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): No new concept(s) introduced Students are able to: • graph quadratic functions expressed symbolically. • graph more complicated cases of quadratic functions using technology. • identify and describe key features of the graphs of quadratic functions. • given two quadratic functions, each represented in a different way, compare the properties of the functions. Learning Goal 8: Graph quadratic functions by hand in simple cases and with technology in complex cases, showing intercepts, extreme values and symmetry of the graph. Compare properties of two quadratic functions, each represented in a different way.	5-3 5-4 5-5 5-8 7-6 7-7 9-1 9-2 9-4 9-5
F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph. F.LE.A.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity	MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • A quantity increasing exponentially eventually exceeds a quantity increasing quadratically. Students are able to: • calculate the rate of change of a quadratic function from a table of values or from a function presented symbolically. • estimate the rate of change from a graph of a quadratic function.	5-1 CB 9-2 9-7

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increasing linearly, quadratically, or (more generally) as a polynomial function.		• analyze graphs and tables to compare rates of change of exponential and quadratic functions. Learning Goal 9: Calculate and interpret the average rate of change of a quadratic function presented symbolically or as a table. Estimate and compare the rates of change from graphs of quadratic and exponential functions.	
F.BF.B.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\ f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Characteristics of even and odd functions in graphs and algebraic expressions • Vertical and horizontal shifts Students are able to: • perform transformations on graphs of linear and quadratic functions. • identify the effect on the graph of replacing f(x) by – $f(x) + k$; – $k\ f(x)$; – $f(kx)$; – *and* $f(x + k)$ for specific values of k (both positive and negative). • identify the effect on the graph of combinations of transformations. • given the graph, find the value of k. • illustrate an explanation of the effects on linear and quadratic graphs using technology. • recognize even and odd functions from their graphs and from algebraic expressions for them. Learning Goal 10: Identify the effects of transformations and combinations of transformations [$f(x) + k$, $k\ f(x)$, $f(kx)$, and $f(x + k)$] on a function; find the value of k given the graph.	5-3 CB 5-3 5-4 5-8 7-7 9-1 9-2
A.REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	Concept(s): No new concept(s) introduced Students are able to: • approximate the solution(x) to a system of equations comprised of a linear and a quadratic	CB 4-4 CB 6-1 7-6 9-8

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solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*		function by using technology to graph the functions, by making a table of values and/or by finding successive approximations. Learning Goal 11: Find approximate solutions of f(x) = g(x), where f(x) is a linear function and g(x) is a quadratic function by making a table of values, using technology to graph and finding successive approximations.	
A.APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial. *[Algebra 1: limit to quadratic and cubic functions in which linear and quadratic factors are available]	MP.7 Look for and make use of structure.	Concept(s): • General shape(s) and end behavior of cubic functions Students are able to: • find the zeros of a polynomial (quadratic and cubic). • test domain intervals to determine where f(x) is greater than or less than zero. • use zeros of a function to sketch a graph. Learning Goal 12: Identify zeros of cubic functions when suitable factorizations are available and use the zeros to construct a rough graph of the function. (*cubic functions are presented as the product of a linear and a quadratic factor)	9-3 CB 9-3
N.RN.B.3. Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • The sum or product of two rational numbers is rational. • The sum of a rational number and an irrational number is irrational. • The product of a nonzero rational number and an irrational number is irrational. Students are able to: • explain and justify conclusions regarding sums and products of two rational numbers.. • explain and justify conclusions regarding the sum of a rational and irrational number. • explain and justify conclusions regarding the product of a nonzero rational and irrational number.	CB 1-6

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Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
		Learning Goal 13: Explain and justify conclusions about sums and products of rational and irrational numbers.	

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Atlantic City High School

Algebra 1 Unit
Modified Benchmarks

Mathematics Task Force Members

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TEST NAME: **2016-2017 ALG1 BM1 SPED**

TEST ID: **65439**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. Which algebraic expression represents the phrase below?

   "one-third of the difference of *y* and 5"

   A. $3(y-5)$

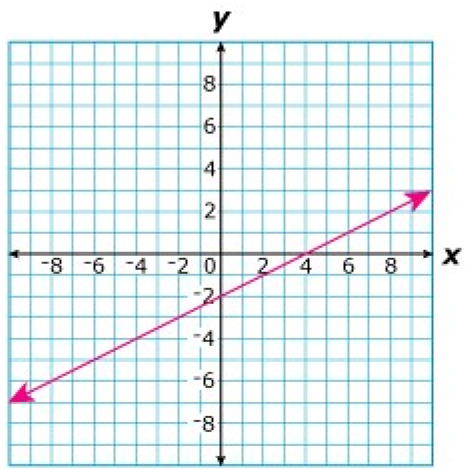
   B. $\frac{y-5}{3}$

   C. $y-\frac{5}{3}$

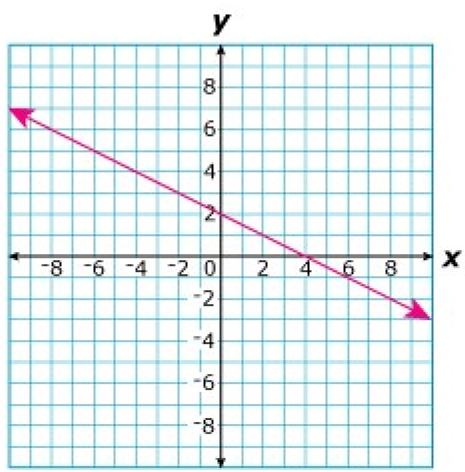
2. Which graph best represents the following equation? *(slope-intercept form y=mx+b)*

$$\frac{1}{2}x - y = 2$$

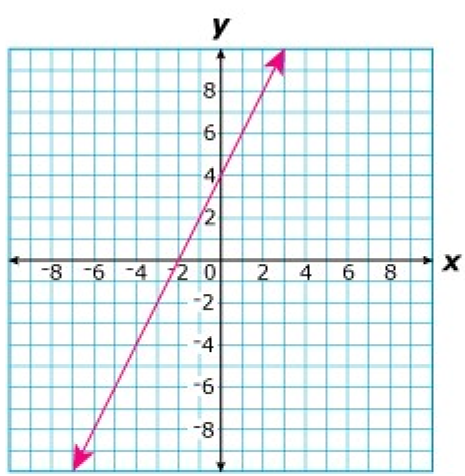
A.



B.



C.



3. What is the slope-intercept form of $-x + 3y = 21$?

A. $y = \frac{22}{3}x$

B. $y = 3x + 7$

C. $y = \frac{1}{3}x + 7$

4. The steps used to solve the equation $x - 2(2x - 5) = 8$ are shown below.

Step 1: $x - 2(2x) + 2(-5) = 8$
Step 2: $x - 4x - 10 = 8$
Step 3: $-3x - 10 = 8$
Step 4: $-3x - 10 + 10 = 8 + 10$
Step 5: $-3x = 18$
Step 6: $-3x \div (-3) = 18 \div (-3)$
Step 7: $x = -6$

Which property is **incorrectly** used?

A. distributive property

B. addition property of equality

C. subtraction property of equality

5. What is the solution of the inequality $-2(2x + 3) + 2 \leq -x + 5$?

A. $x \leq -3$

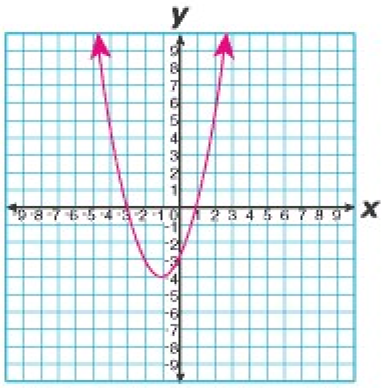
B. $x \geq -3$

C. $x \geq 3$

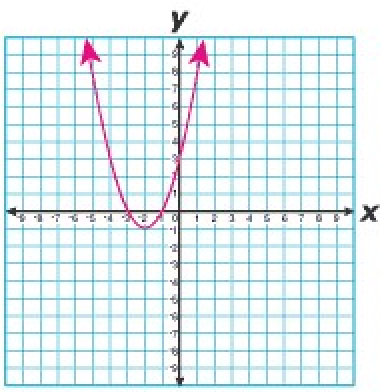
6. Which graph could be used to find the solution set for the following equation? *(Factor then set x=0)*

$x^2 - 4x + 3 = 0$

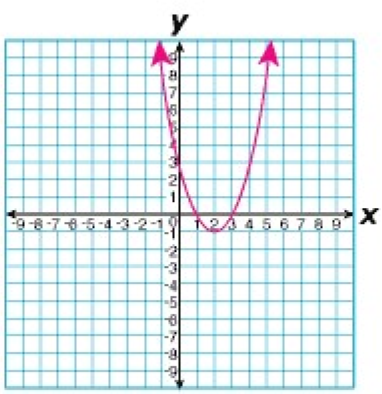
A.



B.



C.



7. What is the greatest common monomial factor of the following polynomial *(GCF)*?

$12a^4b^3 + 18a^5b^2 - 24a^2b$

A. $4a^2b$

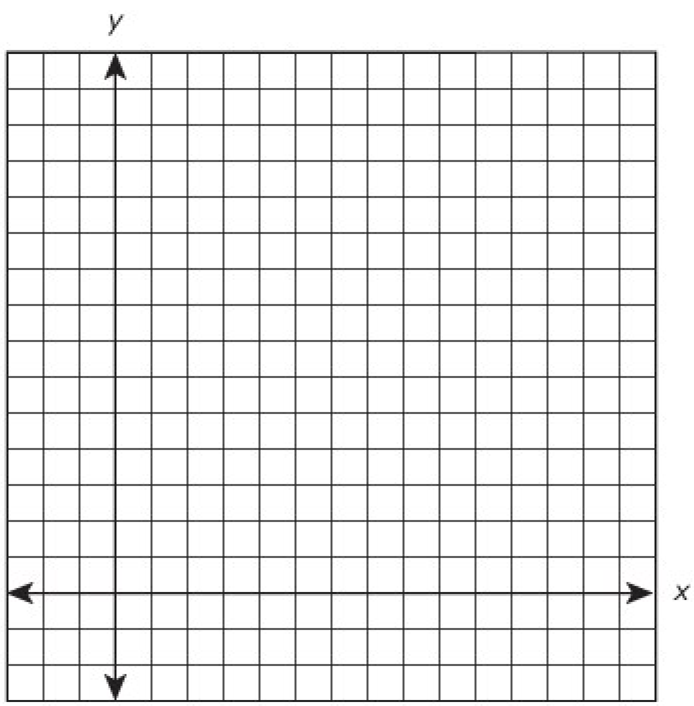
B. $3a^2b^2$

C. $6a^2b$

8. Sophie began draining the 48 gallons of water from her fish tank at 9:00 a.m. At 9:06, 32 gallons of water remained in the tank. The water drained at a constant rate until the tank was empty.

Part A

Use the coordinate plane to graph the amount of water in the tank as Sophie drained it. Label the axes.



Part B

How many minutes did it take the tank to empty? Justify your answer.

Part C

At what rate, in gallons per hour, did the water drain? Justify your answer.

9. **Kim is on a 300 mile road trip. She is traveling at a constant rate that will get her to her destination in exactly 6 hours. At this rate, how many miles will Kim travel in 90 minutes *(proportion: miles/ minute)*?**

A. 50 miles

B. 75 miles

C. 90 miles

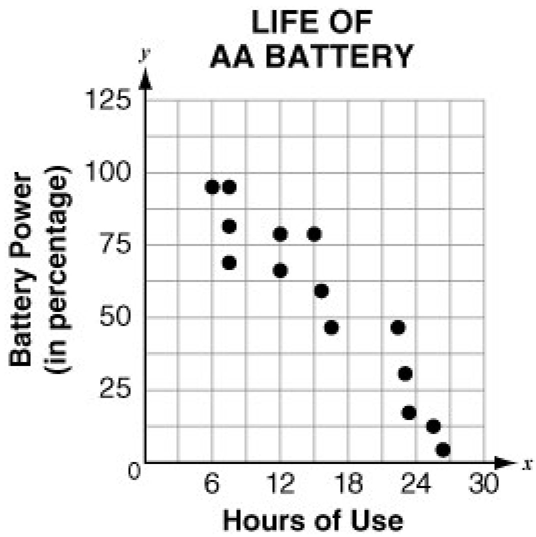
10. John leaves his house for the local community center. He walks a distance of 3 miles from his house in 45 minutes before stopping at a store to pick up a bottle of water. From there, he walks to the community center, which is 5 miles away from the store, in 1 hour. What is John's approximate average speed, **in miles per minute,** for the entire time he is walking *(miles/total minutes)*?

A. 0.067

B. 0.076

C. 0.083

11. The life of a AA battery can be predicted by the number of hours of use. As the number of hours of use increases, the remaining battery power decreases. The linear association is demonstrated in the scatter plot below.



If Tyler used 20% of the battery power in his AA battery, for approximately how many hours has he used the battery?

A. 6 hours

B. 27 hours

C. 40 hours

12. The scatter plot below shows the amount collected from automobile registration fees, in millions of dollars, for different years.

Based on a line of best fit for the data, when will registration fees most likely reach $105 million?

A. 2000

B. 2005

C. 2010

13. As a part of a science experiment, Gary makes a small hole in the bottom of a bottle full of water. He records the amount of water left in the bottle at the end of each minute. He repeats this experiment several times and uses the data to develop the linear model $w = -50m + 1200,$ which describes the amount of water remaining in the water bottle, in w milliliters, after m minutes. Which statement is a correct interpretation of this linear model?

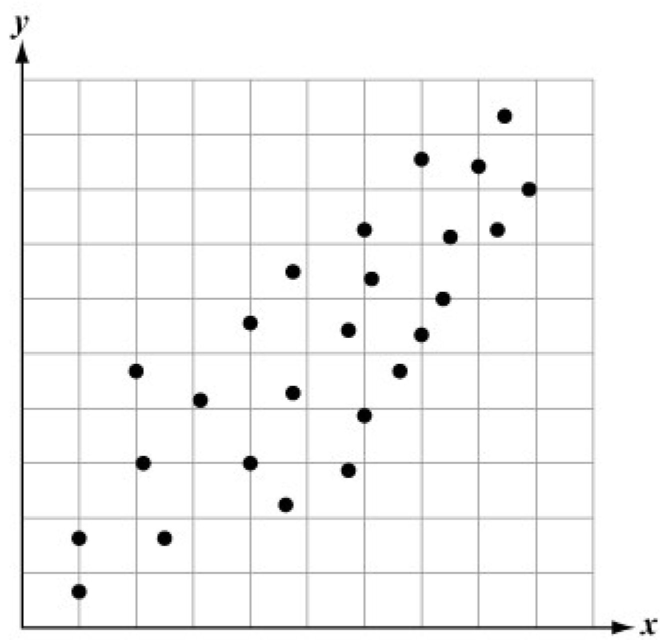
A. The water bottle holds 1,200 milliliters of water and loses 50 milliliters per minute.

B. The water bottle starts with 1,200 milliliters of water and ends with 24 milliliters of water.

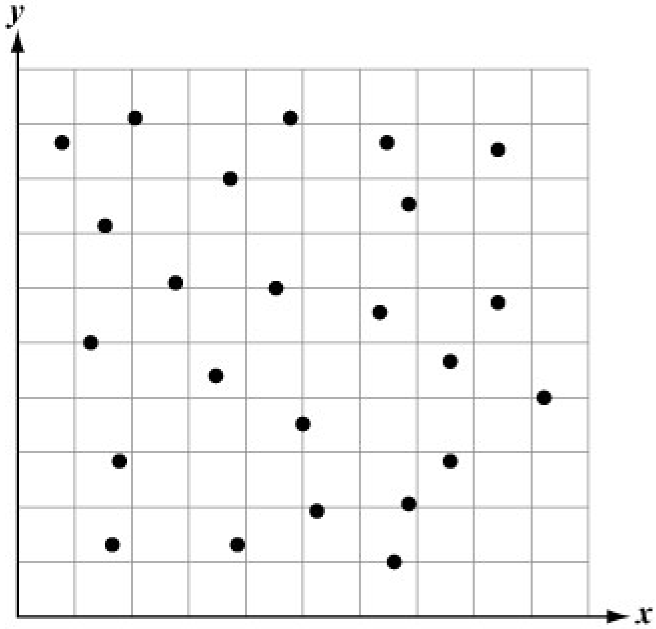
C. The water bottle holds 1,200 milliliters of water and loses 1 milliliter of water every 50 minutes.

14. Which scatter plot would have a correlation coefficient with the highest value *(negative correlation)*?

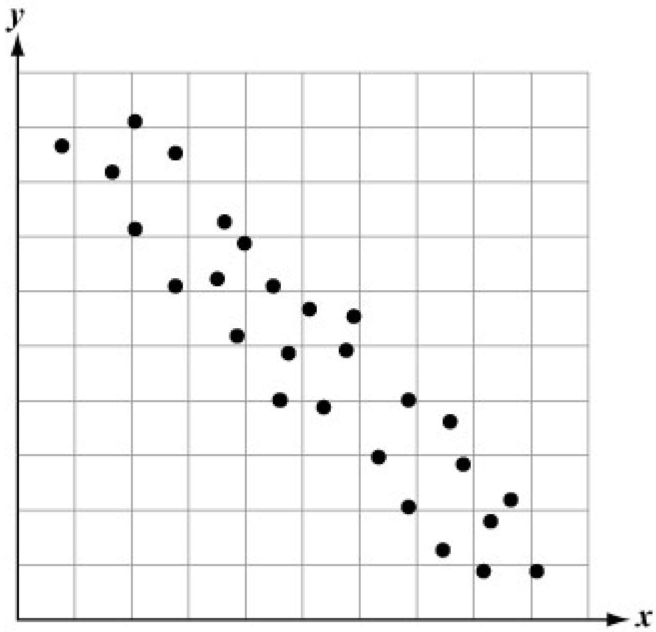
A.



B.



C.



15. Which of these is the **best** example of correlation but NOT causation?

A. the time of year and the toy sales of a department store

B. the amount of food an animal eats daily and the height of the animal

C. the number of fruits placed in a grocery basket and the weight of the basket

16. Miguel and Jacob started a rock collection on the same day.

- Miguel started with 10 rocks and each day thereafter he added 2 rocks. Each of these rocks was separately added sometime during the day.

- Jacob started his collection with 1 rock and each day thereafter he added 4 rocks. Each of these rocks was separately added sometime during the day.

The table shows the number of rocks each boy had in their collection at the end of each day.

Number of Rocks in Collections

Day	Miguel	Jacob
0	10	1
1	12	5
2	14	9
3	16	13
4	18	17
5	20	21
6	22	25

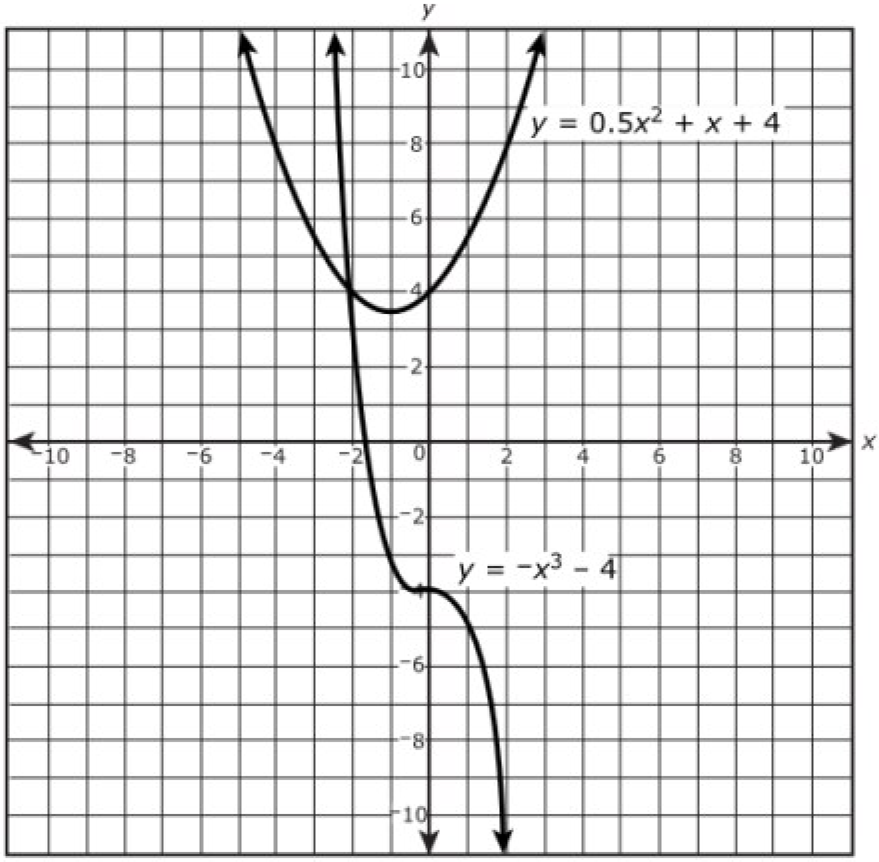
Based on the information in the table, which statement describes a time when Miguel and Jacob could possibly have the same number of rocks in each of their collections?

A. Miguel and Jacob have the same number of rocks at the end of day 4.

B. Miguel and Jacob have the same number of rocks sometime during day 4.

C. Miguel and Jacob have the same number of rocks sometime during day 5.

17. The graph of $f(x) = -x^3 - 4$ and $g(x) = 0.5x^2 + x + 4$ are given.

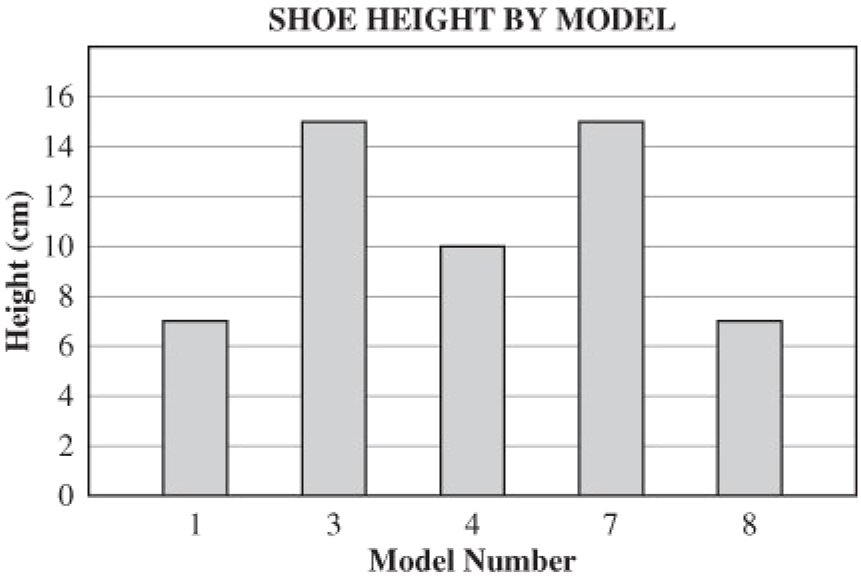


Use the graphs to find the solution to the equation $-x^3 - 4 = 0.5x^2 + x + 4.$

Enter your answer in the box *(where do they cross the x axis)*

Answer: x= ________

18. The bar graph below shows the height (in centimeters) of several models of shoes.



Which set of numbers is the domain of the function *(x values)*?

A. {7, 10, 15}

B. {1, 3, 4, 7, 8}

C. {1, 2, 3, 4, 5, 6, 7, 8}

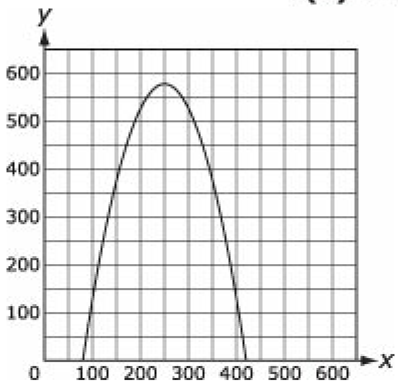
19. **What is the real zero of the graph of $f(x) = x^3 + x^2 + 2x + 2$?**

A. -2

B. -1

C. 0

20. **Consider the graph of $f(x) = -0.02(x - 80)(x - 420)$ shown below.**



Within the first quadrant, over which interval is $f(x)$ increasing?

A. $0 < x < 250$

B. $0 \leq x \leq 250$

C. $80 < x < 250$

TEST NAME: **2016-2017 ALG1 BM2 SPED**
TEST ID: **65578**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. An amusement park charges $17 for each adult ticket and $6 for each child ticket. One day, the park earned $3,640 in ticket sales. Let *x* represent the number of adult tickets sold. Let *y* represent the number of child tickets sold. If 400 tickets were sold on this day, which system of equations can be used to find the number of each type of ticket sold?

A. $x + y = 400$
$17x + 6y = 3{,}640$

B. $x + y = 3{,}640$
$6x + 17y = 400$

C. $x + y = 3{,}640$
$17x + 6y = 400$

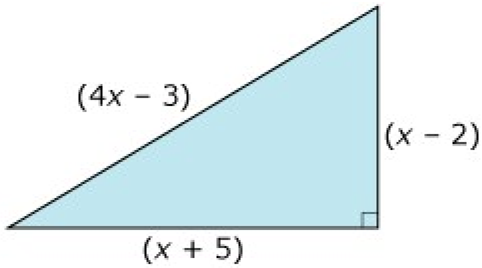
2. **Tickets to a museum cost $7.50 for children and $12 for adults. One Saturday, the museum collected $2,655 and 300 people attended. Which system of equations can be used to solve for the number of children's tickets (*c*) and the number of adults' tickets (*a*) sold by the museum that day?**

A. $a + c = 300$
$12a + 7.50c = 2{,}655$

B. $a + c = 2{,}655$
$12a + 7.50c = 300$

C. $a + c = 2{,}655$
$7.50a + 12c = 300$

3.



Which expression represents the area of the triangle drawn above ? *(A=1/2bh)*

A. $4x^2 - \frac{11}{2}x + 3$

B. $2x^2 + \frac{17}{2}x - \frac{15}{2}$

C. $\frac{1}{2}x^2 + \frac{3}{2}x - 5$

4. What are the x-intercepts of the graph of $y = -3(x - 7)(x + 12)$? *(set x=0)*

A. –36 and 21

B. –21 and 37

C. –12 and 7

5. What is $f(g(x))$ if $f(x) = x^3 - 8$ and $g(x) = -5x$?

A. $-5x^3 - 8$

B. $-125x^3 - 8$

C. $25x^3 - 8$

6. Which of these relations represents a function?

A. $\{(1, 2), (3, 4), (5, 4)\}$

B. $\{(1, 2), (1, 4), (1, 5)\}$

C. $\{(1, 2), (0, 0), (0, 3)\}$

7. Directions: Click on each number you want to select. You must select all correct numbers.

The domain of this function is given as $\{-2, 0, 1, 2, 3\}$.

$$f(x) = x^2 - 3x + 5$$

What numbers are in the range of the function? *(use the values for x to find f(x))*

1	**3**	**5**	**7**	**9**	**11**	**15**

8. Look at the pattern shown below.

2, 4, 16, 256 ...

What is $f(n+1)$ in terms of $f(n)$, where *n* represents the position of a term in this pattern?

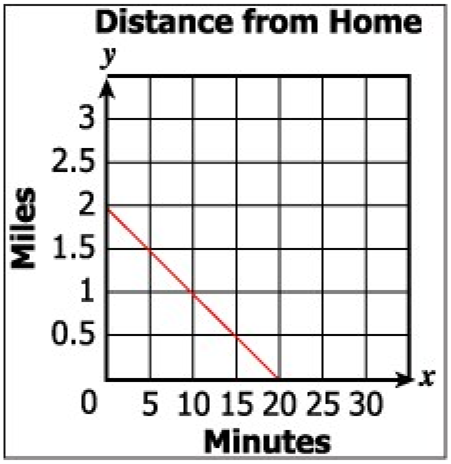
A. $(f(n))^2$

B. $2(f(n))$

C. $2(f(n)-1)$

9. Directions: Click on each statement you want to select. You must select all correct statements.

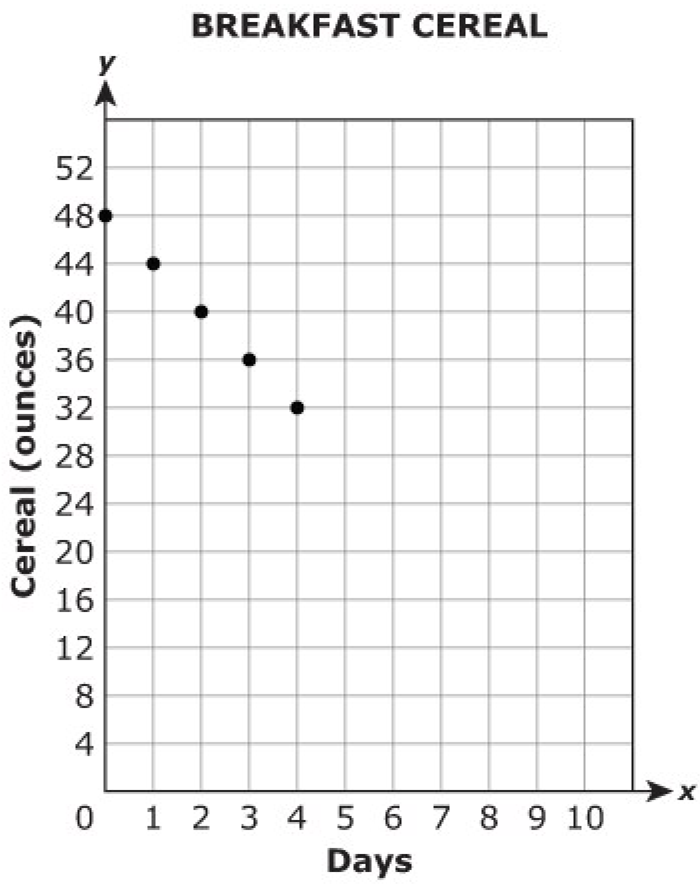
This graph represents *d*, Jake's distance from home in miles, *t* minutes after he left school.



Based on the information displayed in the graph, which statements are true?

- **Jake's school is 5 miles from his house.**
- **Jake walked faster when he got closer to home.**
- **Jake took 20 minutes to get home.**
- **Jake was 1 mile from home after 10 minutes.**

10. Amy has a bowl of cereal for breakfast. The amount of cereal in the box *(y)* is determined by the number of days *(x)* that have passed since she purchased the cereal. The graph below shows that this relationship is a linear function:



Consider an appropriate domain *(x value)* for this situation. What would be the greatest value for this domain?

11. The table below records the median salary at United Construction over a period of 4 years.

Year	Salary
2009	$35,000
2010	$36,000
2011	$38,000
2012	$40,000
2013	$43,000

What is the average annual increase in the median salary from 2009 to 2013? *(add salary increases, divide by 4)*

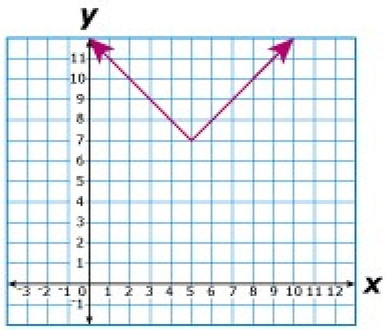
A. $2,000

B. $8,000

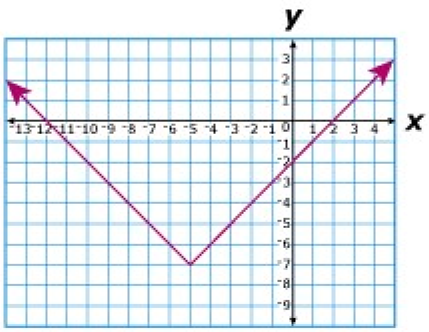
C. $38,400

12. Which graph best represents *y* + 7 = |*x* + 5|? *(solve for y)*

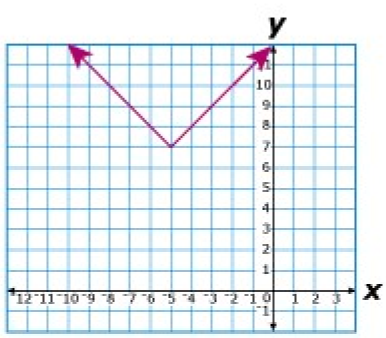
A.



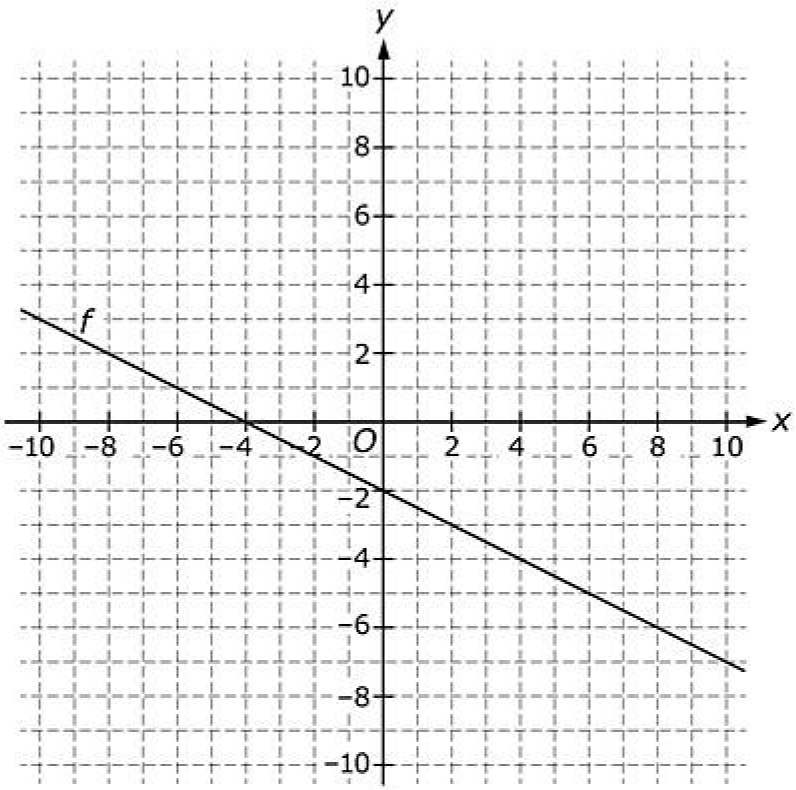
B.



C.



13. The graph of the function *f* is shown in the coordinate plane below.



A table listing some of the values of the linear function *g* is shown below.

x	$g(x)$
0	9
1	6
2	3
3	0

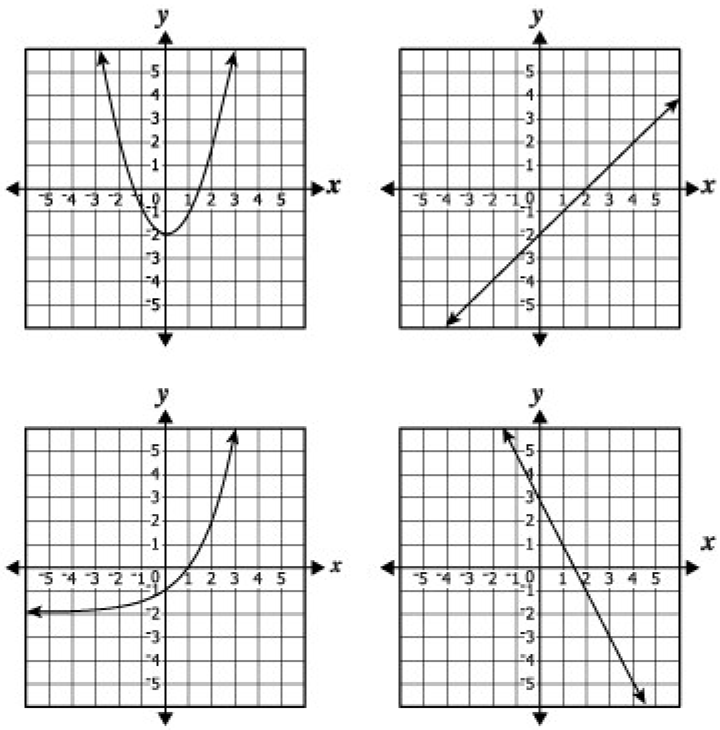
Which of the two functions has the greater absolute value of the rate of change?

Explain your answer.

Answer on a separate sheet.

14. Click on the graphs you want to select.

Which graphs represent a quantity that changes at a constant rate per unit relative to another quantity?



15. The total profit of a manufacturing company in thousands of dollars is modeled by the function $f(x) = -4x^2 + 144x - 1040$, where x represents the selling price of each product in dollars. Which graph best represents the total profit the company earns on different selling prices of its product? *(create a table)*

A.

PROFIT OF MANUFACTURING COMPANY

B.

PROFIT OF MANUFACTURING COMPANY

C.

PROFIT OF MANUFACTURING COMPANY

16. Robert is collecting books to donate to the library. The number of books he collects, *n,* is defined by $n=14d+21$, where d is the number of days he spends collecting books.

Based on this information, use the drop down choices to correctly complete each sentence.

The 14 in the equation represents 1 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day.

The 21 in the equation represents 2 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day. (C) the number of books Robert started with.

17. What is the solution for the system of equations below? *(use the substitution method)*

$$\begin{cases} y = 4x + 20 \\ -x = 2y - 4 \end{cases}$$

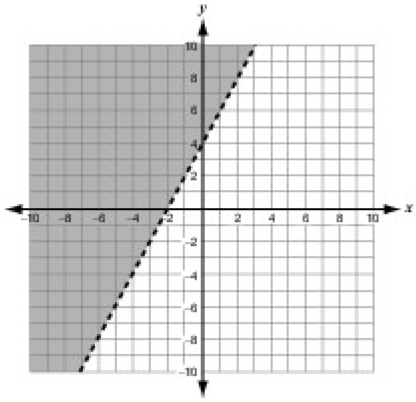
A. $(-2, 12)$

B. $(4, -4)$

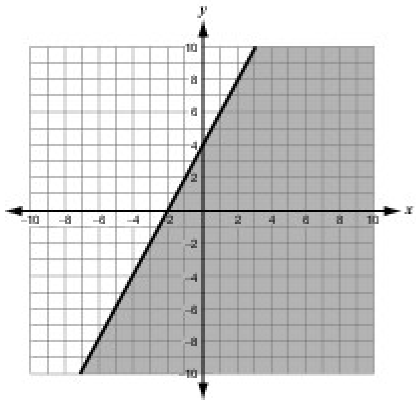
C. $(-4, 4)$

18. Which graph represents the solution of $y < 2x + 4$?

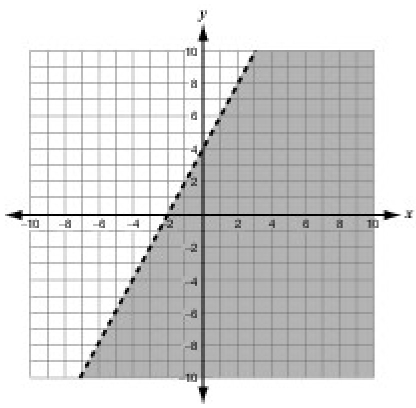
A.



B.



C.



19. Michael has a jar of dimes and nickels. There are 152 dimes and nickels in the jar that total $11. If *d* represents the number of dimes and *n* represents the number of nickels, which system of equations below represents the situation?

A. $\begin{cases} d+n=11 \\ 0.05d+0.10n=152 \end{cases}$

B. $\begin{cases} d+n=11 \\ 0.10d+0.5n=152 \end{cases}$

C. $\begin{cases} d+n=152 \\ 0.10d+0.05n=11 \end{cases}$

20. Fat has more than twice as many calories per gram as carbohydrates and proteins. A gram of fat has about 9 calories, while a gram of carbohydrate or protein has about 4 calories. The expression below represents the total number of calories in a food item.

$$9x+4(y+z)$$

What does the term $4(y+z)$ represent?

A. the number of grams of fat in a food item

C. the number of calories in a food item from fat

B. the number of calories in a food item from carbohydrates and proteins

TEST NAME: **2016-2017 ALG1 BM3 SPED**

TEST ID: **65584**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. The equation below was solved using properties of equality.

$$\frac{3x}{4} + 7 = 19$$

$\frac{3x}{4} = 12$ Step 1

$3x = 48$ Step 2

$x = 16$ Step 3

Which property of equality was used to rewrite the equation from Step 1 to Step 2?

A. addition

B. subtraction

C. multiplication

2. Which function has zeros at -4, 2, and 0?

A. $f(x) = x^3 + 2x^2 - 8x$

B. $f(x) = x^3 - 2x^2 - 8x$

C. $f(x) = x^2 + 2x - 8$

3. Directions: Click on each number you want to select. You must select all correct numbers.

   What values are the solutions for this equation?

   $$x^2 + 3x - 18 = 0$$

−18	−9	−6	−3	−2	2	3	6	9	18

4. Which algebraic expression is equivalent to $(b^2)^7$?

   A. b^{2+7}

   B. $\left((b^2)^5 \right)^2$

   C. $(b^2)^5 \cdot (b^2)^2$

5. What are the solutions to the following equation? *(factor)*

   $x^2 - 8x + 15$

   A. $x = -5$ or $x = -3$

   B. $x = 3$ or $x = 5$

   C. $x = 8$ or $x = 15$

6. Two functions are defined below.

$f(x) = e^{2x} + 5e^{x} + 6$ and $g(x) = 3e^{x} - 5$

If $h(x) = f(x) - g(x)$, which expression represents $h(x)$?

A. $h(x) = e^{2x} + 2e^{x} + 11$

B. $h(x) = e^{2x} + 2e^{x} + 1$

C. $h(x) = 3e^{2x} + 1$

7. **The graph of function $y = |x + 3|$ is translated up 4 units on a coordinate plane. Which equation describes the resulting graph?**

A. $y = 4|x + 3|$

B. $y = |x + 3| - 4$

C. $y = |x + 3| + 4$

8. **Over which interval is the graph of the function $f(x) = -|x - 6| + 2$ increasing?**

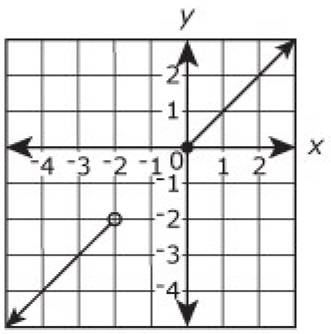
A. $x < 6$

B. $x > 6$

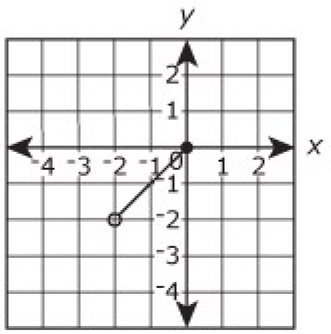
C. $4 < x < 8$

9. Which graph has a domain of $-2 < x \leq 0$?

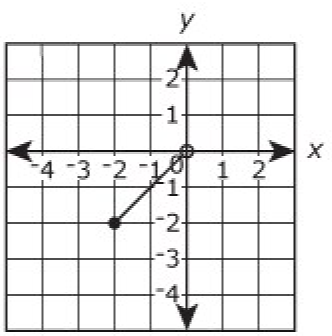
A.



B.



C.



10. Given the function $f(x) = x^2 - 6x + 10$, what is the average rate of change of the function over the interval $[4, 8]$?

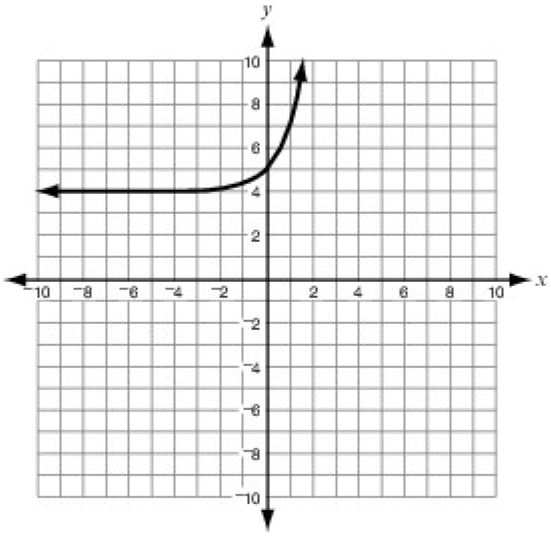
A. 6

B. 7

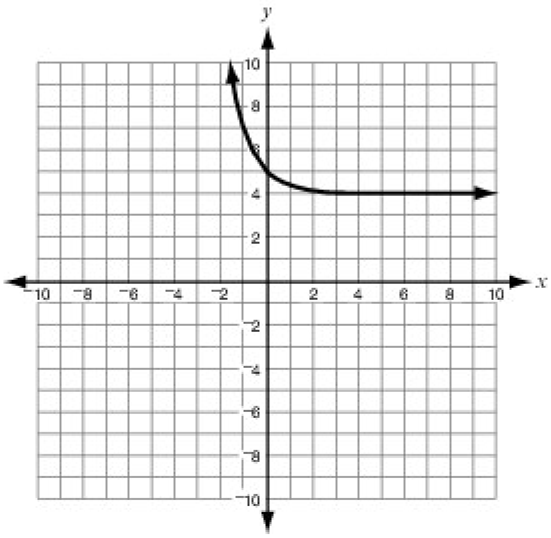
C. 10

11. Which graph represents the function $f(x) = 3^{-x} + 4$?

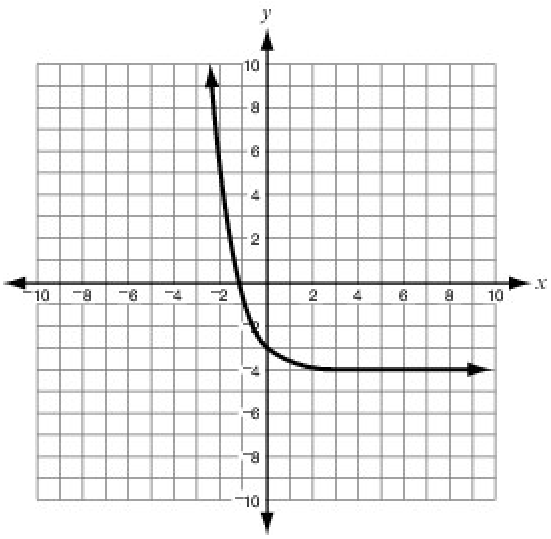
A.



B.



C.



12. The height in feet, y, a kangaroo reaches x seconds after it has jumped in the air is modeled by the quadratic function $f(x) = -16x^2 + 24x$. Which equation shows the correctly factored version of the function and the number of seconds it takes for the kangaroo to return to the ground?

A. $-8x(2x-3)$; 1.5 seconds

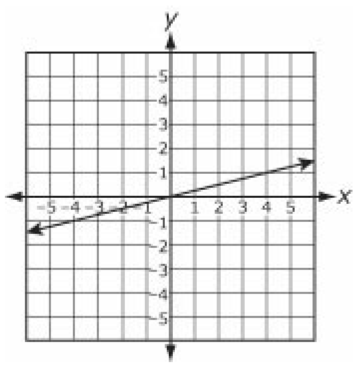
B. $8x(2x+3)$; 8 seconds

C. $8x(2x+3)$; 1.5 seconds

13. **The graph of which linear function has the greatest slope?**

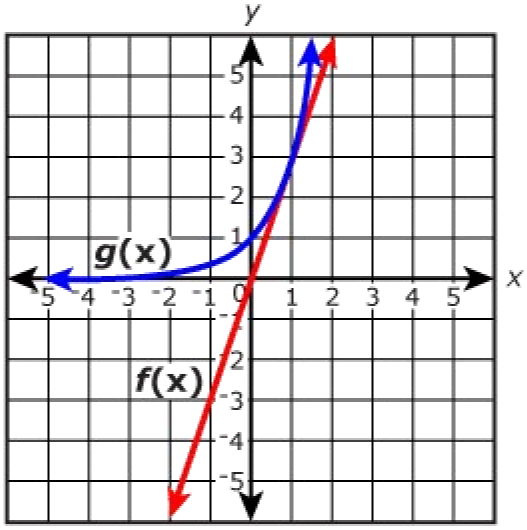
A. $f(x) = 3x + 2$

B.



C. A linear function whose graph passes through the points $(0, 2)$ and $(1, 6)$.

14. The functions $f(x) = 3x$ and $g(x) = 3^x$ intersect at the point $(1, 3)$.



Which statement is true?

A. $f(x)$ and $g(x)$ increase at the same rate beginning at their intersection.

B. $f(x)$ increases at a slower rate beginning at their intersection.

C. $f(x)$ increases at a faster rate beginning at their intersection.

15. Directions: Click on all the numbers you want to select.

Which numbers, when added to 23, will result in an irrational number?

$\frac{5}{6}$	π	3.2	3^2	$\sqrt{4}$	$\sqrt{5}$	14

16. **Ben works as a salesman. Each month he earns a $2,500 flat salary plus a commission of 8% of his monthly sales.**
Part A Write an equation that can be used to find Ben's monthly earnings (*E*) based on *x* dollars in monthly sales.
Part B Last month, Ben earned $3,044. What was the total of Ben's monthly sales last month? Show or explain your work.

17. The table below provides the values of the functions $f(x)$ and $g(x)$ for several values of *x*.

x	$f(x)$	$g(x)$
−3	−1	12
−2	0	3
−1	1	1
0	5	0
1	9	−1
2	2	−3
3	0	−12

Which of the following is a solution to the equation $f(x) = g(x)$?

A. $x = -1$

B. $x = 0$

C. $x = 2$

18. Simplify the expression. *(combine like terms)*

$$(12s^4 - 6s^2 + 4s) + (6s^4 - 4s + 27) - (4s^4 + s^2 + 12)$$

A. $14s^4 - 9s^2 + 4s + 15$

B. $14s^4 - 7s^2 + 15$

C. $14s^4 - 6s^2 - 8s + 15$

19. Which method could **not** be used to solve the following equation?

$x^2 + 14x = 15$

A. Quadratic formula

B. Factor into a product of two linear factors

C. Take the square root of both sides of the equation

20. Below are three quadratic equations and three methods of solving quadratic equations.

Equations

$x^2 + 8x - 9 = 0$	$x^2 - 5x + 1 = 0$	$x^2 = 20$

Methods of Solving

Take the square root of both sides	Use the quadratic formula	Factor the left side of the equation

Which grouping correctly matches each equation with its **best** method of solving?

A.

$x^2 + 8x - 9 = 0$	Take the square root of both sides
$x^2 - 5x + 1 = 0$	Factor the left side of the equation
$x^2 = 20$	Use the quadratic formula

B.

$x^2 + 8x - 9 = 0$	Factor the left side of the equation
$x^2 - 5x + 1 = 0$	Use the quadratic formula
$x^2 = 20$	Take the square root of both sides

C.

$x^2 + 8x - 9 = 0$	Take the square root of both sides
$x^2 - 5x + 1 = 0$	Use the quadratic formula
$x^2 = 20$	Factor the left side of the equation

Atlantic City High School

Geometry Curriculum

Mathematics Task Force Members

Don Coleman

Colleen O'Donnell

Kimberly Rowe

Director of Secondary Education

Donald Harris

Principal

Lina Gil

Assistant Superintendent of Curriculum and Instruction

Sherry Yahn

Geometry Pacing Guide

Date Range	Teachers have approximately 39 school days to complete the suggested sequences of Chapters from the board approved textbook which align with the curricular frameworks. Please refer to the frameworks for specific learning goals that must be covered in your lessons. ***Adjustments should be made accordingly for varying levels.***
9/6/16 – 9/16/16	Complete Geometry Pre-Test Benchmark
9/6/16 – 11/4/16	Unit 1: Chapters 1, 3, 9
10/31/16 – 11/4/16	Complete Geometry Unit 1 Benchmark 1
11/7/16 – 1/13/17	Unit 2: Chapters 2, 4, 5, 6, 7
1/9/17 – 1/13/17	Complete Geometry Unit 2 Benchmark 2
1/17/17 – 3/17/17	Unit 3: Chapters 8, 10, 12
3/13/17 – 3/17/17	Complete Geometry Unit 3 Benchmark 3
3/20/17 – 5/26/17	Unit 4: Chapter 11, 13* Prepare students for PARCC testing using Performance Tasks
5/22/17 – 6/9/17	Complete Geometry Unit 4 Benchmark 4

**If time allows*

All students must complete the pre-test and all 4 benchmarks on the edConnect website. (Benchmark tests are aligned to curricular frameworks, so teachers should be aware of the content of the benchmarks to ensure student success.)

Each teacher may decide to use Benchmark 4 as their final exam as in the past. However, it must be completed by all students (no exemptions from any benchmarks). A cumulative final exam is provided in the appendix of the curriculum for use by teachers that choose to use it.

Suggested Open Educational Resources are available in the Curricular Frameworks for each Unit, which can assist teachers and students with PARCC test preparation.

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 1 **Congruence and Constructions**	G.CO.A.1 G.CO.A.2 G.CO.A.3 G.CO.A.4 G.CO.A.5 G.CO.B.6 G.CO.B.7 G.CO.B.8 G.CO.D.12 G.CO.D.13	• Experiment with transformations in the plane • Understand congruence in terms of rigid motions • Make geometric constructions	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 1: Suggested Open Educational Resources	G.CO.A.1 Defining Parallel Lines G.CO.A.1 Defining Perpendicular Lines G.CO.A.2 Horizontal Stretch of the Plane G.CO.A.3 Seven Circles II G.CO.A.3 Symmetries of rectangles G.CO.A.4 Defining Rotations G.CO.A.5 Showing a triangle congruence	G.CO.B.7 Properties of Congruent Triangles G.CO.B.8 Why does SAS work? G.CO.B.8 Why does SSS work? G.CO.B.8 Why does ASA work? G.CO.D.12 Bisecting an angle G.CO.D.12 Angle bisection and midpoints of line segments G.CO.D.13 Inscribing an equilateral triangle in a circle	
Unit 2 **Congruence, Similarity & Proof**	G.SRT.A.1 G.SRT.A.2 G.SRT.A.3 G.CO.C.9 G.CO.C.10 G.CO.C.11 G.SRT.B.4 G.SRT.B.5	• Understand similarity in terms of similarity transformations • Prove geometric theorems. • Prove theorems involving similarity	
Unit 2: Suggested Open Educational Resources	G.SRT.A.1 Dilating a Line G.SRT.A.2 Are They Similar? G.SRT.A.2 Similar Triangles G.SRT.A.3 Similar Triangles G.CO.C.9 Congruent Angles made by parallel lines and a transverse G.CO.C.9 Points equidistant from two points in the plane	G.CO.C.10 Midpoints of Triangle Sides G.CO.C.10 Sum of angles in a triangle G.CO.C.11 Midpoints of the Sides of a Parallelogram G.CO.C.11 Is this a parallelogram? G.SRT.B.4 Joining two midpoints of sides of a triangle G.SRT.B.4 Pythagorean Theorem G.SRT.B.5 Tangent Line to Two Circles	

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Overview	Standards for Mathematical Content		Unit Focus	Standards for Mathematical Practice
Unit 3 **Trigonometric Ratios & Geometric Equations**	G.GPE.B.4 G.GPE.B.5 G.GPE.B.6 G.GPE.B.7 G.SRT.C.6 G.SRT.C.7	G.SRT.C.8 G.GPE.A.1 G.C.A.1 G.C.A.2 G.C.A.3 G.C.B.5	• Use coordinates to prove simple geometric theorems • Define trigonometric ratios and solve problems involving right triangles • Translate between the geometric description and the equation for a conic section • Understand and apply theorems about circles • Find arc lengths and areas of sectors of circles	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 3: Suggested Open Educational Resources	G.GPE.B.4,5 A Midpoint Miracle G.GPE.B.5 Slope Criterion for Perpendicular G.GPE.B.7 Triangle Perimeters G.SRT.C.6 Defining Trigonometric Ratio G.SRT.C.7 Sine and Cosine of Complimentary Angles		G.SRT.C.8 Constructing Special Angles G.GPE.A.1 Explaining the equation for a circle G.C.A.1 Similar circles G.C.A.2 Right triangles inscribed in circles I G.C.A.3 Circumscribed Triangles	
Unit 4 **Geometric Modeling**	G.MG.A.1 G.GMD.A.3 G.GMD.B.4 G.MG.A.2 G.MG.A.3 G.GMD.A.1		• Explain volume formulas and use them to solve problems. • Visualize relationships between two dimensional and three-dimensional objects • Apply geometric concepts in modeling situations	
Unit 4: Suggested Open Educational Resources	G.MG.A.1Toilet Roll G.GMD.A.3 The Great Egyptian Pyramids G.GMD.B.4 Tennis Balls in a Can G.MG.A.2 How many cells are in the human body? G.MG.A.3 Ice Cream Cone G.GMD.A.1 Area of a circle			

Geometry	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Teachers should create summative assessments in order to collect data and drive day to day instruction. For example, tests, quizzes and constructed response tasks.	*edConnect Department Wide Quarterly Benchmark Testing*
Focus Mathematical Concepts	
Prerequisite skills: Successfully Complete Secondary Geometry	
District/School Tasks	**District/School Primary and Supplementary Resources**
Complete Benchmarking and constructed response tasks to prepare for PARCC testing.	*Pearson Textbook and Online Resources are available to all staff and students.*
Instructional Best Practices and Exemplars	
Teachers should differentiate instruction, create lessons and integrate technology into the classroom whenever possible.	

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Unit 1 Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
G.CO.A.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	MP.6 Attend to precision.	Concept(s): • Point, line, plane, distance along a line, and distance around a circular arc as indefinable notions Students are able to: • use point, line, distance along a line and/or distance around a circular arc to give a precise definition of – angle; – circle (the set of points that are the same distance from a single point - the center); – perpendicular line (two lines are perpendicular if an angle formed by the two lines at the point of intersection is a right angle); – parallel lines (distinct lines that have no point in common); – and line segment. Learning Goal 1: Use the undefined notion of a point, line, distance along a line and distance around a circular arc to develop definitions for angles, circles, parallel lines, perpendicular lines and line segments.	1-2 1-3 1-4 1-6 3-1 10-6
G.CO.A.2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Transformations as functions (e.g. F(P) is the image of point P created by transformation F). Students are able to: • represent transformations with transparencies and geometry software. • describe transformations as functions (points defining the pre-image as the input and the points defining the image as the output).	9-1 CB 9-1 9-2 9-3 9-4 9-6

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		• describe a transformation F of the plane as a rule that assigns to each point P in the plane a point F(P) of the plane. • compare rotations, reflections, and translations to a horizontal stretch, vertical stretch and to dilations, distinguishing preserved distances and angles from those that are not preserved. Learning Goal 2: Represent transformations in the plane using transparencies, describe and explain transformations as functions, and compare rigid transformations to dilations, horizontal stretches and vertical stretches.	
◘ G.CO.A.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • identify lines of symmetry when performing rotations and/or reflections on rectangles, parallelograms, trapezoids and regular polygons. • describe the rotations and reflections that carry rectangles, parallelograms, trapezoids and regular polygons onto itself. Learning Goal 3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself, and identify lines of symmetry.	CB 9-3
◘ G.CO.A.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	MP.6 Attend to precision.	Concept(s): • Impact of transformations on figures in the plane. Students are able to: • develop formal mathematical definitions of a rotation, reflection, and translation. Learning Goal 4: Develop formal definitions of rotations, reflections, and translations.	9-1 9-2 9-3

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G.CO.A.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • draw the transformed figure using, graph paper, tracing paper, and/or geometry software given a geometric figure and a rotation, reflection, or translation. • identify the sequence of transformations required to carry one figure onto another. Learning Goal 5: Draw transformed figures using graph paper, tracing paper, and/or geometry software and identify a sequence of transformations required in order to map one figure onto another.	9-1 9-2 CB 9-2 9-3 9-4
G.CO.B.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	MP.3 Construct viable arguments and critique the reasoning of others.	Concept(s): • Congruence in terms of rigid motion Students are able to: • predict the outcome of a transformation on a figure. • given a description of the rigid motions, transform figures. • given two figures, decide if they are congruent by applying rigid motions. Learning Goal 6: Use rigid transformations to determine and explain congruence of geometric figures.	9-1 9-2 9-3 9-4 9-5
G.CO.B.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Triangle congruence in terms of rigid motion Students are able to: • given that two triangles are congruent based on rigid motion, show that corresponding pairs of sides and angles are congruent. • given that corresponding pairs of sides and angles of two triangles are congruent, show, using rigid motion (transformations) that they are congruent. Learning Goal 7: Show and explain that two triangles are congruent by using	9-5

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		corresponding pairs of sides and corresponding pairs of angles, and by using rigid motions (transformations).	
■ G.CO.B.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Criteria for triangle congruence Students are able to: • show and explain the criteria for Angle-Side-Angle triangle congruence. • show and explain the criteria for Side-Angle-Side triangle congruence. • show and explain the criteria for Side-Side-Side triangle congruence. • explain the relation of the criteria for triangle congruence to congruence in terms of rigid motion. Learning Goal 8: Show and explain how the criteria for triangle congruence extend from the definition of congruence in terms of rigid motion.	9-5
□ G.CO.D.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line*. □ G.CO.D.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Congruence underlies formal constructions. Students are able to: • perform formal constructions using a variety of tools and methods including: – copying a segment; – copying an angle; – bisecting a segment; – bisecting an angle; – constructing perpendicular lines; – constructing the perpendicular bisector of a line segment; – constructing a line parallel to a given line through a point not on the line; – constructing an equilateral triangle; – constructing a square; – and constructing a regular hexagon inscribed in a circle.	1-6 CB 3-2 3-6 4-4 4-5 CB 4-5 5-2 CB 6-9 CB 7-5 10-3

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		• identify the congruencies underlying each construction. Learning Goal 9: Make formal constructions using a variety of tools (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.) and methods.	

Unit 2 Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
■ G.SRT.A.1. Verify experimentally the properties of dilations given by a center and a scale factor: G.SRT.A.1a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. G.SRT.A.1b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	MP.1 Make sense of problems and persevere in solving them MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Dilation of a line that passes through the center of dilation results in the same line. • Dilation of a line that does not pass through the center of dilation results in a line that is parallel to the original line. • Dilation of a line segment results in a longer line segment when, for scale factor k, |k| is greater than 1. • Dilation of a line segment results in a shorter line segment when, for scale factor k, |k| is less than 1. Students are able to: • perform dilations in order to verify the impact of dilations on lines and line segments. Learning Goal 1: Verify the properties of dilations given by a center and a scale factor.	CB 9-6
■ G.SRT.A.2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Similarity transformations are used to determine the similarity of two figures. Students are able to: • given two figures, determine, using transformations, if they are similar. • explain, using similarity transformations, the meaning of similarity for triangles.	9-7

 Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

Unit 2 Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
		Learning Goal 2: Use the definition of similarity in terms of similarity transformations to decide if two given figures are similar and explain, using similarity transformations, the meaning of triangle similarity.	
■ G.SRT.A.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Angle-Angle criterion for similarity Students are able to: • explain Angle-Angle criterion and its relationship to similarity transformations and properties of triangles. Learning Goal 3: Use the properties of similarity transformations to establish the Angle-Angle criterion for two triangles to be similar.	9-7
■ G.CO.C.9. Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.* ■ G.CO.C.10. Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* ■ G.CO.C.11. Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the*	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • A formal proof may be represented with a paragraph proof or a two-column proof. Students are able to: • construct and explain proofs of theorems about lines and angles including: – vertical angles are congruent; – congruence of alternate interior angles; – congruence of corresponding angles; – and points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. • construct and explain proofs of theorems about triangles including: – sum of interior angles of a triangle; – congruence of base angles of an isosceles triangle; – the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; – and the medians of a triangle meet at a point.	2-6 3-2 3-5 4-5 5-1 5-2 5-4 6-2 6-3 6-4 6-5

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Unit 2 Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.		• construct and explain proofs of theorems about parallelograms including: – opposite sides are congruent; – opposite angles are congruent; – the diagonals of a parallelogram bisect each other; – and rectangles are parallelograms with congruent diagonals. Learning Goal 4: Construct and explain formal proofs of theorems involving lines, angles, triangles, and parallelograms.	
■ G.SRT.B.4. Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity*	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • construct and explain proofs of theorems about triangles including: – a line parallel to one side of a triangle divides the other two sides proportionally; – and the Pythagorean Theorem (using triangle similarity). Learning Goal 5: Prove theorems about triangles.	7-5 8-1
■ G.SRT.B.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	MP.7 Look for and make use of structure.	Concept(s): • Corresponding parts of congruent triangles are congruent (CPCTC). Students are able to: • prove geometric relationships in figures using criteria for triangle congruence. • prove geometric relationships in figures using criteria for triangle congruence. • solve problems using triangle congruence criteria (SSS, ASA, SAS, HL). • solve problems using triangle similarity criteria (AA). Learning Goal 6: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	4-2 4-3 4-4 4-5 4-6 4-7 5-1 5-2 5-4 6-1 6-2 6-3 6-4 6-5 6-6 7-2 7-3 7-4

Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

Unit 3 Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
■ G.GPE.B.4. Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).*	MP.3 Construct viable arguments and critique the reasoning of others.	Concept(s): No new concept(s) introduced Students are able to: • Use coordinates to prove geometric theorems including: – prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle (or other quadrilateral); – and prove or disprove that a given point lies on a circle of a given center and radius or point on the circle. Learning Goal 1: Use coordinates to prove simple geometric theorems algebraically.	6-9
■ G.GPE.B.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	MP.3 Construct viable arguments and critique the reasoning of others. MP.8 Look for and express regularity in repeated reasoning	Concept(s): No new concept(s) introduced Students are able to: • prove the slope criteria for parallel lines (parallel lines have equivalent slopes). • prove the slope criteria for perpendicular lines (the product of the slopes of perpendicular lines equals -1). • solve problems using the slope criteria for parallel and perpendicular lines. Learning Goal 2: Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.	3-8 7-3 7-4
■ G.GPE.B.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio. ■ G.GPE.B.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • locate the point on a directed line segment that creates two segments of a given ratio. • find perimeters of polygons using coordinates, the Pythagorean theorem and the distance formula. • find areas of triangle and rectangles using coordinates. Learning Goal 3: Find the point on a directed line segment between two given points that partitions the segment in a given ratio and use	1-3 1-7 6-7 10-1

 Key: ■ Major Clusters | ◻ Supporting | ◎ Additional Clusters | * Benchmarked Standard

Unit 3 Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
		coordinates to compute perimeters of polygons and areas of triangles and rectangles.	
■ G.SRT.C.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	MP.7 Look for and make use of structure.	Concept(s): • Side ratios in right triangles are properties of the angles in the triangle. Students are able to: • show and explain that definitions for trigonometric ratios derive from similarity of right triangles. Learning Goal 4: Show and explain that definitions for trigonometric ratios derive from similarity of right triangles.	CB 8-3
■ G.SRT.C.7. Explain and use the relationship between the sine and cosine of complementary angles ■ G.SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Relationship between sine and cosine of complementary angles Students are able to: • determine and compare sine and cosine ratios of complementary angles in a right triangle. • solve right triangles (determine all angle measures and all side lengths) using trigonometric ratios and the Pythagorean Theorem. Learning Goal 5: Explain and use the relationship between the sine and cosine of complementary angles; use trigonometric ratios and the Pythagorean Theorem to compute all angle measures and side lengths of triangles in applied problems.	8-1 8-2 8-3 8-4 CB 8-4
◎ G.GPE.A.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • given the center and radius, derive the equation of a circle (using the Pythagorean Theorem). • given an equation of a circle in any form, use the method of completing the square to determine the center and radius of the circle.	12-5

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Unit 3 Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
		Learning Goal 6: Derive the equation of a circle of given the center and radius using the Pythagorean Theorem. Given an equation, complete the square to find the center and radius of the circle.	
G.C.A.1. Prove that all circles are similar.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically.	Concept(s): • Similarity of all circles Students are able to: • construct a formal proof of the similarity of all circles. Learning Goal 7: Prove that all circles are similar	10-6
G.C.A.2. Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	Concept(s): No new concept(s) introduced Students are able to: • use the relationship between inscribed angles, radii and chords to solve problems. • use the relationship between central, inscribed, and circumscribed angles to solve problems. • identify inscribed angles on a diameter as right angles. • identify the radius of a circle as perpendicular to the tangent where the radius intersects the circle. Learning Goal 8: Identify and describe relationships among inscribed angles, radii, and chords; use these relationships to solve problems.	10-6 CB 10-6 12-2 12-3
G.C.B.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique he reasoning of others.	Concept(s): • A proportional relationship exists between the length of an arc that is intercepted by an angle and the radius of the circle. Students are able to: • use similarity to derive the fact that the length of the arc intercepted by an angle is proportional to the radius. • define radian measure of an angle as the constant of proportionality when the length of the arc intercepted by an angle is proportional to the radius. • derive the formula for the area of a sector.	10-6 10-7

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Unit 3 Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
		• compute arc lengths and areas of sectors of circles. Learning Goal 7: Find arc lengths and areas of sectors of circles; use similarity to show that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector.	
G.C.A.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically	Concept(s): No new concept(s) introduced Students are able to: • construct the inscribed circle of a triangle. • construct the circumscribed circle of a triangle. • prove properties of the angles of a quadrilateral that is inscribed in a circle. Learning Goal 9: Prove the properties of angles for a quadrilateral inscribed in a circle and construct inscribed and circumscribed circles of a triangle using geometric tools and geometric software.	5-3 12-3

Unit 4 Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
G.MG.A.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). G.GMD.A.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. G.GMD.B.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Real-world objects can be described, approximately, using geometric shapes, their measures, and their properties. Students are able to: • identify cross-sections of three dimensional objects. • identify three-dimensional objects generated by rotation of two-dimensional objects. • solve problems using volume formulas for cylinders, pyramids, cones, and spheres. • model real-world objects with geometric shapes. • describe the measures and properties of geometric shapes that best represent a real-world object.	8-3 10-1 11-1 11-4 11-5 11-6 12-6

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Unit 4 Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
		Learning Goal 1: Model real-world objects with geometric shapes based upon their measures and properties, and solve problems using volume formulas for cylinders, pyramids, cones, and spheres. Identify cross-sections, three-dimensional figures, and identify three-dimensional objects created by the rotation of two-dimensional objects.	
G.MG.A.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • model real-world situations, applying density concepts based on area. • model real-world situations, applying density concepts based on volume. Learning Goal 2: Apply concepts of density based on area and volume in modeling situations.	11-7
G.MG.A.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • design objects or structures satisfying physical constraints • design objects or structures to minimize cost. • solve design problems. Learning Goal 3: Solve design problems using geometric methods	3-4
G.GMD.A.1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • construct viable dissection arguments and informal limit arguments. • apply Cavalieri's principle. • construct an informal argument for the formula for the circumference of a circle. • construct an informal argument for the formula for the area of a circle. • construct an informal argument for the formula for the volume of a cylinder, pyramid, and cone.	CB 10-7 11-4

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Unit 4 Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
		Learning Goal 4: Using dissection arguments, Cavalieri's principle, and informal limit arguments, develop informal arguments for formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.	

Atlantic City High School

Geometry Unit Benchmarks

Mathematics Task Force Members

Don Coleman

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Assistant Superintendent of Curriculum and Instruction

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TEST NAME: **2016-2017 GEO Pretest**

TEST ID: **64097**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

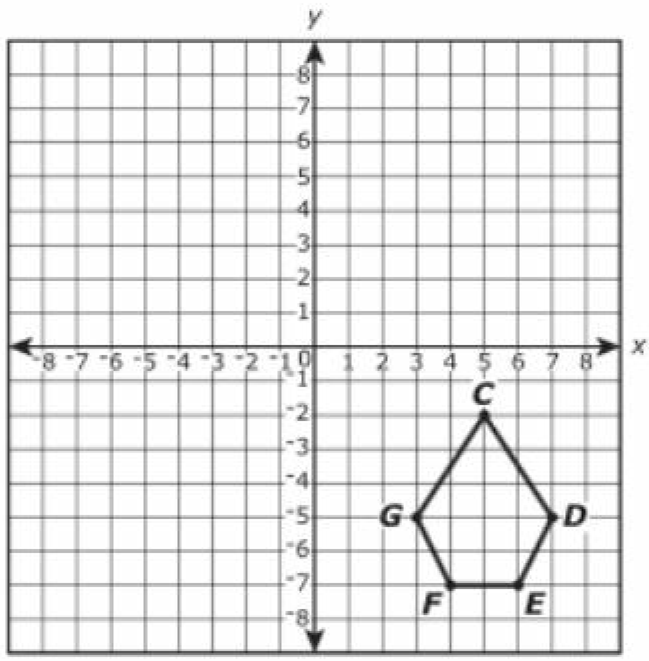
Date:

Read the passage - 'parallelo' - and answer the question below:

parallelo

Pentagon ***CDEFG*** is shown on the coordinate plane.

Pentagon ***CDEFG*** is translated 7 units up and 5 units left, resulting in pentagon ***C'D'E'F'G'*** (not shown).



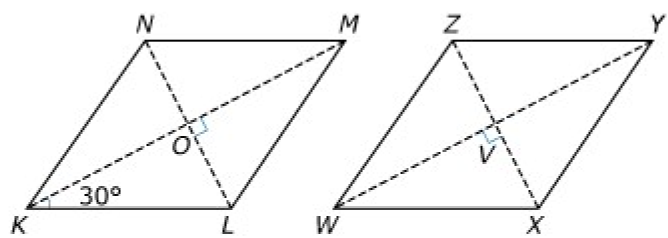
1. Select from the drop-down menus to correctly complete each sentence.

The length of $\overline{FG}$ is 1 - (A) greater than (B) less than (C) equal to to the length of $\overline{F}$.

The perimerter of pentagon ***CDEFG*** is 2 - (A) greater than (B) less than (C) equal to the perimeter of pentagon ***C'D'E'F'G'.***

---

2. Rhombus *KLMN* is congruent to rhombus *WXYZ*.



What is the measure of $\angle WXV$?

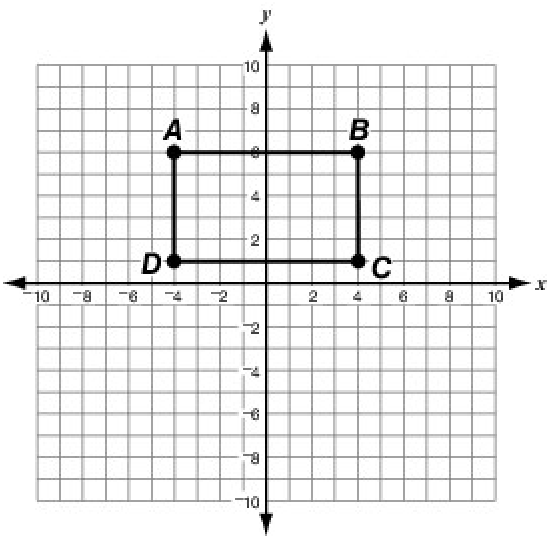
A. $30°$

B. $60°$

C. $90°$

D. $120°$

3. The rectangle $ABCD$, shown below, is reflected across the *x*-axis and then across the *y*-axis, resulting in figure $A'B'C'D'$.



Which statement is correct of the lines in figure $A'B'C'D'$?

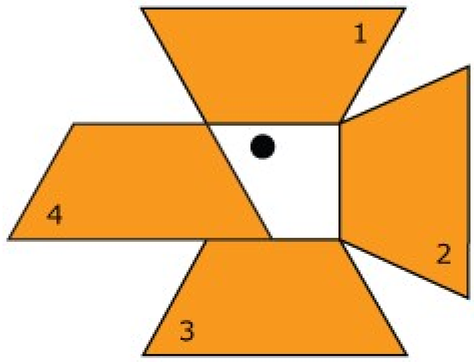
A. On reflection, parallel lines are taken to parallel lines, so $\overline{A'B'}$ will be parallel to $\overline{C'D'}$.

B. On reflection, parallel lines are taken to parallel lines, so $\overline{A'D'}$ will be parallel to $\overline{C'D'}$.

C. On reflection, perpendicular lines are taken to parallel lines, so $\overline{A'D'}$ will be parallel to $\overline{C'D'}$.

D. On reflection, parallel lines are taken to perpendicular lines, so $\overline{A'B'}$ will be perpendicular to $\overline{C'D'}$.

4. Giovanni drew a figure like the one shown below. He used four congruent trapezoids grouped around another quadrilateral.



Which sequence shows a reflection followed by a translation?

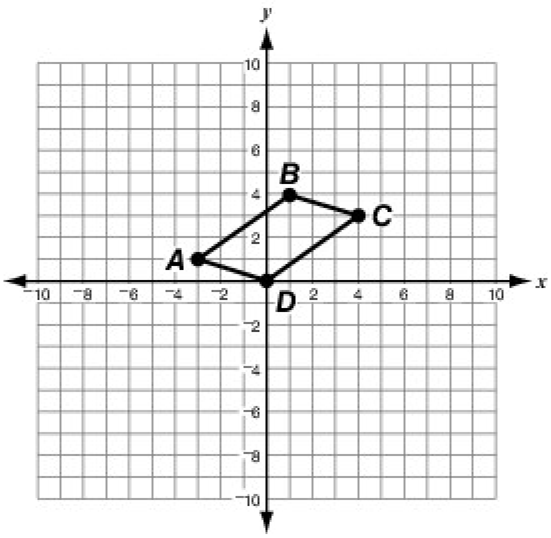
A. Trapezoid 2 to Trapezoid 1

B. Trapezoid 3 to Trapezoid 4

C. Trapezoid 4 to Trapezoid 2

D. Trapezoid 1 to Trapezoid 4

5. Parallelogram $ABCD$, shown on the coordinate grid below, is dilated by a scale factor 4, centered at the origin. What are the vertex coordinates of the dilated figure?



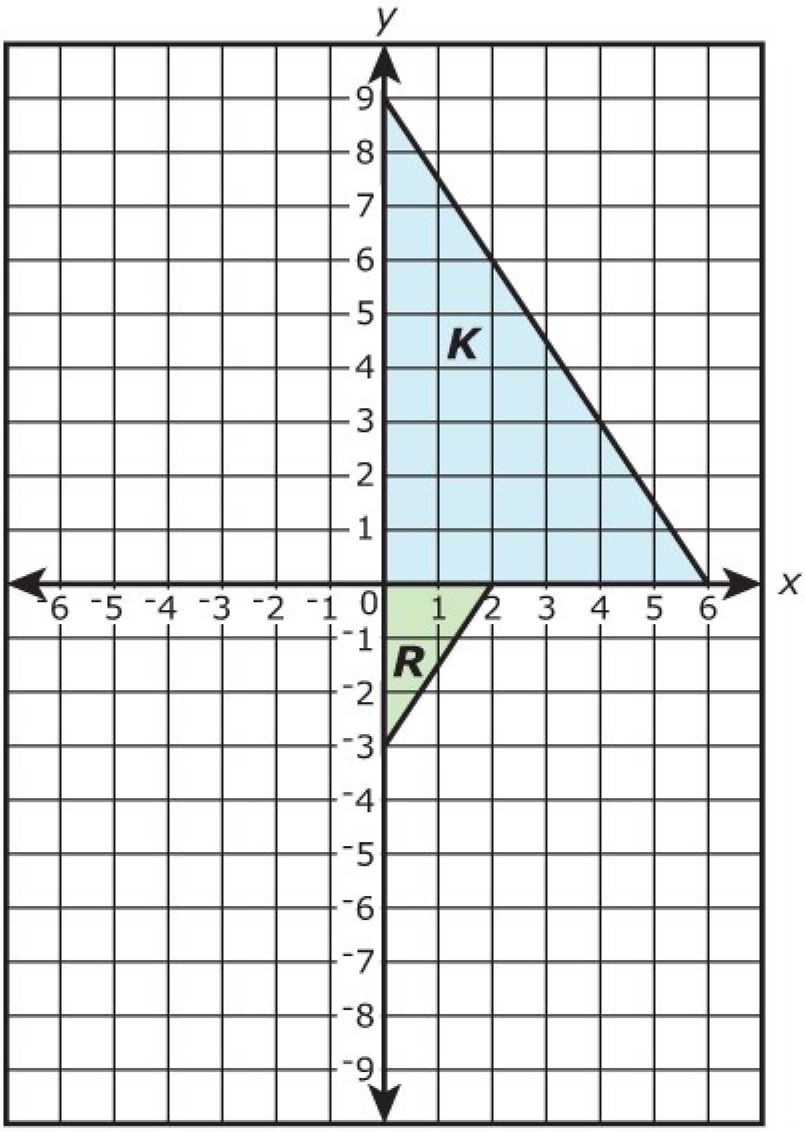
A. $A'(-12, 4), B'(4, 16), C'(16, 12), D'(0, 0)$

B. $A'(4, -12), B'(16, 4), C'(12, 16), D'(0, 0)$

C. $A'(12, -4), B'(-4, -16), C'(-16, -12), D'(0, 0)$

D. $A'(-4, 12), B'(-16, -4), C'(-12, -16), D'(0, 0)$

6. Triangle K and Triangle R are graphed on the coordinate plane.



What sequence of transformations maps Triangle K to Triangle R ?

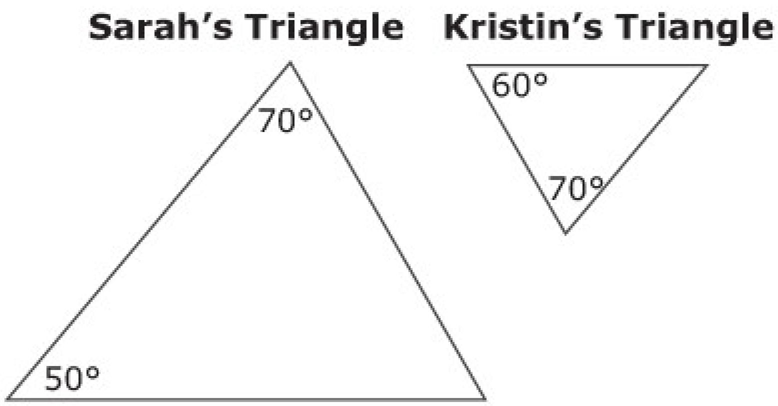
A. rotation of 90° clockwise around the origin and a dilation with the center at the origin and a scale factor of 3

B. rotation of 90° clockwise around the origin and a dilation with the center at the origin and a scale factor of $\frac{1}{3}$

C. reflection over the x-axis and a dilation with the center at the origin and a scale factor of $\frac{1}{3}$

D. reflection over the x-axis and a dilation with the center at the origin and a scale factor of 3

7. Sarah and Kristin each drew a triangle, as shown. Sarah claimed that if Kristin's triangle had two angles congruent to two of the angles in her triangle, then both triangles would be similar.



Which statement best explains the relationship between Kristin's triangle and Sarah's triangle?

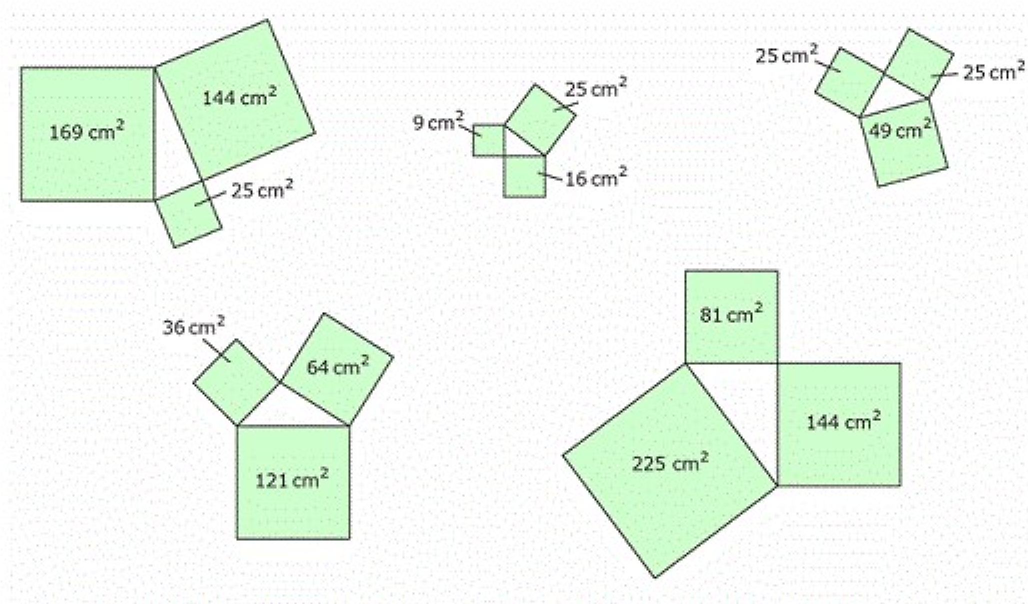
A. Kristin's triangle should be larger than Sarah's triangle because $60° > 50°$.

B. Kristin's triangle appears to be similar to Sarah's triangle but does not have two congruent angles.

C. Kristin's triangle needs an angle smaller than $50°$ because her triangle is smaller than Sarah's triangle.

D. Kristin's triangle has two angles congruent to two angles in Sarah's triangle and is similar to Sarah's triangle.

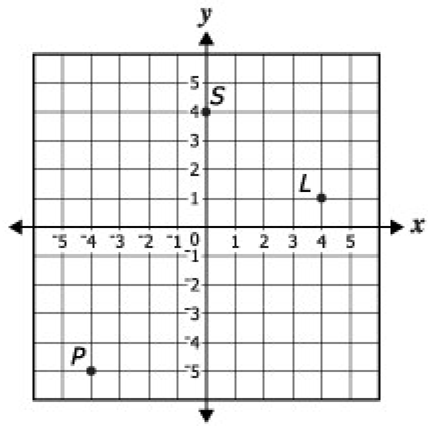
8. A student used the edges of squares that are different sizes to form triangles. Each square is labeled with its area. Which groups of squares are arranged to form a right triangle? Click on the figures you want to select.



9. A room is in the shape of a rectangular prism. The room has a width of 8 feet, a length of 12 feet, and a height of 9 feet. What is the greatest possible distance between two points on the walls in the room?
Round your answer to the nearest foot.

10. Click and drag the numbers into the boxes.

Points *S*, *L*, and *P* on this grid represent the locations of the school, the library, and the park, respectively.



What is the distance, in units, from the school to the library and the distance from the library to the park?

3 units	4 units	5 units
6 units	7 units	8 units
9 units	10 units	

School to Library	**Library to Park**

schoolnet

11. In a plane, if line *a* is perpendicular to line *c*, and line *b* is perpendicular to line *c*, which statement is true?

A. Line *a* is perpendicular to line *b*.

B. Lines *a* and *b* are skew.

C. Lines *a* and *b* intersect.

D. Lines *a* and *b* are parallel.

12. Point K lies at $(-3, 4)$. Point K is reflected over the *y*-axis and then translated 7 units down to produce K'. Which rule could have been used to produce K' from K?

A. $K(x, y) \rightarrow K'(x, y-7)$

B. $K(x, y) \rightarrow K'(-x, y-7)$

C. $K(x, y) \rightarrow K'(x, -y-7)$

D. $K(x, y) \rightarrow K'(-x-7, -y-7)$

13. What is the image of $(^-3,\ 1)$ and $(0,\ ^-4)$ after a clockwise rotation of 180° around the origin?

A. $(^-3,\ ^-1),\ (0,\ 4)$

B. $(1,\ ^-3),\ (^-4,\ 0)$

C. $(3,\ ^-1),\ (0,\ 4)$

D. $(3,\ 1),\ (0,\ ^-4)$

14. Clarisse drew line segment $\overline{PQ}$ and then translated it 3 units to the right and 4 units down to form line segment $\overline{P'Q'}$. She then connected P and P' and Q and Q' to form two more line segments. Which statement(s) about the resulting figure **must** be true?

I. $\overline{PP'} \cong \overline{QQ'}$

II. $\overline{PQ} \parallel \overline{P'Q'}$

III. $P\,P'\,Q'\,Q$ is a rectangle.

A. I only

B. III only

C. I and II only

D. I, II, and III

15. Triangle ABC is located in the third quadrant of a coordinate plane. If triangle ABC is reflected across the *y*-axis to obtain triangle, $A'B'C'$, which statement is true?

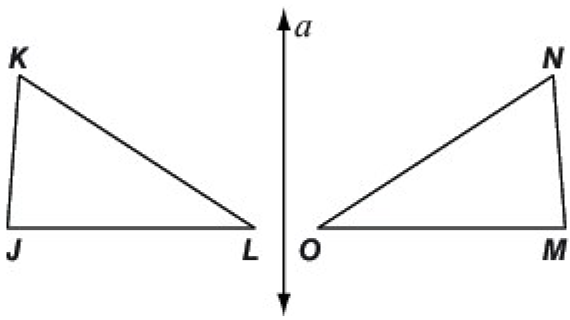
A. $\triangle A'B'C'$ lies in quadrant II and is congruent to $\triangle ABC$.

B. $\triangle A'B'C'$ lies in quadrant IV and is congruent to $\triangle ABC$.

C. $\triangle A'B'C'$ lies in quadrant II and is not congruent to $\triangle ABC$.

D. $\triangle A'B'C'$ lies in quadrant IV and is not congruent to $\triangle ABC$.

16. Use the given triangles to answer the question.



Triangle *JKL* is reflected across line *a* to form triangle *MNO*. Which one of these is **true**?

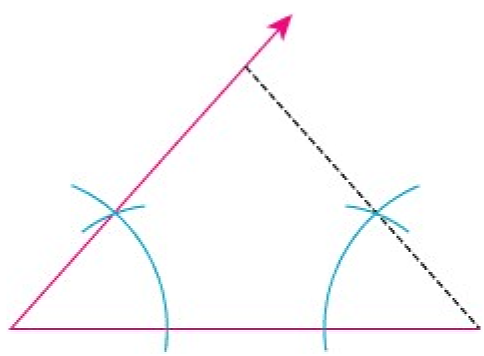
A. $\overline{JK} \cong \overline{MO}$, $\overline{KL} \cong \overline{NO}$, and $\angle L \cong \angle M$

B. $\overline{JK} \cong \overline{MN}$, $\overline{JL} \cong \overline{OM}$, and $\angle J \cong \angle N$

C. $\overline{JK} \cong \overline{NO}$, $\overline{KL} \cong \overline{MN}$, and $\angle L \cong \angle O$

D. $\overline{JK} \cong \overline{MN}$, $\overline{KL} \cong \overline{NO}$, and $\angle K \cong \angle N$

17.



Which construction is illustrated above?

A. A perpendicular to a given line from a point on the line

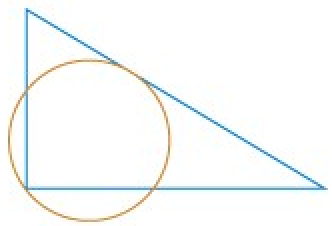
B. An angle congruent to a given angle

C. The bisector of an angle

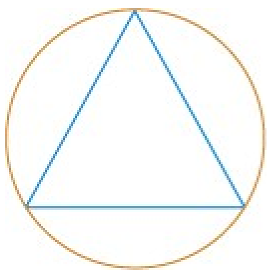
D. The bisector of a line segment

18. Which figure shows a circle inscribed in a triangle?

A.

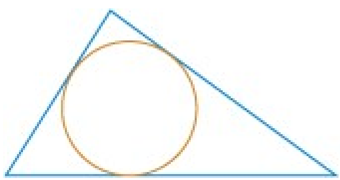


B.

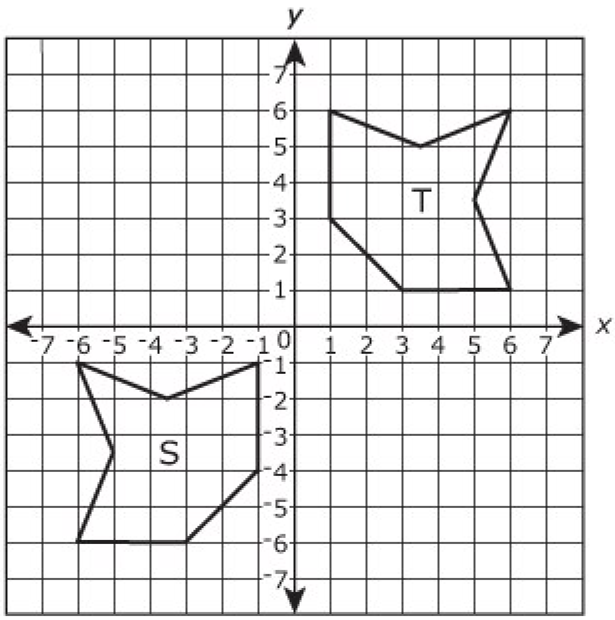


C.

D.



19. Why is figure *S* congruent to figure *T*?



A. Figure *S* can be translated 7 units up and then reflected over the *x*-axis to show congruency to Figure *T*.

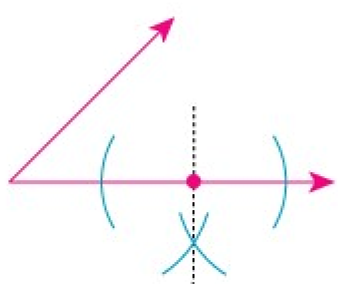
B. Figure *S* can be reflected over the *x*-axis and then dilated by a scale factor of 2 to show congruency to Figure *T*.

C. Figure *S* can be translated 7 units up and then rotated 90° clockwise about the origin to show congruency to Figure *T*.

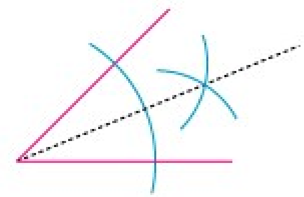
D. Figure *S* can be reflected over the *y*-axis and then rotated 90° counterclockwise about the origin to show congruency to Figure *T*.

20. Which illustrates the construction of the bisector of an angle?

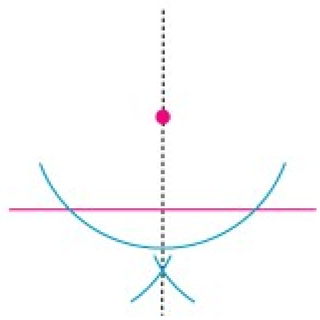
A.



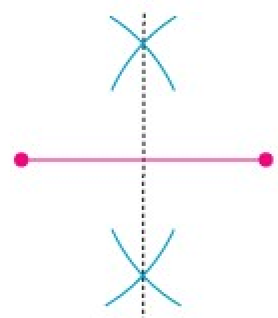
B.



C.



D.



TEST NAME: **2016-2017 GEO BM1**
TEST ID: **64267**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. Match the definition with the geometric term.

Questions	Answer Choices
1. Line Segment	A. Two lines in the same plane that are always the same distance apart.
2. Circle	B. A straight line that connects two points without extending beyond them.
3. Parallel Lines	C. A straight line from the center to the circumference of a circle or sphere.
	D. Determined by two points and extends indefinitely in both directions.
	E. The set of all points in the plane that are the same distance from a given point.

2. Which term can be defined as the set of all points in a plane that are a fixed distance from a given point?

A. arc

B. circle

C. sphere

D. circumference

3. Point K lies at $(-3, 4)$. Point K is reflected over the *y*-axis and then translated 7 units down to produce K'. Which rule could have been used to produce K' from K?

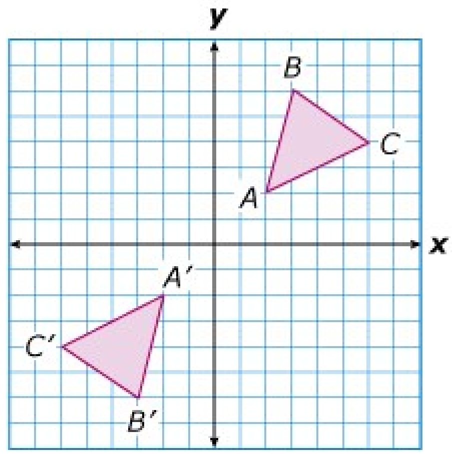
A. $K(x, y) \rightarrow K'(x, y-7)$

B. $K(x, y) \rightarrow K'(-x, y-7)$

C. $K(x, y) \rightarrow K'(x, -y-7)$

D. $K(x, y) \rightarrow K'(-x-7, -y-7)$

4. In the following drawing, $\triangle A'B'C'$ is the image $\triangle ABC$ after a clockwise rotation.



What was the degree of rotation?

A. 45°

B. 90°

C. 180°

D. 270°

5. A function $f(x)$ is described by the ordered pairs (x, y). If the given function is translated 2 units to the right and then reflected across the x-axis, what are the ordered pairs that describe the transformed function?

A. $(-x-2, y)$

B. $(-x+2, y)$

C. $(x-2, -y)$

D. $(x+2, -y)$

6. Which transformation would map a rectangle onto itself?

A. reflection over a diagonal

B. reflection over the shorter side

C. rotation of 40° around its center

D. rotation of 180° around its center

7. Point F' is the image when point F is reflected over the line $x = -2$ and then over the line $y = 3$. The location of F' is $(3, 7)$. Which of the following is the location of point F?

A. $(-7, -1)$

B. $(-7, 7)$

C. $(1, 5)$

D. $(1, 7)$

8. Clarisse drew line segment $\overline{PQ}$ and then translated it 3 units to the right and 4 units down to form line segment $\overline{P'Q'}$. She then connected P and P' and Q and Q' to form two more line segments. Which statement(s) about the resulting figure **must** be true?

I. $\overline{PP'} \cong \overline{QQ'}$

II. $\overline{PQ} \parallel \overline{P'Q'}$

III. $P\,P'\,Q'\,Q$ is a rectangle.

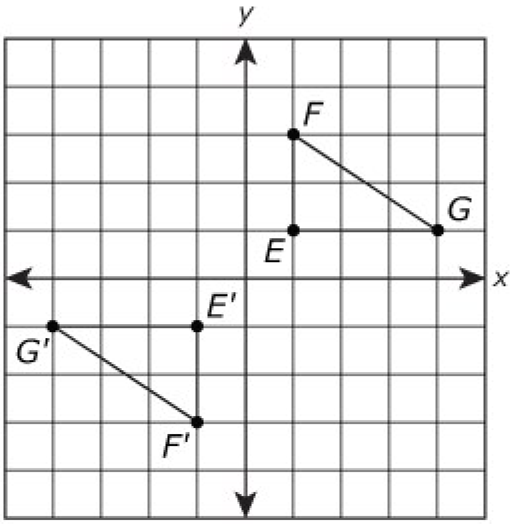
A. I only

B. III only

C. I and II only

D. I, II, and III

9. Which pair of rigid transformations will map $\triangle EFG$ to $\triangle E'F'G'$?



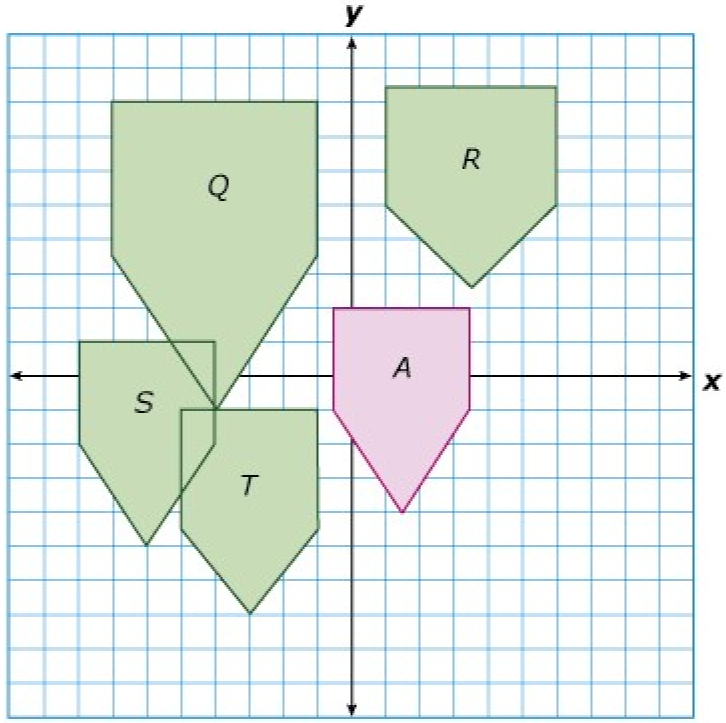
A. A reflection across line $y = x$, then a reflection across $y = -x$.

B. A reflection across the x-axis, then a reflection across the y-axis.

C. A rotation of 90° counterclockwise around the origin, then a reflection across the x-axis.

D. A rotation of 90° clockwise around the origin, then a rotation of 90° counterclockwise around the origin.

10.



Which figure in the drawing best represents a dilation of figure *A* with a scale factor of $\frac{3}{2}$?

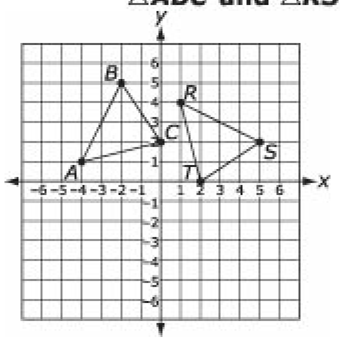
A. *Q*

B. *R*

C. *S*

D. *T*

11. **Consider $\triangle ABC$ and $\triangle RST$ shown below.**



Which transformation can be used to verify $\triangle ABC \cong \triangle RST$?

A. rotate $\triangle ABC$ $90°$ clockwise about point *C*

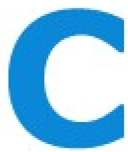
B. rotate $\triangle ABC$ $90°$ clockwise about the origin

C. translate $\triangle ABC$ 2 units to the right and 2 units down

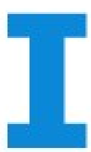
D. translate $\triangle ABC$ 7 units to the right and 3 units down

12. Which of the following figures has reflective (line) symmetry but not rotational (point) symmetry?

A. 

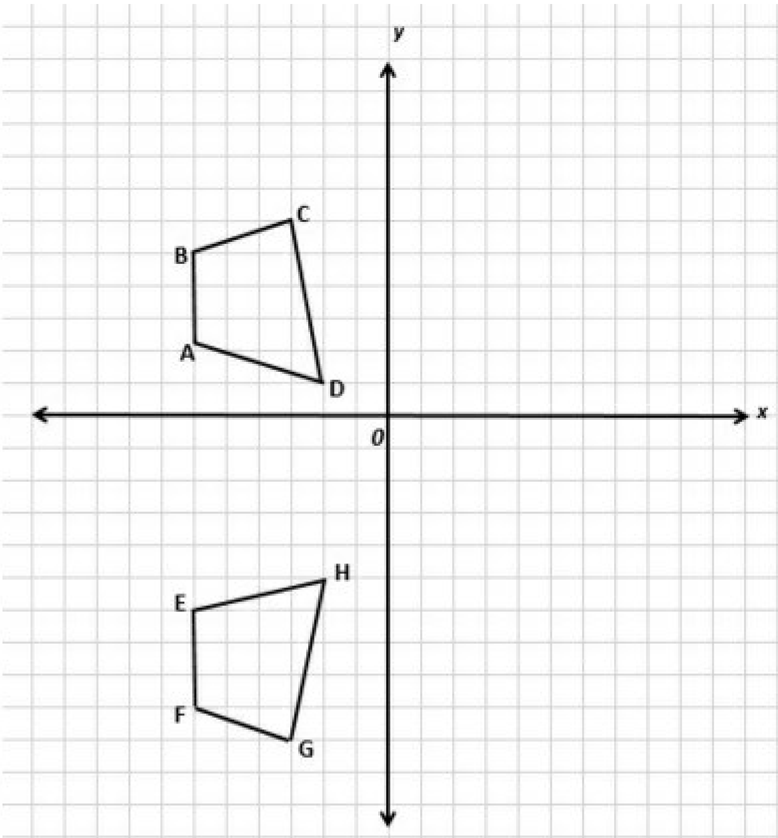
B. 

C. 

D. 

Read the passage - 'Quadrilateral Reflections' - and answer the question below:

Quadrilateral Reflections



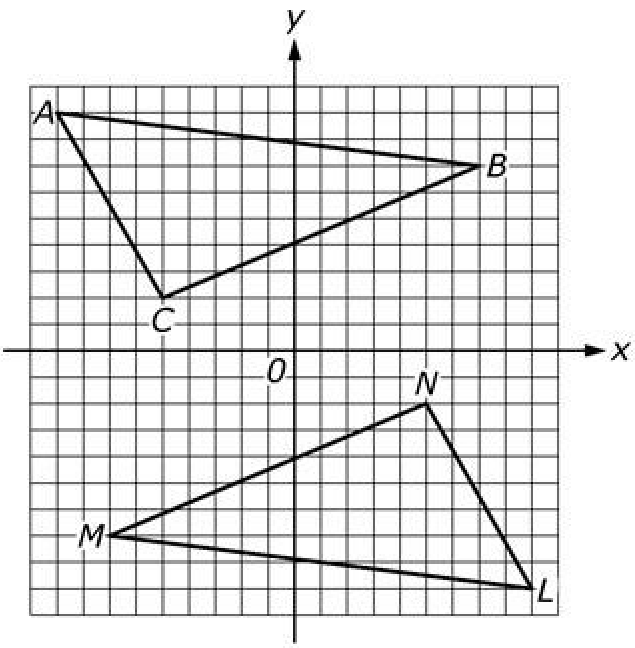
13. Based on the graph shown, determine if the statement shown below is true or false?

$$\frac{AB}{EF} \cong \frac{BC}{FG} \cong \frac{CD}{HE} \cong \frac{DA}{GH}$$

T. True

F. False

14. Triangle *ABC* and triangle *LMN* shown in the coordinate plane below are congruent.



What criteria can prove triangle *ABC* is congruent to triangle *LMN?* Select all that apply.

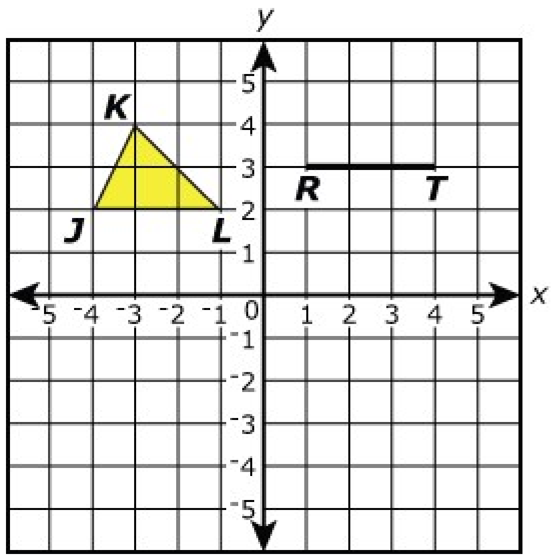
A. SAS

B. ASA

C. SSS

D. AAS

15. Triangle *JKL* and line segment *RT* are shown on the graph.



If triangle *JKL* is congruent to triangle *RST*, what is the maximum number of possible coordinates for point *S*?

A. 1

B. 2

C. 3

D. 4

16. $\triangle XYZ$ is transformed on a coordinate plane to obtain its congruent image $\triangle X'Y'Z'$. Which of the following statements could be true?

I. $\triangle X'Y'Z'$ is the translated image of $\triangle XYZ$.
II. $\triangle X'Y'Z'$ is the reflected image of $\triangle XYZ$.
III. $\triangle X'Y'Z'$ is the rotated image of $\triangle XYZ$.

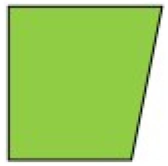
A. only I

B. only II

C. I, II, and III

D. only I and II

17.



The above shape has which type of symmetry?

A. Point symmetry

B. Line symmetry

C. Point and line symmetry

D. No symmetry

18. Which step **must** be completed when using a compass and straightedge to construct a line through a given point, parallel to a given line?

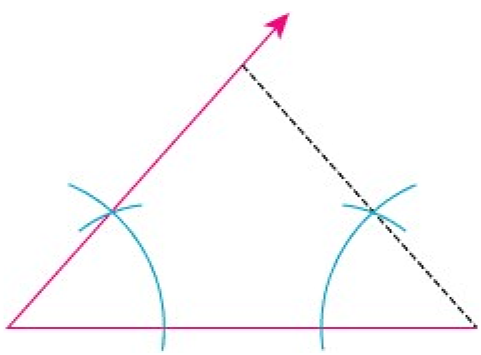
A. copy an angle

B. bisect an angle

C. construct a perpendicular

D. draw a perpendicular bisector

19.



Which construction is illustrated above?

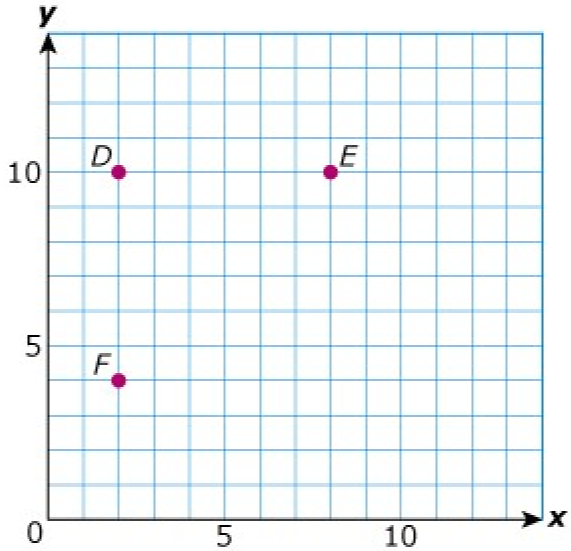
A. A perpendicular to a given line from a point on the line

B. An angle congruent to a given angle

C. The bisector of an angle

D. The bisector of a line segment

20. Three speakers are positioned as shown on the grid below.



The "sweet spot," or best place to hear the music coming out of all three speakers, is the center of the circle inscribed in $\triangle DEF$. What are the coordinates of the sweet spot?

A. (4, 8)

B. (5, 7)

C. (6, 7)

D. (4, 7)

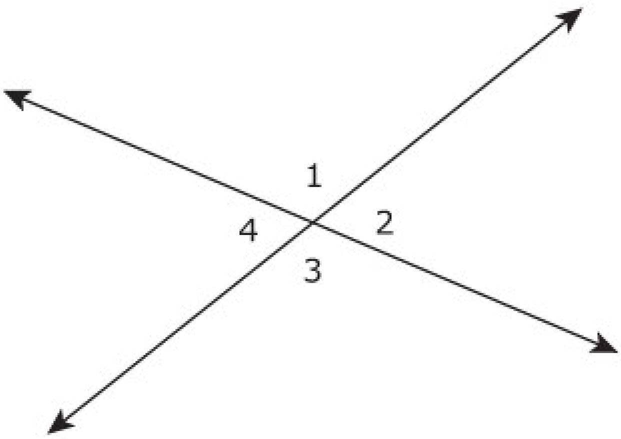
TEST NAME: **2016-2017 GEO BM2**
TEST ID: **64271**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. The diagram shows two lines that intersect to form four angles.



Which explanation proves that vertical angles are congruent?

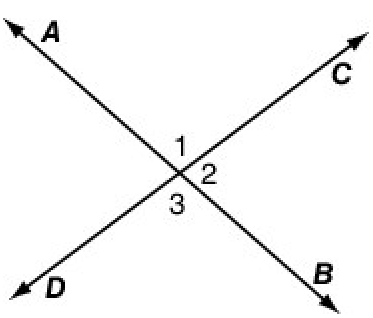
A. $\angle 1$ and $\angle 2$ are supplementary, and $\angle 2$ and $\angle 3$ are supplementary since angles in a linear pair are supplementary. $\angle 1 \cong \angle 3$ because supplements of the same angle are congruent.

B. $\angle 1$ and $\angle 2$ are complementary, and $\angle 2$ and $\angle 3$ are complementary since angles in a linear pair are complementary. $\angle 1 \cong \angle 3$ because complements of the same angle are congruent.

C. $\angle 1$ and $\angle 2$ are supplementary, and $\angle 3$ and $\angle 4$ are supplementary since angles in a linear pair are supplementary. $\angle 1 \cong \angle 3$ because supplements of the same angle are congruent.

D. $\angle 1$ and $\angle 2$ are complementary, and $\angle 3$ and $\angle 4$ are complementary since angles in a linear pair are complementary. $\angle 1 \cong \angle 3$ because complements of the same angle are congruent.

2. Which table correctly lists the reasons to prove $\angle 1 \cong \angle 3$, given that $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$?



A.

Statements	Reasons
1. $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	2. Definition of linear pair
3. $m\angle 1 + m\angle 2 = 180°$; $m\angle 2 + m\angle 3 = 180°$	3. Linear pair postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Transitive property
5. $m\angle 1 = m\angle 3$	5. Subtraction property of equality
6. $\angle 1 \cong \angle 3$	6. Definition of congruency

B.

Statements	Reasons
1. $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	2. Definition of linear pair
3. $m\angle 1 + m\angle 2 = 180°$; $m\angle 2 + m\angle 3 = 180°$	3. Linear pair postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Reflexive property
5. $m\angle 1 = m\angle 3$	5. Subtraction property of equality
6. $\angle 1 \cong \angle 3$	6. Definition of congruency

C.

Statements	Reasons
1. $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	2. Definition of linear pair
3. $m\angle 1 + m\angle 2 = 180°$; $m\angle 2 + m\angle 3 = 180°$	3. Linear pair postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Transitive property
5. $m\angle 1 = m\angle 3$	5. Addition property of equality
6. $\angle 1 \cong \angle 3$	6. Definition of congruency

D.

Statements	Reasons
1. $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	2. Definition of linear pair
3. $m\angle 1 + m\angle 2 = 180°$; $m\angle 2 + m\angle 3 = 180°$	3. Linear pair postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Reflexive property
5. $m\angle 1 = m\angle 3$	5. Addition property of equality
6. $\angle 1 \cong \angle 3$	6. Definition of congruency

3. The lengths of the three sides of different triangles are given below. Which triangle is a right triangle?

A. 4 ft, 4 ft, and $2\sqrt{2}$ ft

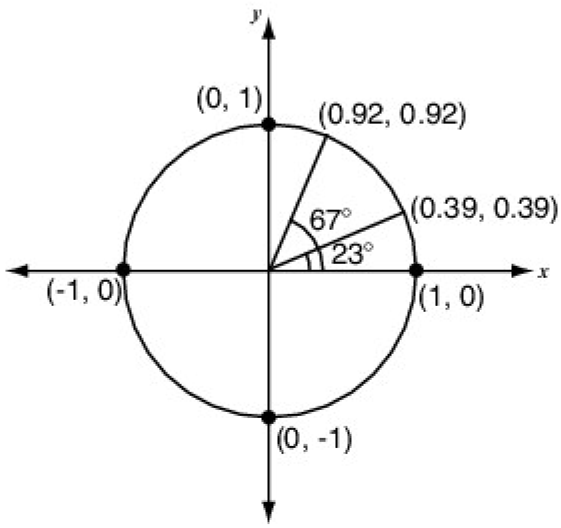
B. 4 ft, $4\sqrt{3}$ ft, and 8 ft

C. $2\sqrt{2}$ ft, $2\sqrt{2}$ ft, and $4\sqrt{2}$ ft

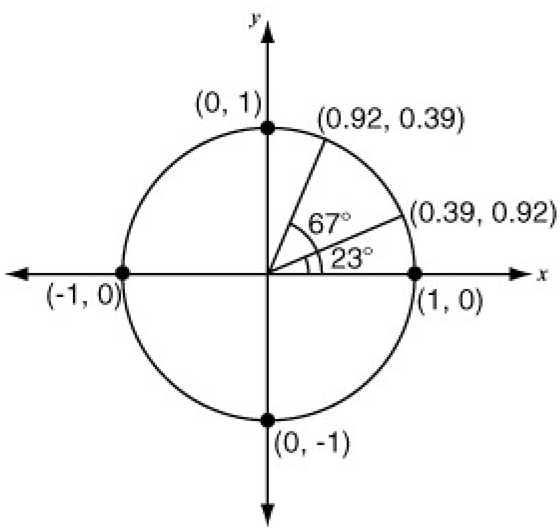
D. $2\sqrt{3}$ ft, $2\sqrt{3}$ ft, and 12 ft

4. Which diagram **best** shows that that $\sin(23°) = \cos(67°)$?

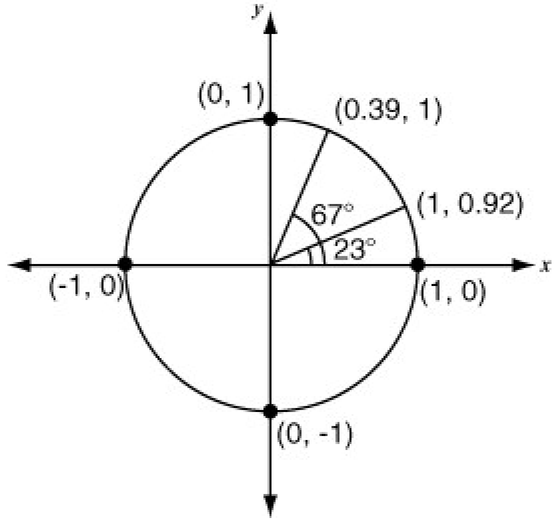
A.



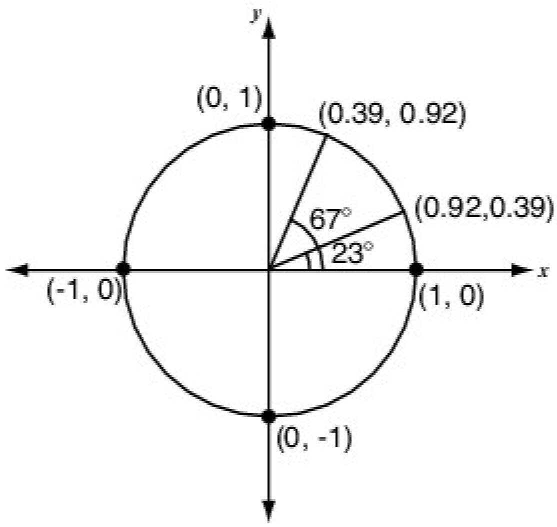
B.



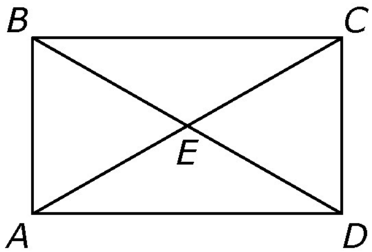
C.



D.



5.



$\overline{AC} \cong \overline{BD}$

Complete the proof that *ABCD* is a rectangle by selecting the correct reason from the drop-down menus to match each statement.

Statement	Reason
$ABCD$ is a parallelogram.	Given

$\overline{AC} \cong \overline{BD}$	Given
$\overline{AD} \cong \overline{CB}$ and $\overline{AB} \cong \overline{CD}$	1 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$\overline{AC} \cong \overline{AC}$ and $\overline{BD} \cong \overline{BD}$	2 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$\triangle ADC \cong \triangle CBA \cong \triangle DAB \cong \triangle BCD$	3 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle

	(F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$\angle ADC \cong \angle CBA \cong \angle DAB \cong \angle BCD$	Corresponding parts of congruent triangles are congruent.
$m\angle ADC = m\angle CBA = m\angle DAB = m\angle BCD$	4 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$m\angle ADC + m\angle CBA + m\angle DAB + m\angle BCD = 360°$	5 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division

	property of equality
$4(m\angle ADC) = 360°$	6 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$(m\angle ADC) = 90°$	7 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$m\angle CBA = m\angle DAB = m\angle BCD = 90°$	8 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle

	(F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$ABCD$ is a rectangle.	9 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality

6. What are the solutions to the equation below?

$3x^2 - 5x - 7 = 0$

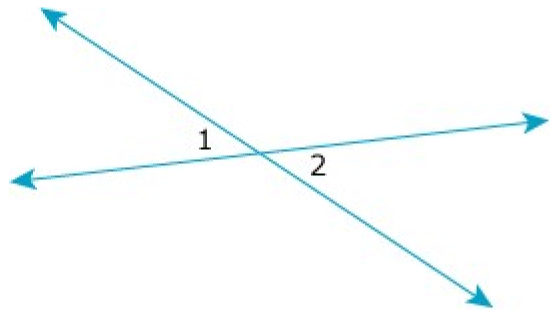
A. $\dfrac{-5 \pm \sqrt{109}}{2}$

B. $\dfrac{-5 \pm \sqrt{109}}{6}$

C. $\dfrac{5 \pm \sqrt{109}}{2}$

D. $\dfrac{5 \pm \sqrt{109}}{6}$

7.



If the measure of $\angle 1$ is 40°, what is the measure of $\angle 2$?

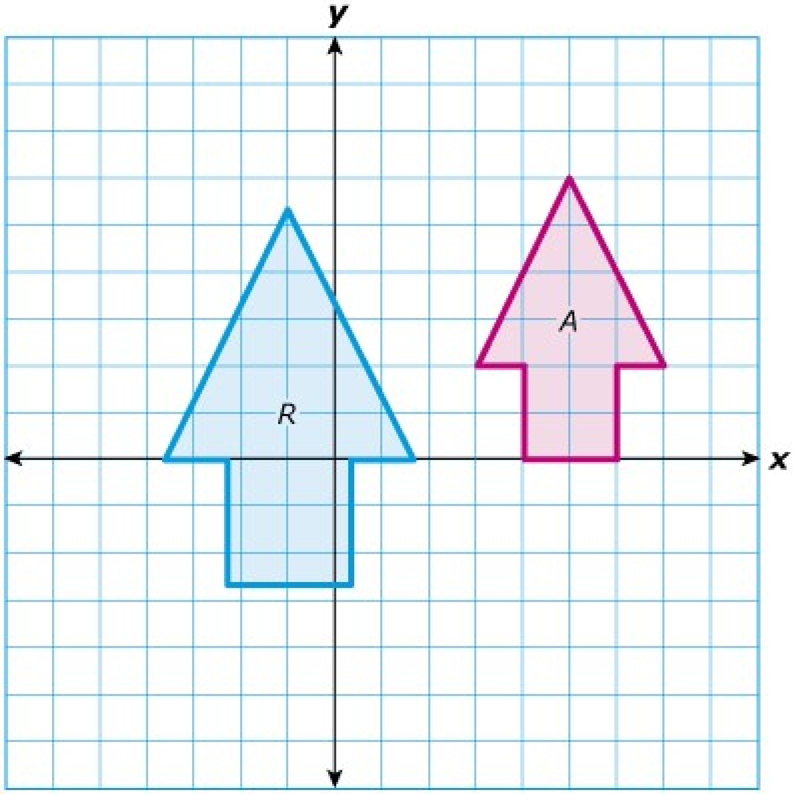
A. 140°

B. 90°

C. 50°

D. 40°

8.



If figure *R* is the image after a dilation of figure *A*, which is closest to the scale factor for the dilation? *(HINT: take a vertex and multiply by your answer choices)*

A. $1\frac{1}{4}$

B. $1\frac{1}{3}$

C. $1\frac{2}{3}$

D. $1\frac{1}{2}$

9. If a 3-centimeter by 5-centimeter photograph is enlarged by 50%, what are the dimensions of the new enlarged photograph?

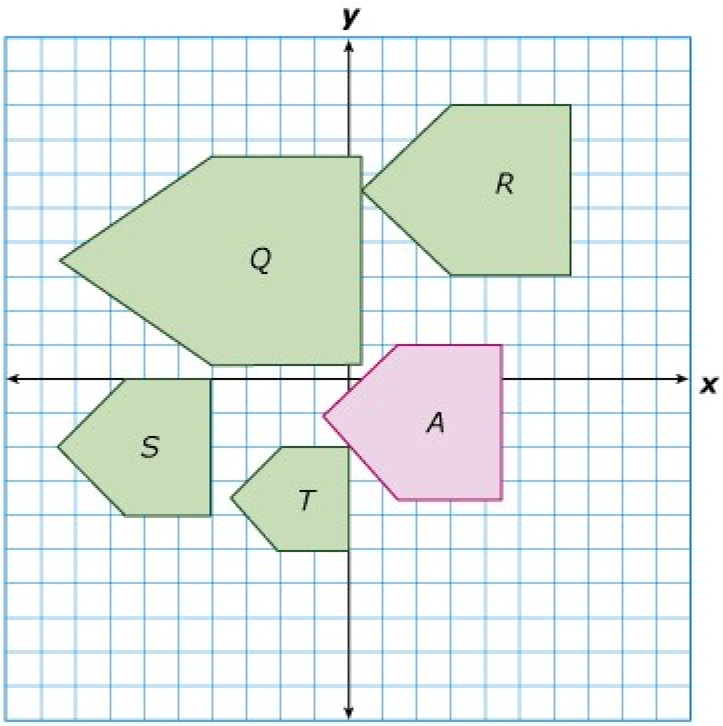
A. 4.5 by 7.5 centimeters

B. 3.5 by 5.5 centimeters

C. 3.25 by 7.5 centimeters

D. 2.5 by 4.5 centimeters

10.



Which figure in the drawing best represents a dilation of figure *A* with a scale factor of $\frac{2}{3}$?

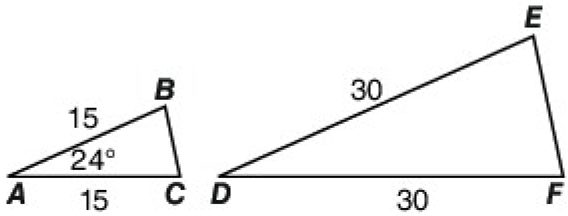
A. *Q*

B. *R*

C. *S*

D. *T*

11. The figure below shows a $\triangle ABC$ and its dilation image $\triangle DEF$.



Which statement must be **true**?

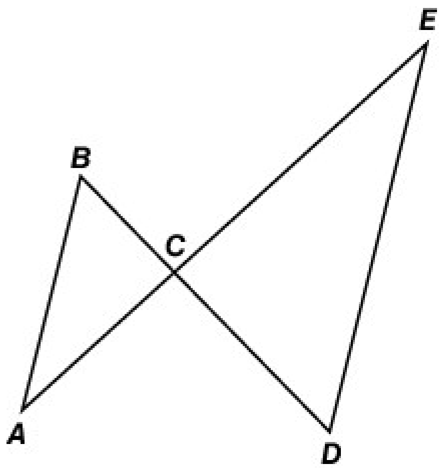
A. $m\angle A = 2m\angle D$ and $2\overline{BC} = \overline{EF}$

B. $m\angle B = m\angle E$ and $2\overline{BC} = \overline{EF}$

C. $m\angle B = m\angle E$ and $\overline{BC} = \overline{EF}$

D. $m\angle A = 2m\angle D$ and $\overline{BC} = \overline{EF}$

12. In the figure below, $\triangle ABC$ was dilated and then rotated 180° about point C to create $\triangle EDC$, as shown below.



Based on the given transformations, which relationships must be true?

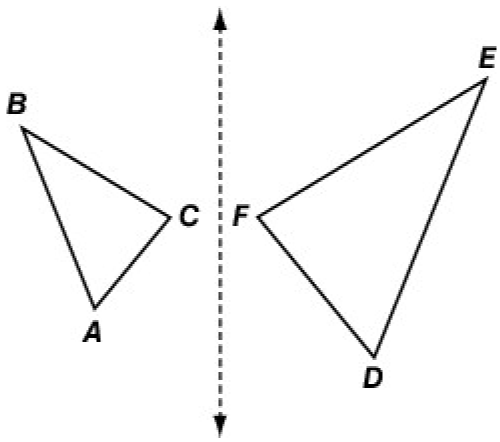
A. $\angle A \cong \angle D$ and $\angle B \cong \angle E$, so $\triangle ABC \sim \triangle DEC$

B. $\angle A \cong \angle E$ and $\angle B \cong \angle D$, so $\triangle ABC \sim \triangle EDC$

C. $\angle BCA \cong \angle DCE$ and $\angle B \cong \angle E$, so $\triangle ABC \cong \triangle DEC$

D. $\angle ACB \cong \angle ECD$ and $\angle A \cong \angle D$, so $\triangle ABC \cong \triangle EDC$

13. Examine the following figure in which $\triangle ABC$ was dilated and then reflected across the given line to create $\triangle DEF$.



If $m\angle A = 57°$ and $m\angle E = 35°$, which statement must be true?

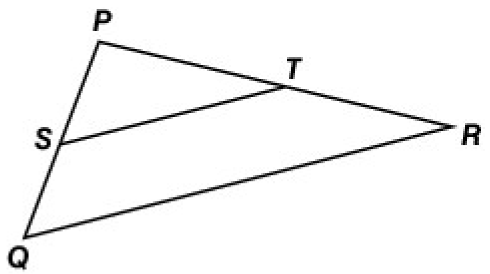
A. $m\angle B = 57°$ and $m\angle D = 35°$

B. $m\angle B = 35°$ and $m\angle D = 57°$

C. $\overline{BC} \cong \overline{EF}$, $\overline{BA} \cong \overline{ED}$ and $m\angle B = 35°$

D. $\overline{BC} \cong \overline{EF}$, $\overline{BA} \cong \overline{ED}$ and $m\angle D = 35°$

14. In the given triangle, $\overline{ST} \parallel \overline{QR}$.



Which of these statements can be proved?

I. $PS = SQ$

II. $\frac{PS}{SQ} = \frac{PT}{TR}$

III. $(PS)^2 + (PT)^2 = (ST)^2$

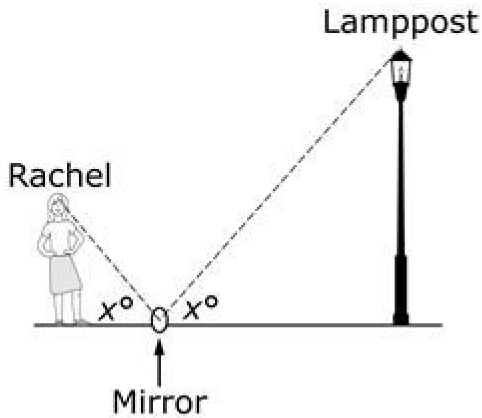
A. I only

B. II only

C. I and III only

D. II and III only

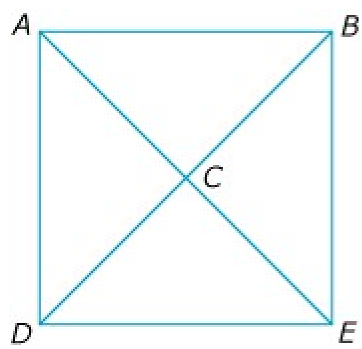
15.



To find the height of a lamppost at a park, Rachel placed a mirror on the ground 20 feet from the base of the lamppost. She then stepped back 4 feet so that she could see the top of the lamp post in the center of the mirror. Rachel's eyes are 5 feet 6 inches above the ground.

What is the height, in feet, of the lamppost? *(HINT: Use a proportion; height to distance from mirror)*

16.



If $\triangle ACD \cong \triangle ECB$, which statement is true?

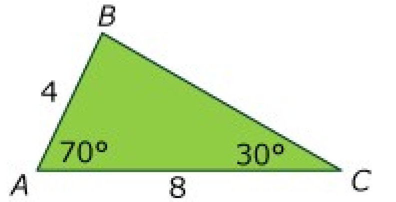
A. $\overline{AC} \cong \overline{EC}$

B. $\overline{AC} \cong \overline{BC}$

C. $\angle ADC \cong \angle BEC$

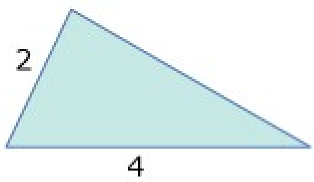
D. $\angle ACD \cong \angle CEB$

17.

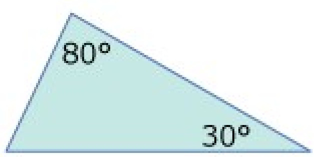


Given the measures shown, which triangle can be shown to be similar to triangle *ABC* shown above?

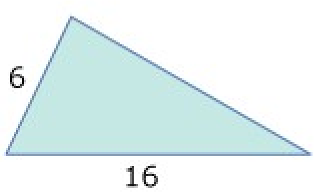
A.



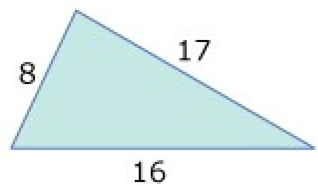
B.



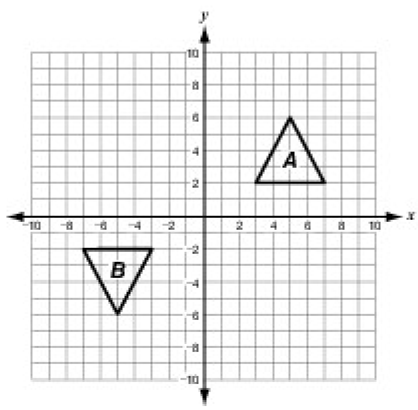
C.



D.



18. Two congruent figures, *A* and *B*, are shown on a coordinate plane below.



Which of these reflection(s) map figure *A* onto figure *B*?

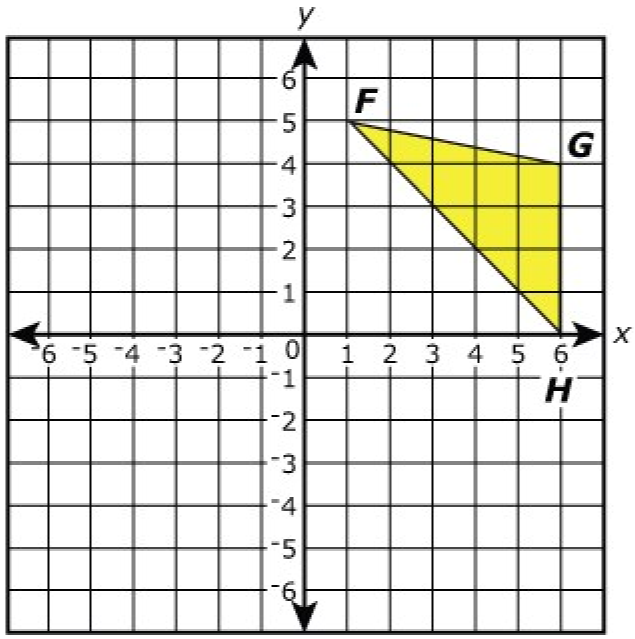
A. a reflection over the line $y = x$

B. a reflection over the line $y = -x$

C. a reflection over the line $x = 0$ followed by a reflection over the line $x = 0$

D. a reflection over the line $x = 0$ followed by a reflection over the line $y = 0$

19. Triangle *FGH* is shown in the diagram.



If triangle *FGH* is congruent to triangle *FEH*, what are the coordinates of *E*?

A. $(8,\ 6)$

B. $(4,\ 2)$

C. $(2,\ 0)$

D. $(1,\ 1)$

20. Sam is studying a geometric drawing. He observes that $\angle PQR$ and $\angle AQB$ are obtuse vertical angles and that $\angle QPR$ and $\angle QAB$ are congruent. He proves that $PQ = AQ$. Which postulate uses Sam's information to prove that $\triangle PQR \cong \triangle AQB$?

A. Angle-Side-Angle (ASA)

B. Hypotenuse Leg (HL)

C. Side-Side-Angle (SAS)

D. Side-Side-Side (SSS)

TEST NAME: **2016-2017 GEO BM3**

TEST ID: **64283**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

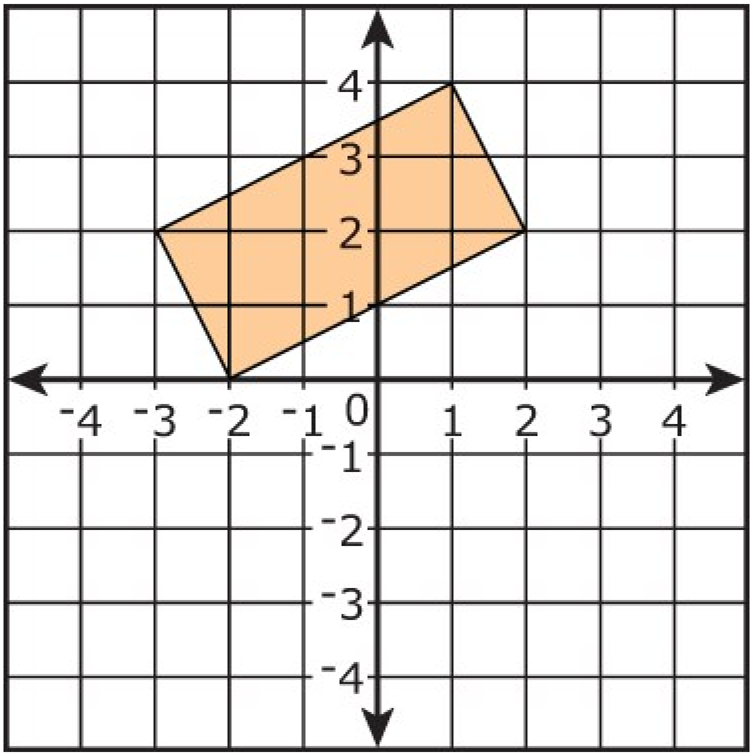
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. A rectangle is graphed on the coordinate plane.



Which expression could be used to find the area of the rectangle?

A. $(\sqrt{13})(\sqrt{20})$

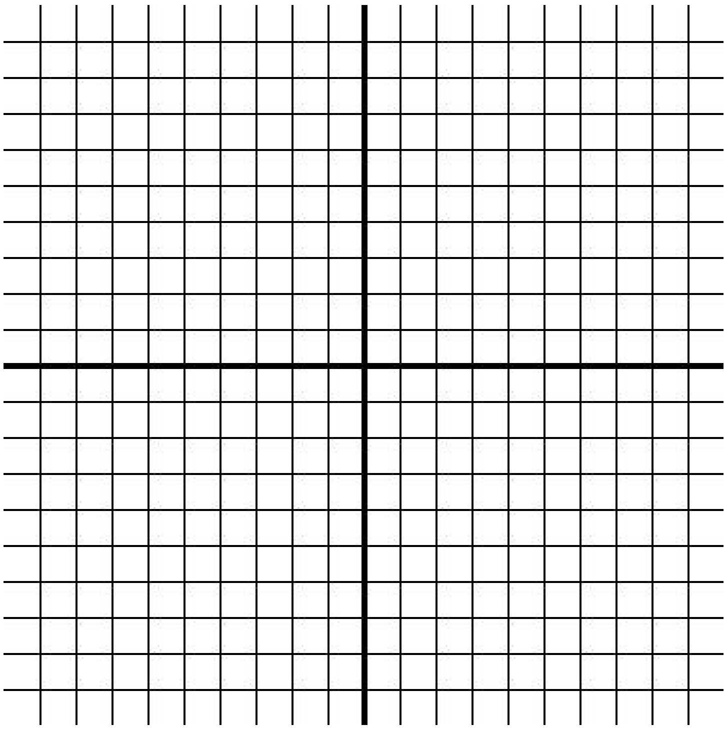
B. $(\sqrt{5})(\sqrt{20})$

C. $(\sqrt{3})(\sqrt{6})$

D. $(\sqrt{2})(\sqrt{3})$

2. A parallelogram has two vertices at (1,1) and (0,7) and its diagonals cross at the point (4,3).

Select the two coordinate pairs that correspond to the two vertices of the parallelogram.



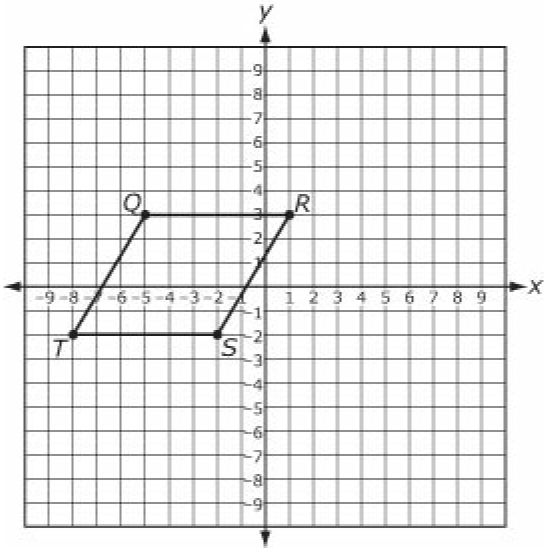
A. (-5, -3)

B. (8, -1)

C. (-2, 3)

D. (7, 5)

3. **Consider parallelogram *QRST* graphed below.**



What is the perimeter of *QRST* in grid units?

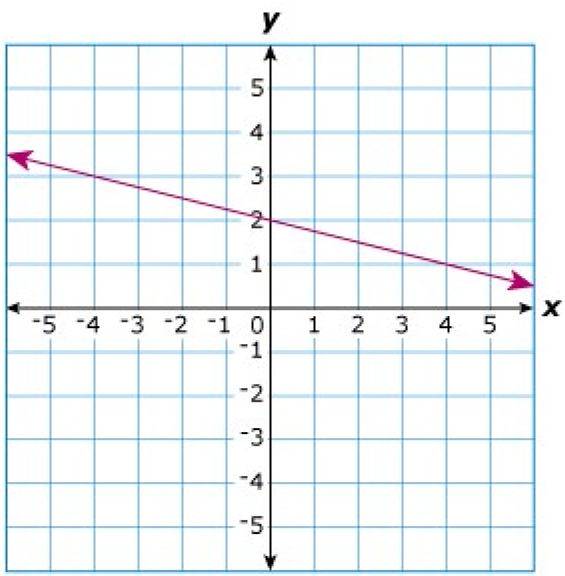
A. $12 + 2\sqrt{2}$

B. $12 + 2\sqrt{34}$

C. 20

D. 24

4. Which is the equation of a line perpendicular to the line shown and through the point *P* (1, –2)?



A. $y = -4x + 6$

B. $y = 4x - 6$

C. $y = -3x + 5$

D. $y = 3x - 5$

5. Classify each of the following pairs of lines as parallel, perpendicular or neither.

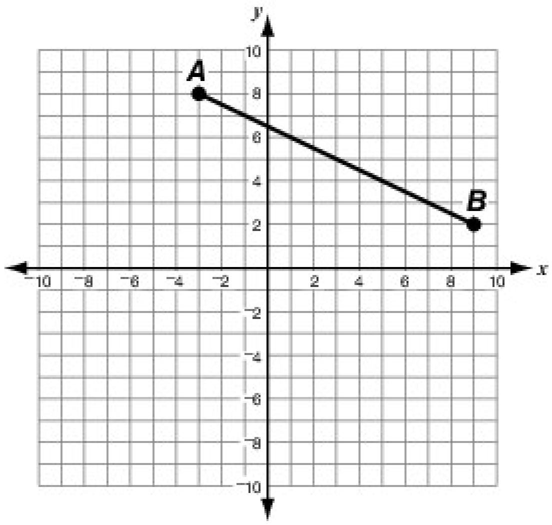
Questions	Answer Choices
1. $3y = -5x - 5$ $(y - 7) = 0.6(x - 5)$	A. Parallel
2. $2x + 3y = 4$ $4x + 5y = 6$	B. Perpendicular
3. $y = 4x + 1$ $(y - 2) = 4(x - 3)$	C. Neither
4. $y = -3x + 5$ $9x + 3y = 2$	

6. Point P lies on the directed line segment from $A(2,3)$ to $B(8,0)$ and partitions the segment in the ratio 2 to 1.

What are the coordinates of point P?

x = 1 - (A) 1 (B) 2 (C) 3 (D) 4 (E) 5 (F) 6 (G) 7 (H) 8 and y = 2 - (A) 1 (B) 2 (C) 3 (D) 4 (E) 5 (F) 6 (G) 7 (H) 8

7. Examine the following coordinate grid.



Point C is the midpoint of $\overline{AB}$. There exists a point D that is located on $\overline{AB}$ and is one-third of the way from C to B. What are the coordinates of D?

A. $(1, 6)$

B. $(3, 5)$

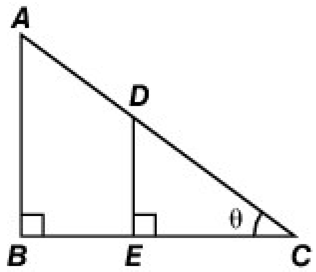
C. $(5, 4)$

D. $(7, 3)$

8. **What is the perimeter, to the nearest tenth of a unit, of a triangle with vertices at $A(2, 1)$, $B(-6, 0)$, and $C(6, -4)$?**

A. 16.3
B. 16.7
C. 20.0
D. 27.1

9. Which of these equations regarding the relationship between the sides and angles of the triangles shown below is **true**?



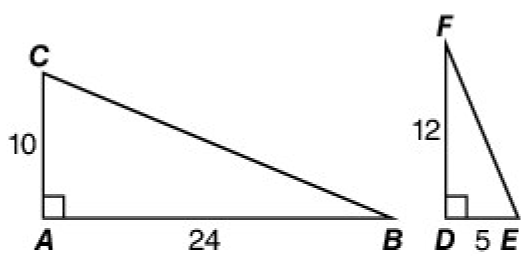
A. $\sin^{-1}\left(\frac{AB}{AC}\right) = \sin\left(\frac{DE}{DC}\right)$

B. $\sin^{-1}\left(\frac{AB}{AC}\right) = \cos^{-1}\left(\frac{DE}{DC}\right)$

C. $\sin^{-1}\left(\frac{AB}{AC}\right) = \sin^{-1}\left(\frac{DE}{DC}\right)$

D. $\sin^{-1}\left(\frac{AB}{AC}\right) = \tan^{-1}\left(\frac{DE}{DC}\right)$

10. If the triangles shown below are similar, which equation about the relationship of their angles is true?



A. $\sin(B) = \sin(E)$

B. $\sec(B) = \cos(E)$

C. $\tan(B) = \cot(F)$

D. $\sin(B) = \sin(F)$

11. If $\sin(2x) = \cos(x + 30°)$, what is the value of *x*?

A. 20°

B. 30°

C. 50°

D. 110°

12. If $\sin(x) = \cos(y)$, which of these are possible values of *x* and *y*?

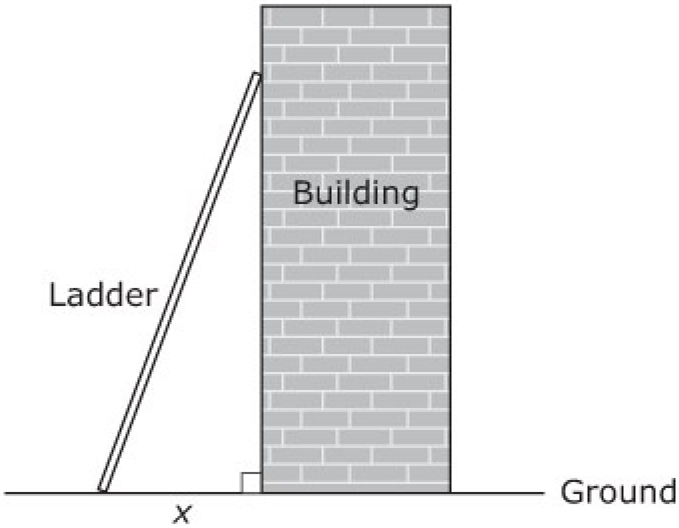
A. $x = 0$ and $y = 0$

B. $x = 15$ and $y = 30$

C. $x = 30$ and $y = 60$

D. $x = 120$ and $y = 60$

13. A worker must lean a 22-foot ladder against the side of a building. Safety rules for the ladder state that the angle of elevation between the ground and the ladder should be 70°.



Which equation should the worker use to determine *x*, the length between the base of the building and the base of the ladder?

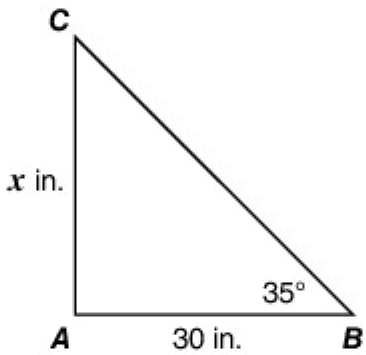
A. $$\sin 20^{o} = \frac{x}{22}$$

B. $$\tan 70^{o} = \frac{22}{x}$$

C. $$70^2 = 22^2 + x^2$$

D. $$\sqrt{70 - 22} = x$$

14. What is the approximate value of x, in inches, in the triangle below?



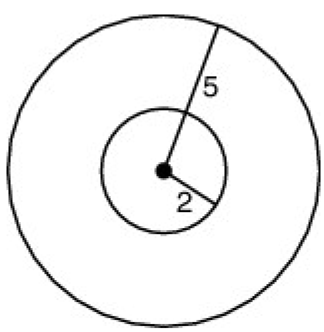
A. 17.2

B. 21.0

C. 30.0

D. 42.8

15. Troy drew the diagram below. The inner circle has a radius of 2 units, and the outer circle has a radius of 5 units. Troy says the two circles are similar.



Which statement **best** explains whether Troy is correct, and why?

A. He is correct because the inner circle is a dilation of the outer circle.

B. He is correct because the inner circle has the same center as the outer circle.

C. He is not correct because the inner circle's radius is less than the outer circle's radius.

D. He is not correct because the inner circle's radius is not half of the outer circle's radius.

16. Triangle *FGH* is inscribed in a circle. Which statement is *always* true?

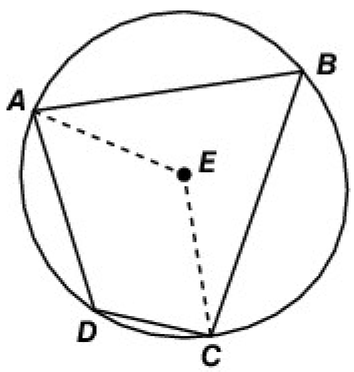
A. One of the angles in the triangle is a central angle in the circle.

B. One of the sides of the triangle is a radius of the circle.

C. If the triangle is obtuse, two of the sides are congruent.

D. If the triangle is a right triangle, one of the sides is a diameter of the circle.

17. Quadrilateral $ABCD$ is inscribed in circle *E*. Angle AEC is a central angle, and angle ABC is an inscribed angle.



Which statement about the angles in this figure **must** be true?

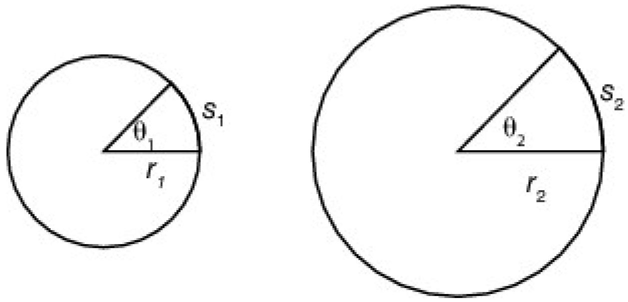
A. $\angle ADC \cong \angle ABC$

B. $\angle ADC \cong \angle AEC$

C. $m\angle ADC + m\angle ABC = 180°$

D. $m\angle ADC + m\angle AEC = 180°$

18. In the given image, $\theta_1 = \theta_2$, and the angles are measured in radians. Which of these must be **true**?



A. $\frac{s_1}{r_1} = \frac{s_2}{r_2} = \frac{\theta}{2\pi}$

B. $\frac{s_1}{s_2} = \frac{r_1}{r_2} = \frac{\theta}{2\pi}$

C. $\frac{s_1}{r_1} = \frac{s_2}{r_2} = \theta$

D. $\frac{s_1}{s_2} = \frac{r_1}{r_2} = \theta$

19. **On a coordinate grid, a circle passes through the point $(6, -1)$ and has a center of $(2, -4)$. Which is a formula for this circle?**

A. $(x-2)^2 + (y+4)^2 = 25$

B. $(x+2)^2 + (y-4)^2 = 5$

C. $(x-6)^2 + (y+1)^2 = 25$

D. $(x+6)^2 + (y-1)^2 = 5$

20. **What are the center and radius of a circle with the equation $x^2 - 6x + y^2 - 16y = 71$?**

A. Center: $(3, 8)$; radius $= 12$

B. Center: $(-3, -8)$; radius $= 12$

C. Center: $(6, 16)$; radius $= \sqrt{71}$

D. Center: $(-6, -16)$; radius $= \sqrt{71}$

TEST NAME: **2016-2017 GEO BM4**

TEST ID: **64292**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

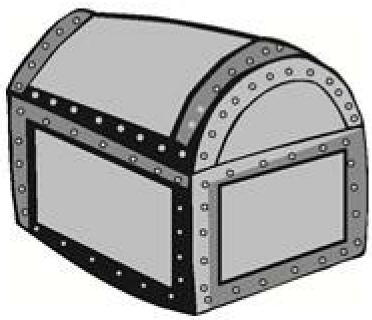
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1.



The figure above represents a chest. What is an appropriate shape (or combination of shapes) that can be used to model the chest.

Drag all the options that apply to the container below.

Sphere	Cylinder	Half a cylinder
Rectangular prism	Rectangular pyramid	

Shapes to model the chest

2. The area of circle *Q* is approximately 157 square inches. If one side of a square is equal to the diameter of circle *Q*, which is the closest approximation to the area of the square?

A. $10\sqrt{2}$ sq ft

B. $157\sqrt{2}$ sq ft

C. 200 sq ft

D. 314 sq ft

3. To study the population of a species of bird, wildlife experts counted the number of birds in a sample area of 250,000 square yards in its natural habitat. They found there were 0.0005 birds per square yard. What would be the number of birds they would expect to find in 500 square miles of the bird's natural habitat?

A. 125

B. 440

C. 774,000

D. 1,000,000

4. Veronica's science class is studying density, and each student is asked to bring in an object to determine its density. Veronica brings in a brick that weighs two pounds and is 6 inches long, 3 inches wide, and 2 inches tall. Her friend Becky brings in a block of wood that weighs 3 pounds and is 1 foot long, 2 inches wide, and 3 inches tall. Which is a true statement about the objects?

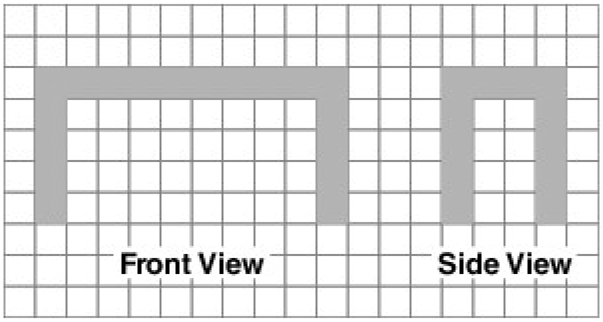
A. The brick has a greater volume than the block and a smaller mass, so the brick is less dense than the block.

B. The block has a smaller volume than the brick and a greater mass, so the brick is more dense than the block.

C. The brick is half the volume of the block but more than half the mass, so the brick is more dense than the block.

D. The block is twice the volume of the brick and more than double the mass, so the brick is less dense than the block.

5. Katie is using graph paper to sketch a design for a flat wooden bench that will have a rectangular seat. The front and side views that Katie sketched are shown below.



If Katie uses a scale on the graph paper in which each box represents a 6-inch by 6-inch square, what are the dimensions of the seat of the bench Katie is designing?

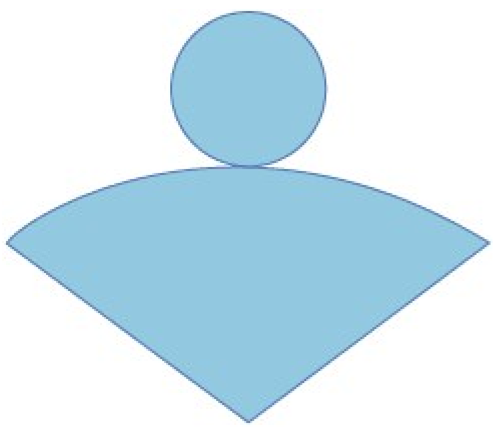
A. 2 feet long by 2.5 feet deep

B. 5 feet long by 2 feet deep

C. 5.5 feet long by 2.5 feet deep

D. 10 feet long by 5 feet deep

6.



Which three-dimensional figure does the net shown above best represent?

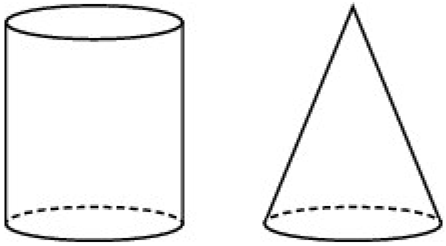
A. Cylinder

B. Sphere

C. Hemisphere

D. Cone

7. The cylinder and the cone shown below have the same height, and their bases have the same radius.



How does the volume of the cylinder (V_{cyl}) compare to the volume of the cone (V_{cone})?

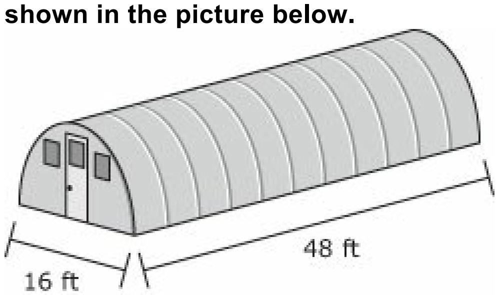
A. $(V_{cyl}) = 2V_{cone}$

B. $V_{cyl} = \frac{1}{3}V_{cone}$

C. $V_{cyl} - V_{cone} = 3V_{cone}$

D. $V_{cyl} - V_{cone} = 2V_{cone}$

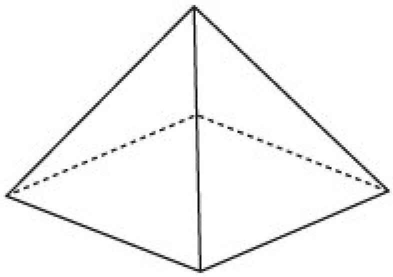
8. **A steel-framed arched hut used for storage has a diameter of 16 feet and length of 48 feet, as shown in the picture below.**



What is the approximate volume of the hut? Use 3.14 for π.

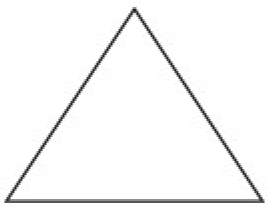
A. 4,823 cubic feet
B. 9,646 cubic feet
C. 19,292 cubic feet
D. 38,584 cubic feet

9. A two-dimensional cross-section of this square pyramid passes through the vertex and is perpendicular to the base.

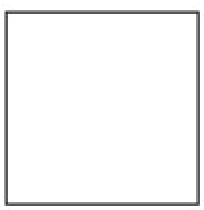


Which polygon identifies the shape of this cross-section?

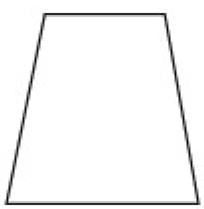
A.



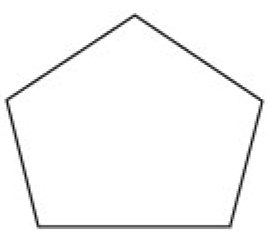
B.



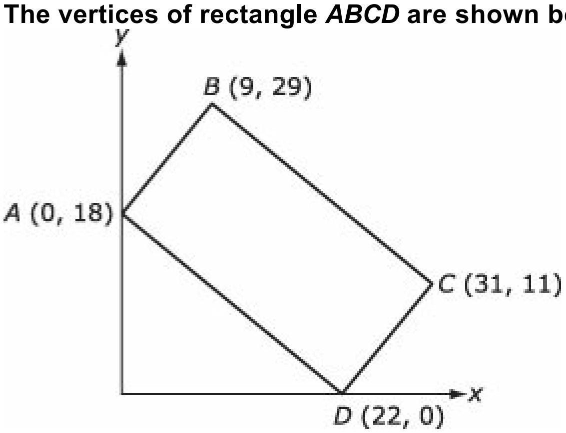
C.



D.



10. **The vertices of rectangle *ABCD* are shown below.**



What is the area of *ABCD*?

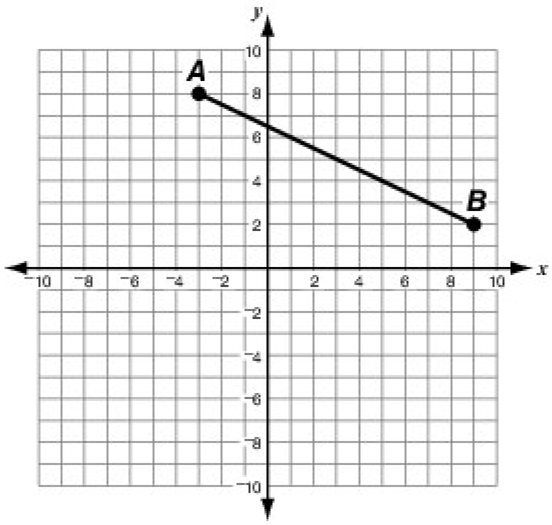
A. 202 units^2

B. 396 units^2

C. 404 units^2

D. 808 units^2

11. Examine the following coordinate grid.



Point *C* is the midpoint of $\overline{AB}$. There exists a point *D* that is located on $\overline{AB}$ and is one-third of the way from *C* to *B.* What are the coordinates of *D*?

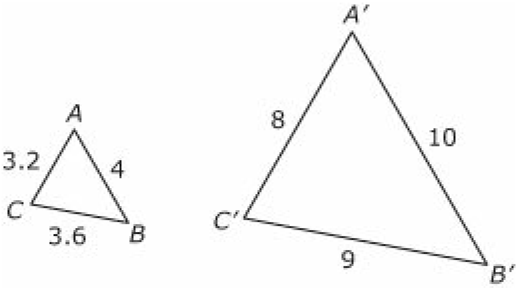
A. $(1, 6)$

B. $(3, 5)$

C. $(5, 4)$

D. $(7, 3)$

12. **Triangle *ABC* is transformed and the image $\triangle A'B'C'$ is formed.**



Which proportion could be used to prove

$\triangle ABC \cong \triangle A'B'C'$

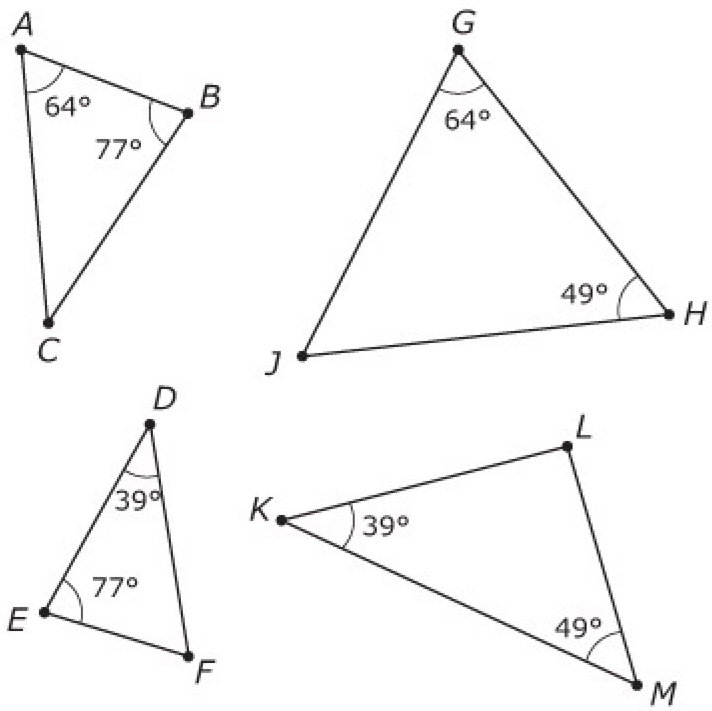
A. $\frac{4}{3.6} = \frac{8}{9} = \frac{3.2}{10}$

B. $\frac{3.2}{4} = \frac{3.6}{9} = \frac{8}{10}$

C. $\frac{3.2}{8} = \frac{3.6}{9} = \frac{4}{10}$

D. $\frac{4}{8} = \frac{3.6}{9} = \frac{3.2}{10}$

13. Which pair of triangles is similar?



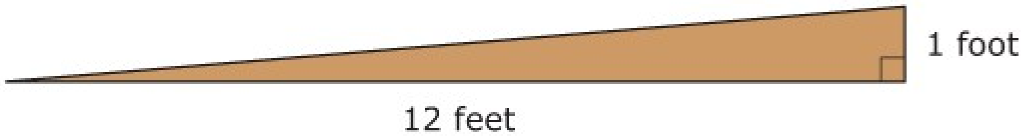
A. $\triangle BCA \sim \triangle EDF$

B. $\triangle DFE \sim \triangle KML$

C. $\triangle ACB \sim \triangle GHJ$

D. $\triangle MKL \sim \triangle HGJ$

14. A building code requires that curb ramps meet certain standards. The slope of the ramp may not rise more than 1 foot for every 12 feet of its run, or horizontal distance.



Which degree measure is closest to the angle of elevation from the ground to the ramp?

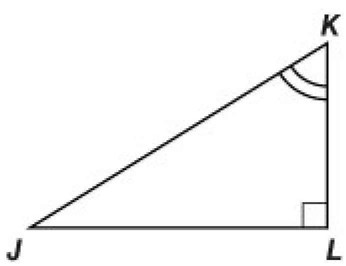
A. 5°

B. 8°

C. 12°

D. 15°

15. Triangle *JKL* is shown below.



Which ratio represents $\tan K$?

A. $\frac{KL}{JL}$

B. $\frac{JL}{LK}$

C. $\frac{JL}{JK}$

D. $\frac{KL}{JK}$

16. On a set of parallel lines cut by a transversal, $m\angle 2 = (7x - 5)°$ and $m\angle 6 = (x + 25)°$. Which value of x could show that $\angle 2$ and $\angle 6$ are corresponding angles, and why?

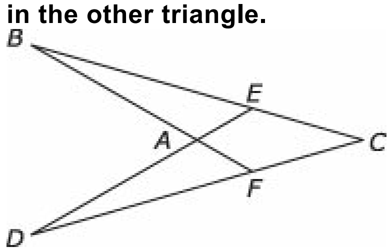
A. $x = 5$; Corresponding angles are congruent.

B. $x = 20$; Corresponding angles are congruent.

C. $x = 5$; Corresponding angles are supplementary.

D. $x = 20$; Corresponding angles are supplementary.

17. **A proof using the diagram below states that a reflection of one triangle across a line will result in the other triangle.**



Which reflection can be used to verify $\triangle BCF \cong \triangle DCE$?

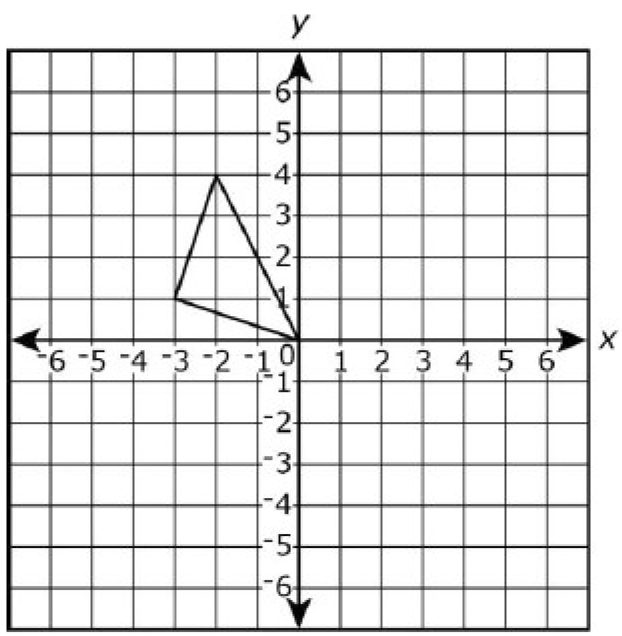
A. $\triangle BCF$ across $\overleftrightarrow{AC}$

B. $\triangle BCF$ across $\overleftrightarrow{BF}$

C. $\triangle DCE$ across $\overleftrightarrow{DE}$

D. $\triangle DCE$ across $\overleftrightarrow{DC}$

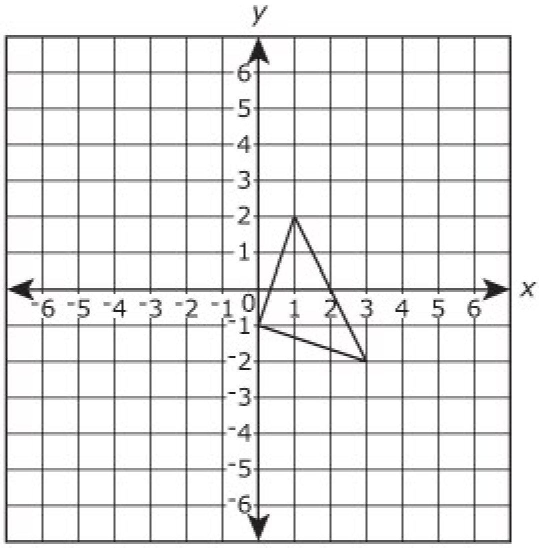
18. A triangle is graphed on a coordinate plane.



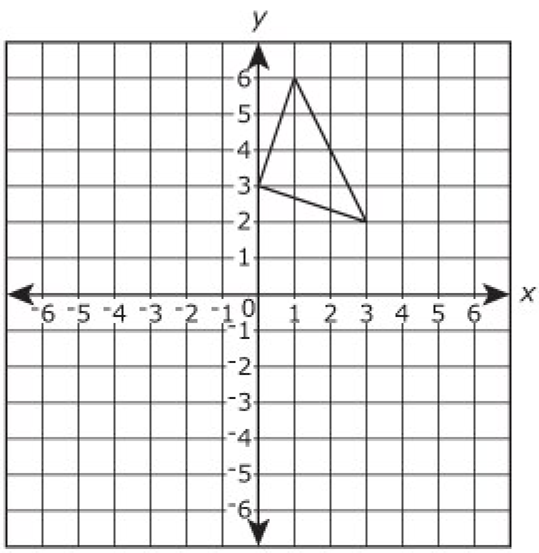
Which graph appears to represent the transformation

$(x, y) \rightarrow (x+3, y-2)$?

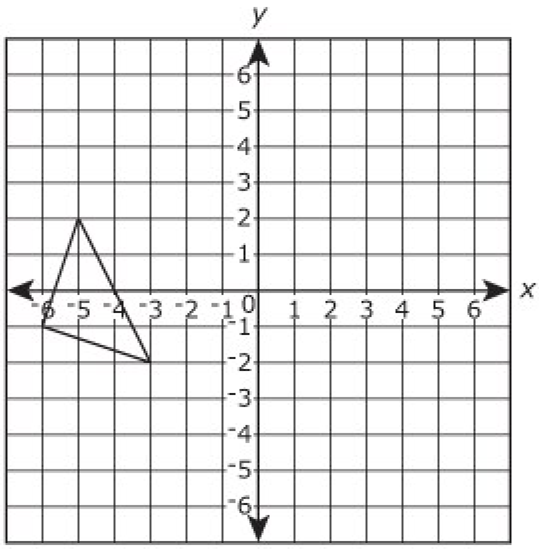
A.



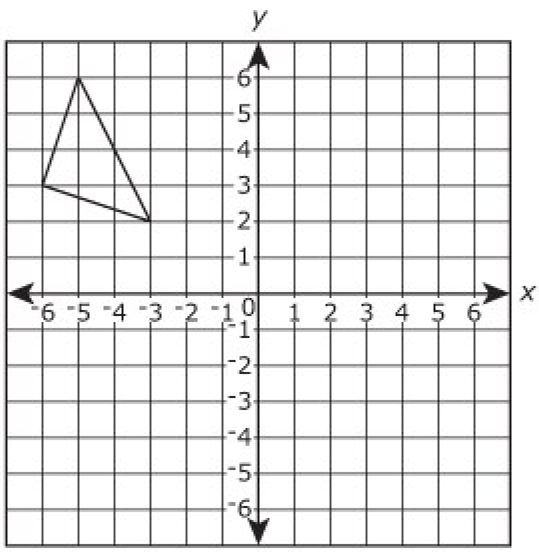
B.



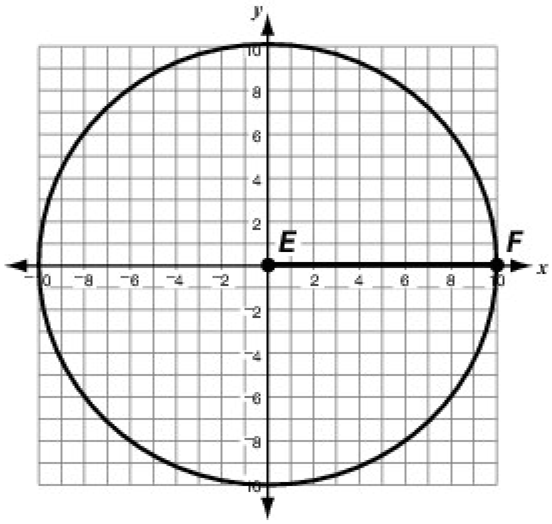
C.


y
x
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

D.


y
x
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

19. William draws circle E, centered at the origin with radius $\overline{EF}$ measuring 10 units, as shown below.



William rotates $\overline{EF}$ 90° counterclockwise about the origin to form $\overline{EG}$. Which statement is **true**?

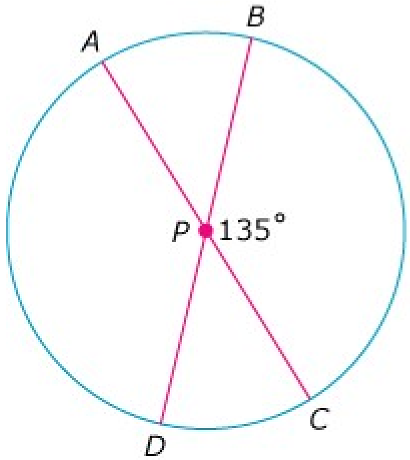
A. $\overline{EF}$ and $\overline{EG}$ are congruent and $m\angle FEG$ is 90°.

B. $\overline{EF}$ and $\overline{EG}$ are not congruent and $m\angle FEG$ is 90°.

C. $\overline{EF}$ and $\overline{EG}$ are congruent and $m\angle FEG$ is not 90°.

D. $\overline{EF}$ and $\overline{EG}$ are not congruent and $m\angle FEG$ is not 90°.

20.



Which is closest to the measure of arc *DC* in circle *P*?

A. 135.0°

B. 67.5°

C. 22.5°

D. 45.0°

Atlantic City High School

Modified Geometry Curriculum

Mathematics Task Force Members

Don Coleman

Colleen O'Donnell

Kimberly Rowe

Director of Secondary Education

Donald Harris

Principal

Lina Gil

Assistant Superintendent of Curriculum and Instruction

Sherry Yahn

Modified Geometry Pacing Guide

Date Range	Teachers have approximately 39 school days to complete the suggested sequences of Chapters from the board approved textbook which align with the curricular frameworks. Please refer to the frameworks for specific learning goals that must be covered in your lessons. ***Adjustments should be made accordingly for varying levels.***
9/6/16 – 9/16/16	Complete Geometry Pre-Test Benchmark
9/6/16 – 11/4/16	Unit 1: Chapters 1, 3, 9
10/31/16 – 11/4/16	Complete Geometry Unit 1 Benchmark 1
11/7/16 – 1/13/17	Unit 2: Chapters 2, 4, 5, 6, 7
1/9/17 – 1/13/17	Complete Geometry Unit 2 Benchmark 2
1/17/17 – 3/17/17	Unit 3: Chapters 8, 10, 12
3/13/17 – 3/17/17	Complete Geometry Unit 3 Benchmark 3
3/20/17 – 5/26/17	Unit 4: Chapter 11 Prepare students for PARCC testing using Performance Tasks
5/22/17 – 6/9/17	Complete Geometry Unit 4 Benchmark 4

All students must complete the pre-test and all 4 benchmarks on the edConnect website. (Benchmark tests are aligned to curricular frameworks, so teachers should be aware of the content of the benchmarks to ensure student success.)

Each teacher may decide to use Benchmark 4 as their final exam as in the past. However, it must be completed by all students (no exemptions from any benchmarks). A cumulative final exam is provided in the appendix of the curriculum for use by teachers that choose to use it.

Suggested Open Educational Resources are available in the Curricular Frameworks for each Unit, which can assist teachers and students with PARCC test preparation.

Overview	Standards for Mathematical Content		Unit Focus	Standards for Mathematical Practice
Unit 1 **Congruence and Constructions**	□ G.CO.A.1 □ G.CO.A.2 □ G.CO.A.3 □ G.CO.A.4 □ G.CO.A.5	■ G.CO.B.6 ■ G.CO.B.7 ■ G.CO.B.8 □ G.CO.D.12 □ G.CO.D.13	• Experiment with transformations in the plane • Understand congruence in terms of rigid motions • Make geometric constructions	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 1: Suggested Open Educational Resources	G.CO.A.1 Defining Parallel Lines G.CO.A.1 Defining Perpendicular Lines G.CO.A.2 Horizontal Stretch of the Plane G.CO.A.3 Seven Circles II G.CO.A.3 Symmetries of rectangles G.CO.A.4 Defining Rotations G.CO.A.5 Showing a triangle congruence		G.CO.B.7 Properties of Congruent Triangles G.CO.B.8 Why does SAS work? G.CO.B.8 Why does SSS work? G.CO.B.8 Why does ASA work? G.CO.D.12 Bisecting an angle G.CO.D.12 Angle bisection and midpoints of line segments G.CO.D.13 Inscribing an equilateral triangle in a circle	
Unit 2 **Congruence, Similarity & Proof**	■ G.SRT.A.1 ■ G.SRT.A.2 ■ G.SRT.A.3 ■ G.CO.C.9	■ G.CO.C.10 ■ G.CO.C.11 ■ G.SRT.B.4 ■ G.SRT.B.5	• Understand similarity in terms of similarity transformations • Prove geometric theorems. • Prove theorems involving similarity	
Unit 2: Suggested Open Educational Resources	G.SRT.A.1 Dilating a Line G.SRT.A.2 Are They Similar? G.SRT.A.2 Similar Triangles G.SRT.A.3 Similar Triangles G.CO.C.9 Congruent Angles made by parallel lines and a transverse G.CO.C.9 Points equidistant from two points in the plane		G.CO.C.10 Midpoints of Triangle Sides G.CO.C.10 Sum of angles in a triangle G.CO.C.11 Midpoints of the Sides of a Parallelogram G.CO.C.11 Is this a parallelogram? G.SRT.B.4 Joining two midpoints of sides of a triangle G.SRT.B.4 Pythagorean Theorem G.SRT.B.5 Tangent Line to Two Circles	

Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

Overview	Standards for Mathematical Content		Unit Focus	Standards for Mathematical Practice
Unit 3 **Trigonometric Ratios & Geometric Equations**	G.GPE.B.4 G.GPE.B.5 G.GPE.B.6 G.GPE.B.7 G.SRT.C.6 G.SRT.C.7	G.SRT.C.8 G.GPE.A.1 G.C.A.1 G.C.A.2 G.C.A.3 G.C.B.5	• Use coordinates to prove simple geometric theorems • Define trigonometric ratios and solve problems involving right triangles • Translate between the geometric description and the equation for a conic section • Understand and apply theorems about circles • Find arc lengths and areas of sectors of circles	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 3: Suggested Open Educational Resources	G.GPE.B.4,5 A Midpoint Miracle G.GPE.B.5 Slope Criterion for Perpendicular G.GPE.B.7 Triangle Perimeters G.SRT.C.6 Defining Trigonometric Ratio G.SRT.C.7 Sine and Cosine of Complimentary Angles		G.SRT.C.8 Constructing Special Angles G.GPE.A.1 Explaining the equation for a circle G.C.A.1 Similar circles G.C.A.2 Right triangles inscribed in circles I G.C.A.3 Circumscribed Triangles	
Unit 4 **Geometric Modeling**	G.MG.A.1 G.GMD.A.3 G.GMD.B.4 G.MG.A.2 G.MG.A.3 G.GMD.A.1		• Explain volume formulas and use them to solve problems. • Visualize relationships between two dimensional and three-dimensional objects • Apply geometric concepts in modeling situations	
Unit 4: Suggested Open Educational Resources	G.MG.A.1Toilet Roll G.GMD.A.3 The Great Egyptian Pyramids G.GMD.B.4 Tennis Balls in a Can G.MG.A.2 How many cells are in the human body? G.MG.A.3 Ice Cream Cone G.GMD.A.1 Area of a circle			

Modified Geometry	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Teachers should create summative assessments in order to collect data and drive day to day instruction. For example, tests, quizzes and constructed response tasks.	*edConnect Department Wide Quarterly Benchmark Testing*
Focus Mathematical Concepts	
Prerequisite skills: Successfully Complete Secondary Geometry	
District/School Tasks	**District/School Primary and Supplementary Resources**
Complete Benchmarking and constructed response tasks to prepare for PARCC testing.	*Pearson Textbook and Online Resources are available to all staff and students.*
Instructional Best Practices and Exemplars	
Teachers should differentiate instruction, create lessons and integrate technology into the classroom whenever possible.	

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Unit 1 Modified Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
G.CO.A.1. Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	MP.6 Attend to precision.	Concept(s): • Point, line, plane, distance along a line, and distance around a circular arc as indefinable notions Students are able to: • use point, line, distance along a line and/or distance around a circular arc to give a precise definition of – angle; – circle (the set of points that are the same distance from a single point - the center); – perpendicular line (two lines are perpendicular if an angle formed by the two lines at the point of intersection is a right angle); – parallel lines (distinct lines that have no point in common); – and line segment. Learning Goal 1: Use the undefined notion of a point, line, distance along a line and distance around a circular arc to develop definitions for angles, circles, parallel lines, perpendicular lines and line segments.	1-2 1-3 1-4 1-6 3-1 10-6
G.CO.A.2. Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch).	MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Transformations as functions (e.g. F(P) is the image of point P created by transformation F). Students are able to: • represent transformations with transparencies and geometry software. • describe transformations as functions (points defining the pre-image as the input and the points defining the image as the output).	9-1 CB 9-1 9-2 9-3 9-4 9-6

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

		• describe a transformation F of the plane as a rule that assigns to each point P in the plane a point F(P) of the plane. • compare rotations, reflections, and translations to a horizontal stretch, vertical stretch and to dilations, distinguishing preserved distances and angles from those that are not preserved. Learning Goal 2: Represent transformations in the plane using transparencies, describe and explain transformations as functions, and compare rigid transformations to dilations, horizontal stretches and vertical stretches.	
◘ G.CO.A.3. Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • identify lines of symmetry when performing rotations and/or reflections on rectangles, parallelograms, trapezoids and regular polygons. • describe the rotations and reflections that carry rectangles, parallelograms, trapezoids and regular polygons onto itself. Learning Goal 3: Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself, and identify lines of symmetry.	CB 9-3
◘ G.CO.A.4. Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	MP.6 Attend to precision.	Concept(s): • Impact of transformations on figures in the plane. Students are able to: • develop formal mathematical definitions of a rotation, reflection, and translation. Learning Goal 4: Develop formal definitions of rotations, reflections, and translations.	9-1 9-2 9-3

◻ G.CO.A.5. Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • draw the transformed figure using, graph paper, tracing paper, and/or geometry software given a geometric figure and a rotation, reflection, or translation. • identify the sequence of transformations required to carry one figure onto another. Learning Goal 5: Draw transformed figures using graph paper, tracing paper, and/or geometry software and identify a sequence of transformations required in order to map one figure onto another.	9-1 9-2 CB 9-2 9-3 9-4
■ G.CO.B.6. Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	MP.3 Construct viable arguments and critique the reasoning of others.	Concept(s): • Congruence in terms of rigid motion Students are able to: • predict the outcome of a transformation on a figure. • given a description of the rigid motions, transform figures. • given two figures, decide if they are congruent by applying rigid motions. Learning Goal 6: Use rigid transformations to determine and explain congruence of geometric figures.	9-1 9-2 9-3 9-4 9-5
■ G.CO.B.7. Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Triangle congruence in terms of rigid motion Students are able to: • given that two triangles are congruent based on rigid motion, show that corresponding pairs of sides and angles are congruent. • given that corresponding pairs of sides and angles of two triangles are congruent, show, using rigid motion (transformations) that they are congruent. Learning Goal 7: Show and explain that two triangles are congruent by using	9-5

Key: ■ Major Clusters | ◻ Supporting | ◯ Additional Clusters | * Benchmarked Standard

		corresponding pairs of sides and corresponding pairs of angles, and by using rigid motions (transformations).	
■ G.CO.B.8. Explain how the criteria for triangle congruence (ASA, SAS, and SSS) follow from the definition of congruence in terms of rigid motions.	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Criteria for triangle congruence Students are able to: • show and explain the criteria for Angle-Side-Angle triangle congruence. • show and explain the criteria for Side-Angle-Side triangle congruence. • show and explain the criteria for Side-Side-Side triangle congruence. • explain the relation of the criteria for triangle congruence to congruence in terms of rigid motion. Learning Goal 8: Show and explain how the criteria for triangle congruence extend from the definition of congruence in terms of rigid motion.	9-5
□ G.CO.D.12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line*. □ G.CO.D.13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Congruence underlies formal constructions. Students are able to: • perform formal constructions using a variety of tools and methods including: – copying a segment; – copying an angle; – bisecting a segment; – bisecting an angle; – constructing perpendicular lines; – constructing the perpendicular bisector of a line segment; – constructing a line parallel to a given line through a point not on the line; – constructing an equilateral triangle; – constructing a square; – and constructing a regular hexagon inscribed in a circle.	1-6 CB 3-2 3-6 4-4 4-5 CB 4-5 5-2 CB 6-9 CB 7-5 10-3

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		• identify the congruencies underlying each construction. Learning Goal 9: Make formal constructions using a variety of tools (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.) and methods.	

Unit 2 Modified Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
■ G.SRT.A.1. Verify experimentally the properties of dilations given by a center and a scale factor: G.SRT.A.1a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged. G.SRT.A.1b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	MP.1 Make sense of problems and persevere in solving them MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Dilation of a line that passes through the center of dilation results in the same line. • Dilation of a line that does not pass through the center of dilation results in a line that is parallel to the original line. • Dilation of a line segment results in a longer line segment when, for scale factor k, |k| is greater than 1. • Dilation of a line segment results in a shorter line segment when, for scale factor k, |k| is less than 1. Students are able to: • perform dilations in order to verify the impact of dilations on lines and line segments. Learning Goal 1: Verify the properties of dilations given by a center and a scale factor.	CB 9-6
■ G.SRT.A.2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.8 Look for and express regularity in repeated reasoning.	Concept(s): • Similarity transformations are used to determine the similarity of two figures. Students are able to: • given two figures, determine, using transformations, if they are similar. • explain, using similarity transformations, the meaning of similarity for triangles.	9-7

Key: ■ Major Clusters \| □ Supporting \| ○ Additional Clusters \| * Benchmarked Standard

Unit 2 Modified Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
		Learning Goal 2: Use the definition of similarity in terms of similarity transformations to decide if two given figures are similar and explain, using similarity transformations, the meaning of triangle similarity.	
■ G.SRT.A.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Angle-Angle criterion for similarity Students are able to: • explain Angle-Angle criterion and its relationship to similarity transformations and properties of triangles. Learning Goal 3: Use the properties of similarity transformations to establish the Angle-Angle criterion for two triangles to be similar.	9-7
■ G.CO.C.9. Prove theorems about lines and angles. *Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints.* ■ G.CO.C.10. Prove theorems about triangles. *Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.* ■ G.CO.C.11. Prove theorems about parallelograms. *Theorems include: opposite sides are congruent, opposite angles are congruent, the*	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concept(s): • A formal proof may be represented with a paragraph proof or a two-column proof. Students are able to: • construct and explain proofs of theorems about lines and angles including: – vertical angles are congruent; – congruence of alternate interior angles; – congruence of corresponding angles; – and points on a perpendicular bisector of a line segment are exactly those equidistant from the segment's endpoints. • construct and explain proofs of theorems about triangles including: – sum of interior angles of a triangle; – congruence of base angles of an isosceles triangle; – the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; – and the medians of a triangle meet at a point.	2-6 3-2 3-5 4-5 5-1 5-2 5-4 6-2 6-3 6-4 6-5

Key: ■ Major Clusters | □ Supporting | ○ Additional Clusters | * Benchmarked Standard

Unit 2 Modified Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
diagonals of a parallelogram bisect each other, and conversely, rectangles are parallelograms with congruent diagonals.		• construct and explain proofs of theorems about parallelograms including: – opposite sides are congruent; – opposite angles are congruent; – the diagonals of a parallelogram bisect each other; – and rectangles are parallelograms with congruent diagonals. Learning Goal 4: Construct and explain formal proofs of theorems involving lines, angles, triangles, and parallelograms.	
G.SRT.B.4. Prove theorems about triangles. *Theorems include: a line parallel to one side of a triangle divides the other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity*	MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • construct and explain proofs of theorems about triangles including: – a line parallel to one side of a triangle divides the other two sides proportionally; – and the Pythagorean Theorem (using triangle similarity). Learning Goal 5: Prove theorems about triangles.	7-5 8-1
G.SRT.B.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	MP.7 Look for and make use of structure.	Concept(s): • Corresponding parts of congruent triangles are congruent (CPCTC). Students are able to: • prove geometric relationships in figures using criteria for triangle congruence. • prove geometric relationships in figures using criteria for triangle congruence. • solve problems using triangle congruence criteria (SSS, ASA, SAS, HL). • solve problems using triangle similarity criteria (AA). Learning Goal 6: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	4-2 4-3 4-4 4-5 4-6 4-7 5-1 5-2 5-4 6-1 6-2 6-3 6-4 6-5 6-6 7-2 7-3 7-4

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Unit 3 Modified Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
G.GPE.B.4. Use coordinates to prove simple geometric theorems algebraically. *For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point (1, √3) lies on the circle centered at the origin and containing the point (0, 2).*	MP.3 Construct viable arguments and critique the reasoning of others.	Concept(s): No new concept(s) introduced Students are able to: • Use coordinates to prove geometric theorems including: – prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle (or other quadrilateral); – and prove or disprove that a given point lies on a circle of a given center and radius or point on the circle. Learning Goal 1: Use coordinates to prove simple geometric theorems algebraically.	6-9
G.GPE.B.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).	MP.3 Construct viable arguments and critique the reasoning of others. MP.8 Look for and express regularity in repeated reasoning	Concept(s): No new concept(s) introduced Students are able to: • prove the slope criteria for parallel lines (parallel lines have equivalent slopes). • prove the slope criteria for perpendicular lines (the product of the slopes of perpendicular lines equals -1). • solve problems using the slope criteria for parallel and perpendicular lines. Learning Goal 2: Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems.	3-8 7-3 7-4
G.GPE.B.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio. G.GPE.B.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • locate the point on a directed line segment that creates two segments of a given ratio. • find perimeters of polygons using coordinates, the Pythagorean theorem and the distance formula. • find areas of triangle and rectangles using coordinates. Learning Goal 3: Find the point on a directed line segment between two given points that partitions the segment in a given ratio and use	1-3 1-7 6-7 10-1

Unit 3 Modified Geometry

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Geometry Common Core Textbook Chapters
		coordinates to compute perimeters of polygons and areas of triangles and rectangles.	
G.SRT.C.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	MP.7 Look for and make use of structure.	Concept(s): • Side ratios in right triangles are properties of the angles in the triangle. Students are able to: • show and explain that definitions for trigonometric ratios derive from similarity of right triangles. Learning Goal 4: Show and explain that definitions for trigonometric ratios derive from similarity of right triangles.	CB 8-3
G.SRT.C.7. Explain and use the relationship between the sine and cosine of complementary angles G.SRT.C.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Relationship between sine and cosine of complementary angles Students are able to: • determine and compare sine and cosine ratios of complementary angles in a right triangle. • solve right triangles (determine all angle measures and all side lengths) using trigonometric ratios and the Pythagorean Theorem. Learning Goal 5: Explain and use the relationship between the sine and cosine of complementary angles; use trigonometric ratios and the Pythagorean Theorem to compute all angle measures and side lengths of triangles in applied problems.	8-1 8-2 8-3 8-4 CB 8-4
G.GPE.A.1. Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • given the center and radius, derive the equation of a circle (using the Pythagorean Theorem). • given an equation of a circle in any form, use the method of completing the square to determine the center and radius of the circle.	12-5

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Unit 3 Modified Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
		Learning Goal 6: Derive the equation of a circle of given the center and radius using the Pythagorean Theorem. Given an equation, complete the square to find the center and radius of the circle.	
G.C.A.1. Prove that all circles are similar.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically.	Concept(s): • Similarity of all circles Students are able to: • construct a formal proof of the similarity of all circles. Learning Goal 7: Prove that all circles are similar	10-6
G.C.A.2. Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.*	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	Concept(s): No new concept(s) introduced Students are able to: • use the relationship between inscribed angles, radii and chords to solve problems. • use the relationship between central, inscribed, and circumscribed angles to solve problems. • identify inscribed angles on a diameter as right angles. • identify the radius of a circle as perpendicular to the tangent where the radius intersects the circle. Learning Goal 8: Identify and describe relationships among inscribed angles, radii, and chords; use these relationships to solve problems.	10-6 CB 10-6 12-2 12-3
G.C.B.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique he reasoning of others.	Concept(s): • A proportional relationship exists between the length of an arc that is intercepted by an angle and the radius of the circle. Students are able to: • use similarity to derive the fact that the length of the arc intercepted by an angle is proportional to the radius. • define radian measure of an angle as the constant of proportionality when the length of the arc intercepted by an angle is proportional to the radius. • derive the formula for the area of a sector.	10-6 10-7

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Unit 3 Modified Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
		• compute arc lengths and areas of sectors of circles. Learning Goal 7: Find arc lengths and areas of sectors of circles; use similarity to show that the length of the arc intercepted by an angle is proportional to the radius. Derive the formula for the area of a sector.	
G.C.A.3. Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically	Concept(s): No new concept(s) introduced Students are able to: • construct the inscribed circle of a triangle. • construct the circumscribed circle of a triangle. • prove properties of the angles of a quadrilateral that is inscribed in a circle. Learning Goal 9: Prove the properties of angles for a quadrilateral inscribed in a circle and construct inscribed and circumscribed circles of a triangle using geometric tools and geometric software.	5-3 12-3

Unit 4 Modified Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
G.MG.A.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder. G.GMD.A.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. G.GMD.B.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): • Real-world objects can be described, approximately, using geometric shapes, their measures, and their properties. Students are able to: • identify cross-sections of three dimensional objects. • identify three-dimensional objects generated by rotation of two-dimensional objects. • solve problems using volume formulas for cylinders, pyramids, cones, and spheres. • model real-world objects with geometric shapes. • describe the measures and properties of geometric shapes that best represent a real-world object.	8-3 10-1 11-1 11-4 11-5 11-6 12-6

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Unit 4 Modified Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
		Learning Goal 1: Model real-world objects with geometric shapes based upon their measures and properties, and solve problems using volume formulas for cylinders, pyramids, cones, and spheres. Identify cross-sections, three-dimensional figures, and identify three-dimensional objects created by the rotation of two-dimensional objects.	
■ G.MG.A.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • model real-world situations, applying density concepts based on area. • model real-world situations, applying density concepts based on volume. Learning Goal 2: Apply concepts of density based on area and volume in modeling situations.	11-7
■ G.MG.A.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • design objects or structures satisfying physical constraints • design objects or structures to minimize cost. • solve design problems. Learning Goal 3: Solve design problems using geometric methods	3-4
◎ G.GMD.A.1. Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • construct viable dissection arguments and informal limit arguments. • apply Cavalieri's principle. • construct an informal argument for the formula for the circumference of a circle. • construct an informal argument for the formula for the area of a circle. • construct an informal argument for the formula for the volume of a cylinder, pyramid, and cone.	CB 10-7 11-4

Key: ■ Major Clusters | ◻ Supporting | ◎ Additional Clusters | * Benchmarked Standard

Unit 4 Modified Geometry			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Geometry Common Core Textbook Chapters**
		Learning Goal 4: Using dissection arguments, Cavalieri's principle, and informal limit arguments, develop informal arguments for formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone.	

Key: Major Clusters | Supporting | Additional Clusters | * Benchmarked Standard

Atlantic City High School

Geometry Unit
Modified Benchmarks

Mathematics Task Force Members

Don Coleman

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TEST NAME: **2016-2017 GEO BM1 SPED**

TEST ID: **66138**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student: ______

Class: ______

Date: ______

1. Match the definition with the geometric term.

Questions

____ **1.** Line Segment

____ **2.** Circle

____ **3.** Parallel Lines

Answer Choices

A. Two lines in the same plane that are always the same distance apart.

B. A straight line that connects two points without extending beyond them.

C. A straight line from the center to the circumference of a circle or sphere.

D. Determined by two points and extends indefinitely in both directions.

E. The set of all points in the plane that are the same distance from a given point.

2. Which term can be defined as the set of all points in a plane that are a fixed distance from a given point?

A. arc

B. circle

C. sphere

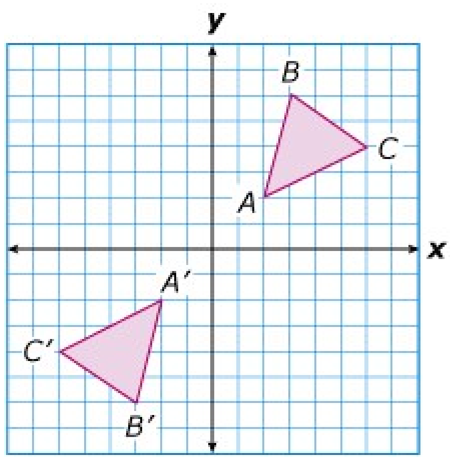
3. Point K lies at $(-3, 4)$. Point K is reflected over the y-axis and then translated 7 units down to produce K'. Which rule could have been used to produce K' from K?

A. $K(x, y) \rightarrow K'(x, y-7)$

B. $K(x, y) \rightarrow K'(-x, y-7)$

C. $K(x, y) \rightarrow K'(x, -y-7)$

4. In the following drawing, $\triangle A'B'C'$ is the image $\triangle ABC$ after a clockwise rotation.



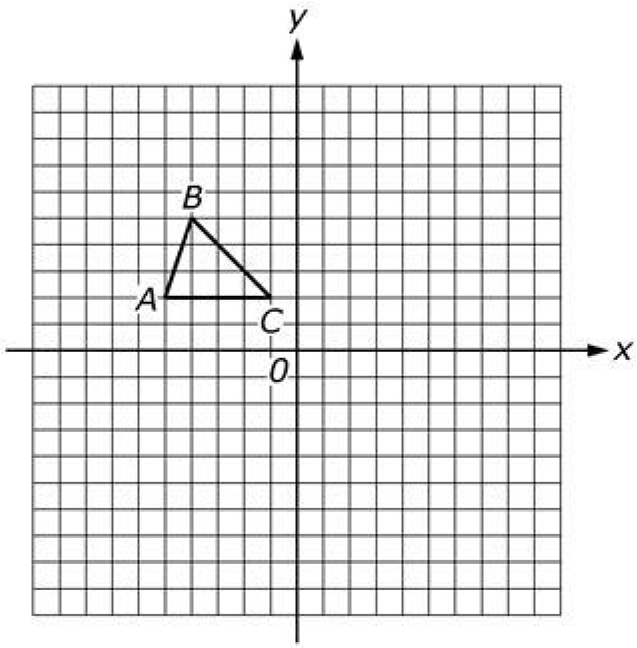
What was the degree of rotation?

A. 45°

B. 90°

C. 180°

5. Triangle ABC is shown in the coordinate plane below. Draw the result of the transformation when triangle ABC is translated 6 units to the right and then rotated $90°$ clockwise about the origin.



Answer on a separate sheet.

6. Which transformation would map a rectangle onto itself?

A. reflection over a diagonal

B. reflection over the shorter side

C. rotation of 180° around its center

7. Point F' is the image when point F is reflected over the line $x = -2$ and then over the line $y = 3$. The location of F' is $(3, 7)$. Which of the following is the location of point F?

A. $(-7, -1)$

B. $(-7, 7)$

C. $(1, 5)$

8. Clarisse drew line segment $\overline{PQ}$ and then translated it 3 units to the right and 4 units down to form line segment $\overline{P'Q'}$. She then connected P and P' and Q and Q' to form two more line segments. Which statement(s) about the resulting figure **must** be true?

I. $\overline{PP'} \cong \overline{QQ'}$

II. $\overline{PQ} \parallel \overline{P'Q'}$

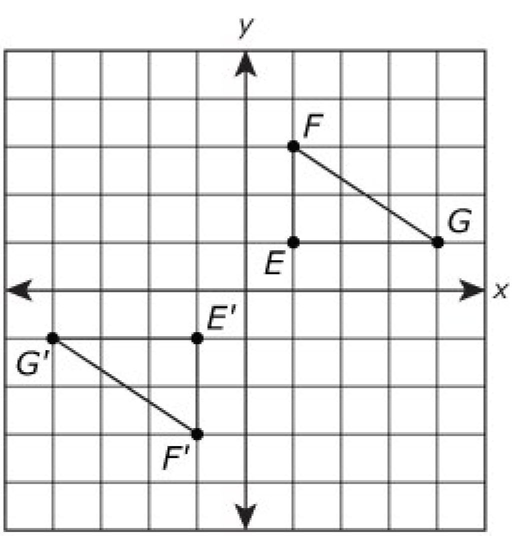
III. $P\,P'\,Q'\,Q$ is a rectangle.

A. I only

B. I and II only

C. I, II, and III

9. Which pair of rigid transformations will map $\triangle EFG$ to $\triangle E'F'G'$?

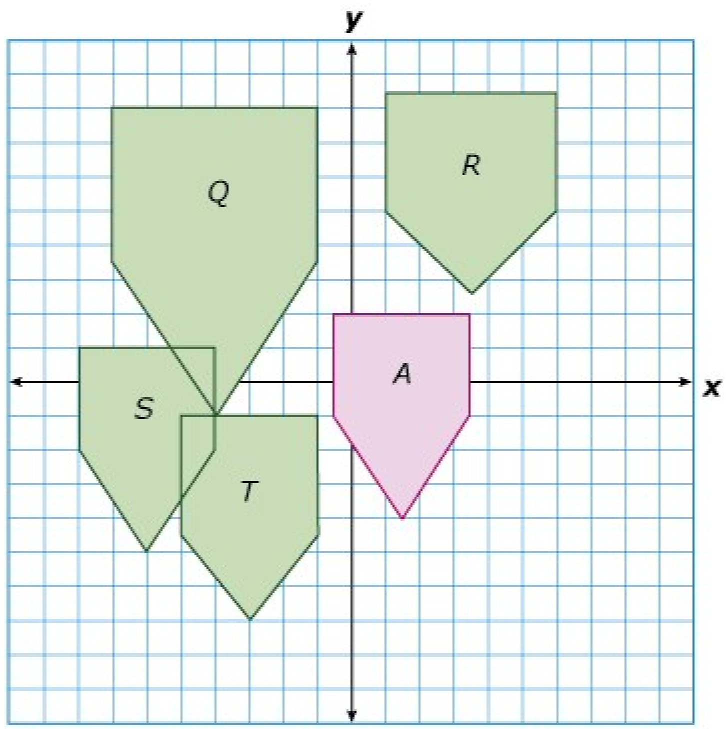


A. A reflection across the *x*-axis, then a reflection across the *y*-axis.

B. A rotation of 90° counterclockwise around the origin, then a reflection across the *x*-axis.

C. A rotation of 90° clockwise around the origin, then a rotation of 90° counterclockwise around the origin.

10.



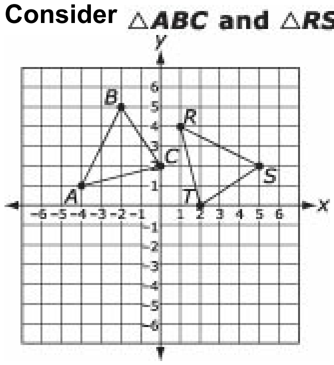
Which figure in the drawing best represents a dilation of figure *A* with a scale factor of $\frac{3}{2}$?

A. *Q*

B. *R*

C. *S*

11. **Consider $\triangle ABC$ and $\triangle RST$ shown below.**



Which transformation can be used to verify $\triangle ABC \cong \triangle RST$?

A. rotate $\triangle ABC$ $90°$ clockwise about point *C*

B. rotate $\triangle ABC$ $90°$ clockwise about the origin

C. translate $\triangle ABC$ 2 units to the right and 2 units down

12. Which of the following figures has reflective (line) symmetry but not rotational (point) symmetry?

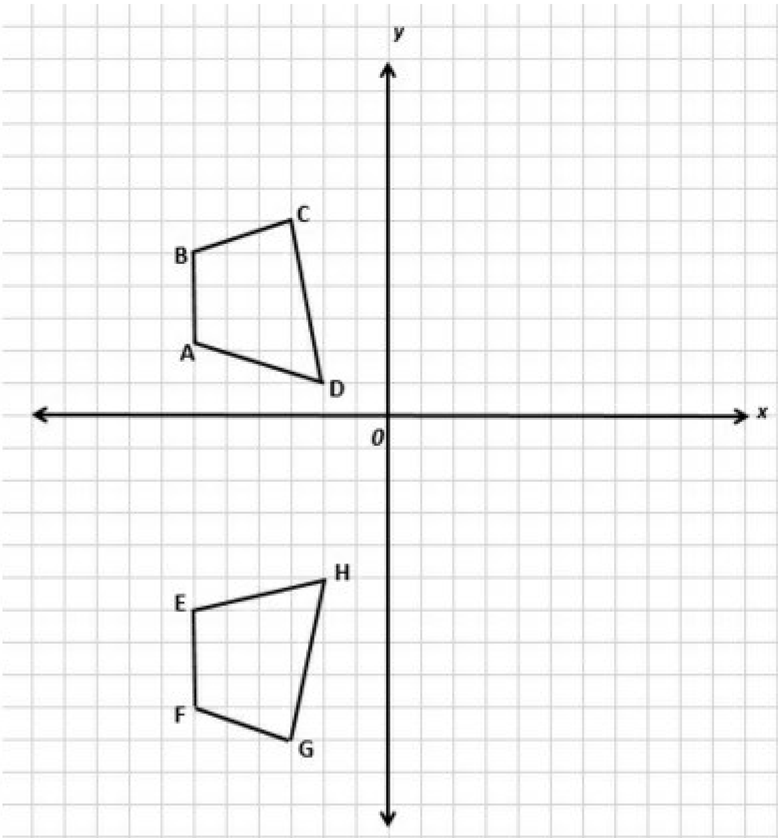
A. **C**

B. **Q**

C. **I**

Read the passage - 'Quadrilateral Reflections' - and answer the question below:

Quadrilateral Reflections



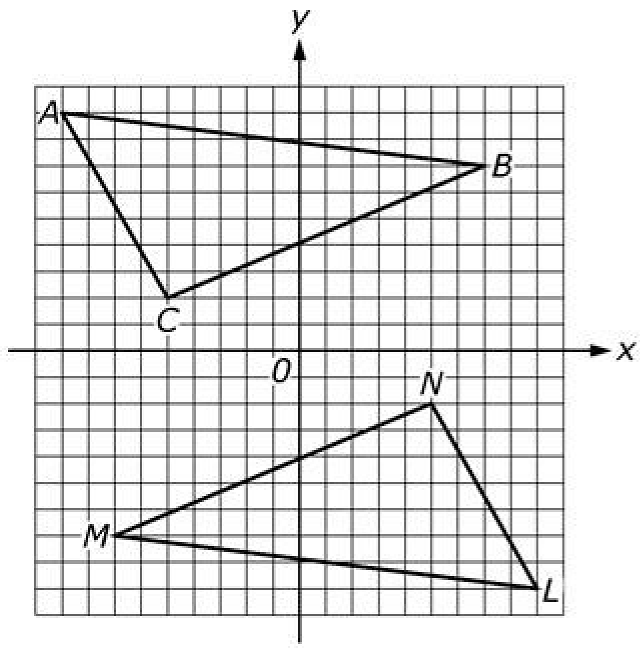
13. Based on the graph shown, determine if the statement shown below is true or false?

$$\frac{AB}{EF} \cong \frac{BC}{FG} \cong \frac{CD}{HE} \cong \frac{DA}{GH}$$

T. True

F. False

14. Triangle *ABC* and triangle *LMN* shown in the coordinate plane below are congruent.



What criteria can prove triangle *ABC* is congruent to triangle *LMN?* Select all that apply.

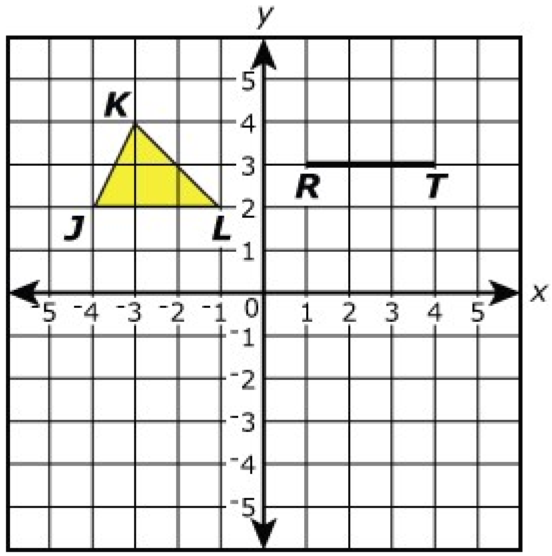
A. SAS

B. ASA

C. SSS

D. AAS

15. Triangle *JKL* and line segment *RT* are shown on the graph.



If triangle *JKL* is congruent to triangle *RST*, what is the maximum number of possible coordinates for point *S*?

A. 1

B. 2

C. 3

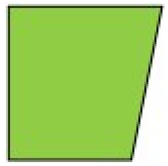
16. $\triangle XYZ$ is transformed on a coordinate plane to obtain its congruent image $\triangle X'Y'Z'$. Which of the following statements could be true?

I. $\triangle X'Y'Z'$ is the translated image of $\triangle XYZ$.
II. $\triangle X'Y'Z'$ is the reflected image of $\triangle XYZ$.
III. $\triangle X'Y'Z'$ is the rotated image of $\triangle XYZ$.

A. only I

B. only II

C. I, II, and III

17. 

The above shape has which type of symmetry?

A. Point symmetry

B. Line symmetry

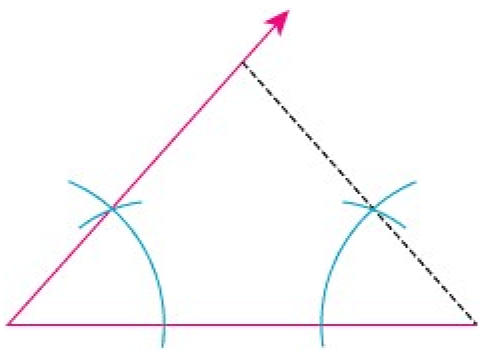
C. No symmetry

18. Which step **must** be completed when using a compass and straightedge to construct a line through a given point, parallel to a given line?

A. copy an angle

B. bisect an angle

C. construct a perpendicular

19. 

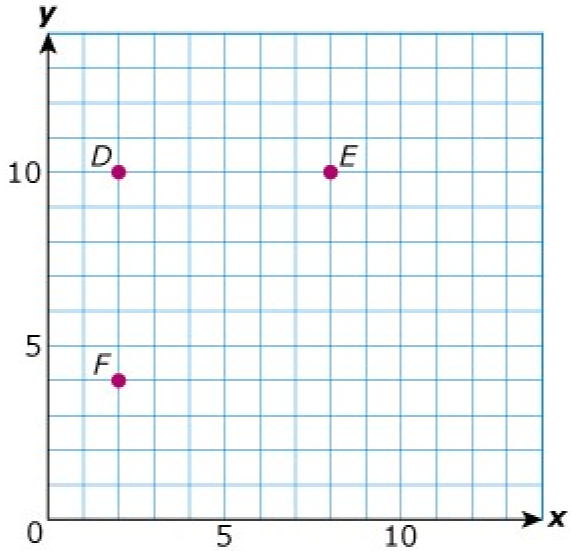
Which construction is illustrated above?

A. An angle congruent to a given angle

B. The bisector of an angle

C. The bisector of a line segment

20. Three speakers are positioned as shown on the grid below.



The “sweet spot,” or best place to hear the music coming out of all three speakers, is the center of the circle inscribed in $\triangle DEF$. What are the coordinates of the sweet spot? *(HINT: find midpoint of all 3 sides; draw segments from the vertices to the midpoints)*

A. (4, 8)

B. (5, 7)

C. (6, 7)

TEST NAME: **2016-2017 GEO BM2 SPED**

TEST ID: **66426**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

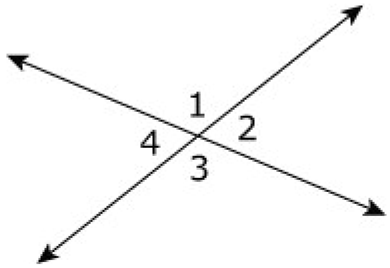
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. Four angles are marked on the diagram.



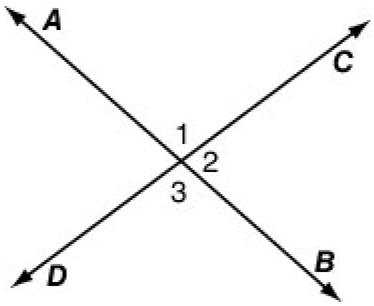
Which explanation proves vertical angles are congruent?

A. $\angle 1$ and $\angle 2$ are supplementary, and $\angle 3$ and $\angle 2$ are supplementary since angles in a linear pair are supplementary. $\angle 1 \cong \angle 3$ because supplements of the same angle are congruent.

B. $\angle 1$ and $\angle 2$ are complementary, and $\angle 3$ and $\angle 2$ are complementary since angles in a linear pair are complementary. $\angle 1 \cong \angle 3$ because complements of the same angle are congruent.

C. $\angle 1$ and $\angle 2$ are supplementary, and $\angle 3$ and $\angle 4$ are supplementary since angles in a linear pair are supplementary. $\angle 1 \cong \angle 3$ because supplements of the same angle are congruent.

2. Which table correctly lists the reasons to prove $\angle 1 \cong \angle 3$, given that $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$?



A.

Statements	Reasons
1. $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	2. Definition of linear pair
3. $m\angle 1 + m\angle 2 = 180°$; $m\angle 2 + m\angle 3 = 180°$	3. Linear pair postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Transitive property
5. $m\angle 1 = m\angle 3$	5. Subtraction property of equality
6. $\angle 1 \cong \angle 3$	6. Definition of congruency

B.

Statements	Reasons
1. $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	2. Definition of linear pair
3. $m\angle 1 + m\angle 2 = 180°$; $m\angle 2 + m\angle 3 = 180°$	3. Linear pair postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Transitive property
5. $m\angle 1 = m\angle 3$	5. Addition property of equality
6. $\angle 1 \cong \angle 3$	6. Definition of congruency

C.

Statements	Reasons
1. $\overleftrightarrow{AB}$ intersects $\overleftrightarrow{CD}$	1. Given
2. $\angle 1$ and $\angle 2$ form a linear pair $\angle 2$ and $\angle 3$ form a linear pair	2. Definition of linear pair
3. $m\angle 1 + m\angle 2 = 180°$; $m\angle 2 + m\angle 3 = 180°$	3. Linear pair postulate
4. $m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	4. Reflexive property
5. $m\angle 1 = m\angle 3$	5. Addition property of equality
6. $\angle 1 \cong \angle 3$	6. Definition of congruency

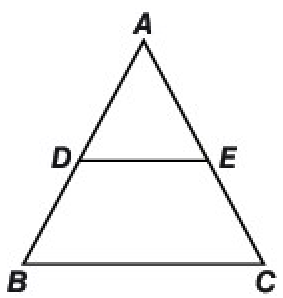
3. The lengths of the three sides of different triangles are given below. Which triangle is a right triangle?
(HINT: square each number; set it equal to the larger)

A. 4 ft, 4 ft, and $2\sqrt{2}$ ft

B. 4 ft, $4\sqrt{3}$ ft, and 8 ft

C. $2\sqrt{2}$ ft, $2\sqrt{2}$ ft, and $4\sqrt{2}$ ft

4. In $\triangle ABC$, $AD = DB$ and $AE = EC$.

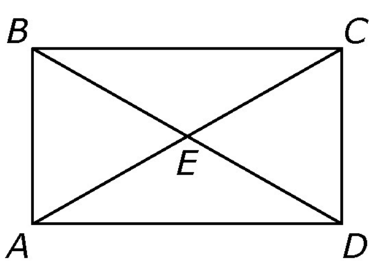


Given the information above, which statement can be proved to be true?

A. Triangle ABC is isosceles.

B. $\overline{DE}$ is perpendicular to $\overline{AC}$.

C. The length of $\overline{DE}$ is half the length of $\overline{BC}$.

5. 

$\overline{AC} \cong \overline{BD}$

Complete the proof that *ABCD* is a rectangle by selecting the correct reason from the drop-down menus to match each statement.

Statement	Reason
$ABCD$ is a parallelogram.	Given
$\overline{AC} \cong \overline{BD}$	Given
$\overline{AD} \cong \overline{CB}$ and $\overline{AB} \cong \overline{CD}$	1 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$\overline{AC} \cong \overline{AC}$ and $\overline{BD} \cong \overline{BD}$	2 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
	3 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS

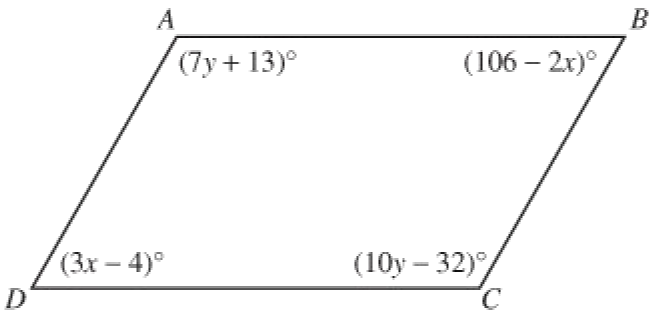
$\triangle ADC \cong \triangle CBA \cong \triangle DAB \cong \triangle BCD$	postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$\angle ADC \cong \angle CBA \cong \angle DAB \cong \angle BCD$	Corresponding parts of congruent triangles are congruent.
$m\angle ADC = m\angle CBA = m\angle DAB = m\angle BCD$	4 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$m\angle ADC + m\angle CBA + m\angle DAB + m\angle BCD = 360°$	5 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution

	(G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$4(m\angle ADC) = 360^\circ$	6 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$(m\angle ADC) = 90^\circ$	7 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
	8 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS

$m\angle CBA = m\angle DAB = m\angle BCD = 90°$	postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality
$ABCD$ is a rectangle.	9 - (A) Definition of congruent angles. (B) The interior angles of a parallelogram sum to 360° (C) SSS postulate (D) Reflexive property (E) Definition of rectangle (F) Substitution (G) Opposite sides of a parallelogram are congruent (H) Division property of equality

6. Given: In Parallelogram *ABCD,*

- $m\angle A = (7y + 13)°$
- $m\angle B = (106 - 2x)°$
- $m\angle C = (10y - 32)°$
- $m\angle D = (3x - 4)°$



Not drawn to scale.

What are the values of *x* and *y*?

Use words, numbers, and/or equations to explain your work.

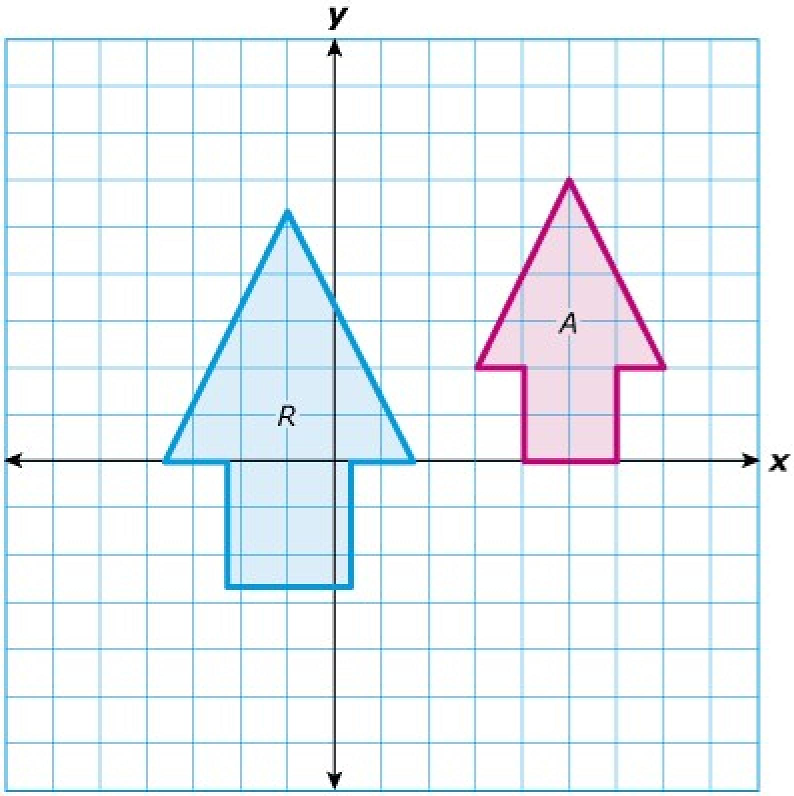
7. If quadrilateral *ABCD* is equilateral, which *cannot* be the shape of *ABCD?*

A. Rhombus

B. Isosceles trapezoid

C. Square

8.



If figure *R* is the image after a dilation of figure *A*, which is closest to the scale factor for the dilation? *(HINT: take a vertex and multiply by your answer choices)*

A. $1\frac{1}{4}$

B. $1\frac{1}{3}$

C. $1\frac{2}{3}$

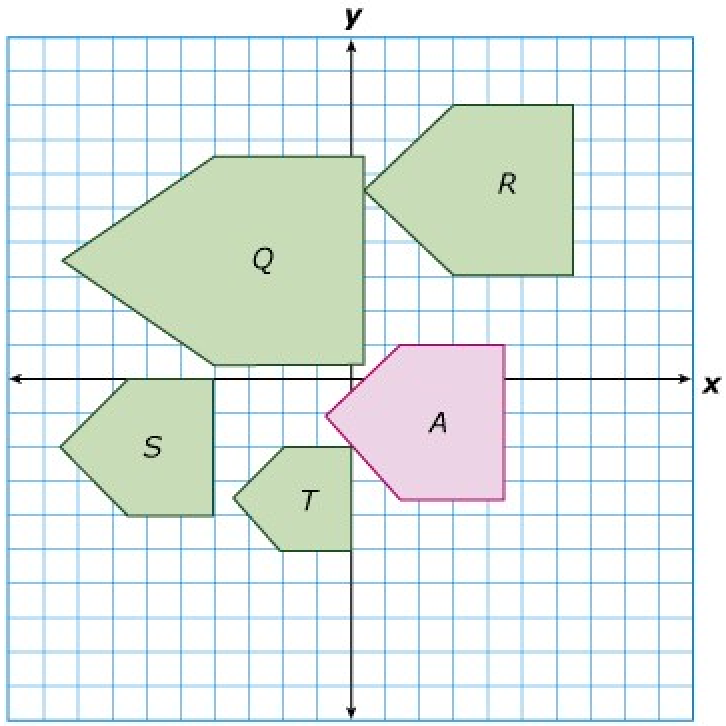
9. If a 3-centimeter by 5-centimeter photograph is enlarged by 50%, what are the dimensions of the new enlarged photograph?

A. 4.5 by 7.5 centimeters

B. 3.5 by 5.5 centimeters

C. 3.25 by 7.5 centimeters

10.



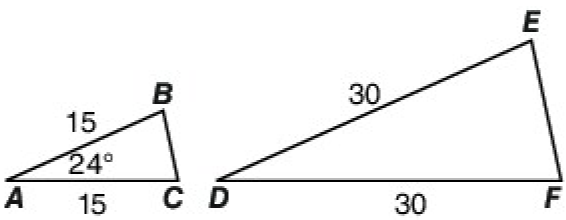
Which figure in the drawing best represents a dilation of figure *A* with a scale factor of $\frac{2}{3}$?

A. *Q*

B. *R*

C. *T*

11. The figure below shows a $\triangle ABC$ and its dilation image $\triangle DEF$.



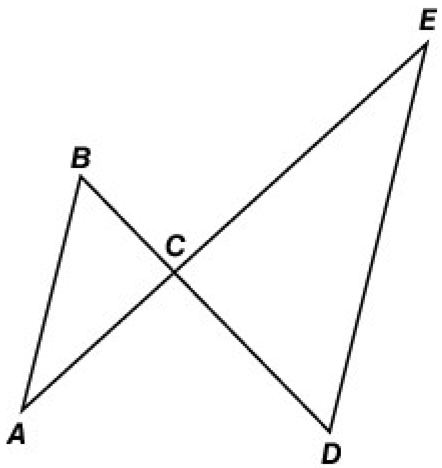
Which statement must be **true**?

A. $m\angle A = 2m\angle D$ and $2\overline{BC} = \overline{EF}$

B. $m\angle B = m\angle E$ and $2\overline{BC} = \overline{EF}$

C. $m\angle B = m\angle E$ and $\overline{BC} = \overline{EF}$

12. In the figure below, $\triangle ABC$ was dilated and then rotated 180° about point C to create $\triangle EDC$, as shown below.



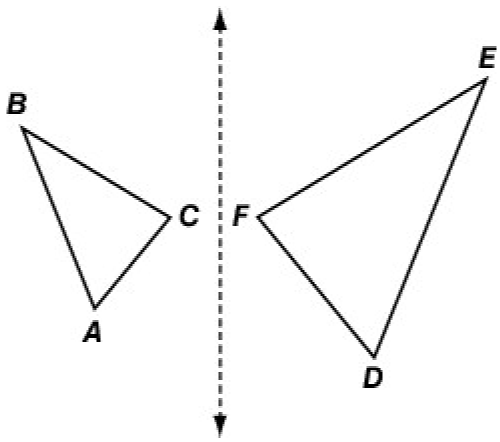
Based on the given transformations, which relationships must be true?

A. $\angle A \cong \angle D$ and $\angle B \cong \angle E$, so $\triangle ABC \sim \triangle DEC$

B. $\angle A \cong \angle E$ and $\angle B \cong \angle D$, so $\triangle ABC \sim \triangle EDC$

C. $\angle BCA \cong \angle DCE$ and $\angle B \cong \angle E$, so $\triangle ABC \cong \triangle DEC$

13. Examine the following figure in which $\triangle ABC$ was dilated and then reflected across the given line to create $\triangle DEF$.



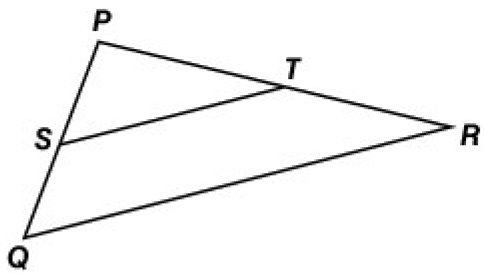
If $m\angle A = 57°$ and $m\angle E = 35°$, which statement must be true?

A. $m\angle B = 35°$ and $m\angle D = 57°$

B. $\overline{BC} \cong \overline{EF}$, $\overline{BA} \cong \overline{ED}$ and $m\angle B = 35°$

C. $\overline{BC} \cong \overline{EF}$, $\overline{BA} \cong \overline{ED}$ and $m\angle D = 35°$

14. In the given triangle, $\overline{ST} \parallel \overline{QR}$.



Which of these statements can be proved?

I. $PS = SQ$

II. $\frac{PS}{SQ} = \frac{PT}{TR}$

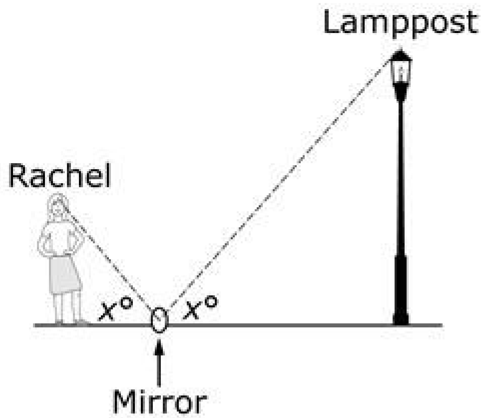
III. $(PS)^2 + (PT)^2 = (ST)^2$

A. I only

B. II only

C. I and III only

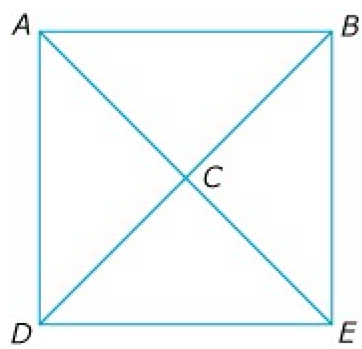
15.



To find the height of a lamppost at a park, Rachel placed a mirror on the ground 20 feet from the base of the lamppost. She then stepped back 4 feet so that she could see the top of the lamp post in the center of the mirror. Rachel's eyes are 5 feet 6 inches above the ground.

What is the height, in feet, of the lamppost? *(HINT: Use a proportion; height to distance from mirror)*

16.



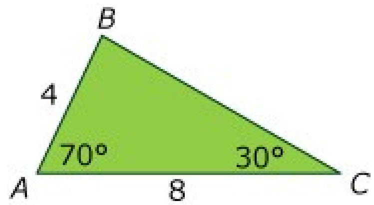
If $\triangle ACD \cong \triangle ECB$, which statement is true?

A. $\overline{AC} \cong \overline{EC}$

B. $\overline{AC} \cong \overline{BC}$

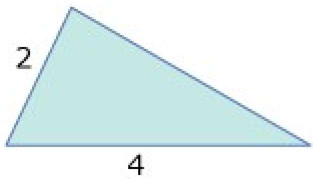
C. $\angle ADC \cong \angle BEC$

17.

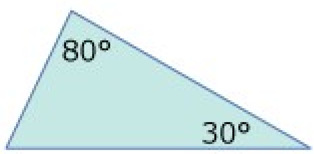


Given the measures shown, which triangle can be shown to be similar to triangle *ABC* shown above?
(HINT: Use angle addition postulate)

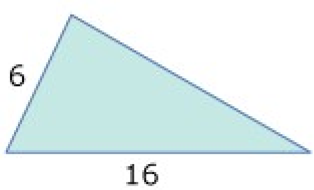
A.



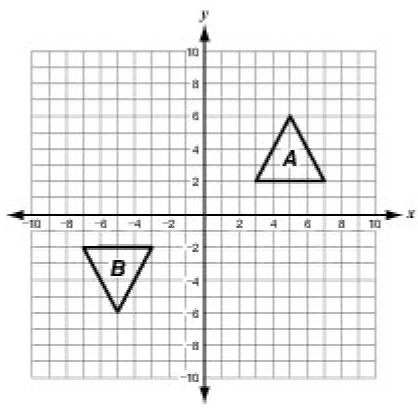
B.



C.



18. Two congruent figures, *A* and *B*, are shown on a coordinate plane below.



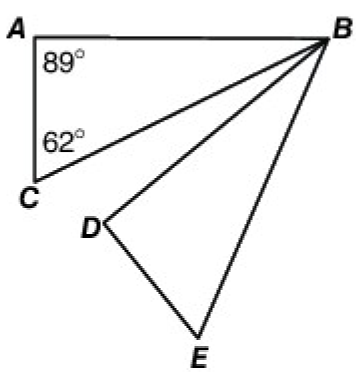
Which of these reflection(s) map figure *A* onto figure *B*?

A. a reflection over the line $y = x$

B. a reflection over the line $x = 0$ followed by a reflection over the line $x = 0$

C. a reflection over the line $x = 0$ followed by a reflection over the line $y = 0$

19. Maggie drew triangle *ABC* and then drew triangle *DBE*.



Triangle *ABC* is congruent to triangle *DBE* only if $m\angle BDE$ is equal to what value? *(Hint: Use corresponding parts)*

A. 55°

B. 62°

C. 89°

20. Sam is studying a geometric drawing. He observes that $\angle PQR$ and $\angle AQB$ are obtuse vertical angles and that $\angle QPR$ and $\angle QAB$ are congruent. He proves that $PQ = AQ$. Which postulate uses Sam's information to prove that $\triangle PQR \cong \triangle AQB$?

A. Angle-Side-Angle (ASA)

B. Hypotenuse Leg (HL)

C. Side-Side-Angle (SAS)

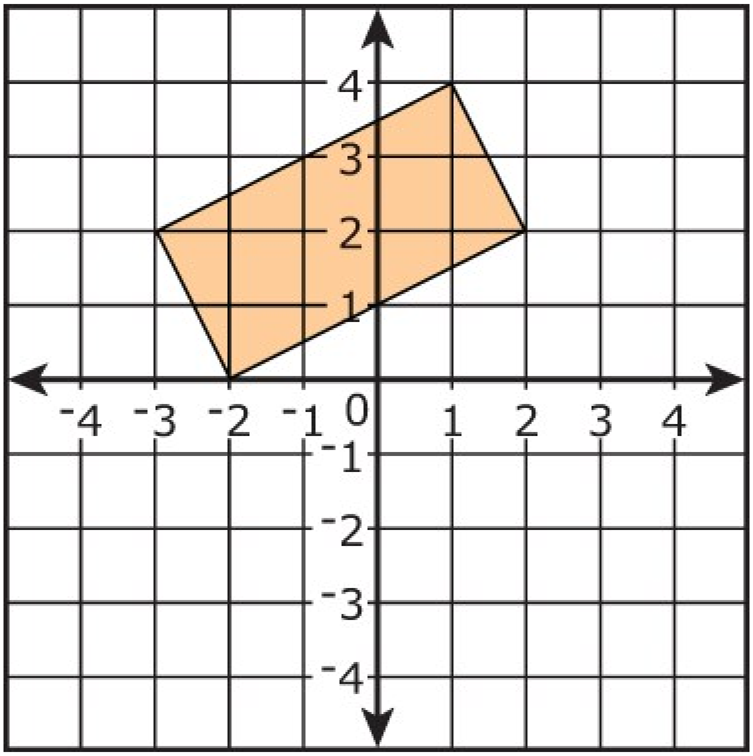
TEST NAME: **2016-2017 GEO BM3 SPED**
TEST ID: **66266**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. A rectangle is graphed on the coordinate plane.



Which expression could be used to find the area of the rectangle? *(Hint: Use pythagorean theorem to fin the length of the diagonals)*

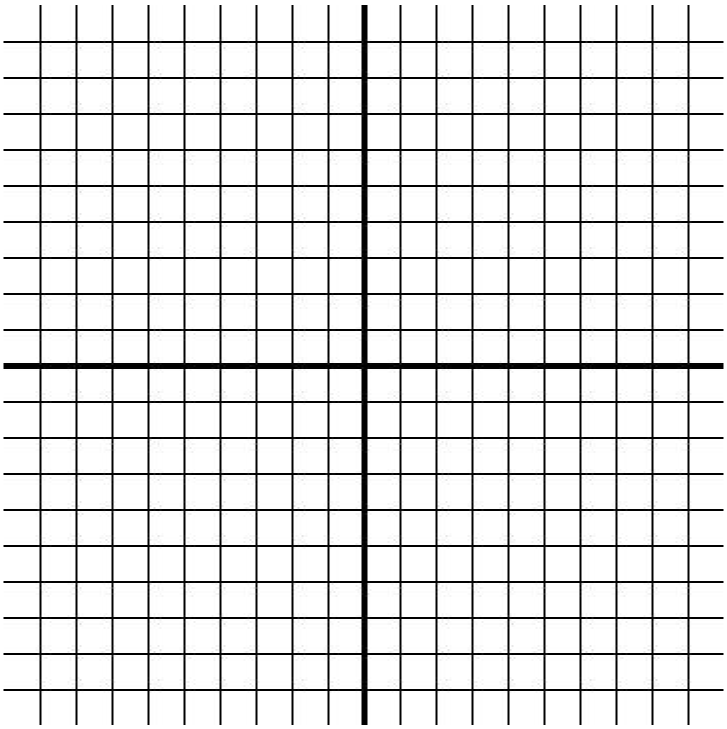
A. $(\sqrt{13})(\sqrt{20})$

B. $(\sqrt{5})(\sqrt{20})$

C. $(\sqrt{3})(\sqrt{6})$

2. A parallelogram has two vertices at (1,1) and (0,7) and its diagonals cross at the point (4,3).

Select the two coordinate pairs that correspond to the two vertices of the parallelogram. *(Hint: Use the graph paper provided to find the other two vertices)*



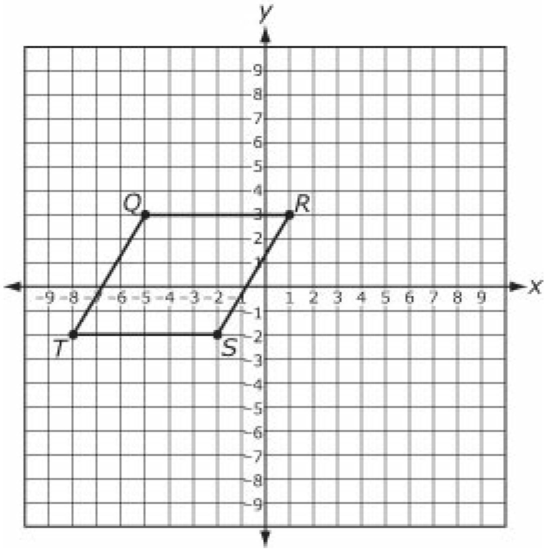
A. (-5, -3)

B. (8, -1)

C. (-2, 3)

D. (7, 5)

3. **Consider parallelogram *QRST* graphed below.**



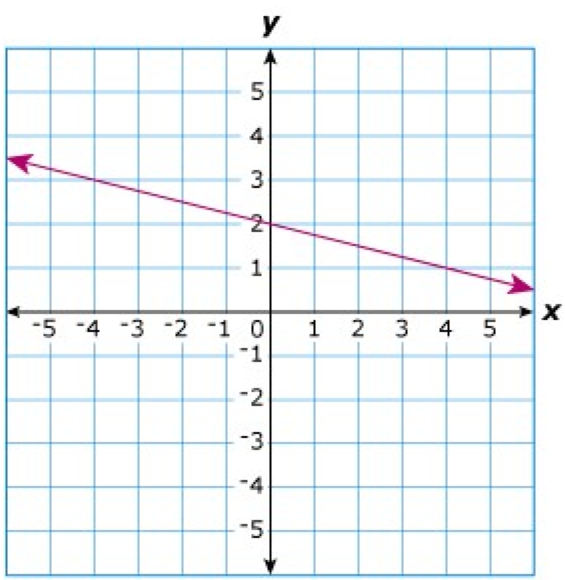
What is the perimeter of *QRST* in grid units? (Hint: Find the length of QT or RS; use pythagorean theorem)

A. $12 + 2\sqrt{2}$

B. $12 + 2\sqrt{34}$

C. 20

4. Which is the equation of a line perpendicular to the line shown and through the point *P* (1, –2)? *(Hint: The slopes of perpendicular lines are opposite reciprocals)*



A. $y = -4x + 6$

B. $y = 4x - 6$

C. $y = -3x + 5$

5. Classify each of the following pairs of lines as parallel, perpendicular or neither. *(Hint: Convert all equations to $y=mx+b$)*

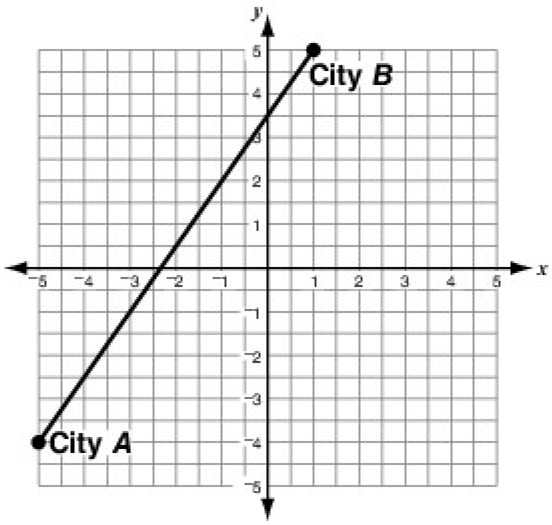
Questions	Answer Choices
1. $3y = -5x - 5$ $(y - 7) = 0.6(x - 5)$	A. Parallel
2. $2x + 3y = 4$ $4x + 5y = 6$	B. Perpendicular
3. $y = 4x + 1$ $(y - 2) = 4(x - 3)$	C. Neither
4. $y = -3x + 5$ $9x + 3y = 2$	

6. Point P lies on the directed line segment from $A(2,3)$ to $B(8,0)$ and partitions the segment in the ratio 2 to 1.

What are the coordinates of point P? *(HINT: Draw a picture)*

x = 1 - (A) 1 (B) 2 (C) 3 (D) 4 (E) 5 (F) 6 (G) 7 (H) 8 and y = 2 - (A) 1 (B) 2 (C) 3 (D) 4 (E) 5 (F) 6 (G) 7 (H) 8

7. A highway connecting two cities is represented on the coordinate plane below. The highway has two rest areas along the route such that they divide the distance between the cities into three equal parts.



Part A. In what ratio does the rest area closest to city A divide the distance from city A to city B?

Part B. What are the coordinates of the point representing the first rest area?

Part C. What are the coordinates of the point representing the second rest area?

Part D. If a service station is built halfway between the rest areas, what are the coordinates of the point representing the service station?

Use words, numbers, and/or pictures to show your work.

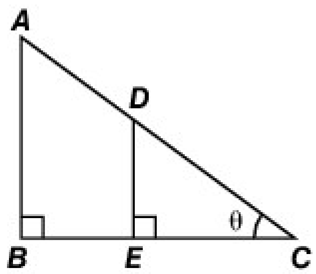
8. **What is the perimeter, to the nearest tenth of a unit, of a triangle with vertices at $A(2, 1)$, $B(-6, 0)$, and $C(6, -4)$? *(Hint: Create right triangles and use pythagorean theorem to find lengths; P=a+b+c)***

A. 16.3

B. 16.7

C. 27.1

9. Which of these equations regarding the relationship between the sides and angles of the triangles shown below is **true**? *(Hint: Create two similar triangles and use the appropriate trig ratio)*

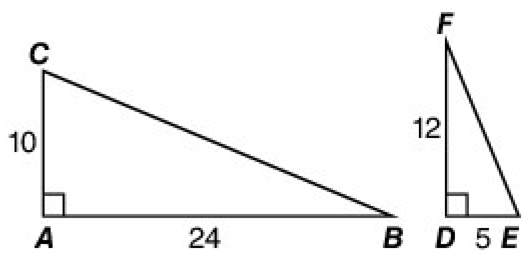


A. $\sin^{-1}\left(\frac{AB}{AC}\right) = \sin\left(\frac{DE}{DC}\right)$

B. $\sin^{-1}\left(\frac{AB}{AC}\right) = \sin^{-1}\left(\frac{DE}{DC}\right)$

C. $\sin^{-1}\left(\frac{AB}{AC}\right) = \tan^{-1}\left(\frac{DE}{DC}\right)$

10. If the triangles shown below are similar, which equation about the relationship of their angles is true? *(Hint: Use trig ratios)*



A. $\sin(B) = \sin(E)$

B. $\sec(B) = \cos(E)$

C. $\sin(B) = \sin(F)$

11. If $\sin(2x) = \cos(x + 30°)$, what is the value of *x*? *(Hint: Sin and Cos are for right triangles, what is the angle total for right triangles)*

A. 20°

B. 30°

C. 50°

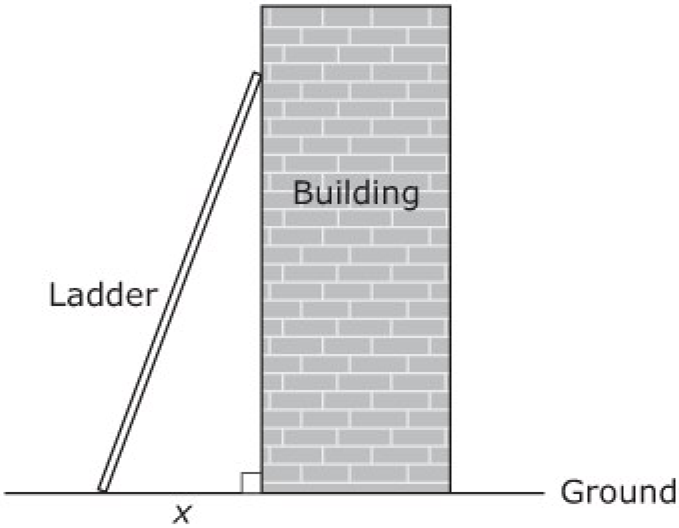
12. If $\sin(x) = \cos(y)$, which of these are possible values of *x* and *y*?

A. $x = 0$ and $y = 0$

B. $x = 30$ and $y = 60$

C. $x = 120$ and $y = 60$

13. A worker must lean a 22-foot ladder against the side of a building. Safety rules for the ladder state that the angle of elevation between the ground and the ladder should be 70°.



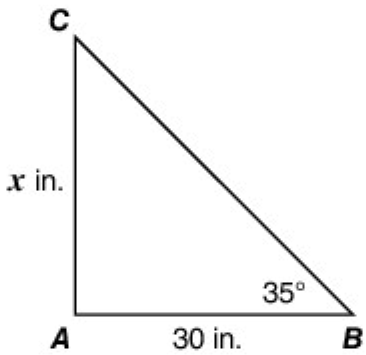
Which equation should the worker use to determine *x*, the length between the base of the building and the base of the ladder?

A. $$\sin 20^o = \frac{x}{22}$$

B. $$\tan 70^o = \frac{22}{x}$$

C. $$70^2 = 22^2 + x^2$$

14. What is the approximate value of *x*, in inches, in the triangle below?

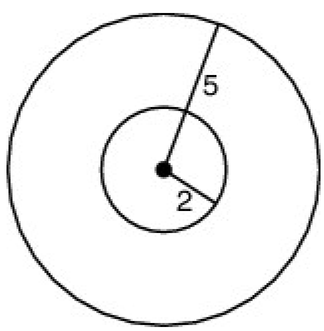


A. 17.2

B. 21.0

C. 30.0

15. Troy drew the diagram below. The inner circle has a radius of 2 units, and the outer circle has a radius of 5 units. Troy says the two circles are similar.



Which statement **best** explains whether Troy is correct, and why?

A. He is correct because the inner circle is a dilation of the outer circle.

B. He is correct because the inner circle has the same center as the outer circle.

C. He is not correct because the inner circle's radius is less than the outer circle's radius.

16. Triangle *FGH* is inscribed in a circle. Which statement is *always* true?

A. One of the angles in the triangle is a central angle in the circle.

B. One of the sides of the triangle is a radius of the circle.

C. If the triangle is a right triangle, one of the sides is a diameter of the circle.

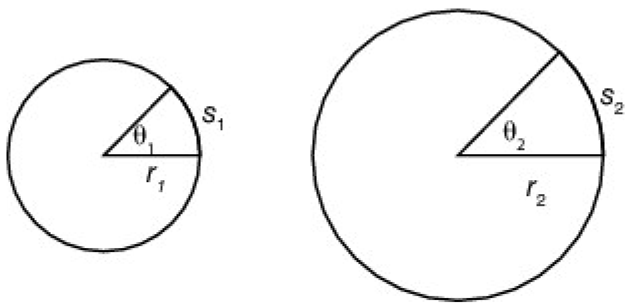
17. Which statement is true for any quadrilateral *EFGH* inscribed in a circle? *(Hint: Draw a picture)*

A. $m\angle E = m\angle H$

B. $m\angle F = m\angle H$

C. $m\angle E + m\angle G = 180°$

18. In the given image, $\theta_1 = \theta_2$, and the angles are measured in radians. Which of these must be **true**?



A. $\frac{s_1}{r_1} = \frac{s_2}{r_2} = \frac{\theta}{2\pi}$

B. $\frac{s_1}{r_1} = \frac{s_2}{r_2} = \theta$

C. $\frac{s_1}{s_2} = \frac{r_1}{r_2} = \theta$

19. **On a coordinate grid, a circle passes through the point $(6, -1)$ and has a center of $(2, -4)$. Which is a formula for this circle?** ***(Hint: Use the formula for a circle)***

A. $(x-2)^2+(y+4)^2=25$

B. $(x+2)^2+(y-4)^2=5$

C. $(x-6)^2+(y+1)^2=25$

20. Which equation represents a circle with a center at $(2, -7)$ and a radius of 4 units?

A. $(x-2)^2+(y+7)^2=4$

B. $(x+2)^2+(y-7)^2=4$

C. $(x-2)^2+(y+7)^2=16$

TEST NAME: **2016-2017 GEO BM4 SPED**

TEST ID: **66377**

GRADE: **Grade 9 - Grade 12**

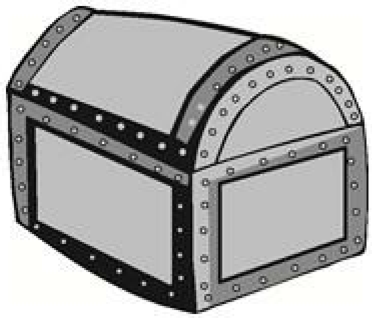
SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. 

The figure above represents a chest. What is an appropriate shape (or combination of shapes) that can be used to model the chest.

Drag all the options that apply to the container below.

Sphere

Cylinder

Half a cylinder

Rectangular prism

Rectangular pyramid

Shapes to model the chest

2. The area of circle *Q* is approximately 157 square inches. If one side of a square is equal to the diameter of circle *Q*, which is the closest approximation to the area of the square? (Hint: Use the formula of a circle A= πr^2 ; area of a square= s^2)

A. $10\sqrt{2}$ sq ft

B. 200 sq ft

C. 314 sq ft

3. To study the population of a species of bird, wildlife experts counted the number of birds in a sample area of 250,000 square yards in its natural habitat. They found there were 0.0005 birds per square yard. What would be the number of birds they would expect to find in 500 square miles of the bird's natural habitat? *(Hint: change yards to miles; 1760 yards= 1 mile)*

   A. 125

   B. 774,000

   C. 1,000,000

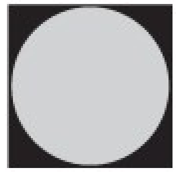
4. Veronica's science class is studying density, and each student is asked to bring in an object to determine its density. Veronica brings in a brick that weighs two pounds and is 6 inches long, 3 inches wide, and 2 inches tall. Her friend Becky brings in a block of wood that weighs 3 pounds and is 1 foot long, 2 inches wide, and 3 inches tall. Which is a true statement about the objects?

   A. The brick has a greater volume than the block and a smaller mass, so the brick is less dense than the block.

   B. The block has a smaller volume than the brick and a greater mass, so the brick is more dense than the block.

   C. The brick is half the volume of the block but more than half the mass, so the brick is more dense than the block.

5. Sophie wants to paint a design composed of circles inscribed in squares along 3 walls of a room. The circles will be yellow, and the spaces outside the circles but inside the squares will be blue. Each of the 3 walls is 120 feet long and 18 feet high. The design will be repeated for the entire length of each wall.



Sophie has plenty of blue paint but will need to buy yellow paint. She has $140 she can spend on paint. Each gallon of paint costs $27 and will cover approximately 350 square feet.

Part A

How many gallons of paint can she buy? What is the maximum area the paint will cover? Show your work.

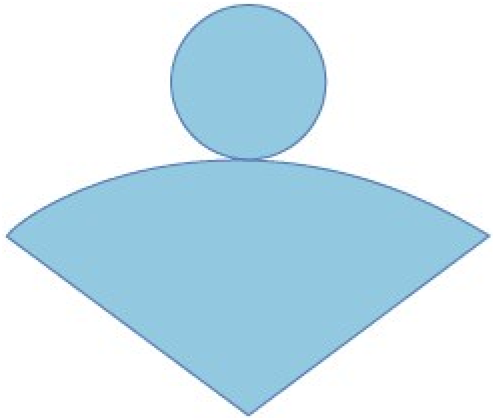
Part B

Sophie wants the circles to have a diameter that is an integer value and wants an integer number of circles on the wall. What is the area of the largest size circle in the design given these constraints? How many circles can she paint on each wall? Show your work or explain your answer.

Part C

What is the total area on all 3 walls that will be painted blue?

6.



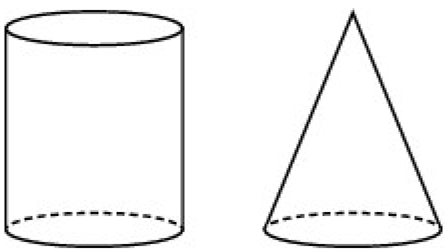
Which three-dimensional figure does the net shown above best represent?

A. Cylinder

B. Hemisphere

C. Cone

7. The cylinder and the cone shown below have the same height, and their bases have the same radius.



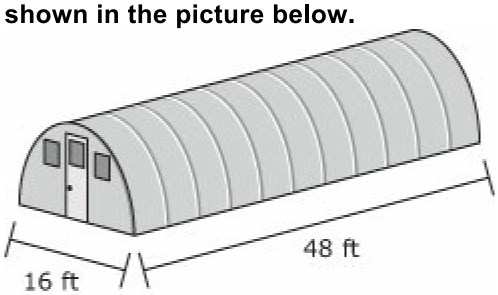
How does the volume of the cylinder (V_{cyl}) compare to the volume of the cone (V_{cone})?

A. $(V_{cyl}) = 2V_{cone}$

B. $V_{cyl} = \frac{1}{3}V_{cone}$

C. $V_{cyl} - V_{cone} = 2V_{cone}$

8. **A steel-framed arched hut used for storage has a diameter of 16 feet and length of 48 feet, as shown in the picture below.**



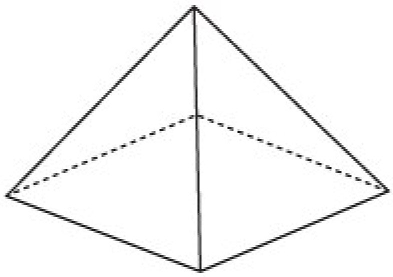
What is the approximate volume of the hut? Use 3.14 for π. *(Hint: Use half of a cylinder)*

A. 4,823 cubic feet

B. 9,646 cubic feet

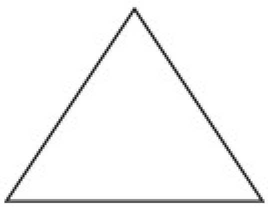
C. 19,292 cubic feet

9. A two-dimensional cross-section of this square pyramid passes through the vertex and is perpendicular to the base.

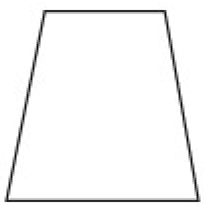


Which polygon identifies the shape of this cross-section?

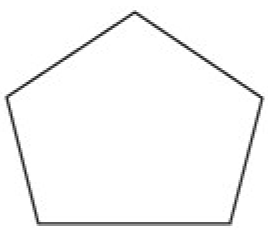
A.



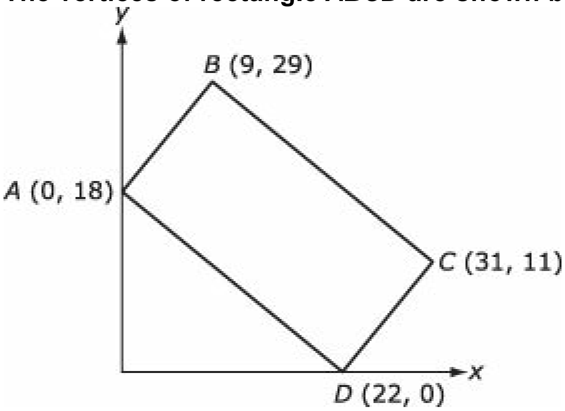
B.



C.



10. **The vertices of rectangle *ABCD* are shown below.**



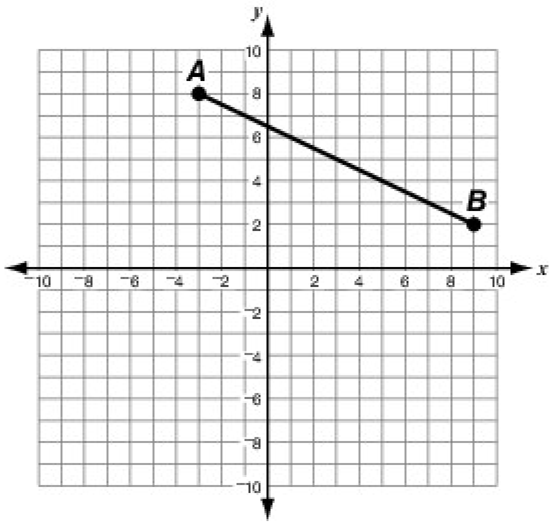
What is the area of *ABCD*? *(Hint: Use the distance formula to find the length and the width)*

A. 202 units^2

B. 404 units^2

C. 808 units^2

11. Examine the following coordinate grid.



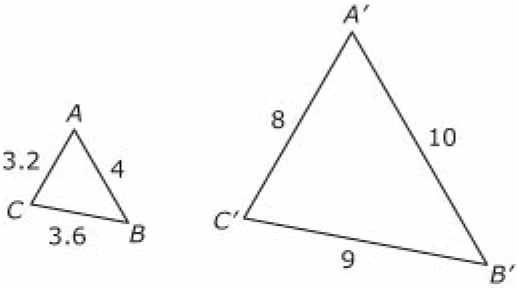
Point C is the midpoint of $\overline{AB}$. There exists a point D that is located on $\overline{AB}$ and is one-third of the way from C to B. What are the coordinates of D? *(Hint: Use the midpoint formula)*

A. $(1, 6)$

B. $(5, 4)$

C. $(7, 3)$

12. **Triangle *ABC* is transformed and the image $\triangle A'B'C'$ is formed.**



Which proportion could be used to prove

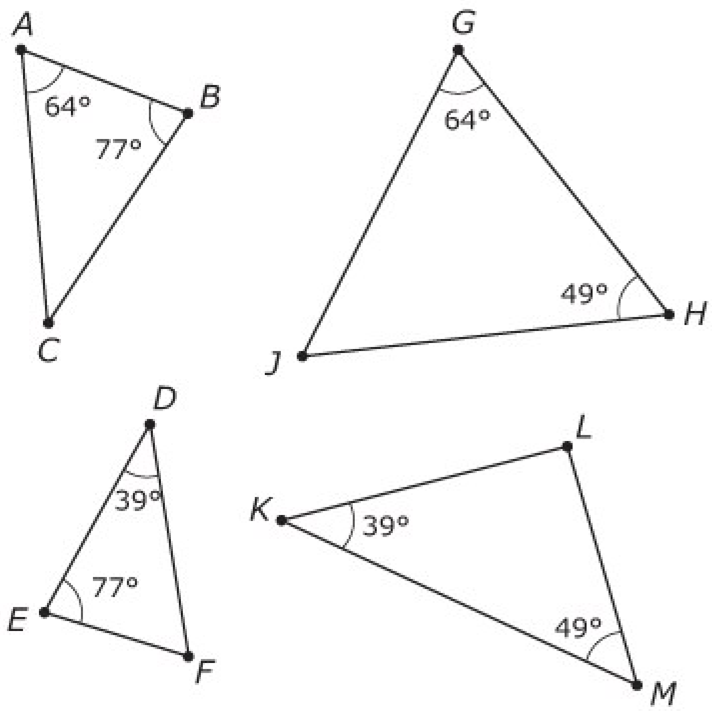
$\triangle ABC \cong \triangle A'B'C'$

A. $\frac{4}{3.6} = \frac{8}{9} = \frac{3.2}{10}$

B. $\frac{3.2}{4} = \frac{3.6}{9} = \frac{8}{10}$

C. $\frac{3.2}{8} = \frac{3.6}{9} = \frac{4}{10}$

13. Which pair of triangles is similar?

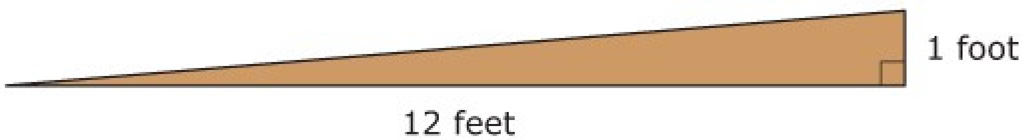


A. $\triangle BCA \sim \triangle EDF$

B. $\triangle DFE \sim \triangle KML$

C. $\triangle ACB \sim \triangle GHJ$

14. A building code requires that curb ramps meet certain standards. The slope of the ramp may not rise more than 1 foot for every 12 feet of its run, or horizontal distance.



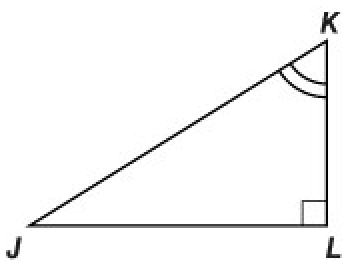
Which degree measure is closest to the angle of elevation from the ground to the ramp? *(Hint: Find the missing angle using trig ratios)*

A. 5°

B. 8°

C. 12°

15. Triangle *JKL* is shown below.



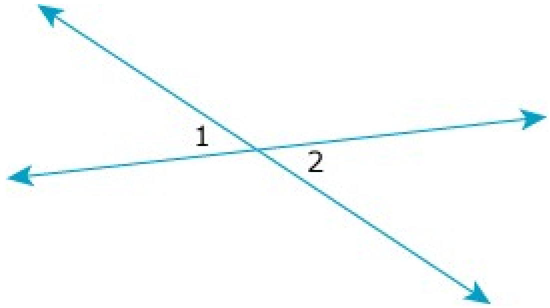
Which ratio represents $\tan K$? *(Hint: Use trig ratios)*

A. $\frac{KL}{JL}$

B. $\frac{JL}{LK}$

C. $\frac{JL}{JK}$

16.



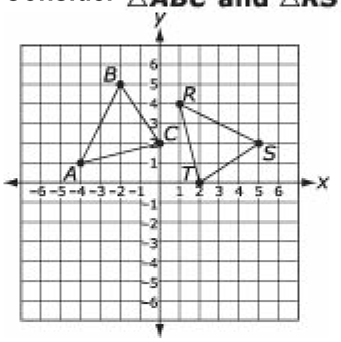
If the measure of $\angle 1$ is 40°, what is the measure of $\angle 2$?

A. 140°

B. 90°

C. 40°

17. **Consider $\triangle ABC$ and $\triangle RST$ shown below.**



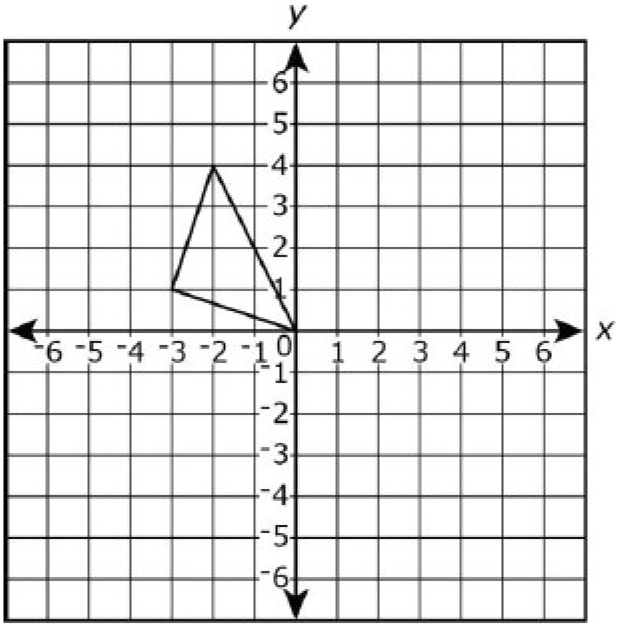
Which transformation can be used to verify $\triangle ABC \cong \triangle RST$?

A. rotate $\triangle ABC$ 90° clockwise about the origin

B. translate $\triangle ABC$ 2 units to the right and 2 units down

C. translate $\triangle ABC$ 7 units to the right and 3 units down

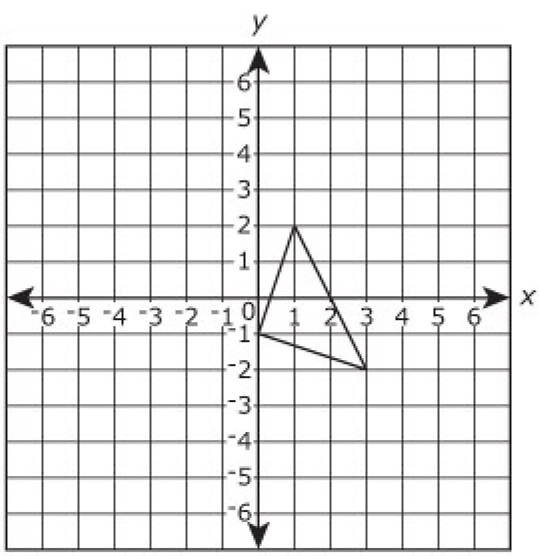
18. A triangle is graphed on a coordinate plane.



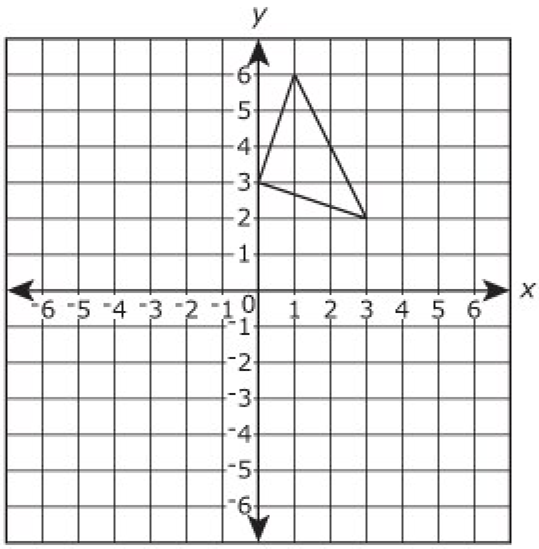
Which graph appears to represent the transformation

$(x, y) \rightarrow (x + 3, y - 2)$?

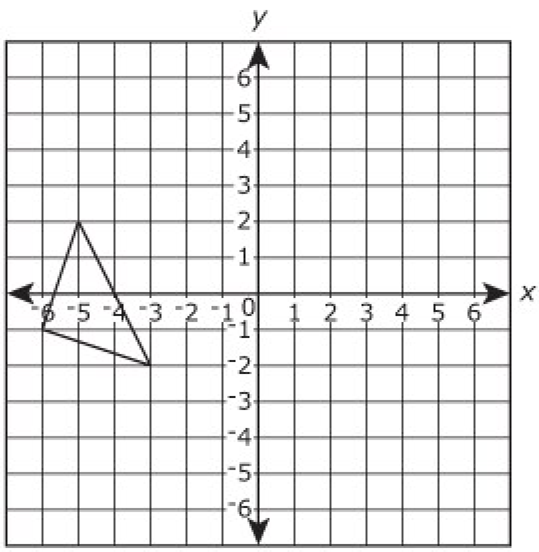
A.



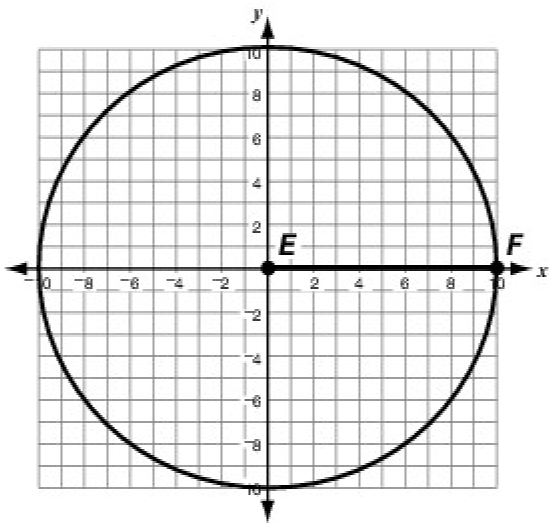
B.


y
x
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

C.


y
x
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6

19. William draws circle E, centered at the origin with radius $\overline{EF}$ measuring 10 units, as shown below.



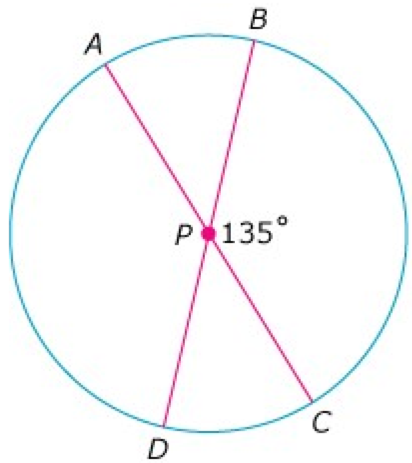
William rotates $\overline{EF}$ 90° counterclockwise about the origin to form $\overline{EG}$.
Which statement is **true**?

A. $\overline{EF}$ and $\overline{EG}$ are congruent and $m\angle FEG$ is 90°.

B. $\overline{EF}$ and $\overline{EG}$ are not congruent and $m\angle FEG$ is 90°.

C. $\overline{EF}$ and $\overline{EG}$ are congruent and $m\angle FEG$ is not 90°.

20.



Which is closest to the measure of arc *DC* in circle *P*?

A. 135.0º

B. 67.5º

C. 45.0º

Atlantic City High School

Algebra 2 Curriculum

Mathematics Task Force Members

Don Coleman

Colleen O'Donnell

Kimberly Rowe

Director of Secondary Education

Donald Harris

Principal

Lina Gil

Assistant Superintendent of Curriculum and Instruction

Sherry Yahn

Algebra 2 Pacing Guide

Date Range	Teachers have approximately 39 school days to complete the suggested sequences of Chapters from the board approved textbook which align with the curricular frameworks. Please refer to the frameworks for specific learning goals that must be covered in your lessons. ***Adjustments should be made accordingly for varying levels.***
9/6/16 – 9/16/16	Complete Algebra 2 Pre-Test Benchmark
9/6/16 – 11/4/16	Unit 1: Chapters 3, 4, 7
10/31/16 – 11/4/16	Complete Algebra 2 Unit 1 Benchmark 1
11/7/16 – 1/13/17	Unit 2: Chapters 5, 6, 8, 10*
1/9/17 – 1/13/17	Complete Algebra 2 Unit 2 Benchmark 2
1/17/17 – 3/17/17	Unit 3: Chapters 9, 13, 14
3/13/17 – 3/17/17	Complete Algebra 2 Unit 3 Benchmark 3
3/20/17 – 5/26/17	Unit 4: Chapter 11 Prepare students for PARCC testing using Performance Tasks
5/22/17 – 6/9/17	Complete Algebra 2 Unit 4 Benchmark 4

**If time allows*

All students must complete the pre-test and all 4 benchmarks on the edConnect website. (Benchmark tests are aligned to curricular frameworks, so teachers should be aware of the content of the benchmarks to ensure student success.)

Each teacher may decide to use Benchmark 4 as their final exam as in the past. However, it must be completed by all students (no exemptions from any benchmarks). A cumulative final exam is provided in the appendix of the curriculum for use by teachers that choose to use it.

Suggested Open Educational Resources are available in the Curricular Frameworks for each Unit, which can assist teachers and students with PARCC test preparation.

Overview	Standards for Mathematical Content		Unit Focus	Standards for Mathematical Practice
Unit 1 **Complex Solutions and Modeling with Rational Exponents**	○ N.CN.A.1 ○ N.CN.A.2 ○ N.CN.C.7 □ A.REI.B.4 ○ A.REI.C.7 ○ A.REI.C.6 ■ F.BF.A.2 □ F.LE.A.2	○ F.LE.B.5 ■ A.SSE.B.4 ■ N.RN.A.1 ■ N.RN.A.2 ■ A.SSE.B.3 □ F.IF.C.8 □ F.LE.A.4	• Perform arithmetic operations with complex numbers • Use complex numbers in polynomial identities and equations • Build a function that models a relationship between two quantities • Construct & compare linear, quadratic, & exponential models • Write expressions in equivalent forms to solve problems • Extend the properties of exponents to rational exponents • Analyze functions using different representations	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 1: Suggested Open Educational Resources	N.CN.A.1 Complex number patterns N.CN.A.2 Powers of a complex number N.CN.C.7, A.REI.B.4b Completing the square A.REI.C.7 Linear and Quadratic System A.REI.C.6 Pairs of Whole Numbers F.BF.A.2 Snake on a Plane F.LE.A.2 Rumors		F.LE.B.5, F.LE.A.2 Exponential Parameters A.SSE.B.4 Course of Antibiotics N.RN.A.1 Evaluating Exponential Expressions N.RN.A.2 Rational or Irrational? A.SSE.B.3c Forms of exponential expressions F.IF.C.8b Carbon 14 dating in practice I F.LE.A.4 Carbon 14 dating	
Unit 2 **Polynomials and Analysis of Nonlinear Functions**	■ A.APR.B.2 ■ A.SSE.A.2 ■ A.APR.B.3 □ F.IF.C.7 ○ A.APR.C.4 □ A.APR.D.6 ■ A.REI.A.1	■ A.REI.A.2 □ A.CED.A.1 ■ F.IF.B.4 ■ F.IF.B.6 ○ G.GPE.A.2 □ F.IF.C.7 ■ A.REI.D.11	• Understand the relationship between zeros and factors of polynomials • Interpret the structure of expressions • Use polynomial identities to solve problems • Analyze functions using different representations • Rewrite rational expressions • Understand solving equations as a process of reasoning and explain the reasoning • Interpret functions in terms of the context • Translate between the geometric description and the equation for a conic section • Represent and solve equations and inequalities graphically	
Unit 2: Suggested Open Educational Resources	A.APR.B.2 The Missing Coefficient A.SSE.A.2 A Cubic Identity A.APR.B.3 Graphing from Factors III F.IF.C.7c Graphs of Power Functions A.APR.C.4 Trina's Triangles A.APR.D.6 Combined Fuel Efficiency A.REI.A.1 Products and Reciprocals		A.REI.A.2 Radical Equations A.REI.A.2, A.CED.A.1 An Extraneous Solution G.GPE.A.2 Defining Parabolas Geometrically F.IF.C.7e Logistic Growth Model A.REI.D.11 Ideal Gas Law	

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

<table>
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□ F.IF.C.7
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<td>□ S.ID.B.6
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■ F.BF.A.1
□ N.Q.A.2
○ F.BF.B.3
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<td colspan="2">• Extend the domain of trigonometric functions using the unit circle
• Analyze functions using different representations
• Interpret functions that arise in applications in terms of the context
• Model periodic phenomena with trigonometric functions
• Prove and apply trigonometric identities
• Summarize, represent, and interpret data on two categorical and quantitative variables
• Build a function that models a relationship between two quantities
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<td rowspan="4">MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments & critique the reasoning of others.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

MP.8 Look for and express regularity in repeated reasoning.</td>
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F.TF.A.2 What exactly is a radian?
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Making Inference, Justifying Conclusion and Conditional Probability</td>
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<td colspan="2">• Summarize, represent, and interpret data on a single count or measurement variable
• Understand and evaluate random processes underlying statistical experiments
• Make inferences and justify conclusions from sample surveys, experiments and observational studies
• Understand the independence and conditional probability and use them to interpret data
• Use the rules of probability to compute probabilities of compound events in a uniform probability model</td>
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<td>Unit 4: Suggested Open Educational Resources</td>
<td colspan="3">S.ID.A.4 Do You Fit in This Car?
S.IC.A.1School Advisory Panel
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S.CP.B.7 The Addition Rule
S.CP.B.7 Rain and Lightning</td>
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Algebra 2	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Teachers should create summative assessments in order to collect data and drive day to day instruction. For example, tests, quizzes and constructed response tasks.	*edConnect Department Wide Quarterly Benchmark Testing*
Focus Mathematical Concepts	
Prerequisite skills: Successfully Complete Secondary Algebra 1 & Geometry	
District/School Tasks	**District/School Primary and Supplementary Resources**
Complete Benchmarking and constructed response tasks to prepare for PARCC testing.	*Pearson Textbook and Online Resources are available to all staff and students.*
Instructional Best Practices and Exemplars	
Teachers should differentiate instruction, create lessons and integrate technology into the classroom whenever possible.	

Unit 1 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
N.CN.A.1. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. N.CN.A.2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers	MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concepts: • Complex number i is defined such that $i^2 = -1$. • Every complex number has the form $a + bi$ with a and b real. Students are able to: • $i^2 = -1$ and the commutative, associative properties to add and subtract complex numbers are to be used. • determine that $i^2 = -1$ and the commutative, associative, and distributive properties to multiply complex numbers. Learning Goal 1: Add, subtract, and multiply complex numbers using the commutative, associative and distributive properties.	4-8
N.CN.C.7. Solve quadratic equations with real coefficients that have complex solutions. A.REI.B.4. Solve quadratic equations in one variable. A.REI.B.4b. Solve quadratic equations by inspection (e.g.,	MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concepts: • As with real solutions, complex solutions to quadratic equations may be determined by taking square roots, factoring, and completing the square. Students are able to:	4-8 5-5 5-6 *Prerequisite Skills found in Algebra 1 Textbook* *9-3* *9-4*

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 1 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.		• solve quadratic equations in one variable that have complex solutions by taking square roots. • solve a quadratic equations in one variable that have complex solutions by completing the square. • solve a quadratic equations in one variable that have complex solutions by factoring. • write complex solutions in $a \pm bi$ form. Learning Goal 2: Solve quadratic equations with real coefficients that have complex solutions by taking square roots, completing the square and factoring.	*9-5* *9-6*
A.REI.C.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line* $y = -3x$ and the circle $x^2 + y^2 = 3$.	MP.1 Make sense of problems and persevere in solving them.	Concepts: • Solutions of linear systems contain different function types. Students are able to: • solve a system containing one linear equation and one quadratic equation algebraically. • graph a system containing one linear equation and one quadratic equation to determine a solution. Learning Goal 3: Solve simple systems consisting of a linear and quadratic equation in two variables algebraically and graphically.	4-9
A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	MP.1 Make sense of problems and persevere in solving them. MP.7 Look for and make use of structure.	Concepts: • Solving a system of linear equations containing n variables requires n equations. Students are able to: • use the substitution method and/or elimination method to find the solution of a system containing three linear equations. Learning Goal 4: Solve algebraically a system of three linear equations.	3-1 3-2 3-3

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 1 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
■ F.BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. ■ F.LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). ◎ F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP 4. Model with mathematics MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concepts: • Recursion Students are able to: • distinguish between recursive and explicit formulas. • represent geometric and arithmetic sequences recursively. • represent geometric and arithmetic sequences with explicit formulas. • translate between recursive form and explicit form of geometric and arithmetic sequences. • recognize explicit formula for geometric sequences as exponential functions containing a domain in the integers only. • interpret the parameters of an exponential function representing a geometric sequence. • interpret the parameters of a linear function representing an arithmetic sequence. Learning Goal 5: Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	*Prerequisite Skills found in Algebra 1 Textbook* *4-7* *5-3* *5-4* *5-5* *5-7* *7-6* *7-7* *7-8* *9-7*
■ A.SSE.B.4. Derive and/or explain the derivation of the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*	MP.1 Make sense of problems and persevere in solving them. MP.7 Look for and make use of structure.	Concepts: • Series as a sum of a sequence Students are able to: • derive or explain the derivation of the formula for the sum of a finite geometric series. • use the formula for the sum of a finite geometric series to solve problems. Learning Goal 6: Use the formula for the sum of a finite geometric series to solve problems [*for example, calculate mortgage payments*; derive the formula for the sum of a finite	9-5 CB 9-5

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Unit 1 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
		geometric series (when the common ratio is not 1)].	
N.RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* N.RN.A.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	MP.7 Look for and make use of structure.	Concepts: • Properties of integer exponents extends to rational exponents (*for example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5)* • Radical notation is a representation of rational exponents. Students are able to: • rewrite expressions containing rational exponents into radical form. • rewrite expressions containing radical notation into exponential expressions containing rational exponents. Learning Goal 7: Use properties of integer exponents to explain and convert between expressions involving radicals and rational exponents.	*Prerequisite Skills found in Algebra 1 Textbook* *7-2* *7-3* *7-4* *7-5*
A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression A.SSE.B.3c: Use the properties of exponents to transform expressions for exponential functions. *For example the expression* 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* F.IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concepts: • Alternate, equivalent forms of an exponential expression containing rational exponents may reveal specific attributes of the function that it defines. Students are able to: • use properties of exponent transform/rewrite an exponential expression for an exponential function. • explain the properties of the quantity or the function. Learning Goal 8: Use the properties of exponents to transform expressions for exponential functions, explain properties of the quantity revealed in the transformed expression or different properties of the function.	*Prerequisite Skills found in Algebra 1 Textbook* *7-7* *9-4* *9-5* 2-4 4-2 5-9 6-8

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Unit 1 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
F.IF.C.8b: Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*			
■ F.LE.A.4. Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concepts: • Exponents and logarithms have an inverse relationship. • Solutions to an exponential equation in one variable can be written as a logarithm. Students are able to: • transform an exponential model represented by $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e. • write the solution to $ab^{ct} = d$ as a logarithm. • use technology to evaluate logarithms having base 2, 10, or e. Learning Goal 9: Express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	7-5 7-6

Unit 2 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
■ A.APR.B.2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x – a$ is $p(a)$, so $p(a) = 0$ if and only if $(x – a)$ is a factor of $p(x)$.	MP.6 Attend to precision.	Concepts: • Polynomial division: For a polynomial $p(x)$ and a number *a:* – $p(a) = 0$ if and only if $(x – a)$ is a factor of $p(x)$ – $(x – a)$ is a factor of $p(x)$ if and only if $p(a) = 0$ Students are able to: • use the Remainder Theorem to determine factors of a polynomial. Learning Goal 1: Apply the Remainder Theorem in order to determine the factors of a polynomial.	5-4
■ A.SSE.A.2. Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 – y^4$ *as* $(x^2)^2 – (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 – y^2)(x^2 + y^2)$. ■ A.APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	MP.7 Look for and make use of structure.	Concepts: • Factors of polynomials can be used to identify zeros to be used to develop a rough graph of the polynomial function. Students are able to: • factor polynomials. • analyze a table of values to determine where the polynomial is increasing and decreasing. • use the zeros of the polynomial to create rough graph. Learning Goal 2: Use an appropriate factoring technique to factor polynomials. Explain the relationship between zeros and factors of polynomials, and use the zeros to construct a rough graph of the function defined by the polynomial.	4-4 4-5 5-2 5-3 5-6 CB 5-7 6-1 6-2 6-3 8-4

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Unit 2 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Factors of polynomials can be used to identify zeros to be used to develop a rough graph of the polynomial function. Students are able to: • graph a polynomial function given its equation. • identify zeros from the graph and using an appropriate factoring technique. • show key features of the graph, including end behavior. • use technology to graph and describe key features of the graph for complicated cases. Learning Goal 3: Graph polynomial functions from equations; identify zeros when suitable factorizations are available; show key features and end behavior.	2-3 2-4 CB 2-4 2-6 2-7 4-1 4-2 5-1 5-2 5-8 6-8 7-2 CB 8-2 8-3
A.APR.C.4. Prove polynomial identities and use them to describe numerical relationships. *For example, the difference of two squares; the sum and difference of two cubes; the polynomial identity* $(x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)^2$ *can be used to generate Pythagorean triples.*	MP.3 Construct viable arguments and critique the reasoning of others. MP.7 Look for and make use of structure.	Concepts: • Polynomial identities can be used to describe numerical relationships. Students are able to: • show that the polynomial identity $(x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples. • prove polynomial identities. Learning Goal 4: Use polynomial identities to describe numerical relationships and prove polynomial identities.	CB 5-5
A.APR.D.6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	MP.1 Make sense of problems and persevere in solving them.	Concepts: • Rational expressions can be written in different forms. Students are able to: • write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$. • use inspection, factoring and long division to rewrite rational expressions.	5-4 8-6

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Unit 2 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
		• use technology to rewrite rational expressions for more complicated cases. Learning Goal 5: Rewrite simple rational expressions in different forms using inspection, long division, or, for the more complicated examples, a computer algebra system.	
■ A.REI.A.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. ■ A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. □ A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics. MP.6 Attend to precision.	Concepts: • Inverse relationships exist between roots and powers. • Extraneous solutions do not result in true statements. Students are able to: • use the inverse relationship between roots and powers when solving radical equations. • identify any extraneous solutions. • solve simple rational equations in one variable (degree of numerators and denominator is not greater than 2). • write simple rational equations in one variable and use the rational equation to solve problems. Learning Goal 6: Solve simple rational and radical equations in one variable, use them to solve problems and show how extraneous solutions may arise. Create simple rational equations in one variable and use them to solve problems.	1-4 1-5 1-6 4-1 4-5 6-5 CB 8-1 8-6
■ F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative;*	MP.1 Make sense of problems and persevere in solving them. MP 4. Model with mathematics MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concepts: • A radical function is any function that contains a variable inside a root. Students are able to: • interpret key features of radical functions from graphs and tables in the context of the problem. • sketch graphs of radical functions given a verbal description of the relationship between the quantities.	2-3 2-5 4-1 4-2 4-3 CB 4-3 5-1 5-8 CB 7-3 13-1

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 2 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
relative maximums and minimums; symmetries; end behavior; and periodicity. ■ F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.		• identify intercepts and intervals where function is increasing/decreasing. • determine the practical domain of a radical function. • determine key features including intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior. Learning Goal 7: For radical functions, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.	13-4 13-5
○ G.GPE.A.2. Derive the equation of a parabola given a focus and directrix		Concepts: • Any point on a parabola is equidistant between the focus and the directrix. Students are able to: • use the distance formula to write an equation of a parabola when the focus and directrix are given. Learning Goal 8: Derive the equation of a parabola given a focus and directrix.	10-2 10-6
□ F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.		Concepts: • Logarithmic functions Students are able to: • graph logarithmic functions having base 2, 10 or e, using technology for more complicated cases. • show intercepts and end behavior of logarithmic functions. Learning Goal 9: Graph logarithmic functions expressed symbolically and show key features of the graph (including intercepts and end behavior).	2-3 2-4 CB 2-4 2-6 2-7 4-1 4-2 5-1 5-2 5-8 6-8 7-2 CB 8-2 8-3

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 2 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
A.REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	Concepts: • Solutions to complex systems of nonlinear functions can be approximated graphically Students are able to: • find the solution to f(x)=g(x) approximately, e.g., using technology to graph the functions; include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. • find the solution to f(x)=g(x) approximately, e.g., using technology to make tables of values, or find successive approximations; include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. Learning Goal 10: Find approximate solutions for f(x)=g(x), using technology to graph, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, logarithmic and exponential functions.	3-1 5-3 7-5 CB 7-6 8-6

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 3 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
F.TF.A.1. Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. F.TF.A.2. Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision.	Concepts: • Radian measure of an angle as the length of the arc on the unit circle that is subtended by the angle • Relationship between degrees and radians Students are able to: • find the measure of the angle given the length of the arc. • find the length of an arc given the measure of the central angle. • convert between radians and degrees. • use the unit circle to evaluate sine, cosine and tangent of standard reference angles. Learning Goal 1: Use the radian measure of an angle to find the length of the arc in the unit circle subtended by the angle and find the measure of the angle given the length of the arc. Learning Goal 2: Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.	13-3 13-4 13-5 13-6
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of	MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concepts: • Relationship between the unit circle in the coordinate plane and graph of trigonometric functions. Students are able to: • graph trigonometric functions, showing period, midline, and amplitude. Learning Goal 3: Graph trigonometric functions expressed symbolically, showing key features of the graph, by hand in simple cases and using technology for more complicated cases.	2-3 2-4 CB 2-4 2-6 2-7 4-1 4-2 4-3 5-1 5-2 5-8 6-8 7-2 CB 7-3 CB 8-2

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Unit 3 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.			8-3 13-1 13-4 13-5
F.TF.B.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	MP.4 Model with mathematics.	Concepts: • Periodic functions may model real-world scenarios. Students are able to: • use characteristics of real world phenomena to select a trigonometric model. • identify amplitude, frequency and midline appropriate for the model. Learning Goal 4: Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.	13-4 13-5 13-6 13-7
F.TF.C.8. Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$,or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concepts: No new concept(s) introduced Students are able to: • prove the Pythagorean identity: $\sin^2(\theta) + \cos^2(\theta) = 1$. • use the Pythagorean identity to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ when given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle. Learning Goal 5: Use the Pythagorean identity $(\sin \theta)^2 + (\cos \theta)^2 = 1$ to find $\sin \theta$, $\cos \theta$, or $\tan \theta$, given $\sin \theta$, $\cos \theta$, or $\tan \theta$, and the quadrant of the angle.	14-1

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 3 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related 6a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: No new concept(s) introduced Students are able to: • fit exponential and trigonometric functions to data using technology. • solve problems using functions fitted to data (prediction equations). • interpret the intercepts of models in context. • Plot residuals of non-linear functions. • Analyze residuals in order to informally evaluate the fit of exponential and trigonometric functions. Learning Goal 6: Represent nonlinear (exponential and trigonometric) data for two variables on a scatter plot, fit a function to the data, analyze residuals (in order to informally assess fit), and use the function to solve problems. Use given functions or choose a function suggested by the context; emphasize exponential and trigonometric models.	5-7 9-7 12-2 12-4
F.IF.C.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.*	MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concepts: No new concept(s) introduced Students are able to: • compare key attributes of functions each represented in a different way (i.e zeros, end behavior, periodicity, asymptotes). Learning Goal 7: Analyze and compare properties of two functions when each is represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	2-4 4-2 5-9 7-3
F.BF.A.1. Write a function that describes a relationship between two quantities. F.BF.A.1b. Combine standard function types using arithmetic operations. *For example, build a function that models the temperature of a cooling body by adding a constant function*	MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concepts: • Functions of various types can be combined to model real world situations. Students are able to: • use arithmetic operations to combine functions of varying types in order to model relationships between quantities.	2-2 2-5 4-2 5-2 6-6 7-2 8-2 8-3

Key: ■ Major | ◘ Supporting | ○ Additional | * Benchmarked Standard

Unit 3 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
to a decaying exponential, and relate these functions to the model. N.Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.		Learning Goal 8: Construct a function that combines, using arithmetic operations, standard function types to model a relationship between two quantities.	*Prerequisite Skills found in Algebra 1 Textbook* *CB 2-5* *2-6* *3-3* *4-5* *5-2* *12-3*
F.BF.B.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k\,f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. *Include recognizing even and odd functions from their graphs and algebraic expressions for them.*	MP.3 Construct viable arguments and critique the reasoning of others. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concepts: • Function notation representation of transformations Students are able to: • perform transformations on graphs of polynomial, exponential, logarithmic, or trigonometric functions. • identify the effect on the graph of replacing f(x) by – $f(x) + k$; – $k\,f(x)$; – $f(kx)$; – *and* $f(x + k)$ for specific values of k (both positive and negative). • identify the effect on the graph of combinations of transformations. • given the graph, find the value of k. • illustrate an explanation of the effects on polynomial, exponential, logarithmic, or trigonometric graphs using technology. Learning Goal 9: Identify the effect on the graph of a polynomial, exponential, logarithmic, or trigonometric function of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative). Find the value of k given the graphs and identify even and odd functions from graphs and equations.	2-6 2-7 4-1 5-9 8-2

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 3 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
F.BF.B.4. Find inverse functions. F.BF.B.4a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. *For example, $f(x) = 2x^3$ or $f(x) = (x+1)/(x-1)$ for $x \neq 1$.* [*note: composition of functions is not introduced here]	MP.1 Make sense of problems and persevere in solving them. MP.6 Attend to precision. MP.8 Look for and express regularity in repeated reasoning.	Concepts: • For a function f(x) that has an inverse, the domain/input for f(x) is the inverse function's range/output and that the range/output for f(x) is the inverse function's domain/input. Students are able to: • use function notation to represent the inverse of a function – $f^{-1}(x)$. • transform an equation in order to isolate the independent variable, recognizing that the domain/input for f(x) is the inverse function's range/output and that the range/output for f(x) is the inverse function's domain/input. Learning Goal 10: Determine the inverse function for a simple function.	*Prerequisite Skills found in Algebra 1 Textbook* *CB 5-5*

Unit 4 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
S.ID.A.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concepts: • Mean and standard deviation are used to fit in a normal distribution • Population percentages may be estimated when the data are approximately normally distributed. Students are able to: • identify data sets as approximately normally distributed or not. • explain the 68-95-99.7 rule for normal distributions (approximately 68% of the area under a normal distribution curve is within one standard deviation, approximately 95% of the area under a normal distribution curve is within two standard deviations, etc). • use the mean and standard deviation of a normal distribution to estimate population percentages.	11-7 11-10

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 4 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
		• use calculators, spreadsheets, and tables to estimate areas under the normal curve and interpret in context. Learning Goal 1: Use the mean and standard deviation of a data set to fit it to a normal distribution, estimate population percentages, and recognize that there are data sets for which such a procedure is not appropriate (use calculators, spreadsheets, and tables to estimate areas under the normal curve).	
S.IC.A.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concepts: • Statistics is a process for making inferences about a population based on analysis of a random sample from the population. Students are able to: • identify and evaluate random sampling methods. • explain the importance of randomness to sampling and inference making. • explain the difference between values that describe a population and a sample, in context. Learning Goal 2: Identify and evaluate random sampling methods.	11-8
S.IC.A.2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?*	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concepts: • Random processes can be described mathematically by using a model: a list or description of possible outcomes. Students are able to: • determine whether a given model is consistent with results from and experiment. • know the difference between experimental and theoretical modeling. • know how far predictions can be projected based on sample size. • design simulations of random sampling. Learning Goal 3: Determine if the outcomes and properties of a specified model are	CB 11-3

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 4 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
		consistent with results from a given data-generating process (e.g. using simulation).	
■ S.IC.B.3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.	MP.4 Model with mathematics.	Concepts: • Collecting data from a random sample of a population makes it possible to draw conclusions about the whole population. • Randomly assigning individuals to different treatments allows a fair comparison of the effectiveness of those treatments. • Sample surveys, experiments, and observational studies serve different statistical purposes allowing for different statistical analyses. Students are able to: • distinguish between sample surveys, experiments, and observational studies. • explain the importance of randomization in each of these processes. • identify voluntary response samples and convenience samples. • describe simple random samples, stratified random samples, and cluster samples. • explain how under coverage, nonresponse, and question wording can lead to bias in a sample survey. Learning Goal 4: Identify the differences among and purposes of sample surveys, experiments, and observational studies, explaining how randomization relates to each.	11-8
■ S.IC.B.4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Appropriately drawn samples of a population may be used to estimate a population mean or population proportion. • Relationship between margin of error, variation with a data set, and variability in the population Students are able to: • conduct simulations of random sampling to gather samples. • estimate population means with sample means.	11-8 CB 11-10a

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 4 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
		• estimate population proportions with sample proportions. • calculate martins of error for the estimates. • explain how the results relate to variability in the population. Learning Goal 5: Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.	
■ S.IC.B.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant ■ S.IC.B.6. Evaluate reports based on data.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • A statistically significant outcome is one that is unlikely to be due to chance alone. Students are able to: • conduct a t-test to evaluate the effectiveness and differences in two treatments. • use simulations to generate data simulating applying two treatments. • use the results of simulations to determine if the differences are significant. • read and explain, in the context of the situation, data from outside reports – discussing experimental study design, drawing conclusions from graphical and numerical summaries, and identifying characteristics of the experimental design. Learning Goal 6: Use data from a randomized experiment to compare two treatments and use simulations to decide if differences between parameters are significant; evaluate reports based on data.	11-6 11-7 11-8 CB 11-10b
○ S.CP.A.1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events (“or,” “and,” “not”).	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.	Concepts: • Events are described as subsets of a sample space. Students are able to: • identify a sample space, recognizing it as the set of all possible outcomes.	*Prerequisite Skills found in Algebra 1 Textbook* *12-7*

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 4 Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
	MP.6 Attend to precision.	• identify and describe subsets of a sample space as events. • describe unions, intersections and complements of events. • visualize unions, intersections and complements of events with Venn diagrams. Learning Goal 7: Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").	
○ S.CP.A.2. Understand that two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities, and use this characterization to determine if they are independent. ○ S.CP.A.3. Understand the conditional probability of *A* given *B* as *P*(*A* and *B*)/*P*(*B*), and interpret independence of *A* and *B* as saying that the conditional probability of *A* given *B* is the same as the probability of *A*, and the conditional probability of *B* given *A* is the same as the probability of *B*. ○ S.CP.A.4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. *For example, collect data from a random sample of students in your school on their favorite subject*	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Two events *A* and *B* are independent if the probability of *A* and *B* occurring together is the product of their probabilities. • Independence of event *A* and event *B* means that the conditional probability of *A* given *B* is the same as the probability of, and the conditional probability of *B* given *A* is the same as the probability of *B*. Students are able to: • identify events as independent or dependent. • interpret the conditional probability of A given B as answering the question 'now that B *has* occurred, what is the probability that event A will occur?'. • determine the conditional probability of *A* given *B* using *P*(*A* and *B*)/*P*(*B*). • represent conditional probability of *A* given *B* as P(A|B). • calculate conditional probabilities. • construct two-way frequency tables for two categorical variables. • calculate probabilities from the two-way frequency table. • use the probabilities to assess independence of two variables.	*Prerequisite Skills found in Algebra 1 Textbook* *12-7* *CB 12-8*

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 4 Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results. S.CP.A.5. Recognize and explain the NEW Concepts of conditional probability and independence in everyday language and everyday situations. *For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.*		Learning Goal 8: Use two-way frequency tables to determine if events are independent and to calculate conditional probability. Use everyday language to explain independence and conditional probability in real-world situations.	
S.CP.B.6. Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A*, and interpret the answer in terms of the model. S.CP.B.7. Apply the Addition Rule, P(A or B) = P(A) + P(B) – P(A and B), and interpret the answer in terms of the model.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Mutually exclusive events exist. Students are able to: • analyze event B's outcomes to determine the proportion of B's outcomes that also belong to event A. • interpret this proportion as conditional probability of A given B. • identify two events as mutually exclusive (disjoint). • calculate probabilities using the Addition rule P(A or B) = P(A) + P(B) – P(A and B). Learning Goal 9: Find the conditional probability of *A* given *B* as the fraction of *B*'s outcomes that also belong to *A* and apply the Addition Rule [*P(A* or *B) = P(A) + P(B) – P(A* and *B)*].	11-3 11-4

Key: Major | Supporting | Additional | * Benchmarked Standard

Atlantic City High School

Algebra 2 Unit Benchmarks

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Don Coleman

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TEST NAME: **2016-2017 ALG2 Pretest**

TEST ID: **64101**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

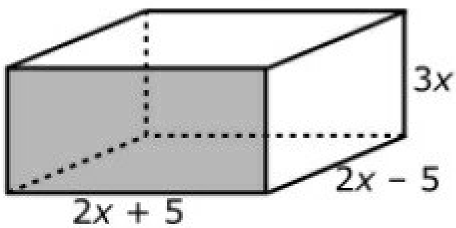
Class:

Date:

Read the passage - 'Box' - and answer the question below:

Box

The diagram represents a right rectangular prism with dimensions labeled as algebraic expressions.



Which of these expressions represents the volume of the prism?

1. Select **all** that apply.

A. $7x$

B. $4x^2 - 25$

C. $12x^3 - 75x$

D. $3x\left(4x^2 - 25\right)$

E. $(2x+5)(6x^2 - 15x)$

F. $12x^3 + 60x^3 + 75x$

G. $12x^3 - 30x^3 + 10x - 25$

2. **The equation $KE = \frac{1}{2}mv^2$ represents the kinetic energy (KE) of an object with mass (*m*) and speed (*v*). Which equation shows *v* in terms of KE and *m*?**

A. $v = 2\sqrt{\frac{KE}{m}}$

B. $v = \sqrt{\frac{2KE}{m}}$

C. $v = \frac{2KE}{m}$

D. $v = \frac{KE}{2m}$

3. The Green Thumb nursery sells plants in hanging baskets for $8.99 each and plants in pots for $4.75 each. Rachel bought 9 plants for a total of $63.95. Which system of equations could be used to find *x*, the number of hanging baskets purchased, and *y*, the number of potted plants purchased?

A. $\begin{cases} x + y = 9 \\ 8.99x + 4.75y = 63.95 \end{cases}$

B. $\begin{cases} x + y = 63.95 \\ 8.99x + 4.75y = 9 \end{cases}$

C. $\begin{cases} x + y = 9 \\ 4.75x + 8.99y = 63.95 \end{cases}$

D. $\begin{cases} x + y = 63.95 \\ 4.75x + 8.99y = 9 \end{cases}$

4. By completing the square, which equation is equivalent to $x^2 - 4x + 14 = 13$?

A. $(x+2)^2 = 3$ because $x^2 - 4x + (-2)^2 = -1 + (-2)^2$

B. $(x-2)^2 = 3$ because $x^2 - 4x + (-2)^2 = -1 + (-2)^2$

C. $(x+2)^2 = 5$ because $x^2 - 4x + (-2)^2 = 1 + (-2)^2$

D. $(x-2)^2 = 5$ because $x^2 - 4x + (-2)^2 = 1 + (-2)^2$

5. What are the *x*-intercepts of the graph of $y = (5x - 8)(7x + 3)$?

A. $\left(\frac{3}{7}, 0\right)$ and $\left(-\frac{8}{5}, 0\right)$

B. $\left(-\frac{3}{7}, 0\right)$ and $\left(-\frac{8}{5}, 0\right)$

C. $\left(\frac{3}{7}, 0\right)$ and $\left(\frac{8}{5}, 0\right)$

D. $\left(-\frac{3}{7}, 0\right)$ and $\left(\frac{8}{5}, 0\right)$

6. The tables below contain ordered pairs that satisfy functions $f(x)$ and $g(x)$. According to the tables, where do the functions intersect?

A.

x	$f(x)$	$g(x)$
-2	$-\frac{8}{9}$	9
-1	$-\frac{2}{3}$	6
0	0	5
1	2	6
2	8	9

The functions intersect at $(0, 0)$.

B.

x	$f(x)$	$g(x)$
-2	18	2
-1	11	-1
0	6	0
1	3	-1
2	2	2

The functions intersect at $(-1, -1)$, $(0, 0)$, and $(2, 2)$.

C.

x	$f(x)$	$g(x)$
-2	-3	$-\frac{3}{4}$
-1	-1	$-\frac{1}{2}$
0	1	0
1	3	1
2	5	3

The functions intersect at $(-1, -1)$, $(0, 0)$, and $(1, 1)$.

D.

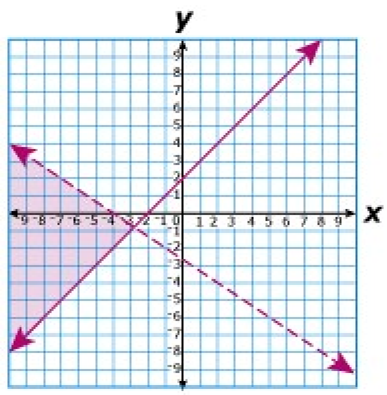
x	$f(x)$	$g(x)$
-2	4	-10
-1	2	-2
0	0	0
1	2	2
2	4	10

The functions intersect at $(0, 0)$ and $(1, 2)$.

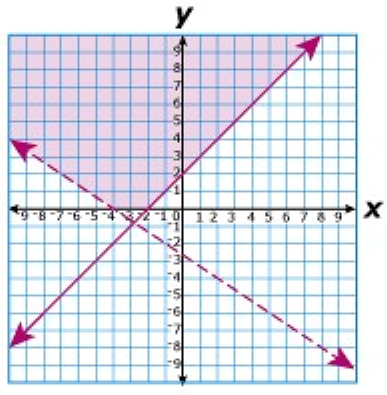
7. Which graph best represents the solution to the following system?

$$\begin{cases} -2x - 3y < 8 \\ -x + y \leq 2 \end{cases}$$

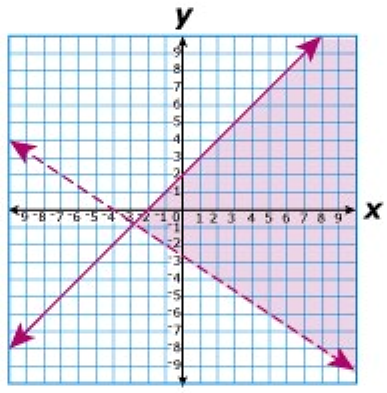
A.



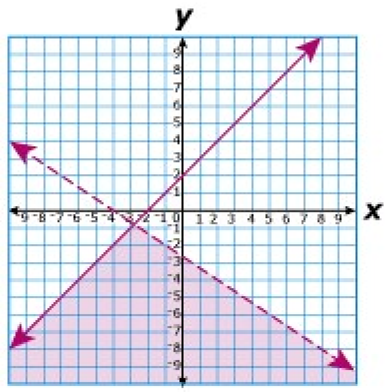
B.



C.



D.



8. What is the greatest monomial factor of $9a^2 - 12ab - 12b^2$?

A. $9a^2$

B. $3a$

C. 3

D. 12

9. **Directions: Click on each factor you want to select. You must select all correct factors.**

Which expressions are factors of $9x^4 - 4y^4$?

$(3x+2y)$	$(3x-2y)$
$(3x^2+2y^2)$	$(3x^2-2y^2)$
$(9x^2+4y^2)$	$(9x^2-4y^2)$

10. Select the values and signs from the drop-down menus that correctly complete the solution by factoring.

$x^2 - 2x - 3 = 0$

(x + 1 - (A) 1 (B) 2 (C) 3 (D) 4)(x 2 - (A) + (B) - 3 - (A) 1 (B) 2 (C) 3 (D) 4)

x= 4 - (A) -4 (B) -3 (C) -2 (D) -1 ; x = 5 - (A) 1 (B) 2 (C) 3 (D) 4

11. Complete the square of the quadratic equation below.

$f(x) = -x^2 + 24x + 64$

What is the maximum value of the function defined by the equation?

12. Directions: Click on each number within the set that you want to select. You must select all correct numbers.

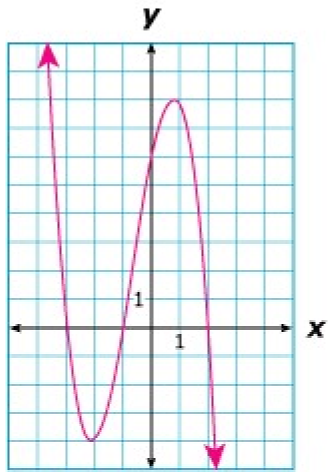
This set defines a function.

$$\{(1, 4), (2, -3), (-1, -3), (6, 4)\}$$

Within the set, select the numbers which represent the domain of the function.

−3	−1	1	2	4	6

13.



What are the apparent zeros of the function of *x* graphed above?

A. 6

B. 0

C. –2, 1, 3

D. –3, –1, and 2

14. I. 1 + 2 + 4 + 8, . . .

II. $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$

III. $\sqrt{2}, \sqrt{3}, \sqrt{4}, \sqrt{5}, \ldots$

Which of the above are sequences?

A. I only

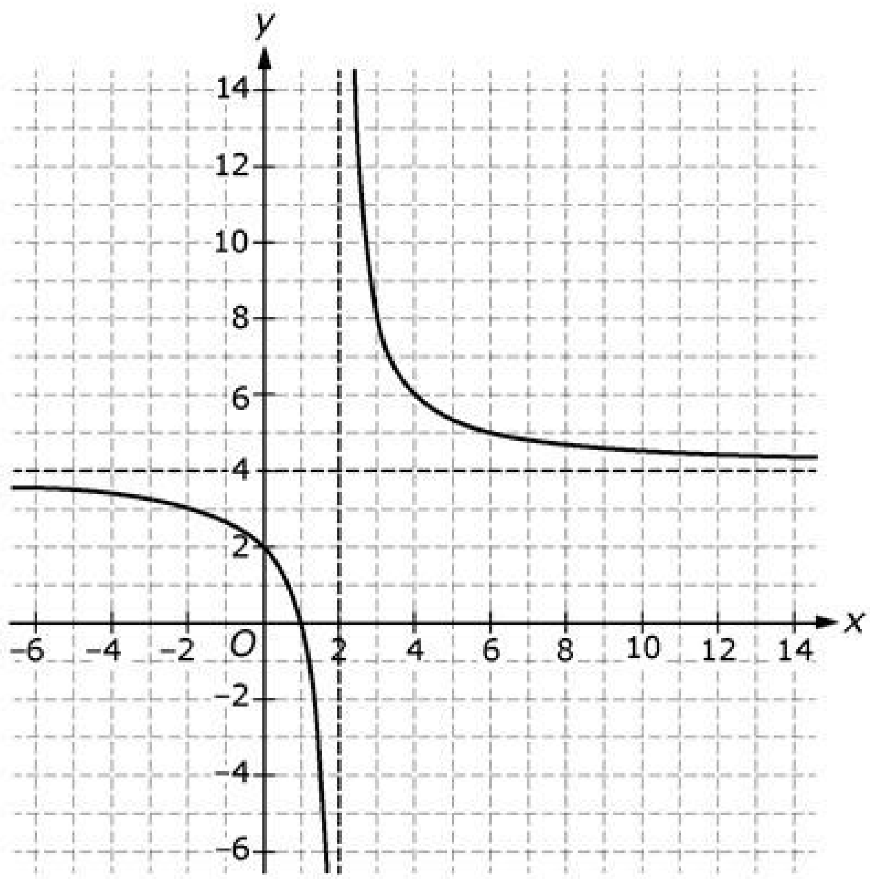
B. I and II

C. I and III

D. II and III

Read the passage - 'Graph' - and answer the question below:

Graph



The function *f(x)* is represented by the graph.

15. Based on this graph drag and drop each answer into it's correct container.

$x < 1$	$1 < x < 2$	$x > 2$

For what values of x is f(x) > 0?

For what values of x is f(x) < 0?

16. If $f(x) = -|x| + 4$ and x is an element of {–3, –1, 0, 2, 4}, which set contains the values of $f(x)$?

A. {4, 5, 6, 7, 8}

B. {0, 2, 4, 5, 7}

C. {–3, –1, 0, 2, 4}

D. {0, 1, 2, 3, 4}

17. The population growth for a species of birds, in thousands, can be represented by the function $p(t) = 20(1.24)^t$, where t is the number of years since 2002. What is the approximate average rate of change of the population between the years of 2004 and 2007?

A. 9.3 thousand birds/year

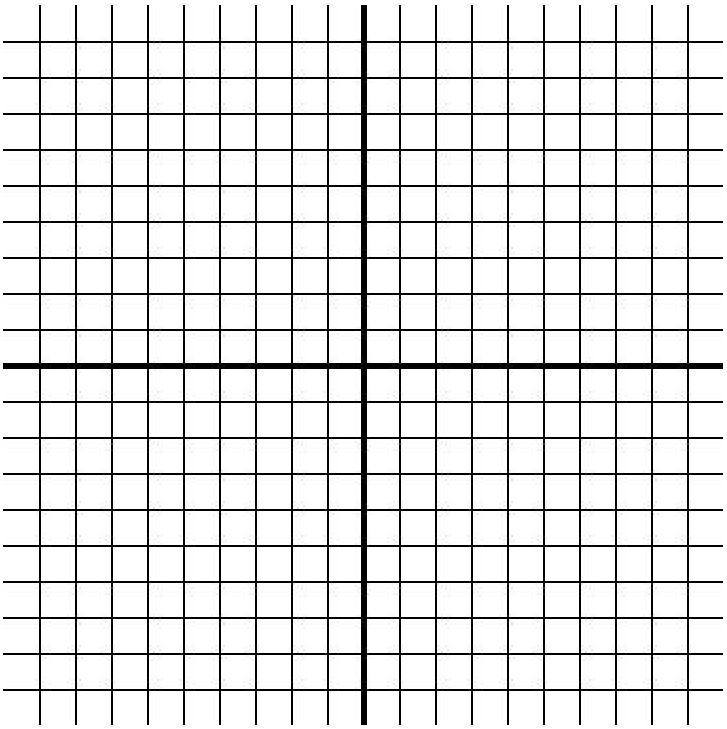
B. 14.3 thousand birds/year

C. 27.9 thousand birds/year

D. 42.9 thousand birds/year

18. A parallelogram has two vertices at (1,1) and (0,7) and its diagonals cross at the point (4,3).

Select the two coordinate pairs that correspond to the two vertices of the parallelogram.



A. (-5, -3)

B. (8, -1)

C. (-2, 3)

D. (7, 5)

19. Classify each of the following pairs of lines as parallel, perpendicular or neither.

Questions		Answer Choices
	1. $3y = -5x - 5$ $(y - 7) = 0.6(x - 5)$	A. Parallel
	2. $2x + 3y = 4$ $4x + 5y = 6$	B. Perpendicular
	3. $y = 4x + 1$ $(y - 2) = 4(x - 3)$	C. Neither
	4. $y = -3x + 5$ $9x + 3y = 2$	

20. If $\cos(a) = \sin(32°)$, what is the value of a?

A. 32°

B. 58°

C. 148°

D. 328°

TEST NAME: **2016-2017 ALG2 BM1**

TEST ID: **64524**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

Read the passage - 'Expresson' - and answer the question below:

Expresson

The expression $3x^2 - 33x - 180$ can be factored into the form $a(x + b)(x + c)$, where a, b, and c are constants, to reveal the zeros of the function defined by the expression.

What are the zeros of the function defined by $3x^2 - 33x - 180$?

1. Select all that apply.

   A. -15

   B. -10

   C. -6

   D. -4

   E. 4

   F. 6

   G. 10

   H. 15

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2. For which values of x does the graph of $y = 2(x - 10)(x + 11)$ cross the x-axis?

   A. –10 and 11

   B. –11 and 10

   C. –20 and 22

   D. –22 and 20

3. Two of the terms of a finite geometric sequence are $a_6 = 0.00096$ and $a_7 = 0.000192$.

Which statements or equations are correct?

Select all that apply.

A. $a_1 = 3$

B. $a_1 = 15$

C. $r = 5$

D. $r = 0.2$

E. The sum of the first 10 terms, rounded to the nearest hundreth, is 18.75.

F. The sum of the first 20 terms, rounded to the nearest hundredth, is 3.75.

4. On each day of a contest, the amount of money added to the jackpot was one and one-half times the total from the previous day. The initial amount in the jackpot was *x* dollars. After five days, the total amount in the jackpot was $4,747.50.

What is the value of *x*, rounded off to the nearest whole number?

5.

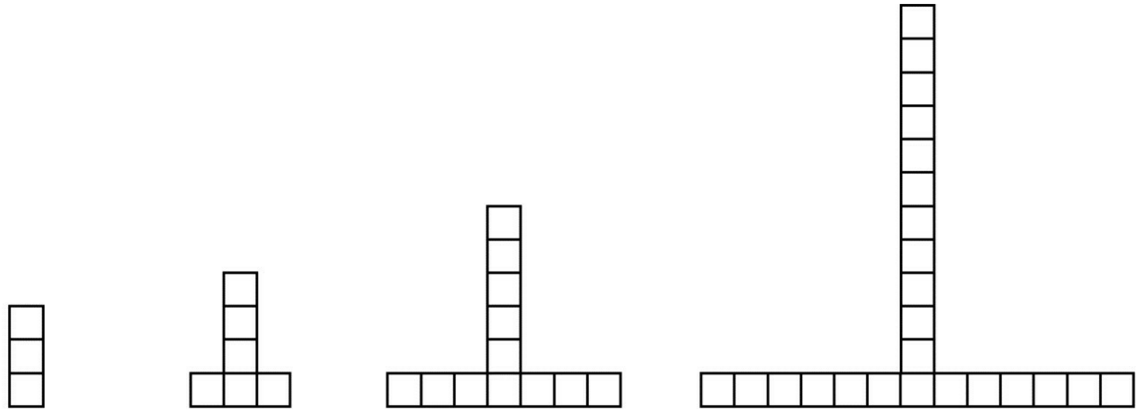

Figure 1 Figure 2 Figure 3 Figure 4

Look at the pattern represented above. How many boxes would Figure 7 have?

6.

n	1	2	3	4	…	n
a_n	0.2	0.02	0.002	0.0002	…	a_n

The first four terms of a geometric sequence are shown in the table above. Which equation defines the sequence?

A. $a_n = (0.2)(0.1)n$

B. $a_n = (0.2)(0.1)^n$

C. $a_n = (0.2)(0.1)(n-1)$

D. $a_n = (0.2)(0.1)^{n-1}$

7. **Which expression is equivalent to $\sqrt[3]{27}$?**

A. $3^{\frac{1}{9}}$

B. 3^3

C. $\left(3^3\right)^{\frac{1}{2}}$

D. $\left(3^3\right)^{\frac{1}{3}}$

8. Which is an equivalent form of the following expression?

$27^{\frac{2}{3}}$

A. 3

B. 6

C. 9

D. 18

9. Which is equivalent to $\sqrt{(16-x)^2}$?

A. $|8-x|$

B. $|4-x|$

C. $|16-x|\sqrt{32x}$

D. $|16-x|$

10. What is the simplified form of the expression $\dfrac{\left[(3^9 \times 9^9)^{\frac{1}{3}}\right]^{\frac{1}{2}}}{\left(9^{\frac{1}{2}}\right)^4}$?

A. $3^{\frac{1}{2}}$

B. $3^{\frac{17}{2}}$

C. $3^{\frac{37}{2}}$

D. $3^{\frac{53}{2}}$

11. Drag and drop **all** the solutions to $3x^2 + 13x = 10$.

-1	-5	$\frac{-20}{6}$
	$\frac{2}{3}$	

Is a solution to the equation

12. $\begin{cases} y = \frac{1}{2}x - 1 \\ x - 2y = 2 \end{cases}$

What is the greatest number of solutions to the system of equations shown above?

A. 0

B. 1

C. 2

D. An infinite number

13. The matrix below shows the prices of 4 different types of athletic shoes at 5 different shoe stores.

$$\begin{array}{r c} \text{Store} & \begin{array}{ccccc} \quad A \quad & \quad B \quad & \quad C \quad & \quad D \quad & \quad E \quad \end{array} \\ \begin{array}{r} \text{Tennis} \\ \text{Aerobics} \\ \text{Walking} \\ \text{Running} \end{array} & \begin{bmatrix} 35.99 & 41.99 & 29.00 & 43.59 & 37.60 \\ 82.50 & 89.00 & 76.00 & 82.50 & 79.99 \\ 22.50 & 32.00 & 30.99 & 28.75 & 35.99 \\ 64.99 & 67.00 & 72.50 & 61.99 & 69.99 \end{bmatrix} \end{array}$$

What store and shoe type is in row 3, column 4?

A. Store C, Walking

B. Store C, Running

C. Store D, Walking

D. Store D, Running

14. The function $f(x) = 1000(1.25)^{-x}$ models the value of an investment over x years. Which statement **best** describes the investment modeled by $f(x)$?

A. The investment grows at the rate of 25% per year.

B. The investment grows at the rate of 20% per year.

C. The investment decreases at the rate of 20% per year.

D. The investment decreases at the rate of 25% per year.

15. James threw a ball from the roof of a building. The ball fell 3 feet in the first second, 9 feet in next second, and 27 feet in the third second. Which expression represents the distance the ball fell at the *n*th second?

A. 3^n

B. $3n$

C. n^3

D. $6n - 3$

16. **Which logarithmic equation is equivalent to $y = 2^x$?**

A. $\log_x 2 = y$

B. $\log_2 x = y$

C. $\log_y 2 = x$

D. $\log_2 y = x$

17. Robert is collecting books to donate to the library. The number of books he collects, *n,* is defined by $n=14d+21$, where *d* is the number of days he spends collecting books.

Based on this information, use the drop down choices to correctly complete each sentence.

The 14 in the equation represents 1 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day. (C) the number of books Robert started with.

The 21 in the equation represents 2 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day. (C) the number of books Robert started with.

18. Which number is equivalent to the complex number $2 - i^5$?

A. 1

B. $2 - i$

C. $2 + i$

D. 3

19. Which is equivalent to the following equation?

$17 - 3i - (-5 - 8i)$

A. $22 - 11i$

B. $22 - 5i$

C. $22 + 11i$

D. $22 + 5i$

20. Solve the equation for x.

$$x^2 - x + 6 = 0$$

A. $x = \dfrac{1 \pm 5i}{2}$

B. $x = \dfrac{1 \pm i\sqrt{23}}{2}$

C. $x = 2 \text{ or } x = 3$

D. $x = 3 \text{ or } x = -2$

TEST NAME: **2016-2017 ALG2 BM2**

TEST ID: **64526**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student: ____________________

Class: ____________________

Date: ____________________

1. Which of the following polynomials has a factor of $(x + 3)$?

   A. $2x^3 + 6x^2 - 5x - 15$

   B. $2x^3 - 6x^2 + 14x - 42$

   C. $4x^3 + 2x^2 - 12x - 90$

   D. $-x^3 + 9x^2 - 27x + 27$

2. A polynomial function is defined as $f(x) = 3x^3 + bx^2 + cx + d$, where b, c, and d are integers. Given that $f(3) = 0$, which of the following is a possible value of d?

   A. 8

   B. 9

   C. 10

   D. 11

3. If $(y - 3)(y^2 + by + c) = y^3 - 27$, which could be the values of b and c?

   A. $b = 3$ and $c = -9$

   B. $b = 3$ and $c = 9$

   C. $b = -3$ and $c = 9$

   D. $b = -3$ and $c = -9$

4. At what values of x does the graph of $y = x(5x + 8)(7x - 3)$ cross the x-axis?

A. $-\frac{8}{5}$, 0, and $\frac{3}{7}$

B. $-\frac{8}{5}$ and $\frac{3}{7}$

C. $-\frac{3}{7}$ and $\frac{8}{5}$

D. $-\frac{3}{7}$, 0, and $\frac{8}{5}$

5. Which polynomial identity can be proved using the polynomial division given below?

$$a+b\overline{)a^3+b^3}$$

A. $a^3+b^3=(a+b)(a^2+ab+b^2)$

B. $a^3+b^3=(a+b)(a^2-ab+b^2)$

C. $a^3+b^3=(a+b)(a^2+2ab+b^2)$

D. $a^3+b^3=(a+b)(a^2-2ab+b^2)$

6. Simplify the expression $\dfrac{6x^2+5x-21}{2x-3}$.

A. $3x+7$

B. $3x-2-\dfrac{15}{2x-3}$

C. $3x-2-\dfrac{27}{2x-3}$

D. $4x+3-\dfrac{18}{2x-3}$

7. Which rational expression cannot be reduced?

A. $\dfrac{2x+y}{2x}$

B. $\dfrac{2x+1}{4x+2}$

C. $\dfrac{3x+12}{x+4}$

D. $\dfrac{3x+12}{9x}$

Read the passage - 'Going to a Baseball Game' - and answer the question below:

Going to a Baseball Game

Going to a Baseball Game

Chris is a big fan of the baseball team in the city where she lives, and she loves to go to the games with her family. Chris and her dad are planning a trip to a game for four people. He asked her to determine how much it will cost for their tickets and snacks at the game. Chris's dad thinks they may go to several games this year.

They chose the section of the park where they wanted to sit, and Chris found the prices for seats in that section. She found three ways to buy the tickets.

- Individual game tickets for the section they chose are $30 per ticket.
- The cost of a 21-game package of tickets for one seat in their section is $20 per game.
- A package of 10 tickets costs $200, and they can be used in any combination of single tickets per game or multiple tickets per game in their section.

Chris thinks they will each want a hot dog and a soft drink, and two people can share a bag of peanuts. This table shows the cost of those items at the game.

FOOD COSTS	
Food Item	**Cost**
Hot dog	$6.00
Soft drink	$4.50
Peanuts	$5.00

An additional cost will be the $20 charge at the parking lot.

8. Read "Going to a Baseball Game" and answer the question.

   How many individual game tickets could be bought for the same cost of one 21-game package of tickets?

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9. A teacher can spend as much as $125.00 to take students to a movie. A movie theater charges a $10.00 group fee and $5.50 per ticket. Which of the following inequalities represents the problem and could be solved to find the maximum number of students, *x*, who could attend the movie?

   A. $10 + 5.5x > 125$

   B. $10 + 5.5x \leq 125$

   C. $(10 + 5.5)x \leq 125$

   D. $5.5 + 10x \leq 125$

10. The steps for solving the equation $3(2m + 4) = 42$ are shown below.

Step 1 : $6m + 12 = 42$

Step 2 : $6m = 30$

Step 3 : $m = 5$

Which list shows the correct sequence of the properties of equality used to solve the equation?

A. distributive, division, subtraction

B. distributive, subtraction, division

C. division, distributive, subtraction

D. subtraction, division, distributive

11. Which of the following equals $\dfrac{4x^2 - 9}{2x^2 + 15x - 27}$?

A. $\dfrac{2x-3}{x+9}$

B. $\dfrac{2x+3}{x+9}$

C. $\dfrac{2x-3}{x-9}$

D. $\dfrac{2x^2-1}{x^2+15x-3}$

12. What is the solution for the equation below?

$$\sqrt{12-x} = x$$

A. $x = 3$ only

B. $x = 4$ only

C. $x = -4$ and $x = 3$

D. $x = 4$ and $x = -3$

13. Let $f(x) = \frac{x+2}{x^2+5x+6}$ and $g(x) = \frac{1}{6}x^2 + \frac{1}{3}$ over the interval $[-3, 2]$. How many solutions for the equation $f(x) = g(x)$ exist over that interval?

A. 1

B. 2

C. 3

D. 4

14.

x	*y*
1	4
2	1
3	5
4	10
5	16
6	19
7	15

Which equation best represents the regression line for the data given in the table above?

A. $y = 3x - 2$

B. $y = 3x + 2$

C. $y = -3x + 2$

D. $y = -3x - 2$

15. Which statement describes the graph of $f(x) = -(x+1)^2 + 4$?

A. A minimum at $(-1, 4)$ and a zero at $(0, 3)$

B. A maximum at $(-1, 4)$ and a zero at $(0, 3)$

C. A minimum at $(-1, 4)$ and a zero at $(-3, 0)$

D. A maximum at $(-1, 4)$ and a zero at $(-3, 0)$

16. Over which interval do the functions $f(x) = x^2 + 2x + 2$ and $g(x) = -x^2 + 2x + 10$ have the same average rate of change?

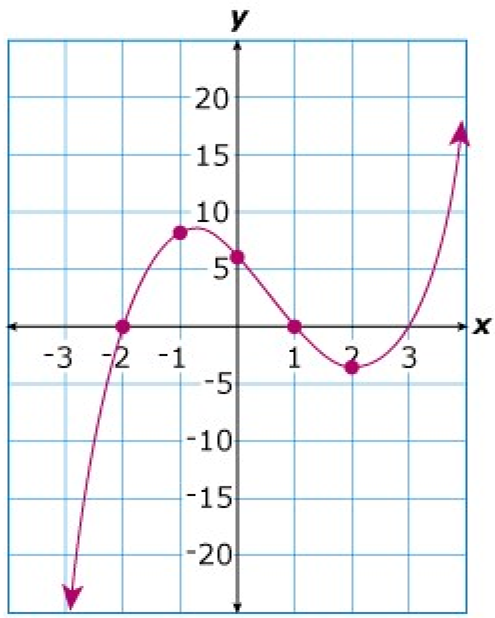
A. $[-2, 2]$

B. $[-2, 0]$

C. $[0, 2]$

D. $[2, 10]$

17. Which of the following equations can be used to draw the graph shown?



A. $y = (x - 1)(x^2 - x - 6)$

B. $y = (x - 1)(x^2 - x + 5)$

C. $y = (x - 1)(x^2 + x - 6)$

D. $y = (x + 1)(x^2 - 2x + 3)$

18. **A parabola has a focus at $(3, 2)$ and a directrix at $x = -1$. What is the equation for this parabola?**

A. $(y - 2)^2 = -8(x - 3)$

B. $(y - 2)^2 = -8(x - 1)$

C. $(y - 2)^2 = 8(x - 3)$

D. $(y - 2)^2 = 8(x - 1)$

19. What steps can be used to solve the equation –3*a* + 7 = 21?

A. Subtract 7 from both sides and then divide both sides by –3.

B. Add 7 to both sides and then multiply both sides by –3.

C. Divide both sides by 7 and then add 3 to both sides.

D. Add 7 to both sides and then divide both sides by –3.

20. Which expression is equivalent to $x^3 + x^2 - x - 1$?

A. $x(x-1)^2$

B. $(x+1)(x-1)^2$

C. $(x+1)^2(x-1)$

D. $x(x+1)(x-1)$

TEST NAME: **2016-2017 ALG2 BM3**

TEST ID: **64528**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. Given the functions $f(x) = \frac{1}{2x}$ and $g(x) = \frac{4}{x^2}$, which expression represents $f(x)+g(x)$?

A. $\frac{9}{2x^2}$

B. $\frac{x+4}{2x^2}$

C. $\frac{x+8}{2x^2}$

D. $\frac{1+2x}{x^2}$

2. If $f(x) = x - 1$ and $g(x) = x^2$, what is the value of $f(g(x))$?

A. $x^2 - 1$

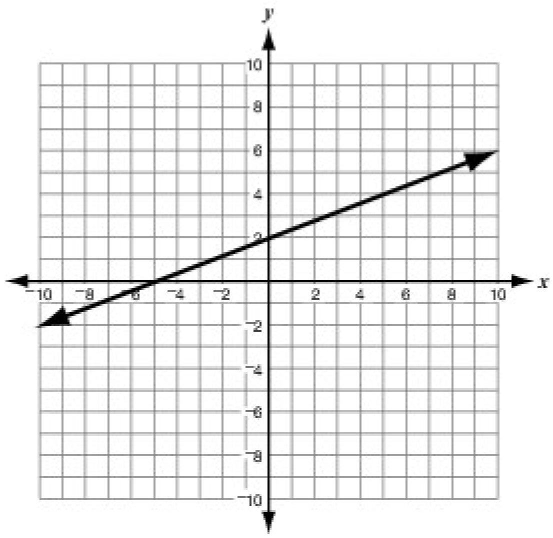
B. $x^3 - 1$

C. $x^2 - 2x + 1$

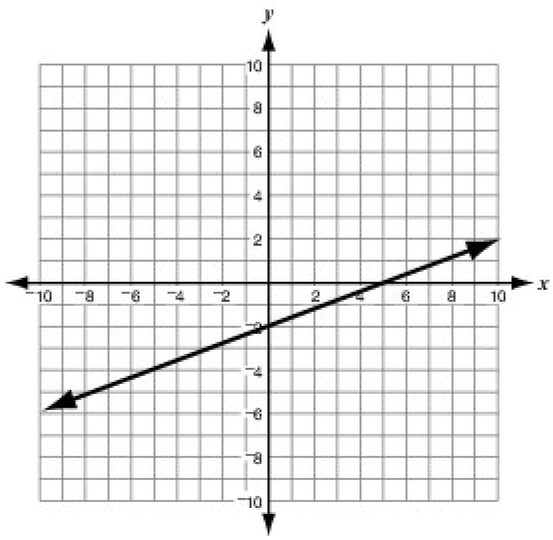
D. $x^2 + x - 1$

3. Which graph represents a function with an *x*-intercept at -2 and a *y*-intercept at 5?

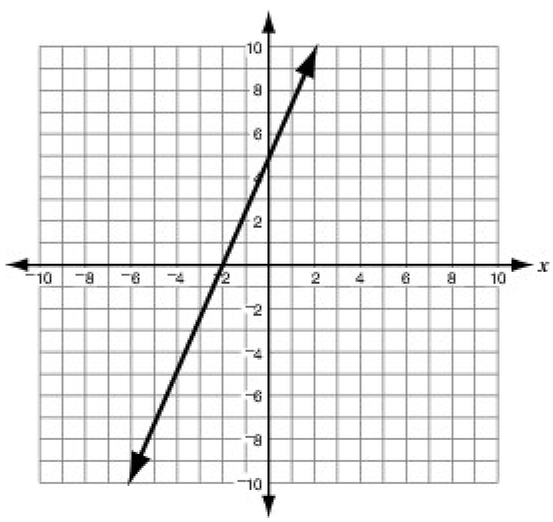
A.



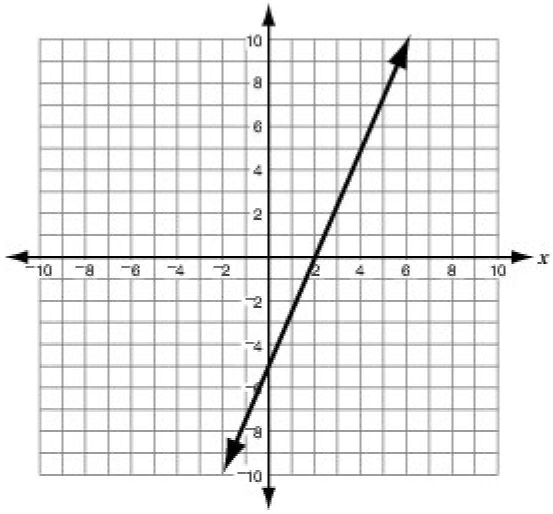
B.



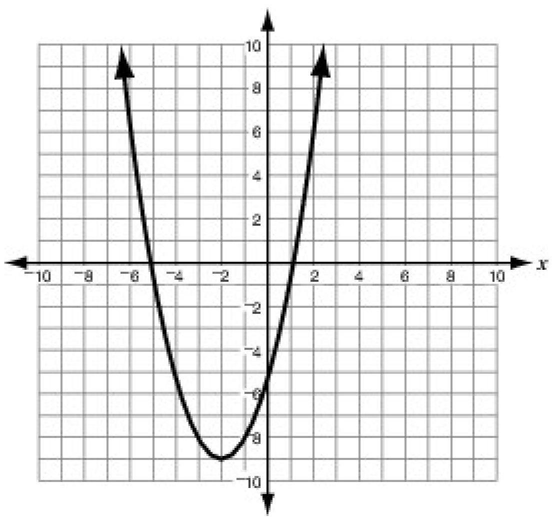
C.



D.



4. During which interval is the function shown on the graph below decreasing?



A. $(\infty, -2)$

B. $(-9, 0)$

C. $(-5, 1)$

D. $(-2, \infty)$

5. Which function has the following features?

- symmetry over the y-axis
- increasing for all $x<0$
- y-intercept of 0

A. $y=x^3+x$

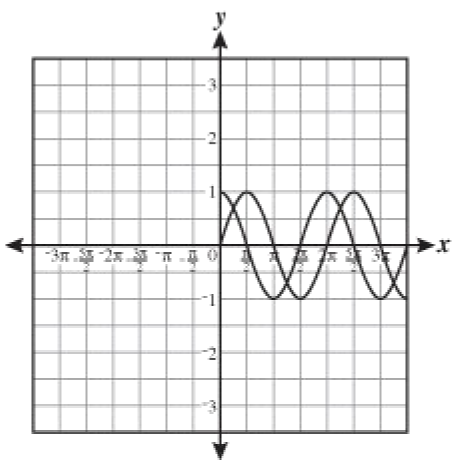
B. $y=-x^3-x$

C. $y=x^4+x^2$

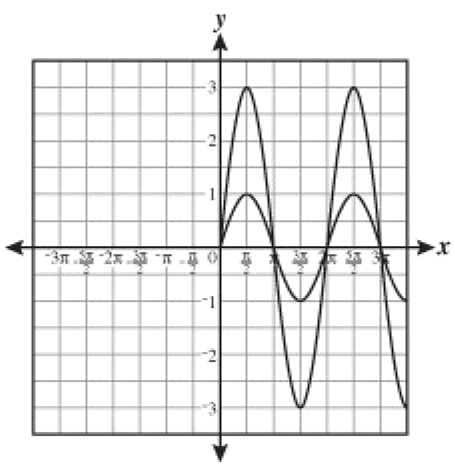
D. $y=-x^4-x^2$

6. Which graph shows two sinusoidal functions with the same period, but with different amplitudes?

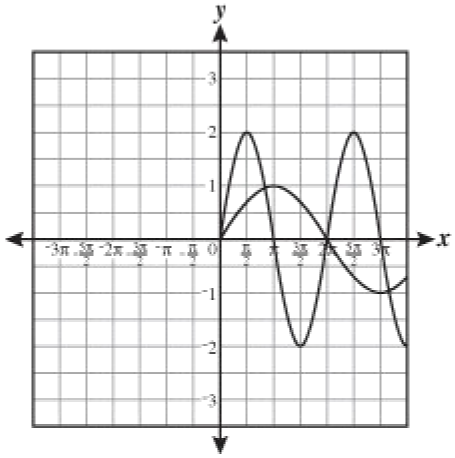
A.



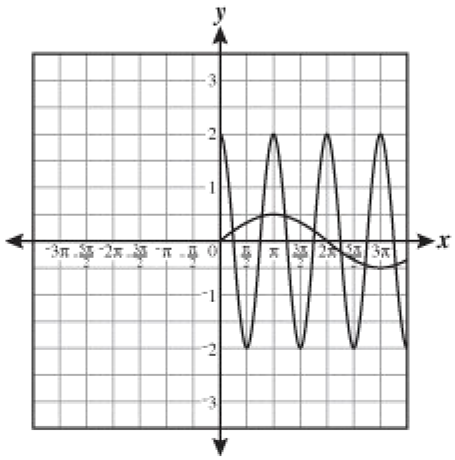
B.



C.



D.



7. Which trigonometric function has a period of π , amplitude of 3, and a *y*-intercept of 4?

A. $f(x) = 3 \cos(2x) + 1$

B. $f(x) = 3 \sin(2x) + 1$

C. $f(x) = 3 \cos(x) + 4$

D. $f(x) = 3 \sin(x) + 4$

8. If *y* varies directly as *x* and *y* = 25 when *x* = 10, what is the constant of variation?

A. 0.4

B. 1

C. 2.5

D. 250

9. **Kim is on a 300 mile road trip. She is traveling at a constant rate that will get her to her destination in exactly 6 hours. At this rate, how many miles will Kim travel in 90 minutes?**

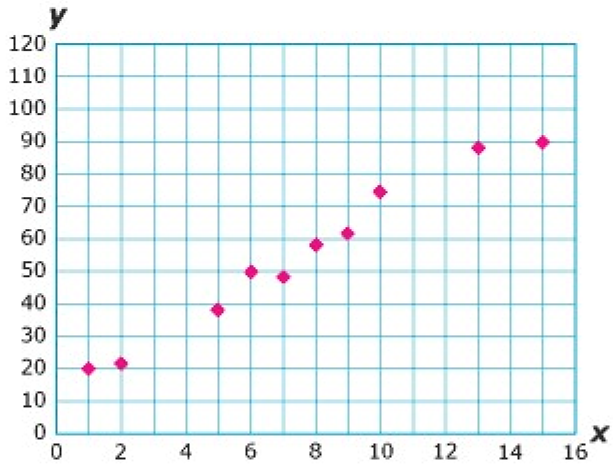
A. 50 miles
B. 75 miles
C. 90 miles
D. 100 miles

10. Four engineers accurately measured the length of a county road using a laser meter. The table below shows the measure that each engineer recorded. If each measurement is accurate, which of the following engineers recorded the *least* precise length?

Engineer	Measurement
Ronde	6.00×10^3 m
Henry	6.0×10^3 m
Luisa	6000.00 m
Natia	6000.0 m

A. Ronde
B. Henry
C. Luisa
D. Natia

11.



Based on the line of best fit for the scatter plot above, what is the best prediction for the value of *x* when *y* = 100?

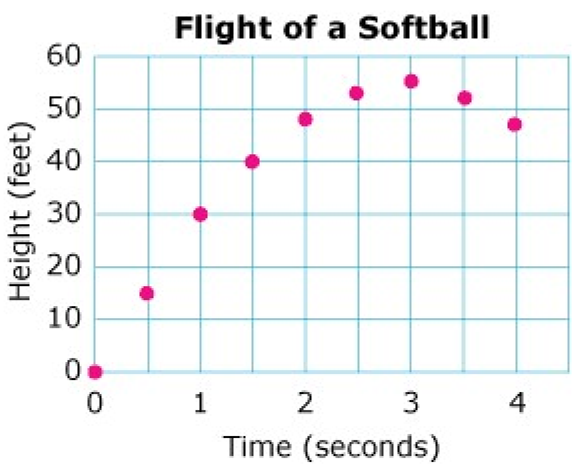
A. 14

B. 16

C. 18

D. 21

12. The scatter plot below shows the height of a softball after being thrown, with respect to time.



If the height of the softball continues the quadratic pattern in the scatter plot, how many seconds will have passed when the softball hits the ground?

A. 4.5 seconds

B. 5 seconds

C. 5.5 seconds

D. 6 seconds

13. If the graph of $f(x) = \sqrt{x} + 3$ is translated 2 units right and 4 units down, which of these functions describes the transformed graph?

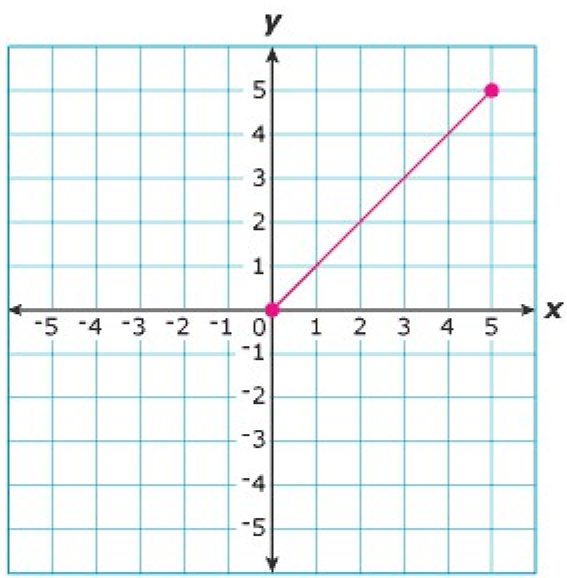
A. $g(x) = \sqrt{x-2} - 1$

B. $g(x) = \sqrt{x+2} - 1$

C. $g(x) = \sqrt{x-2} + 7$

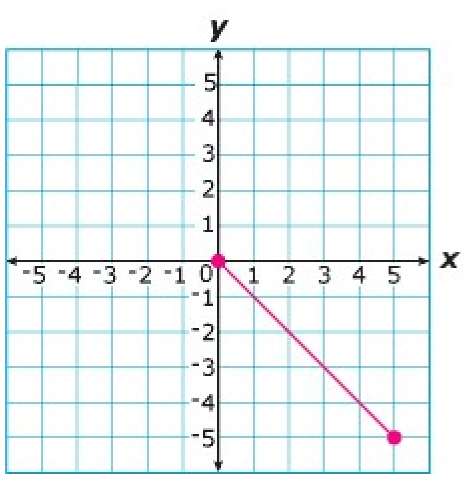
D. $g(x) = \sqrt{x+2} + 7$

14.

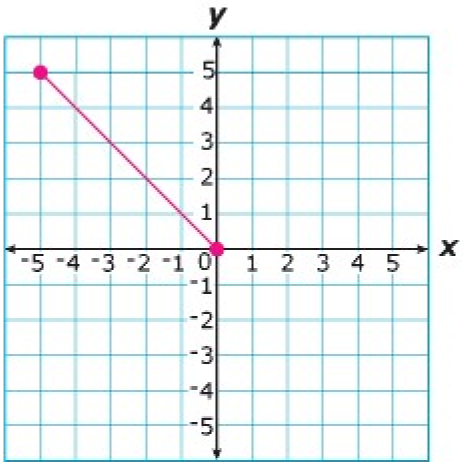


Which graph best represents a translation of the line segment graphed above?

A.

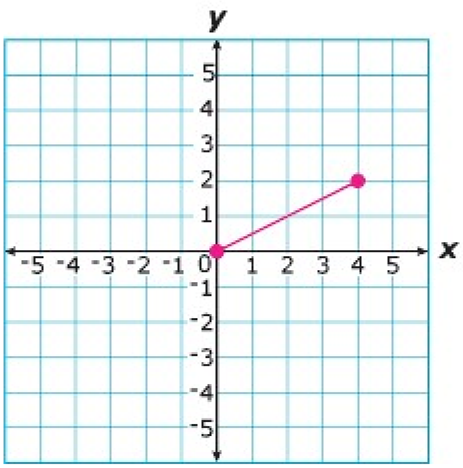


B.



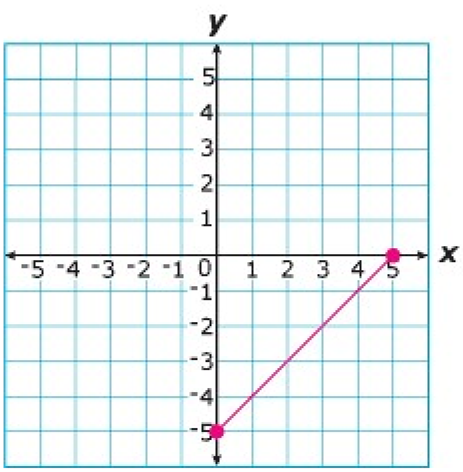
y
x
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1
1 2 3 4 5

C.



y
x
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1
1 2 3 4 5

D.



y
x
5
4
3
2
1
0
-1
-2
-3
-4
-5
-5 -4 -3 -2 -1
1 2 3 4 5

15. Which of these correctly identifies the inverse of the function $f(x) = \frac{(x+2)}{(x-2)}$ and the domain of the inverse?

A. $f^{-1}(x) = \frac{4}{(x-1)} + 2$ for all real values of x except $x = 2$

B. $f^{-1}(x) = \frac{4}{(x-1)} + 2$ for all real values of x except $x = 1$

C. $f^{-1}(x) = 1 - \frac{4}{(x+2)}$ for all real values of x except $x = 2$

D. $f^{-1}(x) = 1 - \frac{4}{(x+2)}$ for all real values of x except $x = -2$

16. Solve.

$$(6x^2 - 4x - 5) - (3x^2 - 7x + 2)$$

A. $3x^2 - 11x - 3$

B. $3x^2 - 11x - 7$

C. $3x^2 + 3x - 7$

D. $3x^2 - 3x - 3$

17. Which expression is equivalent to $\cos\frac{62\pi}{3}$?

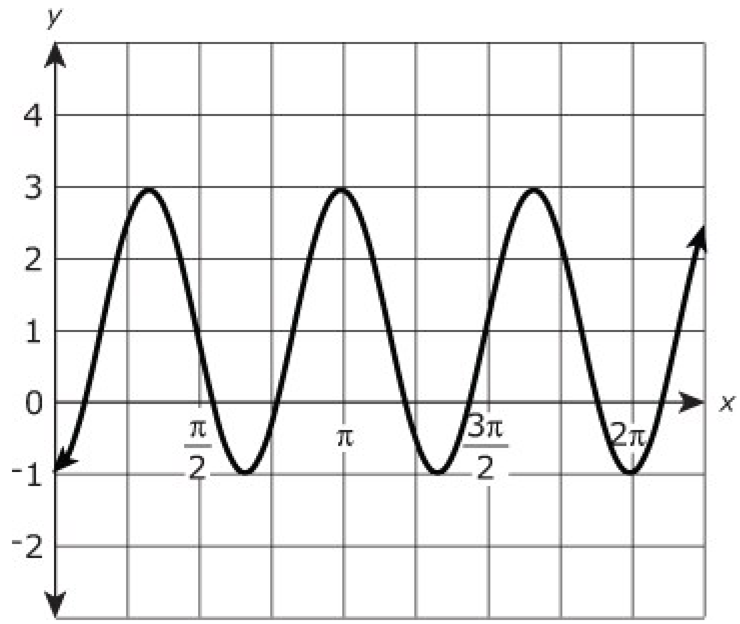
A. $\sin\frac{35\pi}{3}$

B. $\sin\frac{38\pi}{3}$

C. $\cos\frac{47\pi}{3}$

D. $\cos\frac{50\pi}{3}$

18. A function is graphed on the coordinate grid.



Which function is represented in the graph for the interval $[0,\ 2\pi]$?

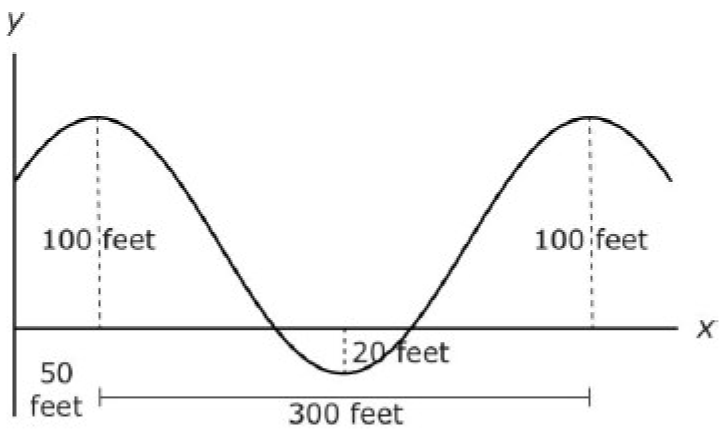
A. $y = -2\cos(3x) - 1$

B. $y = -2\cos(3x) + 1$

C. $y = -3\cos(2x) + 1$

D. $y = -3\cos(3x) - 1$

19. A section of roller coaster track has the shape of a sinusoidal function, as shown. The first of two high points occurs 50 feet from the beginning of the sinusoidal portion of the track. The high points are 100 feet above the ground and 300 feet apart. The low point of the sinusoidal portion of the track occurs when the track is in an underground tunnel 20 feet below the ground.



Let *x* be the horizontal distance in feet from the beginning of the sinusoidal portion of the track and *y* be the height in feet of the track above the ground. Which function models this portion of the roller coaster track?

A. $$y = 60\cos\left(\frac{\pi}{150}(x-50)\right) - 20$$

B. $$y = 60\cos\left(\frac{\pi}{150}(x-50)\right) + 40$$

C. $$y = 100\cos\left(\frac{\pi}{150}(x-50)\right) - 20$$

D. $$y = 100\cos\left(\frac{\pi}{150}(x-50)\right) + 40$$

20. Let u be a point in Quadrant II such that $\sin u = \frac{\sqrt{5}}{5}$. What is $\cos u$?

A. $-\frac{1}{2}$

B. $-\frac{2\sqrt{5}}{5}$

C. $-\frac{\sqrt{5}}{5}$

D. $\frac{2\sqrt{5}}{5}$

TEST NAME: **2016-2017 ALG2 BM4**
TEST ID: **64530**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. **Over the next three days, there is a 1 in 4 chance that it will rain on each of the three days. What is the chance that it will rain on all three of these days?**

   A. $\frac{1}{64}$

   B. $\frac{3}{64}$

   C. $\frac{1}{4}$

   D. $\frac{3}{4}$

2. A manufacturer claims that their battery for a particular cell phone model lasts 10 hours. However, consumers complained that the batteries lasted less than 10 hours. The manufacturer randomly sampled 24 batteries and found that the mean battery life of the sample was 9.5 hours with a standard deviation of 0.20 hours.

   Select the statement that is accurate about the given data.

   A. The manufactor's claim is true, 9.5 rounds off to 10.

   B. The manufactor's claim is false, 9.5 is more than 2 standard deviations below 10.

3. **A bag of marbles contains 7 blue marbles, 10 green marbles, and 3 red marbles. In a study, Marcos randomly chose a marble from the bag, recorded the color, and then replaced the marble in the bag. He repeated these steps 100 times. The results of his study are shown in the table.**

Color	Number of Occurrences
Blue	7
Green	78
Red	15

Based on the experimental and theoretical probabilities of Marcos's study, which statement is true?

A. The percentage of marbles chosen from the bag that are red is inconsistent with the percentage of marbles in the bag that are red.

B. The percentage of marbles chosen from the bag that are green is greater than the percentage of marbles in the bag that are green.

C. The percentage of marbles chosen from the bag that are blue is consistent with the percentage of marbles in the bag that are blue.

D. The number of red marbles chosen from the bag is the same as the number of red marbles in the bag.

4. Which design would be best to use to determine how satisfied new-car buyers were with their purchase?

A. a sample survey of 100 customers chosen at random from each of the 5 major car makers

B. an observational study of new-car buyers' behavior after the purchase of their new car

C. an experiment comparing the number of cars recalled by each of the 5 major car makers

D. a voluntary response survey of new-car buyers about their satisfaction with their purchase

5. A survey of 800 randomly selected college students shows that 85% of college students own a laptop computer. The results were based on a 95% confidence level with a margin of error of $\pm 2.5\ \%$. If the confidence level was changed to 90%, which percent would be closest to the margin of error for these results?

A. $\pm 2.1\ \%$

B. $\pm 3.0\ \%$

C. $\pm 5.0\ \%$

D. $\pm 7.5\ \%$

6. A company hired seven trainees for a typing position. The trainees were given a typing test on the first day. After receiving training, they were given the same test again. The errors each trainee made in the two tests are listed below in order by trainee.

Test 1: 6, 3, 14, 8, 10, 6, 5

Test 2: 4, 2, 10, 8, 6, 3, 6

Which statement is **true**?

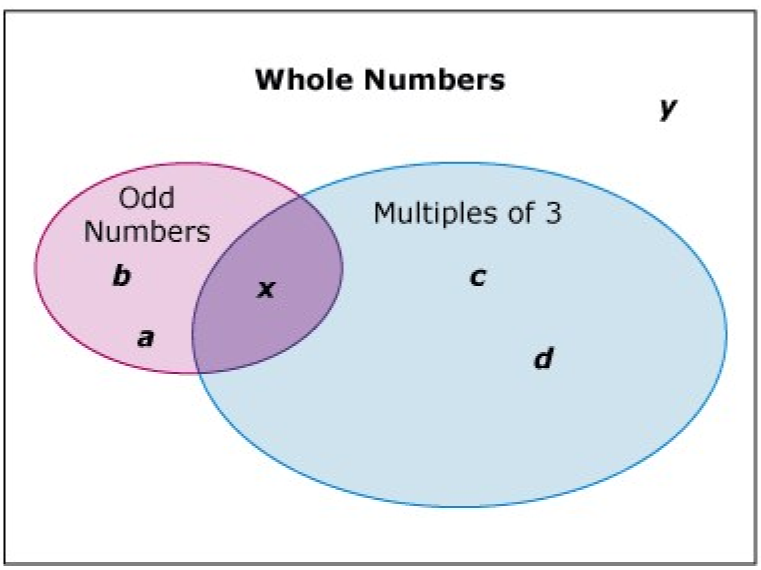
A. The number of errors made by each trainee was reduced after the trainings.

B. The range of the number of errors the trainees made increased after the trainings.

C. The average number of errors the trainees made was reduced after the trainings.

D. The median number of errors the trainees made was reduced after the trainings.

7.



Which value could be represented by *x* in the Venn Diagram shown above?

A. 4

B. 5

C. 6

D. 9

8. Teams of students compete in a robotics contest. The times for the robots to complete an obstacle course are normally distributed. The mean time for completion is 60 seconds, and the standard deviation is 4 seconds. Approximately what percentage of the robots will complete the course in 56 to 64 seconds?

A. 8%

B. 50%

C. 60%

D. 68%

9. A student rolls two number cubes each with faces numbered 1 through 6. The student wants the sum of the numbers on the top faces to equal either a prime number or a multiple of 3. Which set of numbers represents all possible outcomes of the event?

A. 2, 3, 5, 7,11

B. 2, 3, 5, 6, 7, 9, 11, 12

C. 2, 3, 5, 6, 7, 9, 11, 12, 13, 15

D. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

10. **The table below represents data collected from a random sample of students.**

	Likes to Drink Milk	Does Not Like to Drink Milk	Total
Male Students	11	5	16
Female Students	13	6	19
Total	24	11	35

What is the probability, to the nearest percent, that a female student likes to drink milk?

A. 37%
B. 46%
C. 54%
D. 68%

11. Decide which of the following 6 situations are independent and which are not independent.

Drag and drop each of the situations to the correct container.

Choosing one card at random from a deck of 52 cards, where each card has a single number from 1-13 and each number appears on 4 different colored cards. Holding onto the selected card and choosing another card at random from the remaining cards in the deck.

Rolling a number cube two times in a row.

Picking a marble from a non-see through bag of 3 different colored marbles. Without putting the marble back, picking a second marble.

Choosing one card at random from a deck of 52 cards, where each card has a single number from 1-13 and each number appears on 4 different colored cards. Placing that card back into the deck and selecting another card.

Spinning a spinner with 20 sectors, 10 black, 5 red, 3 blue, 2 green, then spinning a second time.

Picking a marble from a non-see through bag of 3 different colored marbles. Putting the marble back and picking a second marble.

Independent	Not Indepedent

12. Select from the drop-down menus to correctly complete the sentences.

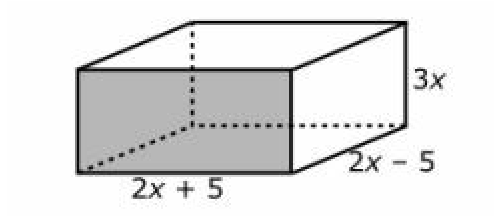
The sum $\frac{1}{3} + \frac{\sqrt{5}}{3}$ 1 - (A) rational (B) irrational because the sum 2 - (A) can (B) cannot be expressed as a single fraction with a rational numerator and a rational denominator.

The quotient $\frac{20}{\sqrt{16}}$ is 3 - (A) rational (B) irrational because the quotient 4 - (A) has a square root in its demonminator (B) is equal to an integer .

13. Which values are equivalent to $3\sqrt{40}$? Click on the numbers you want to select.

$\sqrt{360}$	$2\sqrt{90}$	$\sqrt{120}$
$\sqrt{4800}$	$6\sqrt{10}$	$10\sqrt{36}$

14. The diagram represents a right rectangular prism with dimensions labeled as algebraic expressions.



Which of these expressions represents the volume of the prism?

Select **all** that apply.

A. $7x$

B. $4x^2 - 25$

C. $12x^3 - 75x$

D. $3x(4x^2 - 25)$

E. $(2x + 5)(6x^2 - 15x)$

F. $12x^3 + 60x^3 + 75x$

G. $12x^3 - 30x^3 + 10x - 25$

15. Which expression can be used to calculate the third term of the expansion of $(3x^2-7)^8$?

A. $\binom{8}{2}(3x^2)^3(-7)^5$

B. $\binom{8}{2}(3x^2)^6(-7)^2$

C. $\binom{8}{3}(3x^2)^3(-7)^5$

D. $\binom{8}{3}(3x^2)^6(-7)^2$

16. Angle *P* is an angle in standard position on the unit circle, and $cos\ P = -\frac{1}{2}$. Which equation is also true?

A. $sin\ P = \frac{1}{2}$

B. $sin\ P = \frac{\sqrt{3}}{2}$

C. $tan\ P = \sqrt{3}$

D. $tan\ P = \frac{\sqrt{3}}{3}$

17. The addition formulas for sine and cosine are given below.

$$sin(\propto +\beta) = sin \propto cos\beta + sin\beta cos \propto$$

$$cos(\propto +\beta) = cos \propto cos\beta - sin \propto sin\beta$$

Using the radical values in the unit circle, what is the value of sin 75°?

A. $\dfrac{\sqrt{2}+1}{2}$

B. $\dfrac{\sqrt{2}-\sqrt{3}}{2}$

C. $\dfrac{\sqrt{6}+\sqrt{2}}{4}$

D. $\dfrac{\sqrt{6}-\sqrt{2}}{4}$

18. Which is **not** a complex number written in the form *a* + *bi*?

A. $3i$

B. 27

C. $\dfrac{\sqrt{2}}{i\sqrt{6}}$

D. $7-4i$

19. Which statement is true for the complex number system?

A. For a number *i* such that $i^2 = 1$, *ai* + *b* is a complex number with real numbers *a* and *b*.

B. For a number *i* such that $i^2 = -1$, *a* + *bi* is a complex number with real numbers *a* and *b*.

C. For a number *i* such that $i^2 = ai - b$, is a complex number with real numbers *a* and *b*.

D. For a number *i* such that $i = -1$, *ai* + *bi* is a complex number with real numbers *a* and *b*.

20. What is the solution to the equation $2^t = 14$?

A. $t = 7$

B. $t = \sqrt{14}$

C. $t = \ln(14)$

D. $t = \frac{\ln(14)}{\ln(2)}$

Modified Algebra 2 Curriculum

Mathematics Task Force Members

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Director of Secondary Education

Donald Harris

Principal

Lina Gil

Assistant Superintendent of Curriculum and Instruction

Sherry Yahn

Modified Algebra 2 Pacing Guide

Date Range	Teachers have approximately 39 school days to complete the suggested sequences of Chapters from the board approved textbook which align with the curricular frameworks. Please refer to the frameworks for specific learning goals that must be covered in your lessons. ***Adjustments should be made accordingly for varying levels.***
9/6/16 – 9/16/16	Complete Modified Algebra 2 Pre-Test Benchmark
9/6/16 – 12/12/16	Unit 1: Chapters 1, 2, 11
12/6/16 – 12/12/16	Complete Modified Algebra 2 Unit 1 Benchmark 1
12/13/16 – 3/8/17	Unit 2: Chapters 3, 4, 7
3/1/17 – 3/8/17	Complete Modified Algebra 2 Unit 2 Benchmark 2
3/9/17 – 5/22/17	Unit 3: Chapters 5, 6, 8, 10*
5/23/17 – 6/9/17	Complete Modified Algebra 2 Unit 3 Benchmark 3

**If time allows*

All students must complete the pre-test and all 3 benchmarks on the edConnect website. (Benchmark tests are aligned to curricular frameworks, so teachers should be aware of the content of the benchmarks to ensure student success.)

Each teacher may decide to use Benchmark 3 as their final exam as in the past. However, it must be completed by all students (no exemptions from any benchmarks). A cumulative final exam is provided in the appendix of the curriculum for use by teachers that choose to use it.

Suggested Open Educational Resources are available in the Curricular Frameworks for each Unit, which can assist teachers and students with PARCC test preparation.

Overview	Standards for Mathematical Content		Unit Focus	Standards for Mathematical Practice
[Unit 1](#) **Modeling with Statistics**	S.ID.A.1 S.ID.A.2 S.ID.A.3 S.ID.B.5 S.ID.B.6	F.IF.B.4* F.IF.B.5*	• Summarize, represent, and interpret data on a single count or measurement variable • Summarize, represent, and interpret data on two categorical and quantitative variables • Interpret functions that arise in applications in terms of the context	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 1: Suggested Open Educational Resources	S.ID.A.1-3 Haircut Costs S.ID.A.1-3 Speed Trap S.ID.A.2-3 Measuring Variability in a Data Set S.ID.A.3 Identifying Outliers S.ID.B.5 Support for a Longer School Day? S.ID.B.6 Laptop Battery Charge 2 F.IF.B.4 The Aquarium F.IF.B.4 Containers F.IF.B.4-5 The Canoe Trip, Variation 2			
[Unit 2](#) **Complex Solutions and Modeling with Rational Exponents**	N.CN.A.1 N.CN.A.2 N.CN.C.7 A.REI.B.4 A.REI.C.7 A.REI.C.6 F.BF.A.2 F.LE.A.2	F.LE.B.5 A.SSE.B.4 N.RN.A.1 N.RN.A.2 A.SSE.B.3 F.IF.C.8 F.LE.A.4	• Perform arithmetic operations with complex numbers • Use complex numbers in polynomial identities and equations • Build a function that models a relationship between two quantities • Construct & compare linear, quadratic, & exponential models • Write expressions in equivalent forms to solve problems • Extend the properties of exponents to rational exponents • Analyze functions using different representations	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 2: Suggested Open Educational Resources	N.CN.A.1 Complex number patterns N.CN.A.2 Powers of a complex number N.CN.C.7, A.REI.B.4b Completing the square A.REI.C.7 Linear and Quadratic System A.REI.C.6 Pairs of Whole Numbers F.BF.A.2 Snake on a Plane F.LE.A.2 Rumors	F.LE.B.5, F.LE.A.2 Exponential Parameters A.SSE.B.4 Course of Antibiotics N.RN.A.1 Evaluating Exponential Expressions N.RN.A.2 Rational or Irrational? A.SSE.B.3c Forms of exponential expressions F.IF.C.8b Carbon 14 dating in practice I F.LE.A.4 Carbon 14 dating		
[Unit 3](#) **Polynomials and Analysis of**	A.APR.B.2 A.SSE.A.2 A.APR.B.3 F.IF.C.7	A.REI.A.2 A.CED.A.1 F.IF.B.4 F.IF.B.6	• Understand the relationship between zeros and factors of polynomials • Interpret the structure of expressions	MP.1 Make sense of problems and persevere in solving them.

Key: Major | Supporting | Additional | * Benchmarked Standard

Nonlinear Functions	A.APR.C.4 A.APR.D.6 A.REI.A.1	G.GPE.A.2 F.IF.C.7 A.REI.D.11	• Use polynomial identities to solve problems • Analyze functions using different representations • Rewrite rational expressions • Understand solving equations as a process of reasoning and explain the reasoning • Interpret functions in terms of the context • Translate between the geometric description and the equation for a conic section • Represent and solve equations and inequalities graphically	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 3: Suggested Open Educational Resources	A.APR.B.2 The Missing Coefficient A.SSE.A.2 A Cubic Identity A.APR.B.3 Graphing from Factors III F.IF.C.7c Graphs of Power Functions A.APR.C.4 Trina's Triangles A.APR.D.6 Combined Fuel Efficiency A.REI.A.1 Products and Reciprocals		A.REI.A.2 Radical Equations A.REI.A.2, A.CED.A.1 An Extraneous Solution G.GPE.A.2 Defining Parabolas Geometrically F.IF.C.7e Logistic Growth Model A.REI.D.11 Ideal Gas Law	

Modified Algebra 2	
District/School Formative Assessment Plan	**District/School Summative Assessment Plan**
Teachers should create summative assessments in order to collect data and drive day to day instruction. For example, tests, quizzes and constructed response tasks.	*edConnect Department Wide Quarterly Benchmark Testing*
Focus Mathematical Concepts	
Prerequisite skills: Successfully Complete Secondary Algebra 1 & Geometry	
District/School Tasks	**District/School Primary and Supplementary Resources**
Complete Benchmarking and constructed response tasks to prepare for PARCC testing.	*Pearson Textbook and Online Resources are available to all staff and students.*
Instructional Best Practices and Exemplars	
Teachers should differentiate instruction, create lessons and integrate technology into the classroom whenever possible.	

Unit 1 Modified Algebra 2

Content & Practice Standards		**Critical Knowledge & Skills**	**Pearson Algebra 1 Common Core Textbook Chapters**
S.ID.A.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively.	Concept(s): No new concept(s) introduced Students are able to: • represent data with dot plots on the real number line. • represent data with histograms on the real number line. • represent data with box plots on the real number line.	*Prerequisite Skills found in Algebra 1 Textbook* *12-2* *12-4*

Key: Major | Supporting | Additional | * Benchmarked Standard

	MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Learning Goal 1: Represent data with plots (dot plots, histograms, and box plots) on the real number line.	
S.ID.A.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. S.ID.A.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • Appropriate use of a statistic depends on the shape of the data distribution. • Standard deviation Students are able to: • represent two or more data sets with plots and use appropriate statistics to compare their center and spread. • interpret differences in shape, center, and spread in context. • explain possible effects of extreme data points (outliers) when summarizing data and interpreting shape, center and spread. Learning Goal 2: Compare center and spread of two or more data sets, interpreting differences in shape, center, and spread in the context of the data, taking into account the effects of outliers.	11-10 *Prerequisite Skills found in Algebra 1 Textbook* *12-3* *CB 12-3* *12-4*
S.ID.B.5. Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concept(s): • Categorical variables represent types of data which may be divided into groups. Students are able to: • construct two-way frequency tables for categorical data. • interpret joint, marginal and conditional relative frequencies in context. • explain possible associations between categorical data in two-way tables. • identify and describe trends in the data. Learning Goal 3: Summarize and interpret categorical data for two categories in two-way frequency tables; explain possible associations and trends in the data.	*Prerequisite Skills found in Algebra 1 Textbook* *CB 12-5*

Key: Major | Supporting | Additional | * Benchmarked Standard

■ S.ID.B.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. S.ID.B.6a. Fit a function to the data (including the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. S.ID.B.6b. Informally assess the fit of a function by plotting and analyzing residuals, including with the use of technology.	MP.1 Make sense of problems and persevere in solving them. MP 2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • fit a function to data using technology. • solve problems using functions fitted to data (prediction equations). • interpret the intercepts of models in context. • plot residuals of linear and non-linear functions. • analyze residuals in order to informally evaluate the fit of linear and non-linear functions. Learning Goal 4: Fit functions to data using technology, plot residuals and informally assess the fit of linear and non-linear functions by analyzing residuals.	*Prerequisite Skills found in Algebra 1 Textbook* *5-7* *CB 5-7* *9-7* *CB 9-7* *12-2* *12-4*
■ F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features	MP.4 Model with mathematics. MP.6 Attend to precision.	Concept(s): No new concept(s) introduced Students are able to: • interpret maximum/minimum and intercepts of functions from graphs and tables in the context of the problem. • sketch graphs of functions given a verbal description of the relationship between the quantities. • identify intercepts and intervals where function is increasing/decreasing. • determine the practical domain of a function .	2-3 2-5 4-1 4-3 5-1 5-8 CB 7-3 13-1 13-4

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*. ■ F.IF.B.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. *For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.*		Learning Goal 5: Interpret key features of functions from graphs and tables. Given a verbal description of the relationship, sketch the graph of a function, showing key features and relating the domain of the function to its graph.	13-5 *Prerequisite Skills found in Algebra 1 Textbook* *4-2* *4-3* *4-4* *5-3* *5-4* *5-5* *7-6* *7-7* *9-1* *9-2* *9-7* *11-6* *11-7*

Unit 2 Modified Algebra 2

Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
○ N.CN.A.1. Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real. ○ N.CN.A.2. Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers	MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concepts: • Complex number i is defined such that $i^2 = -1$. • Every complex number has the form $a + bi$ with a and b real. Students are able to: • $i^2 = -1$ and the commutative, associative properties to add and subtract complex numbers are to be used.	4-8

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 2 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
		• determine that $i^2 = -1$ and the commutative, associative, and distributive properties to multiply complex numbers. Learning Goal 1: Add, subtract, and multiply complex numbers using the commutative, associative and distributive properties.	
N.CN.C.7. Solve quadratic equations with real coefficients that have complex solutions. A.REI.B.4. Solve quadratic equations in one variable. A.REI.B.4b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b.	MP.5 Use appropriate tools strategically. MP.7 Look for and make use of structure.	Concepts: • As with real solutions, complex solutions to quadratic equations may be determined by taking square roots, factoring, and completing the square. Students are able to: • solve quadratic equations in one variable that have complex solutions by taking square roots. • solve a quadratic equations in one variable that have complex solutions by completing the square. • solve a quadratic equations in one variable that have complex solutions by factoring. • write complex solutions in $a \pm bi$ form. Learning Goal 2: Solve quadratic equations with real coefficients that have complex solutions by taking square roots, completing the square and factoring.	4-8 5-5 5-6 *Prerequisite Skills found in Algebra 1 Textbook* *9-3* *9-4* *9-5* *9-6*
A.REI.C.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. *For example, find the points of intersection between the line $y = -3x$* and the circle *$x^2 + y^2 = 3$.*	MP.1 Make sense of problems and persevere in solving them.	Concepts: • Solutions of linear systems contain different function types. Students are able to: • solve a system containing one linear equation and one quadratic equation algebraically. • graph a system containing one linear equation and one quadratic equation to determine a solution.	4-9

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 2 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
		Learning Goal 3: Solve simple systems consisting of a linear and quadratic equation in two variables algebraically and graphically.	
A.REI.C.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	MP.1 Make sense of problems and persevere in solving them. MP.7 Look for and make use of structure.	Concepts: • Solving a system of linear equations containing *n* variables requires *n* equations. Students are able to: • use the substitution method and/or elimination method to find the solution of a system containing three linear equations. Learning Goal 4: Solve algebraically a system of three linear equations.	3-1 3-2 3-3
F.BF.A.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. F.LE.A.2 Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). F.LE.B.5. Interpret the parameters in a linear or exponential function in terms of a context.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP 4. Model with mathematics MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.	Concepts: • Recursion Students are able to: • distinguish between recursive and explicit formulas. • represent geometric and arithmetic sequences recursively. • represent geometric and arithmetic sequences with explicit formulas. • translate between recursive form and explicit form of geometric and arithmetic sequences. • recognize explicit formula for geometric sequences as exponential functions containing a domain in the integers only. • interpret the parameters of an exponential function representing a geometric sequence. • interpret the parameters of a linear function representing an arithmetic sequence. Learning Goal 5: Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.	*Prerequisite Skills found in Algebra 1 Textbook* *4-7* *5-3* *5-4* *5-5* *5-7* *7-6* *7-7* *7-8* *9-7*
A.SSE.B.4. Derive and/or explain the derivation of the formula for the sum of a finite geometric series (when the	MP.1 Make sense of problems and persevere in solving them.	Concepts: • Series as a sum of a sequence Students are able to:	9-5 CB 9-5

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 2 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
common ratio is not 1), and use the formula to solve problems. *For example, calculate mortgage payments.*	MP.7 Look for and make use of structure.	• derive or explain the derivation of the formula for the sum of a finite geometric series. • use the formula for the sum of a finite geometric series to solve problems. Learning Goal 6: Use the formula for the sum of a finite geometric series to solve problems [*for example, calculate mortgage payments*; derive the formula for the sum of a finite geometric series (when the common ratio is not 1)].	
N.RN.A.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.* N.RN.A.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.	MP.7 Look for and make use of structure.	Concepts: • Properties of integer exponents extends to rational exponents (*for example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5)* • Radical notation is a representation of rational exponents. Students are able to: • rewrite expressions containing rational exponents into radical form. • rewrite expressions containing radical notation into exponential expressions containing rational exponents. Learning Goal 7: Use properties of integer exponents to explain and convert between expressions involving radicals and rational exponents.	*Prerequisite Skills found in Algebra 1 Textbook* *7-2* *7-3* *7-4* *7-5*
A.SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression A.SSE.B.3c: Use the properties of exponents to transform expressions for exponential functions. *For example the*	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.7 Look for and make use of structure.	Concepts: • Alternate, equivalent forms of an exponential expression containing rational exponents may reveal specific attributes of the function that it defines. Students are able to: • use properties of exponent transform/rewrite an exponential expression for an exponential function.	*Prerequisite Skills found in Algebra 1 Textbook* *7-7* *9-4* *9-5* 2-4 4-2 5-9

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 2 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
expression 1.15^t *can be rewritten as* $(1.15^{1/12})^{12t} \approx 1.012^{12t}$ *to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.* F.IF.C.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function F.IF.C.8b: Use the properties of exponents to interpret expressions for exponential functions. *For example, identify percent rate of change in functions such as* $y = (1.02)^t$, $y = (0.97)^t$, $y = (1.01)^{12t}$, $y = (1.2)^{t/10}$, *and classify them as representing exponential growth or decay.*		• explain the properties of the quantity or the function. Learning Goal 8: Use the properties of exponents to transform expressions for exponential functions, explain properties of the quantity revealed in the transformed expression or different properties of the function.	6-8
F.LE.A.4. Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics.	Concepts: • Exponents and logarithms have an inverse relationship. • Solutions to an exponential equation in one variable can be written as a logarithm. Students are able to: • transform an exponential model represented by $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e. • write the solution to $ab^{ct} = d$ as a logarithm. • use technology to evaluate logarithms having base 2, 10, or e. Learning Goal 9: Express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.	7-5 7-6

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 3 Modified Algebra 2			
Content Standards	**Suggested Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Pearson Algebra 2 Common Core Textbook Chapters**
■ A.APR.B.2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x - a$ is $p(a)$, so $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$.	MP.6 Attend to precision.	Concepts: • Polynomial division: For a polynomial $p(x)$ and a number a: – $p(a) = 0$ if and only if $(x - a)$ is a factor of $p(x)$ – $(x - a)$ is a factor of $p(x)$ if and only if $p(a) = 0$ Students are able to: • use the Remainder Theorem to determine factors of a polynomial. Learning Goal 1: Apply the Remainder Theorem in order to determine the factors of a polynomial.	5-4
■ A.SSE.A.2. Use the structure of an expression to identify ways to rewrite it. *For example, see* $x^4 - y^4$ *as* $(x^2)^2 - (y^2)^2$, *thus recognizing it as a difference of squares that can be factored as* $(x^2 - y^2)(x^2 + y^2)$. ■ A.APR.B.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	MP.7 Look for and make use of structure.	Concepts: • Factors of polynomials can be used to identify zeros to be used to develop a rough graph of the polynomial function. Students are able to: • factor polynomials. • analyze a table of values to determine where the polynomial is increasing and decreasing. • use the zeros of the polynomial to create rough graph. Learning Goal 2: Use an appropriate factoring technique to factor polynomials. Explain the relationship between zeros and factors of polynomials, and use the zeros to construct a rough graph of the function defined by the polynomial.	4-4 4-5 5-2 5-3 5-6 CB 5-7 6-1 6-2 6-3 8-4

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 3 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concepts: • Factors of polynomials can be used to identify zeros to be used to develop a rough graph of the polynomial function. Students are able to: • graph a polynomial function given its equation. • identify zeros from the graph and using an appropriate factoring technique. • show key features of the graph, including end behavior. • use technology to graph and describe key features of the graph for complicated cases. Learning Goal 3: Graph polynomial functions from equations; identify zeros when suitable factorizations are available; show key features and end behavior.	2-3 2-4 CB 2-4 2-6 2-7 4-1 4-2 5-1 5-2 5-8 6-8 7-2 CB 8-2 8-3
A.APR.C.4. Prove polynomial identities and use them to describe numerical relationships. *For example, the difference of two squares; the sum and difference of two cubes; the polynomial identity* $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ *can be used to generate Pythagorean triples.*	MP.3 Construct viable arguments and critique the reasoning of others. MP.7 Look for and make use of structure.	Concepts: • Polynomial identities can be used to describe numerical relationships. Students are able to: • show that the polynomial identity $(x^2 + y^2)^2 = (x^2 - y^2)^2 + (2xy)^2$ can be used to generate Pythagorean triples. • prove polynomial identities. Learning Goal 4: Use polynomial identities to describe numerical relationships and prove polynomial identities.	CB 5-5
A.APR.D.6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$, using inspection, long division, or, for the more complicated examples, a computer algebra system.	MP.1 Make sense of problems and persevere in solving them.	Concepts: • Rational expressions can be written in different forms. Students are able to: • write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where $a(x)$, $b(x)$, $q(x)$, and $r(x)$ are polynomials with the degree of $r(x)$ less than the degree of $b(x)$. • use inspection, factoring and long division to rewrite rational expressions.	5-4 8-6

Key: Major | Supporting | Additional | * Benchmarked Standard

Unit 3 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
		• use technology to rewrite rational expressions for more complicated cases. Learning Goal 5: Rewrite simple rational expressions in different forms using inspection, long division, or, for the more complicated examples, a computer algebra system.	
■ A.REI.A.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise. ■ A.REI.A.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. □ A.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions.*	MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics. MP.6 Attend to precision.	Concepts: • Inverse relationships exist between roots and powers. • Extraneous solutions do not result in true statements. Students are able to: • use the inverse relationship between roots and powers when solving radical equations. • identify any extraneous solutions. • solve simple rational equations in one variable (degree of numerators and denominator is not greater than 2). • write simple rational equations in one variable and use the rational equation to solve problems. Learning Goal 6: Solve simple rational and radical equations in one variable, use them to solve problems and show how extraneous solutions may arise. Create simple rational equations in one variable and use them to solve problems.	1-4 1-5 1-6 4-1 4-5 6-5 CB 8-1 8-6
■ F.IF.B.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative;*	MP.1 Make sense of problems and persevere in solving them. MP 4. Model with mathematics MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.	Concepts: • A radical function is any function that contains a variable inside a root. Students are able to: • interpret key features of radical functions from graphs and tables in the context of the problem. • sketch graphs of radical functions given a verbal description of the relationship between the quantities.	2-3 2-5 4-1 4-2 4-3 CB 4-3 5-1 5-8 CB 7-3 13-1

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 3 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
relative maximums and minimums; symmetries; end behavior; and periodicity. ■ F.IF.B.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.		• identify intercepts and intervals where function is increasing/decreasing. • determine the practical domain of a radical function. • determine key features including intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maxima and minima; symmetries; end behavior. Learning Goal 7: For radical functions, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.	13-4 13-5
○ G.GPE.A.2. Derive the equation of a parabola given a focus and directrix		Concepts: • Any point on a parabola is equidistant between the focus and the directrix. Students are able to: • use the distance formula to write an equation of a parabola when the focus and directrix are given. Learning Goal 8: Derive the equation of a parabola given a focus and directrix.	10-2 10-6
□ F.IF.C.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. F.IF.C.7e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.		Concepts: • Logarithmic functions Students are able to: • graph logarithmic functions having base 2, 10 or e, using technology for more complicated cases. • show intercepts and end behavior of logarithmic functions. Learning Goal 9: Graph logarithmic functions expressed symbolically and show key features of the graph (including intercepts and end behavior).	2-3 2-4 CB 2-4 2-6 2-7 4-1 4-2 5-1 5-2 5-8 6-8 7-2 CB 8-2 8-3

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Unit 3 Modified Algebra 2

Content Standards	Suggested Standards for Mathematical Practice	Critical Knowledge & Skills	Pearson Algebra 2 Common Core Textbook Chapters
■ A.REI.D.11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.*	MP.1 Make sense of problems and persevere in solving them. MP.5 Use appropriate tools strategically.	Concepts: • Solutions to complex systems of nonlinear functions can be approximated graphically Students are able to: • find the solution to f(x)=g(x) approximately, e.g., using technology to graph the functions; include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. • find the solution to f(x)=g(x) approximately, e.g., using technology to make tables of values, or find successive approximations; include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. Learning Goal 10: Find approximate solutions for f(x)=g(x), using technology to graph, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, logarithmic and exponential functions.	3-1 5-3 7-5 CB 7-6 8-6

Key: ■ Major | □ Supporting | ○ Additional | * Benchmarked Standard

Atlantic City High School

Algebra 2 Unit Modified Benchmarks

Mathematics Task Force Members

Don Coleman

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TEST NAME: **2016-2017 ALG2 BM1 SPED**

TEST ID: **65967**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

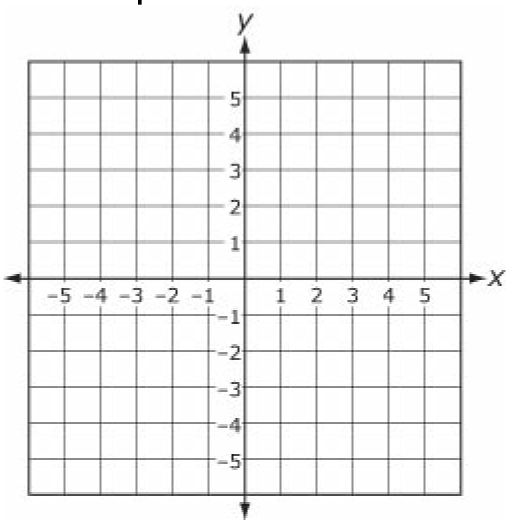
1. Which statement describes the graph of $f(x) = -(x+1)^2 + 4$?

   A. A minimum at (−1, 4) and a zero at (0, 3)

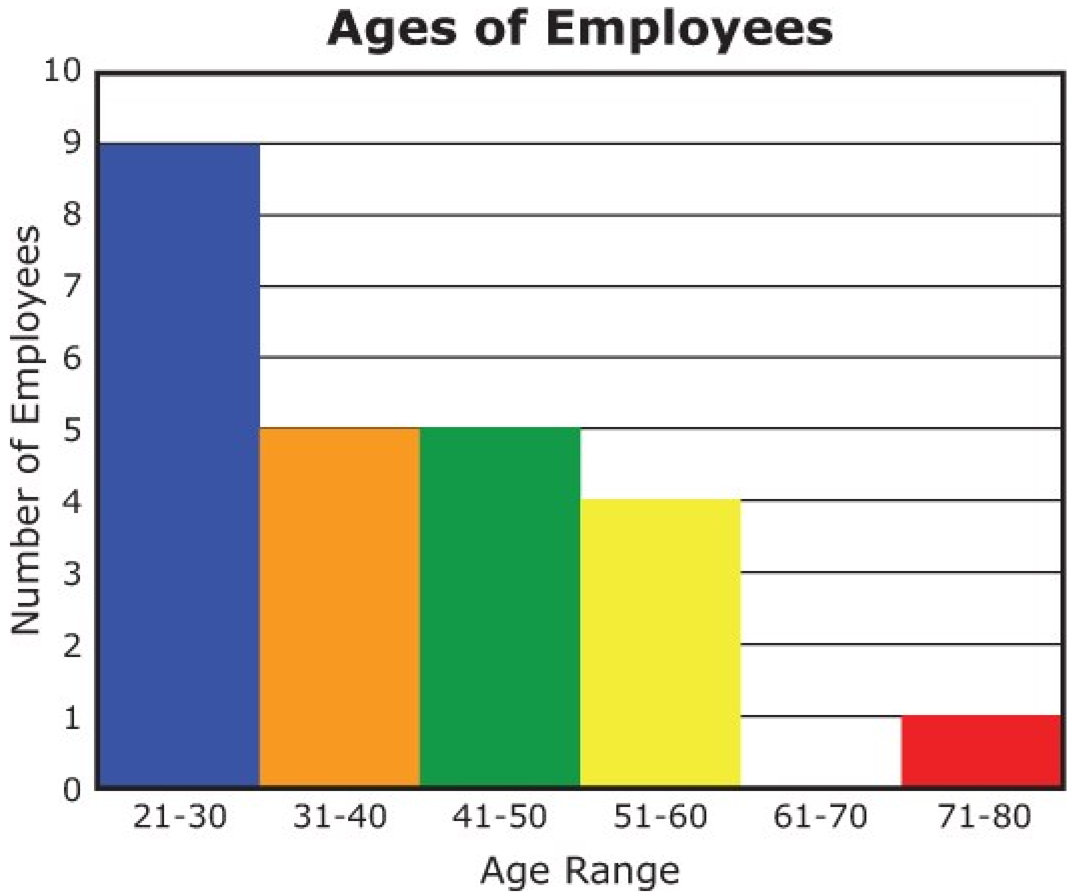
   B. A maximum at (−1, 4) and a zero at (0, 3)

   C. A maximum at (−1, 4) and a zero at (− 3, 0)

2. **Part A Write an equation of a line with a slope of 2 that passes through the point (2, 5). Show or explain your work. *(y=mx+b)***
   Part B Graph the line from Part A.



3. The histogram below displays the ages of a company's employees.



The company hires 7 new employees. The ages of the new employees are 48, 51, 60, 61, 63, 70, and 71. What should the height of the bar for age range 61-70 be to represent the ages of the new employees?

A. 3

B. 4

C. 5

4. What is the median for the following set of data?

{60, 68, 72, 79, 61, 62, 80, 83, 72, 74, 69, 80}

A. 71

B. 72

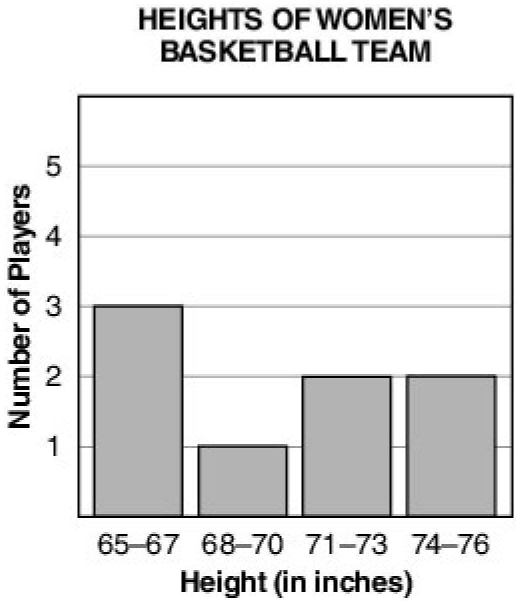
C. 72.5

5. The heights in inches of a college women's basketball team are listed below.

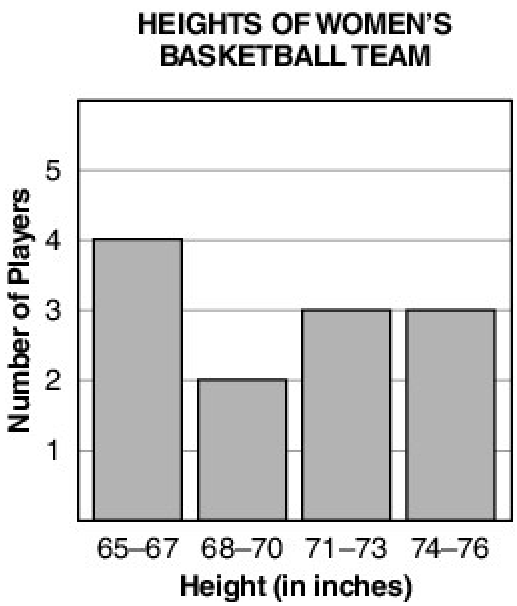
72, 65, 68, 75, 72, 74, 70, 66, 65, 75, 71, 66

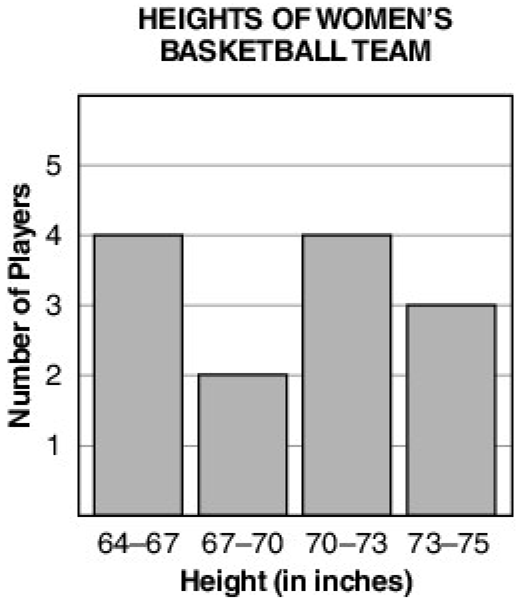
Which histogram **correctly** represents these data?

A.

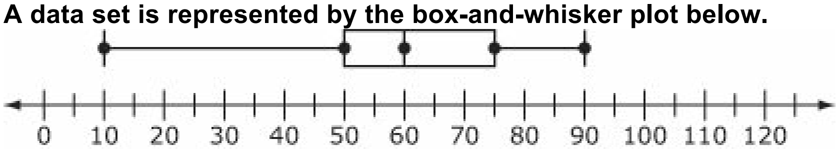


B.



C. 

6. **A data set is represented by the box-and-whisker plot below.**



Between which two values does 50% of the data lie?

A. 10 and 120

B. 50 and 75

C. 60 and 75

7. The table below shows the number of students in each grade at Lincoln High School and whether they attended a football game.

	Freshman	Sophomore	Junior	Senior
Attended	48	90	224	254
Did NOT Attend	182	141	36	8

Which of these statements can be concluded based on the table?

A. Of the students who did not attend the game, 8.0% are seniors.

B. Of the students who attended the game, 22.8% are juniors.

C. Of the students who attended the game, 77.6% are juniors or seniors.

8. The scatter plot below shows the amount collected from automobile registration fees, in millions of dollars, for different years.

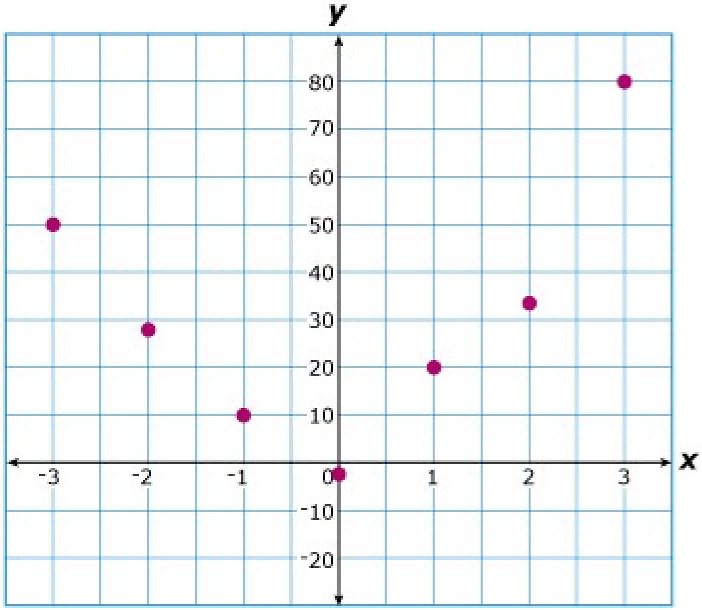
Based on a line of best fit for the data, when will registration fees most likely reach $105 million?

A. 2000

B. 2005

C. 2010

9.



x	y
-3	50
-2	28
-1	10
0	-2
1	20
2	33
3	80

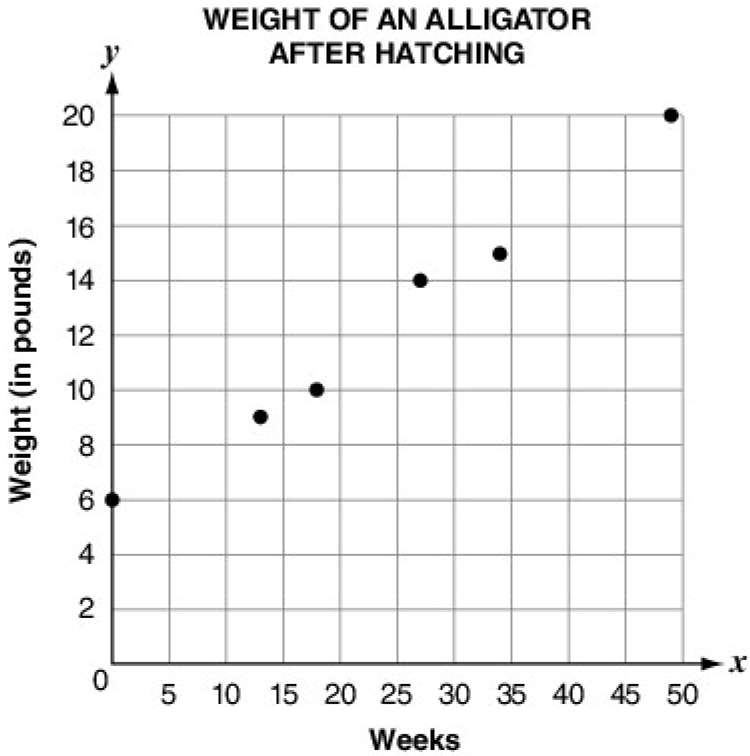
Which quadratic regression equation best fits the scatter plot and table shown above? *(Hint: substitute x values into the equations **answers will NOT be exact)*

A. $y = 7x^2 + 4x + 4$

B. $y = 4x^2 - 3$

C. $y = 4x^2 + 4x - 2$

10. The scatter plot below shows how the weight of a baby alligator changed after hatching.



Which equation **best** represents the weight, *w,* of this alligator *n* weeks after hatching? *(y=mx+b)*

A. $w = 0.25n + 6$

B. $w = 6n + 0.25$

C. $w = 6n + 0.65$

11. Click on the equations you want to select.

Jackie is solving this system of linear equations.

$$3x + 2y = 20$$

$$4x - y = 30$$

Which equations could be part of the process of solving this system?
(hint: use elimination method)

$\mathbf{4}x + \mathbf{6}y = \mathbf{20}$

$\mathbf{12}x + \mathbf{8}y = \mathbf{80}$

$\mathbf{8}x - y = \mathbf{60}$

$\mathbf{8}x - \mathbf{2}y = \mathbf{60}$

12. What is the sum of the roots of the equation $2x^2 + 5x - 3 = 0$? *(HINT: factor, add answers)*

A. -3.5

B. -2.5

C. -1.5

13. Below are three quadratic equations and three methods of solving quadratic equations.

Equations

$x^2 + 8x - 9 = 0$	$x^2 - 5x + 1 = 0$	$x^2 = 20$

Methods of Solving

Take the square root of both sides	Use the quadratic formula	Factor the left side of the equation

Which grouping correctly matches each equation with its **best** method of solving?

A.

$x^2 + 8x - 9 = 0$	Take the square root of both sides
$x^2 - 5x + 1 = 0$	Factor the left side of the equation
$x^2 = 20$	Use the quadratic formula

B.

$x^2 + 8x - 9 = 0$	Use the quadratic formula
$x^2 - 5x + 1 = 0$	Take the square root of both sides
$x^2 = 20$	Factor the left side of the equation

C.

$x^2 + 8x - 9 = 0$	Factor the left side of the equation
$x^2 - 5x + 1 = 0$	Use the quadratic formula
$x^2 = 20$	Take the square root of both sides

14. Sandy needs \$485 to take a class trip. She has already earned \$125. She earns \$25 each day she babysits the neighbors' children. What is the minimum number of days that Sandy needs to babysit the neighbors' children in order to have enough money for her class trip? *(HINT: solve for x, answer is approximate)*

A. 14

B. 15

C. 19

15. Riley determined the speed of her car using the equation $-15x + 60 = 30$. What does the variable x represent?

A. the initial speed of the car

B. the rate of deceleration of the car

C. the point in time at which the speed of the car is assessed

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Read the passage - 'An Expression' - and answer the question below:

An Expression

An expression is shown.

$-3a(a - b - 5) + 4(-2a + 2b) + b(a + 3b - 7)$

16. Which expression is equivalent to the one shown? *(HINT: distribute)*

A. $-11a^2 + 3b^2 - 2ab + 7a + b$

B. $-11a^2 + 3b^2 - 4ab + 7a + b$

C. $-3a^2 + 3b^2 - 2ab + 7a + b$

---

17. Which expression is equivalent to $\frac{3x}{x-5} - \frac{2}{x+5} + \frac{4x-1}{x^2-25}$?

A. $\frac{3x^2+2x-1}{(x-5)(x+5)}$

B. $\frac{3x^2+2x+14}{(x-5)(x+5)}$

C. $\frac{3x^2+17x+9}{(x-5)(x+5)}$

18. If $f(x) = x^2 - 2x - 8$, which factors reveal the zeros of the function?

A. $(x-4)$ and $(x+2)$

B. $(x+4)$ and $(x-2)$

C. $(x+4)$ and $(x+2)$

19. Solve for x. *(HINT: Put in standard form and factor)*

$$2x - 3 = \frac{x^2}{3}.$$

20. **Directions: Click on each factor you want to select. You must select all correct factors.**

Which expressions are factors of $9x^4 - 4y^4$?

$(3x + 2y)$	$(3x - 2y)$
$(3x^2 + 2y^2)$	$(3x^2 - 2y^2)$
$(9x^2 + 4y^2)$	$(9x^2 - 4y^2)$

TEST NAME: **2016-2017 ALG2 BM2 SPED**
TEST ID: **66004**
GRADE: **Grade 9 - Grade 12**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

Read the passage - 'Expresson' - and answer the question below:

Expresson

The expression $3x^2 - 33x - 180$ can be factored into the form $a(x + b)(x + c)$, where a, b, and c are constants, to reveal the zeros of the function defined by the expression.

What are the zeros of the function defined by $3x^2 - 33x - 180$?

1. Select all that apply. *(HINT: 2 answers)*

   A. -15

   B. -10

   C. -6

   D. -4

   E. 4

   F. 6

   G. 10

   H. 15

2. Which expression can be used to find the zeros of the function $f(x) = 4x^2 + 2x - 12$?

A. $2(x+2)(2x-3)$

B. $2(x-3)(x+2)$

C. $2(2x+3)(x-2)$

3. Find the sum of $\sum_{n=1}^{4} 3\left(\frac{1}{10}\right)^n$.

A. 0.3003

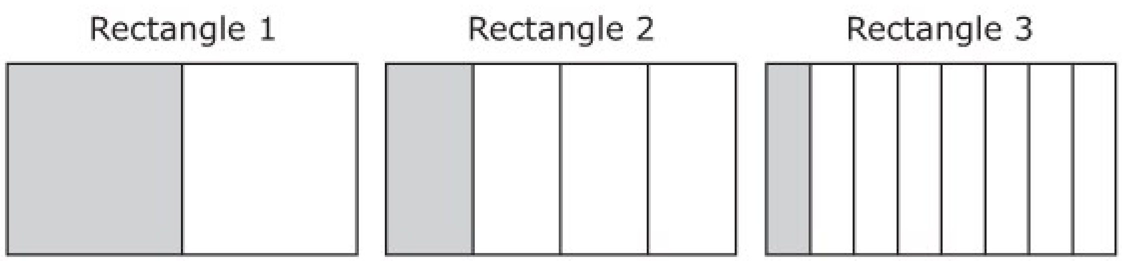
B. 0.3081

C. 0.3333

4. Ten congruent rectangles are shaded as follows.

- Half of the area in the first rectangle is shaded.
- Half of the area shaded in the first rectangle is shaded in the second rectangle.
- Half of the area shaded in the second rectangle is shaded in the third rectangle.
- This pattern continues for the remaining rectangles.

The first 3 rectangles are shown:



Part A

Write a formula to find the sum of the shaded areas of the 10 rectangles.

Part B

Is the total area shaded on the 10 rectangles greater than or less than the area of one full rectangle? Explain your answer.

5. Which is an arithmetic series?

A. 1, 2, 3, 4, …

B. 1 + 2 + 4 + 8 + …

C. 1 + 2 + 3 + 4 + …

6.

n	1	2	3	4	…	n
a_n	0.2	0.02	0.002	0.0002	…	a_n

The first four terms of a geometric sequence are shown in the table above. Which equation defines the sequence? *(HINT: substitute n into each equation)*

A. $a_n = (0.2)(0.1)n$

B. $a_n = (0.2)(0.1)^n$

C. $a_n = (0.2)(0.1)^{n-1}$

7. **Which expression is equivalent to $\sqrt[3]{27}$? *(HINT: factor tree)***

A. $3^{\frac{1}{9}}$

B. 3^3

C. $\left(3^3\right)^{\frac{1}{3}}$

8. Which is an equivalent form of the following expression?

$27^{\frac{2}{3}}$

A. 3

B. 9

C. 18

9. Which is equivalent to $\sqrt{(16-x)^2}$?

A. $|4-x|$

B. $|16-x|\sqrt{32x}$

C. $|16-x|$

10. What is the simplified form of $\left(\frac{x^2 y^{-3}}{z^{-1}}\right)^{-5}$, assuming all variables are non-zero?

A. $\frac{x^{10} z^5}{y^{15}}$

B. $\frac{y^{15}}{x^{10} z^5}$

C. $\frac{z^6}{x^3 y^8}$

11. Drag and drop **all** the solutions to $3x^2 + 13x = 10$. *(HINT: slide and divide)*

-1	-5	$\frac{-20}{6}$
	$\frac{2}{3}$	

Is a solution to the equation

12. $\begin{cases} y = \frac{1}{2}x - 1 \\ x - 2y = 2 \end{cases}$

What is the greatest number of solutions to the system of equations shown above?

A. 0

B. 1

C. An infinite number

13. The matrix below shows the prices of 4 different types of athletic shoes at 5 different shoe stores.

$$\begin{array}{c} \textit{Store} \\ \text{Tennis} \\ \text{Aerobics} \\ \text{Walking} \\ \text{Running} \end{array} \begin{array}{c} \begin{array}{ccccc} \quad A \quad & \quad B \quad & \quad C \quad & \quad D \quad & \quad E \quad \end{array} \\ \begin{bmatrix} 35.99 & 41.99 & 29.00 & 43.59 & 37.60 \\ 82.50 & 89.00 & 76.00 & 82.50 & 79.99 \\ 22.50 & 32.00 & 30.99 & 28.75 & 35.99 \\ 64.99 & 67.00 & 72.50 & 61.99 & 69.99 \end{bmatrix} \end{array}$$

What store and shoe type is in row 3, column 4?

A. Store C, Walking

B. Store D, Walking

C. Store D, Running

14. The wall of a kitchen has a length of 12 feet (ft) and a height of 10 ft. The wall is to be tiled to cover half of its height and its entire length. How many tiles of dimensions $0.75 \text{ ft} \times 0.50 \text{ ft}$ are required if there is no space between each tile?

A. 160

B. 120

C. 45

15. James threw a ball from the roof of a building. The ball fell 3 feet in the first second, 9 feet in next second, and 27 feet in the third second. Which expression represents the distance the ball fell at the *n*th second?

A. 3^n

B. $3n$

C. $6n - 3$

16. **Which logarithmic equation is equivalent to $y = 2^x$?**

A. $\log_x 2 = y$

B. $\log_2 x = y$

C. $\log_2 y = x$

17. Robert is collecting books to donate to the library. The number of books he collects, *n,* is defined by $n=14d+21$, where d is the number of days he spends collecting books.

Based on this information, use the drop down choices to correctly complete each sentence.

The 14 in the equation represents 1 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day. (C) the number of books Robert started with.

The 21 in the equation represents 2 - (A) the number of days Robert collected books. (B) the number of books Robert collected each day. (C) the number of books Robert started with.

18. Which expression is equivalent to the expression $-\sqrt{4}-\sqrt{-9}$?

A. $-2-3i$

B. $-2+3i$

C. $-4-9i$

19. Which is equivalent to the following equation? *(HINT: combine like terms)*

17 – 3*i* – (–5 – 8*i*)

A. 22 – 11*i*

B. 22 – 5*i*

C. 22 + 5*i*

20. Solve the equation for *x*. *(HINT: Use the quadratic formula)*

$$x^2 - x + 6 = 0$$

A. $x = \dfrac{1 \pm 5i}{2}$

B. $x = \dfrac{1 \pm i\sqrt{23}}{2}$

C. $x = 2 \text{ or } x = 3$

D. $x = 3 \text{ or } x = -2$

TEST NAME: **2016-2017 ALG2 BM3 SPED**

TEST ID: **66032**

GRADE: **Grade 9 - Grade 12**

SUBJECT: **Mathematics**

TEST CATEGORY: **My Classroom Assessment**

Student:

Class:

Date:

1. What is the remainder when $x^4 - 5x^3 + 3x^2 - 2x + 7$ is divided by $x - 1$?

A. 4

B. 7

C. 10

2. Which function has a remainder of 3 when divided by $x + 2$?

A. $f(x) = x^2 - 6x + 11$

B. $f(x) = x^2 + 3x + 5$

C. $f(x) = x^2 - 4x + 7$

3. Which number is a zero of $f(x) = 2x(x + 7)(x - 4)$?

A. −4

B. 0

C. 2

4. At what values of *x* does the graph of $y = x(5x + 8)(7x - 3)$ cross the *x*-axis? *(HINT: set each equal to 0 and solve)*

A. $-\frac{8}{5}$, 0, and $\frac{3}{7}$

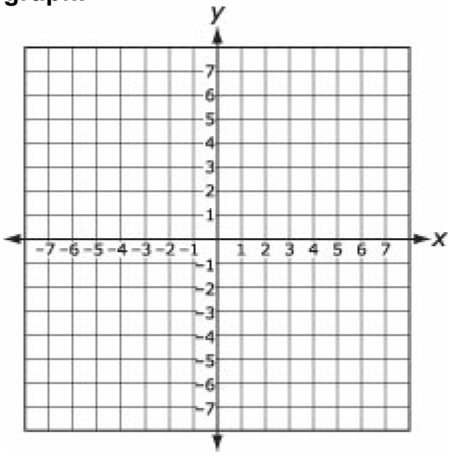
B. $-\frac{8}{5}$ and $\frac{3}{7}$

C. $-\frac{3}{7}$ and $\frac{8}{5}$

5. **Consider the function $f(x) = (x-2)(x+1)^2(x-1)$.**

Part A Find the zeros of $f(x)$. Show or explain your work. ***(HINT: set each equal to 0)***

Part B Sketch a rough graph to represent $f(x)$ on the grid below. Identify the *y*-intercept of the graph.



6. Simplify the expression $\dfrac{6x^2+5x-21}{2x-3}$.

(HINT: slide and divide then simplify)

A. $3x+7$

B. $3x-2-\dfrac{15}{2x-3}$

C. $3x-2-\dfrac{27}{2x-3}$

7. Which rational expression cannot be reduced?

A. $\dfrac{2x+y}{2x}$

B. $\dfrac{2x+1}{4x+2}$

C. $\dfrac{3x+12}{9x}$

8. Alma invests \$300 in an account that compounds interest annually. After 2 years, the balance of the account is \$329.49. To the nearest tenth of a percent, what is the rate of interest on the account?

A. 6.9%

B. 5.4%

C. 4.8%

9. The steps used to solve the equation $3(2x-3)+4=7$ are shown below.

Step 1: $3(2x-3)+4-4=7-4$

Step 2: $3(2x)+3(-3)=3$

Step 3: $6x-9=3$

Step 4: $6x-9+9=3+9$

Step 5: $6x \div 6=12 \div 6$

Step 6: $x=2$

In which step has the addition property of equality been used?

A. Step 1

B. Step 2

C. Step 4

10. The steps for solving the equation $3(2m + 4) = 42$ are shown below.

Step 1 : $6m + 12 = 42$

Step 2 : $6m = 30$

Step 3 : $m = 5$

Which list shows the correct sequence of the properties of equality used to solve the equation?

A. distributive, division, subtraction

B. distributive, subtraction, division

C. division, distributive, subtraction

11. Which of the following equals $\dfrac{4x^2 - 9}{2x^2 + 15x - 27}$?

(HINT: factor then simplify)

A. $\dfrac{2x-3}{x+9}$

B. $\dfrac{2x+3}{x+9}$

C. $\dfrac{2x-3}{x-9}$

12. What is the solution for the equation below? *(HINT: check for extraneous solutions)*

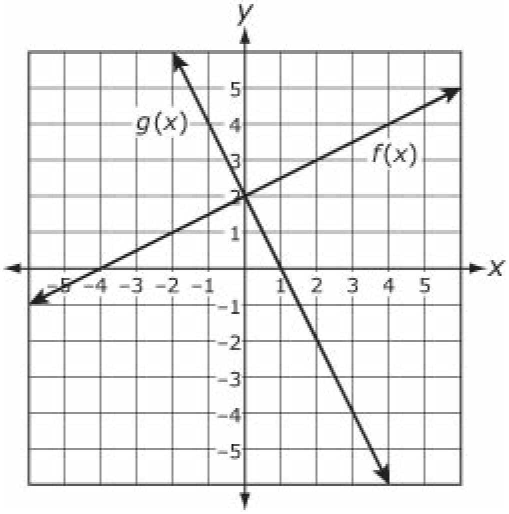
$$\sqrt{12-x} = x$$

A. $x = 3$ only

B. $x = 4$ only

C. $x = 4$ and $x = -3$

13. **The graphs of $f(x)$ and $g(x)$ are shown below.**



Which value is a solution to the equation $f(x) = g(x)$? *(HINT: share an x-intercept)*

A. - 4

B. 0

C. 1

14.

x	y
1	4
2	1
3	5
4	10
5	16
6	19
7	15

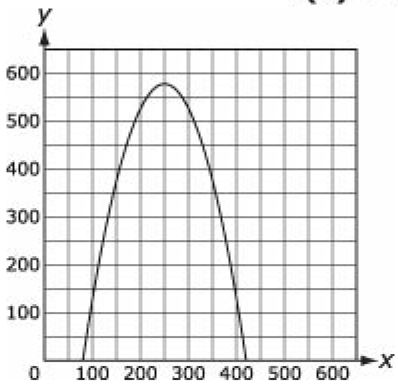
Which equation best represents the regression line for the data given in the table above? *(HINT: imput x values to find y values)*

A. $y = 3x - 2$

B. $y = 3x + 2$

C. $y = -3x + 2$

15. **Consider the graph of $f(x) = -0.02(x - 80)(x - 420)$ shown below.**



Within the first quadrant, over which interval is $f(x)$ increasing?

A. $0 < x < 250$

B. $0 \le x \le 250$

C. $80 < x < 250$

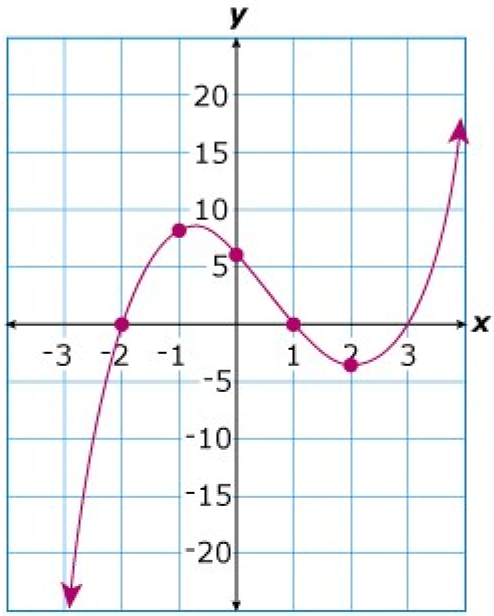
16. Which equation has a rate of change of 5?

A. $y = x + 5$

B. $y = x \cdot 5$

C. $y = x \div 5$

17. Which of the following equations can be used to draw the graph shown? (HINT: factor answers and find x-intercept)

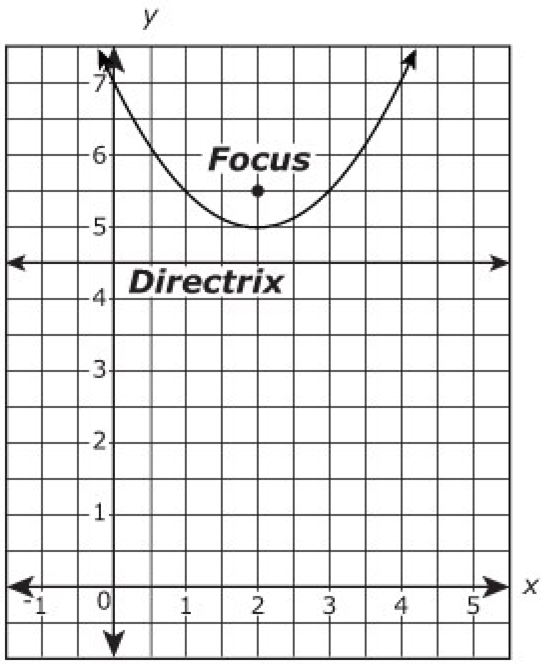


A. $y = (x - 1)(x^2 - x - 6)$

B. $y = (x - 1)(x^2 - x + 5)$

C. $y = (x - 1)(x^2 + x - 6)$

18. The graph shows a parabola with the focus and the directrix identified.
(HINT: find vertex)



Which equation would produce this parabola?

A. $$x = \frac{1}{4}(y-5)^2 + 2$$

B. $$x = \frac{1}{2}(y-5)^2 + 2$$

C. $$y = \frac{1}{2}(x-2)^2 + 5$$

19. What steps can be used to solve the equation $-3a + 7 = 21$?

A. Subtract 7 from both sides and then divide both sides by –3.

B. Add 7 to both sides and then multiply both sides by –3.

C. Divide both sides by 7 and then add 3 to both sides.

20. Which pair of equations represents two perpendicular lines?

A. $y = -4x + 3$
$y = 4x - 3$

B. $y = -2x - 1$
$y = \frac{1}{2}x + 6$

C. $y = \frac{1}{5}x + 7$
$y = 5x - 2$

Atlantic City High School

Cumulative

Final Exams

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Assistant Superintendent of Curriculum and Instruction

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Algebra I Final Exam

____ 1. Is 31 prime or composite?
a. composite b. prime

Find the greatest common factor of the numbers.

____ 2. 26 and 39
a. 26 b. 16 c. 7 d. 13

Find the least common multiple of the set of numbers.

____ 3. 4, 9, and 12
a. 18 b. 432 c. 216 d. 36

Find the value of *x* that completes the statement.

____ 4. $\frac{x}{42} = \frac{6}{7}$
a. 49 b. 36 c. 1 d. 6

Write as a fraction in simplest form.

____ 5. 0.12
a. $\frac{4}{33}$ b. $\frac{1}{10}$ c. $\frac{3}{25}$ d. $\frac{33}{4}$

What is an algebraic expression for the word phrase?

____ 6. 4 times the difference of *q* and *h*
a. $4q - h$ b. $4qh$ c. $4(q - h)$ d. $4 - qh$

What is the simplified form of each expression?

____ 7. $\underline{9(9 + 10) \div (9 - 8)}$
a. 91 b. 74 c. 11 d. 171

____ 8. Evaluate $(ab)^2$ for $a = 6$ and $b = 5$.
a. 625 b. 900 c. 60 d. 150

Simplify each expression.

____ 9. $\frac{4hf}{-5f}$
a. $-\frac{5}{4}h$ c. $-\frac{4}{5}h$
b. $-\frac{5}{4}f$ d. $\frac{4}{5}f$

____ 10. You made two deposits to your bank account this month. One deposit was \$11.19, and the second deposit was \$16.75. Your balance at the end of the month is \$72.31, and you made no withdrawals. Write and evaluate an expression for your balance at the beginning of the month.

a. \$72.31 + (\$11.19 – \$16.75); \$66.75
b. \$72.31 – \$11.19 – \$16.75; \$44.37
c. \$72.31 – (\$11.19 – \$16.75); \$77.87
d. \$72.31 + \$11.19 + \$16.75; \$100.25

What is the simplified form of each expression?

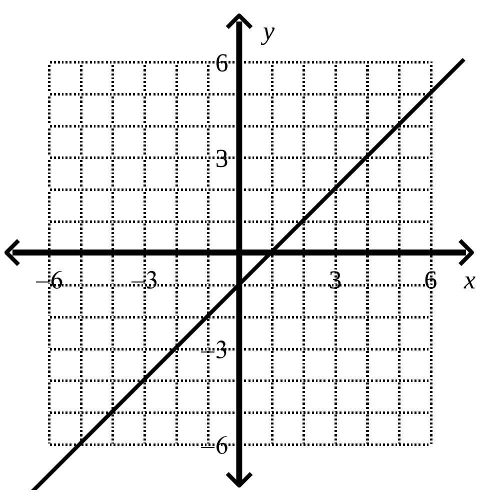
____ 11. $5.7f^2 + 4.9x - 8.5x + 1.3f^2 - 2.2x$

a. $4.4f^2 - 5.8x$
c. $4.4f^2 - 1.4x$
b. $7f^2 - 5.8x$
d. $7f^2 - 1.4x$

____ 12. A souvenir maker wants to create a scale model of the Eiffel Tower. The Eiffel Tower is 324 meters tall and has a base with dimensions 125 meters by 125 meters. The model will rest on a base with dimensions 9.5 cm by 9.5 cm. How tall will the model be in centimeters?

a. 0.246 cm
c. 0.27 cm
b. 27.28 cm
d. 24.62 cm

____ 13. The graph of $y = x - 1$ is shown below. Which ordered pair is NOT a solution of the equation $y = x - 1$?



a. $(1, 0)$
c. $(-2, -3)$
b. $(4, 3)$
d. $(3, 1)$

What is the solution of the equation?

____ 14. $-10(x + 8) = -5(3x + 7)$

a. 10
b. 9
c. –9
d. 8

____ 15. You are shopping for jeans. City Express sells 3 pairs of jeans for \$74. Denim Planet sells 2 pairs of jeans for \$75. New Threads sells 4 pairs of jeans for \$112. Which store has the best deal?

a. All jeans are the same price
c. City Express
b. Denim Planet
d. New Threads

What is the solution of the proportion?

____ 16. $\frac{x-6}{9} = \frac{5}{10}$

a. 24
b. $-\frac{21}{2}$
c. $-\frac{51}{10}$
d. $-\frac{9}{2}$

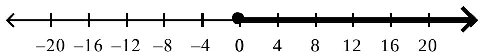
____ 17. A dress that normally costs $76.00 is on sale for 65% off. What is the sale price of the dress?

a. $26.60
c. $49.40
b. $1.17
d. $11.00

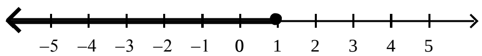
What are the solutions of the inequality? Graph the solutions.

____ 18. $-9x \geq -9$

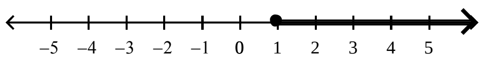
a. $x \geq 0$



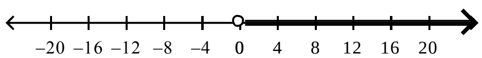
b. $x \leq 1$



c. $x \geq 1$



d. $x > 0$



What are the solutions of the inequality?

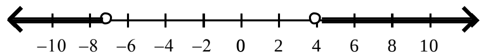
____ 19. $4 + 6a \geq 5(a + 4)$

a. $a \geq 20$
b. $a \geq 24$
c. $a \geq -16$
d. $a \geq 16$

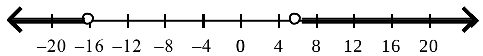
What are the solutions of the compound inequality? Graph the solutions.

____ 20. $2x - 1 < -15$ or $3x + 2 > 11$

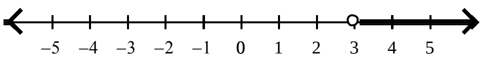
a. $x < -7$ or $x > 4\frac{1}{3}$



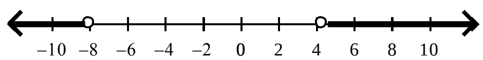
b. $x < -16$ or $x > 6$



c. $x < -7$ or $x > 3$



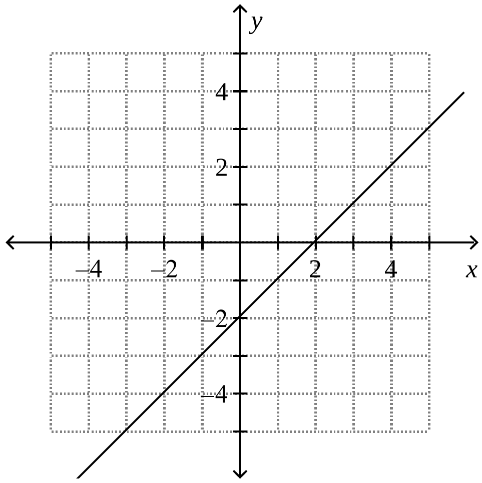
d. $x < -8$ or $x > 4\frac{1}{3}$



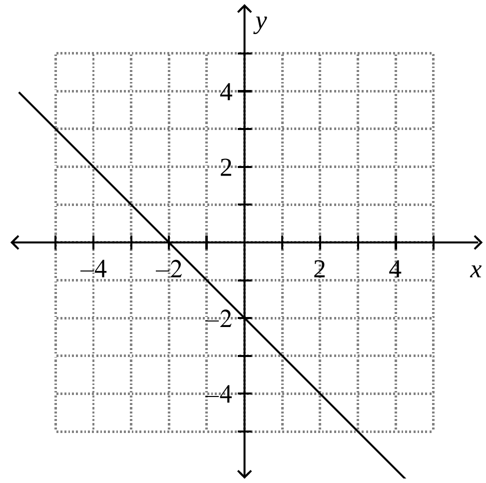
What is the graph of the function rule?

____ 21. $y = x + 2$

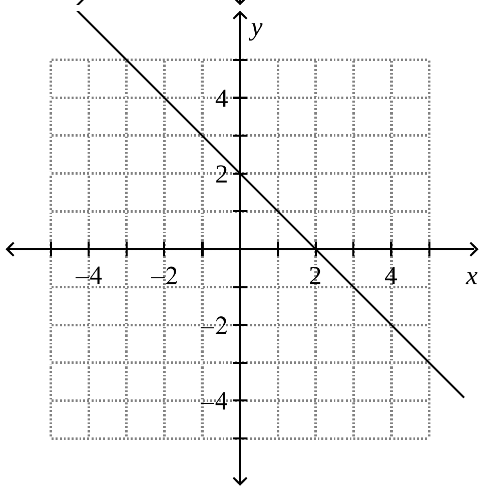
a.



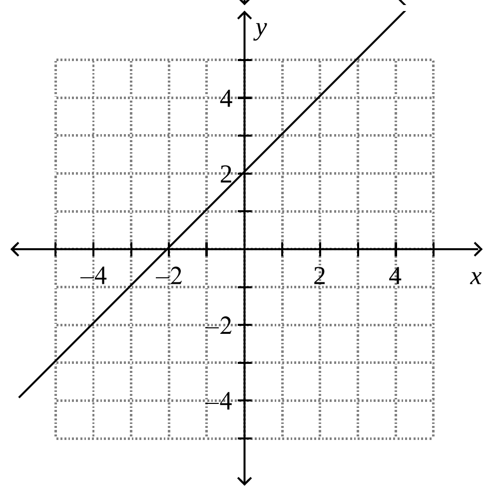
c.



b.

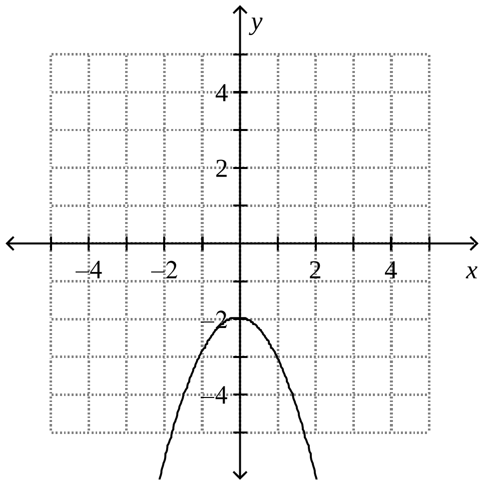


d.

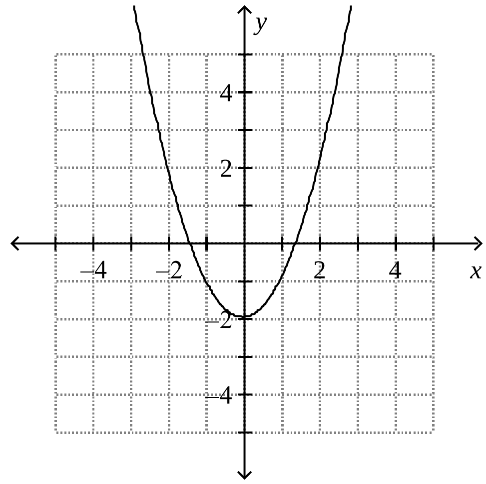


_____ 22. $y = x^2 - 2$

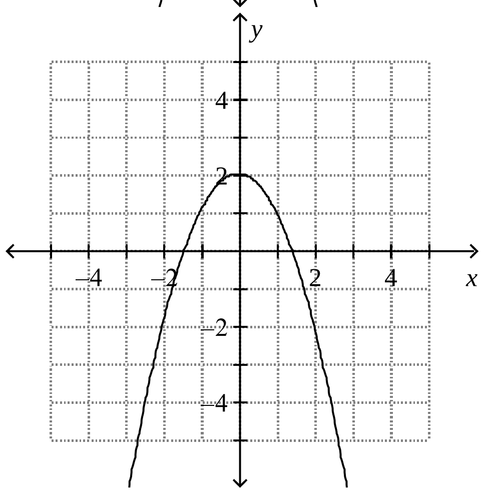
a.



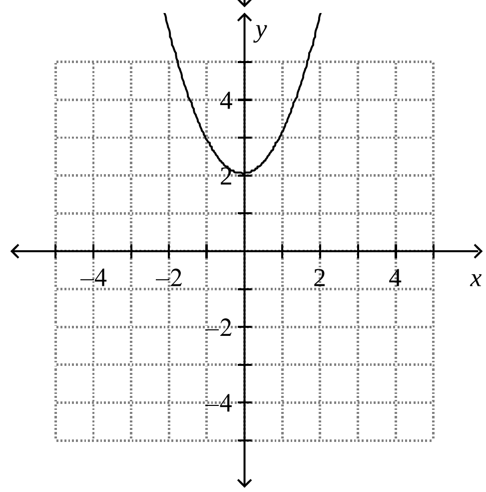
c.



b.



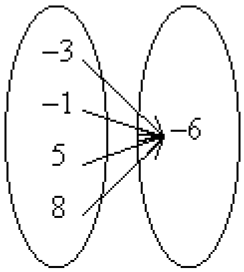
d.



____ 23. Identify the mapping diagram that represents the relation and determine whether the relation is a function.

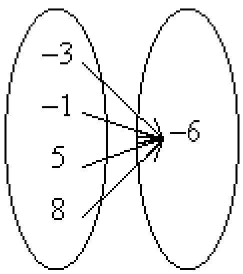
$\{(-3, -6), (-1, -6), (5, -6), (8, -6)\}$

a.



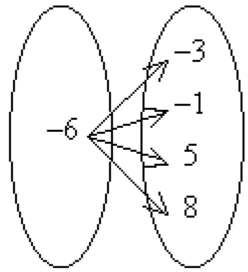
The relation is not a function.

b.



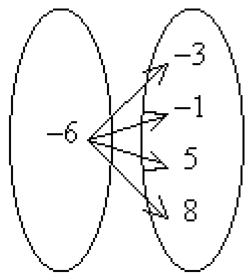
The relation is a function.

c.



The relation is a function.

d.



The relation is not a function.

Describe a pattern in each sequence. What are the next two terms of each sequence?

____ 24. 1, –1, 1, –1, . . .

a. subtract 2 from the previous term; 1, –1
b. multiply the previous term by 1; –1, –1
c. multiply the previous term by –1; 1, –1
d. add –2 to the previous term; 1, 3

What is the slope of the line that passes through the pair of points?

____ 25. (2, 4), (9, 3)

a. –7 b. 7 c. $\frac{1}{7}$ d. $-\frac{1}{7}$

What are the slope and *y*-intercept of the graph of the given equation?

____ 26. *y* = –5*x* – 6

a. The slope is 6 and the *y*-intercept is –5.
b. The slope is 5 and the *y*-intercept is 6.
c. The slope is –5 and the *y*-intercept is –6.
d. The slope is –6 and the *y*-intercept is –5.

____ 27. Kendra owns a restaurant. She charges \$3.00 for 2 eggs and one piece of toast, and \$1.80 for one egg and one piece of toast. How much does Kendra charge for an egg? A piece of toast?

a. \$1.20 per egg; \$.60 for toast
b. \$.60 per egg; \$1.20 for toast
c. \$.60 per egg; \$.60 for toast
d. \$1.20 per egg; \$1.20 for toast

What is the solution of the system? Use substitution.

____ 28. $y = 4x + 6$
$y = 2x$

a. (–3, –6)
b. (6, 3)
c. (1, 2)
d. (3, 6)

____ 29. A corner store sells two kinds of baked goods: cakes and pies. A cake costs \$15 and a pie costs \$7. In one day, the store sold 14 baked goods for a total of \$146. How many cakes did they sell?

a. 6 cakes
b. 7 cakes
c. 4 cakes
d. 8 cakes

Which ordered pair is a solution of the inequality?

____ 30. $y - 2 < x$

a. (5, –6)
b. (5, 7)
c. (0, 8)
d. (1, 14)

What is the simplified form of each expression?

____ 31. $7g^5b^{-6}$

a. $7g^{-5}b^6$
b. $\frac{g^5}{7b^6}$
c. $7gb^{-30}$
d. $\frac{7g^5}{b^6}$

Find the simplified form of the expression. Give your answer in scientific notation.

____ 32. $\left(6 \times 10^2\right)\left(6 \times 10^4\right)$

a. 3.6×10^7
b. 1.2×10^9
c. 1.2×10^7
d. 3.6×10^9

What is the simplified form of the expression?

____ 33. $(m^6)^3$

a. m^{18}
b. m^{216}
c. $2m^{18}$
d. m^9

What is the simplified form of each expression?

____ 34. $(-6a^3b^3)^3(a^7b^5)^3$

a. $-216a^{30}b^{24}$
b. $\frac{a^{30}b^{24}}{-216}$
c. $-216a^{16}b^{14}$
d. $216a^{30}b^{24}$

Simplify the product.

____ 35. $5a^2(3a^4 + 3b + 2)$

a. $8a^4 + 8ab + 5a^2$

b. $15a^8 + 3b + 10a^2$

c. $15a^6 + 15a^2b + 10a^2$

d. $8a^6 + 15a^2b + 5a^2$

Simplify the product using FOIL.

____ 36. $(4x + 7)(2x + 3)$

a. $8x^2 - 26x + 21$

b. $8x^2 + 2x - 21$

c. $8x^2 + 26x + 21$

d. $8x^2 - 2x - 21$

What is the factored form of the following expressions?

____ 37. $w^2 + 18w + 77$

a. $(w - 7)(w + 11)$

b. $(w - 7)(w - 11)$

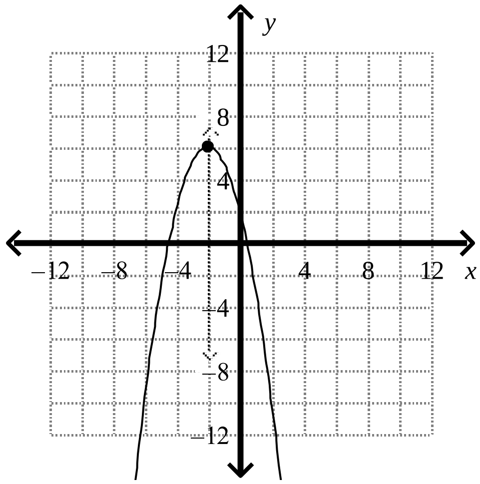
c. $(w + 7)(w + 11)$

d. $(w + 1)(w + 77)$

Graph the function. Identify the vertex and axis of symmetry.

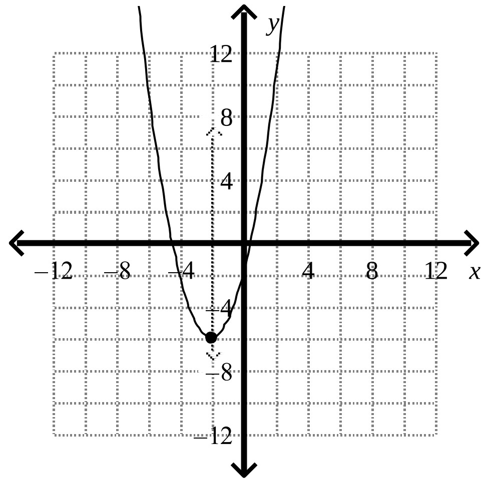
____ 38. $f(x) = -x^2 - 4x + 2$

a.



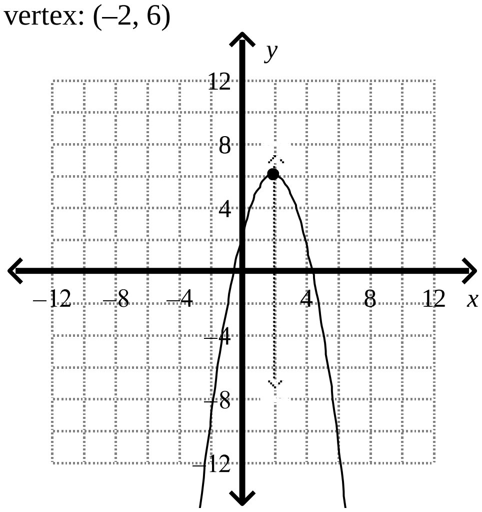
axis of symmetry: $x = -2$
vertex: (–2, 6)

c.



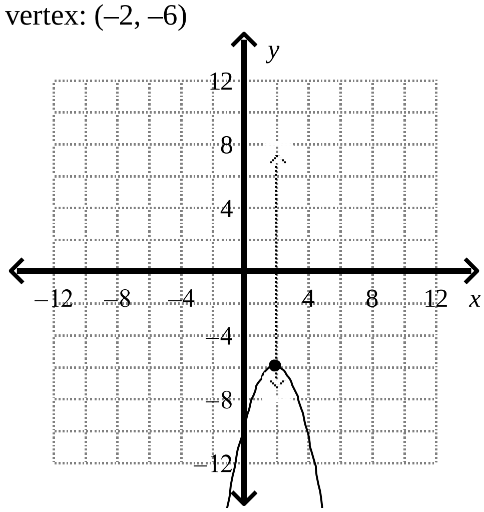
axis of symmetry: $x = -2$
vertex: (–2, –6)

b.



axis of symmetry: $x = 2$
vertex: (2, 6)

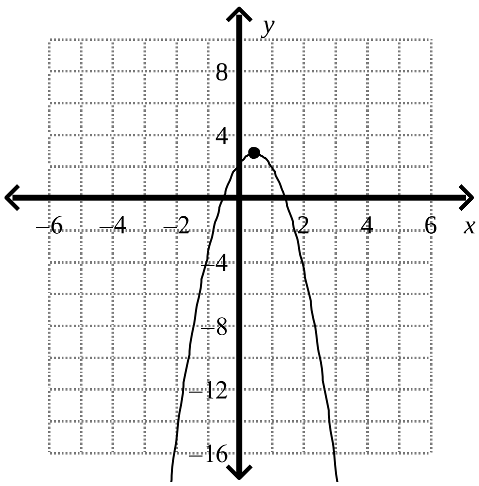
d.



axis of symmetry: $x = 2$
vertex: (2, –6)

____ 39. Do the equation and graph below share a vertex? If so, what is it?

$f(x) = x^2 - 6x + 4$



a. yes, $(\frac{1}{2}, -1\frac{1}{2})$

b. yes, (3, –5)

c. no

d. yes, (1, –1)

Solve the equation using the Zero-Product Property.

____ 40. $(2x + 2)(2x + 10) = 0$

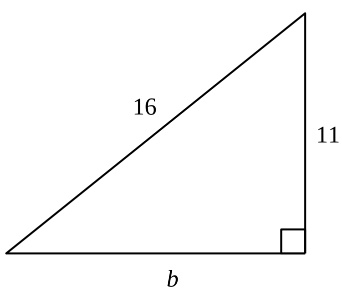
a. 1, –5

b. –1, –5

c. –1, 5

d. –2, 2

____ 41. A slide is 16 ft long. To get to the top of the slide, you use a vertical 11-foot high rung ladder. What is the distance, *b*, from the bottom of the slide to the bottom of the stairs? Round your answer to the nearest tenth.



a. 19.4

b. 13.5

c. 11.6

d. 27.0

Simplify the radical expression.

____ 42. $\sqrt{100x^{10}}$

a. $x\sqrt{50}$

b. $10x^{10}$

c. $10x^{5}$

d. $7\sqrt{3x^{10}}$

Simplify the radical expression.

____ 43. $\sqrt{\dfrac{63x^{15}y^{9}}{7xy^{11}}}$

a. $\dfrac{8x^{7}y^{4}\sqrt{xy}}{\sqrt{7xy^{11}}}$

b. $\dfrac{3x^{7}}{y}$

c. $\dfrac{9x^{7}}{y}$

d. $9x^{7}y$

Simplify the radical expression by rationalizing the denominator.

____ 44. $\dfrac{4}{\sqrt{21}}$

a. $\dfrac{\sqrt{441}}{21}$

b. $\dfrac{4\sqrt{21}}{21}$

c. $21\sqrt{4}$

d. $4\sqrt{21}$

Simplify the expression.

____ 45. $(5+\sqrt{3})(5-\sqrt{3})$

a. $25+\sqrt{3}$

b. $28+10\sqrt{3}$

c. 16

d. 22

Simplify the rational expression. State any excluded values.

____ 46. $\dfrac{x^2+2x-15}{x^2+3x-18}$

a. $\dfrac{x-5}{x-6}$; where $x \neq 6$

b. $\dfrac{x-3}{x-6}$; where $x \neq 6$

c. $\dfrac{x+5}{x-3}$ where $x \neq 3$

d. $\dfrac{x+5}{x+6}$; where $x \neq -6, 3$

Find the sum or difference.

____ 47. $\begin{bmatrix} -9 & -1 & 7 \\ 0 & -4 & 2 \end{bmatrix} - \begin{bmatrix} -2 & 0 & 6 \\ 7 & 5 & -1 \end{bmatrix}$

a. $\begin{bmatrix} -7 & 1 & 1 \\ 7 & -9 & -1 \end{bmatrix}$

b. $\begin{bmatrix} -7 & -1 & 1 \\ 7 & -9 & 1 \end{bmatrix}$

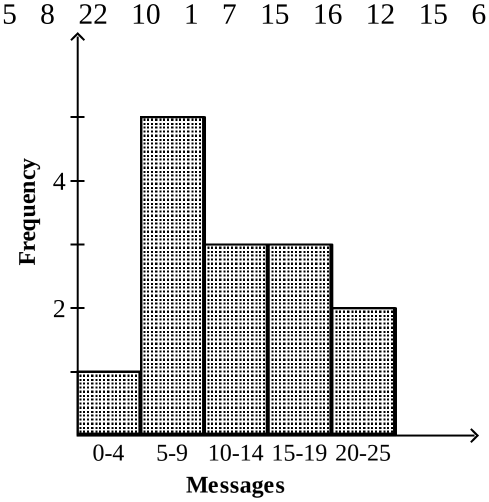
c. $\begin{bmatrix} -7 & 1 & 1 \\ 7 & -9 & 1 \end{bmatrix}$

d. $\begin{bmatrix} -7 & -1 & 1 \\ -7 & -9 & 3 \end{bmatrix}$

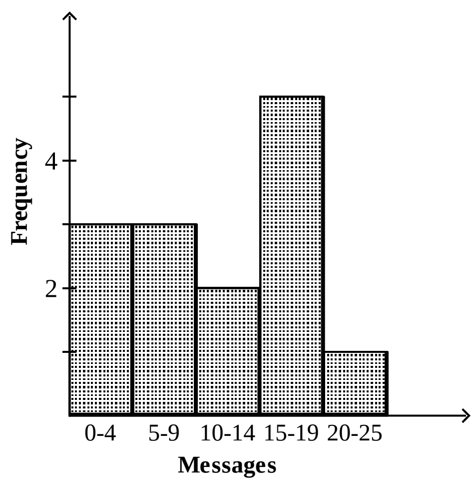
____ 48. The data below shows the average number of text messages a group of students send per day. What is a histogram that represents the data?

20 5 8 22 10 1 7 15 16 12 15 6 13 8

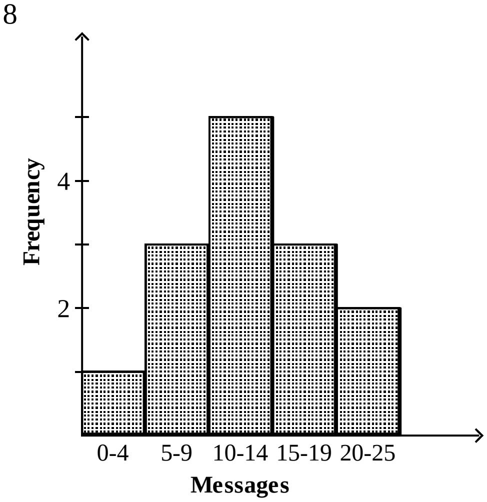
a.



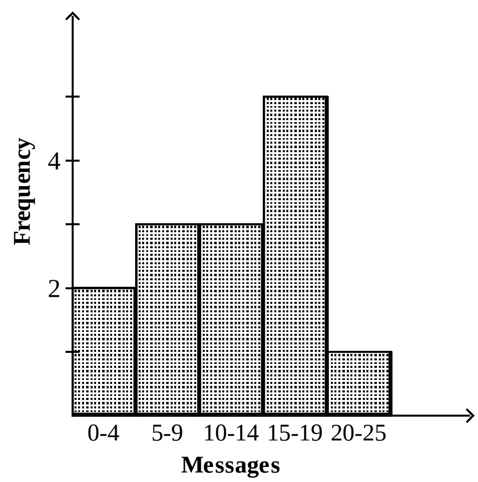
b.



c.

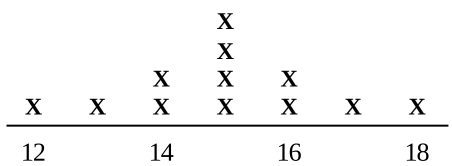


d.



____ 49. The line plot shows the number of hours that a group of students spent studying for the SAT during their first week of preparation. What are the mean, median, mode, and range of their times spent studying?

Hours Studied per Student



a. mean = 12
median = 15
mode = 12
range = 6

b. mean = 12
median = 15
mode = 12
range = 7

c. mean = 15
median = 15
mode = 15
range = 7

d. mean = 15
median = 15
mode = 15
range = 6

____ 50. Suppose you flip a coin and roll a number cube. What is the probability of having tails come up on the coin and an even number on the number cube?

a. $\frac{1}{4}$

b. $\frac{1}{2}$

c. 1

d. $\frac{3}{4}$

Algebra I Final Exam Test
Answer Section

1. ANS: B PTS: 1 DIF: L1
   REF: 0-1 Prime Numbers and Composite Numbers
   OBJ: Prime Numbers and Composite Numbers
   TOP: Skills Handbook: Prime Numbers and Composite Numbers
   KEY: prime numbers | composite numbers
2. ANS: D PTS: 1 DIF: L1 REF: 0-2 Factors and Multiples
   OBJ: Factors and Multiples TOP: Skills Handbook: Factors and Multiples
   KEY: greatest common factor
3. ANS: D PTS: 1 DIF: L1 REF: 0-2 Factors and Multiples
   OBJ: Factors and Multiples TOP: Skills Handbook: Factors and Multiples
   KEY: least common multiple
4. ANS: B PTS: 1 DIF: L2 REF: 0-4 Simplifying Fractions
   OBJ: Simplifying Fractions TOP: Skills Handbook: Simplifying Fractions
   KEY: proportion
5. ANS: C PTS: 1 DIF: L1 REF: 0-5 Fractions and Decimals
   OBJ: Fractions and Decimals TOP: Skills Handbook: Fractions and Decimals
   KEY: convert | terminating decimals | fractions
6. ANS: C PTS: 1 DIF: L3 REF: 1-1 Variables and Expressions
   OBJ: 1-1.1 To write algebraic expressions NAT: CC A.SSE.1.a| A.1.a| A.3.b
   TOP: 1-1 Problem 3 Writing Expressions With Two Operations
   KEY: algebraic expression | variable
7. ANS: D PTS: 1 DIF: L3
   REF: 1-2 Order of Operations and Evaluating Expressions
   OBJ: 1-2.2 To use the order of operations to evaluate expressions
   NAT: CC A.SSE.1.a| N.3.a| N.5.e TOP: 1-2 Problem 2 Simplifying a Numerical Expression
   KEY: power | exponent | base | simplify | evaluate
8. ANS: B PTS: 1 DIF: L3
   REF: 1-2 Order of Operations and Evaluating Expressions
   OBJ: 1-2.2 To use the order of operations to evaluate expressions
   NAT: CC A.SSE.1.a| N.3.a| N.5.e TOP: 1-2 Problem 3 Evaluating Algebraic Expressions
   KEY: power | exponent | base | simplify | evaluate
9. ANS: C PTS: 1 DIF: L3 REF: 1-4 Properties of Real Numbers
   OBJ: 1-4.1 To identify and use properties of real numbers
   NAT: CC N.RN.3| N.1.d| N.3.d| N.5.f| N.6.a| A.3.d
   TOP: 1-4 Problem 3 Writing Equivalent Expressions KEY: equivalent expressions
10. ANS: B PTS: 1 DIF: L4
    REF: 1-5 Adding and Subtracting Real Numbers
    OBJ: 1-5.1 To find sums and differences of real numbers
    NAT: CC N.RN.3| N.1.d| N.3.b| N.3.c| N.3.d| A.3.c
    TOP: 1-5 Problem 4 Adding and Subtracting Real Numbers KEY: opposites | additive inverses
11. ANS: B PTS: 1 DIF: L4 REF: 1-7 The Distributive Property
    OBJ: 1-7.1 To use the Distributive Property to simplify expressions
    NAT: CC A.SSE.1.a| N.1.d| N.3.b| N.3.c| N.3.d| A.3.c
    TOP: 1-7 Problem 5 Combining Like Terms
    KEY: Distributive Property | coefficient | term | like terms
12. ANS: D PTS: 1 DIF: L4 REF: 1-8 An Introduction to Equations

OBJ: 1-8.1 To solve equations using tables and mental math NAT: CC A.CED.1| N.2.b| A.3.b
TOP: 1-8 Problem 3 Writing an Equation KEY: equation | solution of an equation

13. ANS: D PTS: 1 DIF: L3 REF: 1-9 Patterns, Equations, and Graphs
OBJ: 1-9.1 To use tables, equations, and graphs to describe relationships
NAT: CC A.CED.2| CC A.REI.10| A.1.a TOP: 1-9 Problem 2 Using a Table, an Equation, and a Graph
KEY: graphing | equations in two variables

14. ANS: B PTS: 1 DIF: L3
REF: 2-4 Solving Equations With Variables on Both Sides
OBJ: 2-4.1 To solve equations with variables on both sides
NAT: CC A.CED.1| CC A.REI.1| CC A.REI.3| A.4.a| A.4.c
TOP: 2-4 Problem 3 Solving an Equation With Grouping Symbols
KEY: Distributive Property | like terms

15. ANS: C PTS: 1 DIF: L3 REF: 2-6 Ratios, Rates, and Conversions
OBJ: 2-6.1 To find ratios and rates NAT: CC N.Q.1| CC N.Q.2| N.3.b| N.3.f| M.1.i| M.2.b
TOP: 2-6 Problem 1 Comparing Unit Rates KEY: ratio | rate | unit rate

16. ANS: B PTS: 1 DIF: L2 REF: 2-7 Solving Proportions
OBJ: 2-7.1 To solve and apply proportions
NAT: CC N.Q.1| CC A.CED.1| CC A.REI.3| N.3.b| N.3.f| N.4.c
TOP: 2-7 Problem 3 Solving a Multi-Step Proportion
KEY: proportion | cross products | Cross Products Property

17. ANS: A PTS: 1 DIF: L3 REF: 2-9 Percents
OBJ: 2-9.2 To solve percent problems using the percent equation
NAT: CC N.Q.3| N.3.b| N.3.f| N.4.d TOP: 2-9 Problem 3 Finding a Part
KEY: rearrange formula | create an equation | percent

18. ANS: B PTS: 1 DIF: L3
REF: 3-3 Solving Inequalities Using Multiplication or Division
OBJ: 3-3.1 To use multiplication or division to solve inequalities
NAT: CC N.Q.2| CC A.CED.1| CC A.REI.3
TOP: 3-3 Problem 4 Dividing by a Negative Number

19. ANS: D PTS: 1 DIF: L3 REF: 3-4 Solving Multi-Step Inequalities
OBJ: 3-4.1 To solve multi-step inequalities NAT: CC A.CED.1| CC A.REI.3
TOP: 3-4 Problem 4 Solving an Inequality With Variables on Both Sides

20. ANS: C PTS: 1 DIF: L3 REF: 3-6 Compound Inequalities
OBJ: 3-6.2 To solve and graph inequalities containing the word or
NAT: CC A.CED.1| CC A.REI.3
TOP: 3-6 Problem 4 Solving a Compound Inequality Involving Or
KEY: compound inequality

21. ANS: D PTS: 1 DIF: L2 REF: 4-4 Graphing a Function Rule
OBJ: 4-4.1 To graph equations that represent functions
NAT: CC N.Q.1| CC A.REI.10| CC F.IF.5| A.1.b
TOP: 4-4 Problem 1 Graphing a Function Rule KEY: continuous graph

22. ANS: C PTS: 1 DIF: L2 REF: 4-4 Graphing a Function Rule
OBJ: 4-4.1 To graph equations that represent functions
NAT: CC N.Q.1| CC A.REI.10| CC F.IF.5| A.1.b
TOP: 4-4 Problem 4 Graphing Nonlinear Function Rules KEY: continuous graph

23. ANS: B PTS: 1 DIF: L3
REF: 4-6 Formalizing Relations and Functions
OBJ: 4-6.1 To determine whether a relation is a function
NAT: CC F.IF.1| CC F.IF.2| N.2.c| A.1.b| A.1.g| A.1.i| A.3.f
TOP: 4-6 Problem 1 Identifying Functions Using Mapping Diagrams

KEY: relation | domain | range

24. ANS: C PTS: 1 DIF: L3 REF: 4-7 Sequences and Functions
OBJ: 4-7.1 To identify and extend patterns in sequences
NAT: CC A.SSE.1.a| CC A.SSE.1.b| CC F.LE.2| CC F.IF.3| CC F.BF.1.a| CC F.BF.2| CC F.IF.6| CC F.LE.1.b| A.1.b TOP: 4-7 Problem 1 Extending Sequences
KEY: sequence | term of a sequence | arithmetic sequence

25. ANS: D PTS: 1 DIF: L2 REF: 5-1 Rate of Change and Slope
OBJ: 5-1.2 To find slope NAT: CC F.IF.6| CC F.LE.1.b| A.2.a| A.2.b
TOP: 5-1 Problem 3 Finding Slope Using Points KEY: slope

26. ANS: C PTS: 1 DIF: L2 REF: 5-3 Slope-Intercept Form
OBJ: 5-3.1 To write linear equations using slope-intercept form
NAT: CC A.SSE.1.a| CC A.SSE.2| CC A.CED.2| CC F.IF.4| CC F.IF.7.a| CC F.BF.1.a| CC F.BF.3| CC F.LE.2| CC F.LE.5| A.2.a| A.2.b TOP: 5-3 Problem 1 Identifying Slope and y-intercept
KEY: linear equation | y-intercept | slope-intercept form

27. ANS: A PTS: 1 DIF: L4 REF: 6-1 Solving Systems By Graphing
OBJ: 6-1.1 To solve systems of equations by graphing NAT: CC A.REI.6| A.4.d
TOP: 6-1 Problem 2 Writing a System of Equations
KEY: consistent | independent | solution of a system of linear equations | system of linear equations

28. ANS: A PTS: 1 DIF: L2
REF: 6-2 Solving Systems Using Substitution
OBJ: 6-2.1 To solve systems of equations using substitution NAT: CC A.REI.6| A.4.d
TOP: 6-2 Problem 1 Using Substitution
KEY: substitution method | exact solution of a system of linear equations

29. ANS: A PTS: 1 DIF: L3
REF: 6-2 Solving Systems Using Substitution
OBJ: 6-2.1 To solve systems of equations using substitution NAT: CC A.REI.6| A.4.d
TOP: 6-2 Problem 3 Using Systems of Equations KEY: substitution method

30. ANS: A PTS: 1 DIF: L3 REF: 6-5 Linear Inequalities
OBJ: 6-5.1 To graph linear inequalities in two variables NAT: CC A.CED.3| CC A.REI.12| A.4.d
TOP: 6-5 Problem 1 Identifying Solutions of a Linear Inequality
KEY: linear inequality | solution of an inequality

31. ANS: D PTS: 1 DIF: L2 REF: 7-1 Zero and Negative Exponents
OBJ: 7-1.1 To simplify expressions involving zero and negative exponents
NAT: CC N.RN.1| CC N.RN.2| N.1.d| N.3.a| A.3.c| A.3.h
TOP: 7-1 Problem 2 Simplifying Exponential Expressions

32. ANS: A PTS: 1 DIF: L2
REF: 7-2 Multiplying Powers With the Same Base
OBJ: 7-2.1 To multiply powers with the same base
NAT: CC N.RN.1| N.1.d| N.1.f| N.3.a| A.3.c| A.3.h
TOP: 7-2 Problem 3 Multiplying With Scientific Notation

33. ANS: A PTS: 1 DIF: L2
REF: 7-3 More Multiplication Properties of Exponents OBJ: 7-3.1 To raise a power to a power
NAT: CC N.RN.1| N.1.d| N.1.f| N.3.a| A.3.c| A.3.h
TOP: 7-3 Problem 1 Simplifying a Power Raised to a Power

34. ANS: A PTS: 1 DIF: L4
REF: 7-3 More Multiplication Properties of Exponents OBJ: 7-3.2 To raise a product to a power
NAT: CC N.RN.1| N.1.d| N.1.f| N.3.a| A.3.c| A.3.h
TOP: 7-3 Problem 4 Simplifying an Expression With Products

35. ANS: C PTS: 1 DIF: L3 REF: 8-2 Multiplying and Factoring
OBJ: 8-2.1 To multiply a monomial by a polynomial NAT: CC A.APR.1| N.5.c| A.3.c| A.3.e

TOP: 8-2 Problem 1 Multiplying a Monomial and a Trinomial KEY: polynomial | monomial | trinomial

36. ANS: C PTS: 1 DIF: L3 REF: 8-3 Multiplying Binomials
OBJ: 8-3.1 To multiply two binomials or a binomial by a trinomial
NAT: CC A.APR.1| A.3.e TOP: 8-3 Problem 3 Using FOIL
KEY: multiplying binomials

37. ANS: C PTS: 1 DIF: L3 REF: 8-5 Factoring x^2 + bx + c
OBJ: 8-5.1 To factor trinomials of the form x^2 + bx + c NAT: CC A.SSE.1.a| N.5.c
TOP: 8-5 Problem 1 Factoring x^2 + bx + c Where b > 0, c > 0

38. ANS: A PTS: 1 DIF: L3 REF: 9-2 Quadratic Functions
OBJ: 9-2.1 To graph quadratic functions of the form y = ax^2 + bx + c
NAT: CC A.CED.2| CC F.IF.4| CC F.IF.7.a| CC F.IF.9| CC F.BF.3| A.1.e| A.2.a| A.4.a
TOP: 9-2 Problem 1 Graphing y = ax^2 + bx + c KEY: vertex | axis of symmetry

39. ANS: C PTS: 1 DIF: L3 REF: 9-2 Quadratic Functions
OBJ: 9-2.1 To graph quadratic functions of the form y = ax^2 + bx + c
NAT: CC A.CED.2| CC F.IF.4| CC F.IF.7.a| CC F.IF.9| CC F.BF.3| A.1.e| A.2.a| A.4.a
TOP: 9-2 Problem 1 Graphing y = ax^2 + bx + c
KEY: vertex | compare properties of two functions

40. ANS: B PTS: 1 DIF: L3
REF: 9-4 Factoring to Solve Quadratic Equations
OBJ: 9-4.1 To solve quadratic equations by factoring
NAT: CC A.SSE.3.a| CC A.CED.1| CC A.REI.4.b| CC F.IF.8.a| N.5.c| A.4.a
TOP: 9-4 Problem 1 Using the Zero-Product Property KEY: Zero-Product Property

41. ANS: C PTS: 1 DIF: L3 REF: 10-1 The Pythagorean Theorem
OBJ: 10-1.1 To solve problems using the Pythagorean Theorem
NAT: CC G.SRT.8| M.2.a| G.3.b| G.3.c| G.3.d| G.4.d
TOP: 10-1 Problem 2 Finding the Length of a Leg
KEY: Pythagorean Theorem | leg | right triangles in applied problems

42. ANS: C PTS: 1 DIF: L2 REF: 10-2 Simplifying Radicals
OBJ: 10-2.1 To simplify radicals involving products and quotients
NAT: CC A.REI.2| A.3.e TOP: 10-2 Problem 2 Removing Variable Factors
KEY: radical expression

43. ANS: B PTS: 1 DIF: L4 REF: 10-2 Simplifying Radicals
OBJ: 10-2.1 To simplify radicals involving products and quotients
NAT: CC A.REI.2| A.3.e TOP: 10-2 Problem 5 Simplifying Fractions Within Radicals
KEY: radical expression

44. ANS: B PTS: 1 DIF: L2 REF: 10-2 Simplifying Radicals
OBJ: 10-2.1 To simplify radicals involving products and quotients
NAT: CC A.REI.2| A.3.e TOP: 10-2 Problem 6 Rationalizing Denominators
KEY: radical expression | rationalize the denominator

45. ANS: D PTS: 1 DIF: L3
REF: 10-3 Operations With Radical Expressions
OBJ: 10-3.2 To simplify products and quotients of radical expressions
NAT: CC A.REI.2| A.3.e TOP: 10-3 Problem 3 Multiplying Radical Expressions
KEY: radical expression

46. ANS: D PTS: 1 DIF: L4
REF: 11-1 Simplifying Rational Expressions
OBJ: 11-1.1 To simplify rational expressions NAT: CC A.APR.7 | A.3.e
TOP: 11-1 Problem 2 Simplifying a Rational Expression Containing a Trinomial
KEY: rational expression | excluded value

47. ANS: D PTS: 1 DIF: L3

REF: 12-1 Organizing Data Using Matrices
OBJ: 12-1.2 To add and subtract matrices and multiply a matrix by a scalar
NAT: CC N.VM.6| D.1.c   TOP: 12-1 Problem 1 Adding and Subtracting Matrices
KEY: matrix

48. ANS: A   PTS: 1   DIF: L3   REF: 12-2 Frequency and Histograms
OBJ: 12-2.1 To make and interpret frequency tables and histograms
NAT: CC N.Q.1| CC S.ID.1| D.1.a| D.1.b| D.1.c
TOP: 12-2 Problem 2 Making a Histogram
KEY: histogram | frequency | frequency table

49. ANS: D   PTS: 1   DIF: L3
REF: 12-3 Measures of Central Tendency and Dispersion
OBJ: 12-3.1 To find mean, median, mode, and range
NAT: CC N.Q.2| CC S.ID.2| CC S.ID.3| D.1.a| D.1.c| D.2.a| D.2.b| D.2.c
TOP: 12-3 Problem 4 Finding Measures of Central Tendency and Range
KEY: mean | median | mode | range

50. ANS: A   PTS: 1   DIF: L2
REF: 12-8 Probability of Compound Events
OBJ: 12-8.1 To find probabilities of mutually exclusive and overlapping events
NAT: CC S.CP.7| CC S.CP.8| D.4.a| D.4.c| D.4.h| D.4.j
TOP: 12-8 Problem 2 Finding the Probability of Independent Events
KEY: independent events

DO NOT WRITE ON TEST

Geometry Final Exam

____ 1. Joey's sock drawer is unorganized and contains 2 black dress socks, 4 black ankle socks, 2 brown dress socks, and 3 brown ankle socks. What is the probability that Joey chooses a sock at random that is brown or is a dress sock?

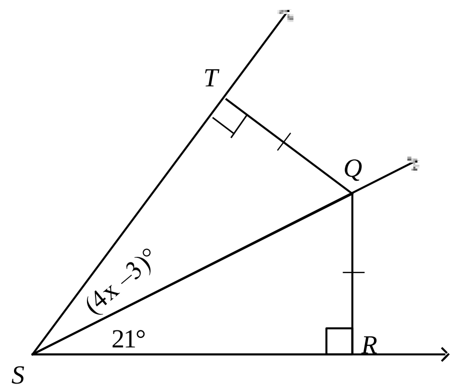
A. $\frac{9}{11}$

B. 1, or 100%

C. $\frac{7}{11}$

D. $\frac{2}{11}$

____ 2. *Q* is equidistant from the sides of $\angle TSR$. Find the value of *x*. The diagram is not to scale.



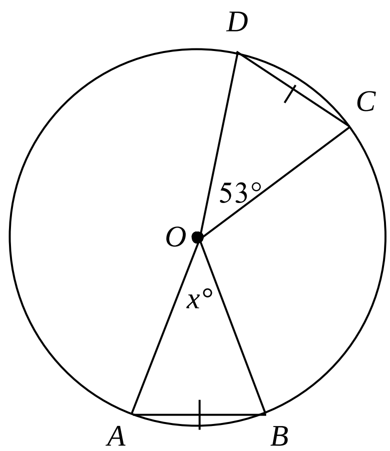
A. 21 B. 10 C. 4.5 D. 6

____ 3. Write this statement as a conditional in *if-then* form:
All triangles have three sides.

A. If a triangle has three sides, then all triangles have three sides.
B. If a figure has three sides, then it is not a triangle.
C. If a figure is a triangle, then all triangles have three sides.
D. If a figure is a triangle, then it has three sides.

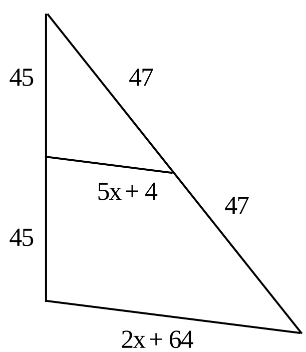
Find the value of *x*. If necessary, round your answer to the nearest tenth. *O* is the center of the circle. The figure is not drawn to scale.

____ 4.



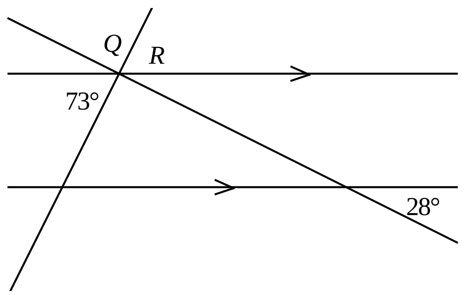
A. 37 B. 74 C. 53 D. 26.5

____ 5. Find the length of the midsegment. The diagram is not to scale.



A. 78 B. 20 C. 39 D. 33

____ 6. Find $m\angle Q$. The diagram is not to scale.



A. 107 B. 79 C. 89 D. 101

____ 7. Where is the circumcenter of any given triangle?

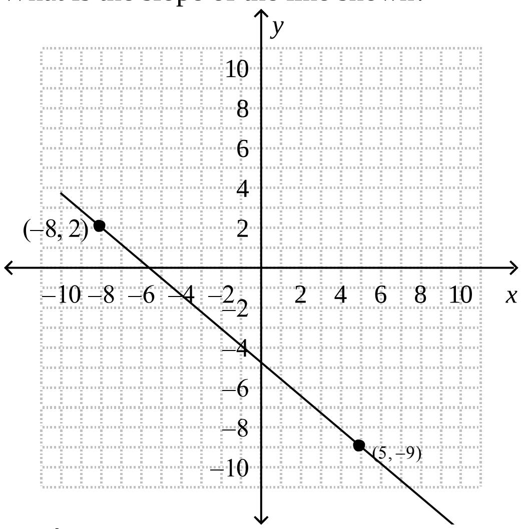
A. the point of concurrency of the altitudes of the triangle
B. the point of concurrency of the perpendicular bisectors of the sides of the triangle
C. the point of concurrency of the bisectors of the angles of the triangle
D. the point of concurrency of the medians of the triangle

____ 8. Find the missing value to the nearest hundredth.

$$\sin \square = \frac{7}{39}$$

A. 10.34° B. 10.18° C. 60.83° D. 79.66°

____ 9. What is the slope of the line shown?



A. $-\frac{11}{13}$

B. $\frac{13}{11}$

C. $\frac{11}{13}$

D. $-\frac{13}{11}$

Simplify.

____ 10. $\left(\frac{7}{3}\right)^2$

A. $\frac{49}{9}$ B. $\frac{49}{3}$ C. $\frac{14}{3}$ D. $\frac{7}{3}$

____ 11. The widths of two similar rectangles are 4 m and 6 m. What is the ratio of the perimeters? Of the areas?

A. 2 : 3 and 9 : 16

B. 2 : 3 and 4 : 9

C. 3 : 4 and 4 : 9

D. 3 : 4 and 9 : 16

____ 12. Which type of isometry is the equivalent of two reflections across intersecting lines?

A. glide reflection

B. rotation

C. reflection

D. none of these

____ 13. What is the negation of this statement?
Miguel has three cats.

A. Miguel does not like cats.

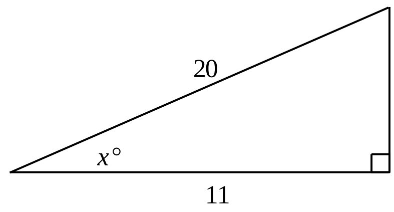
B. The cat has three owners.

C. Miguel does not have three cats.

D. Miguel has no cats.

Find the value of *x*. Round to the nearest degree.

____ 14.



Not drawn to scale

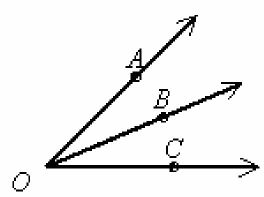
A. 57 B. 33 C. 29 D. 55

Solve the equation.

____ 15. $3(y + 2) = 15$

A. 3 B. 2 C. –7 D. 7

____ 16. If $m\angle AOC = 73°$, $m\angle BOC = 2x + 10$, and $m\angle AOB = 4x - 15$, find the degree measure of $\angle BOC$ and $\angle AOB$. The diagram is not to scale.



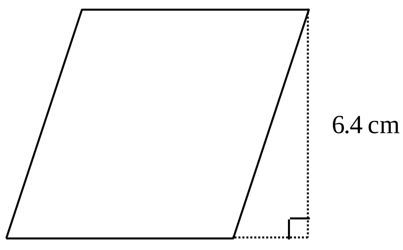
A. $m\angle BOC = 37°$; $m\angle AOB = 36°$
B. $m\angle BOC = 36°$; $m\angle AOB = 37°$
C. $m\angle BOC = 26°$; $m\angle AOB = 47°$
D. $m\angle BOC = 47°$; $m\angle AOB = 26°$

____ 17. Is the statement a good definition? If not, find a counterexample.
A square is a figure with two pairs of parallel sides and four right angles.

A. The statement is a good definition.
B. No; a rhombus is a counterexample.
C. No; a rectangle is a counterexample.
D. No; a parallelogram is a counterexample.

Find the area. The figure is not drawn to scale.

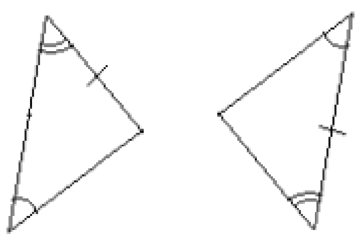
____ 18.



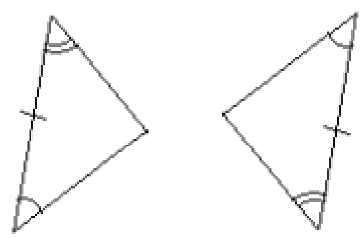
A. $1.6\ cm^2$ B. $30.72\ cm^2$ C. $61.44\ cm^2$ D. $11.2\ cm^2$

____ 19. Which pair of triangles is congruent by ASA?

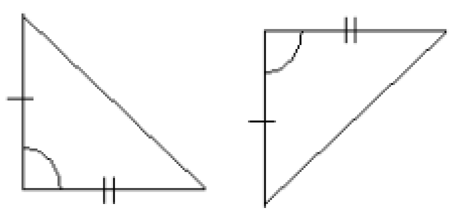
A.



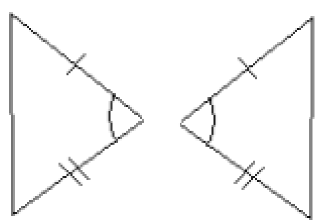
C.



B.



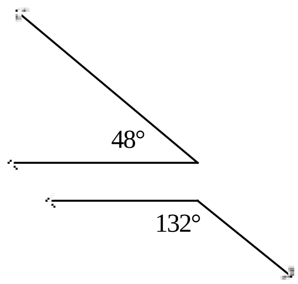
D.



____ 20. Which statement is true?

A. All parallelograms are rectangles.
B. All quadrilaterals are rectangles.
C. All rectangles are squares.
D. All squares are rectangles.

_____ 21. How are the two angles related?



Drawing not to scale

A. complementary
B. supplementary
C. vertical
D. adjacent

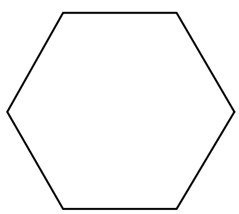
_____ 22. Twice a number plus –4 is 24. What is the number?

A. 20 B. 16 C. 14 D. 10

_____ 23. Suppose Ruth Ann has 3 routes she can choose from to get from school to the library, and 5 routes from the library to her home. How many routes are there from Ruth Ann's school to her home with a stop at the library?

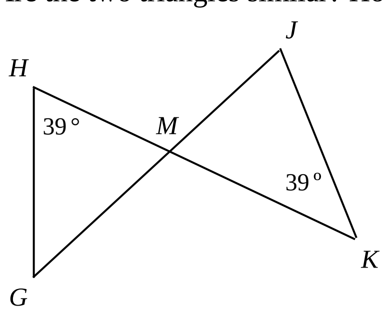
A. 60 B. 15 C. 9 D. 25

_____ 24. Find the sum of the measures of the angles of the figure.



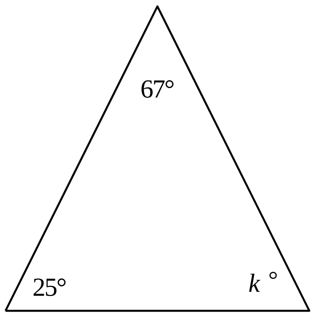
A. 900 B. 720 C. 1080 D. 1440

_____ 25. Are the two triangles similar? How do you know?



A. yes, by AA~ B. yes, by SAS~ C. no D. yes, by SSS~

____ 26. Find the value of *k*. The diagram is not to scale.



A. 92 B. 113 C. 42 D. 88

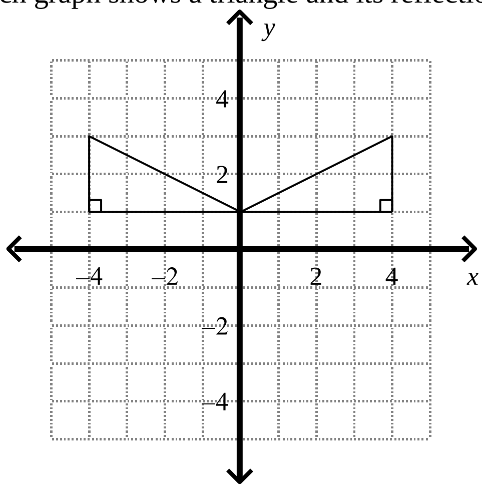
What is the solution of each proportion?

____ 27. $\frac{n-6}{3n} = \frac{n-5}{3n+1}$

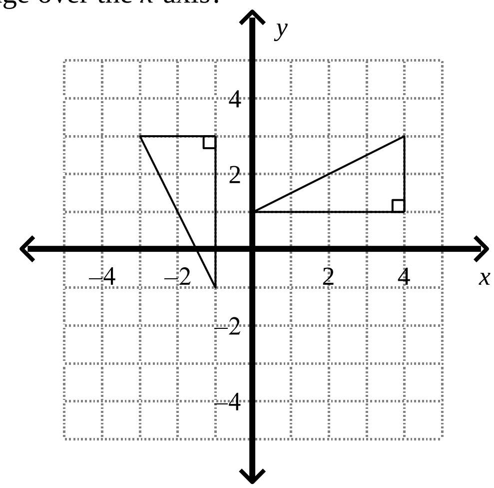
A. –3 B. $\frac{2}{5}$ C. $\frac{9}{17}$ D. 3

____ 28. Which graph shows a triangle and its reflection image over the *x*-axis?

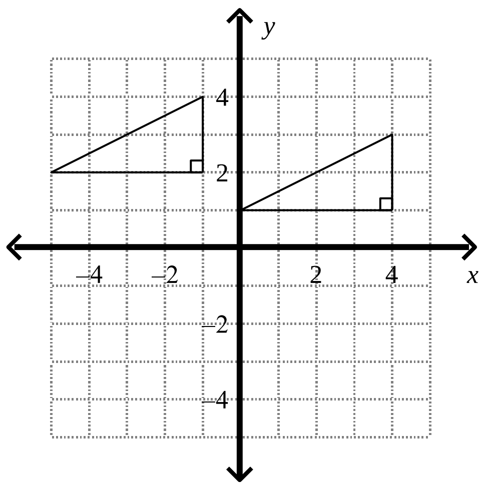
A.



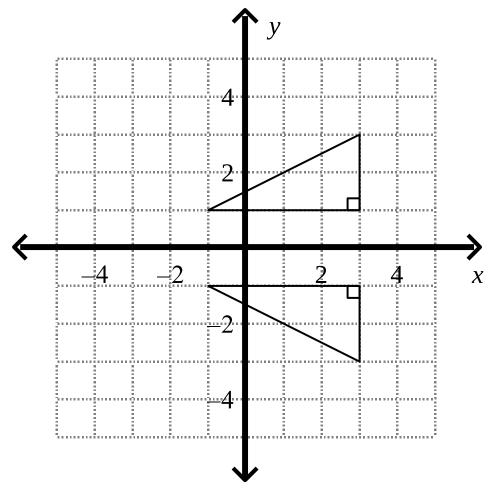
C.



B.



D.



Solve. Round to the nearest tenth if necessary.

____ 29. $6^2 + 8^2 = x^2$

A. ± 48 B. ± 28 C. ± 10 D. ± 100

____ 30. $\sqrt{50}$

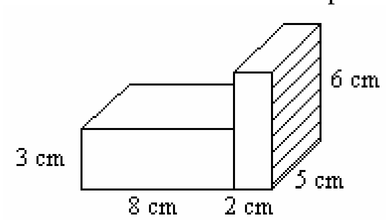
A. 5 B. 10 C. 7 D. 7.1

Express each ratio in simplest form.

____ 31. 49 to 70

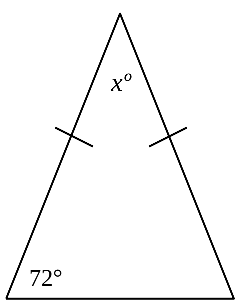
A. 14 to 25 B. 25 to 14 C. 10 to 7 D. 7 to 10

____ 32. Find the volume of the composite space figure to the nearest whole number.



A. 170 cm^3 B. 180 cm^3 C. 120 cm^3 D. 60 cm^3

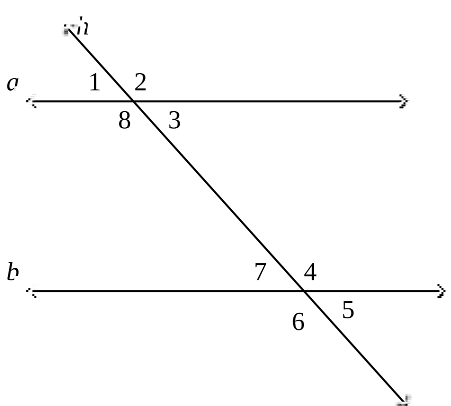
____ 33. What is the value of *x*?



Drawing not to scale

A. 36° B. 144° C. 108° D. 54°

Use the diagram to find the following.



____ 34. Identify a pair of same-side interior angles.

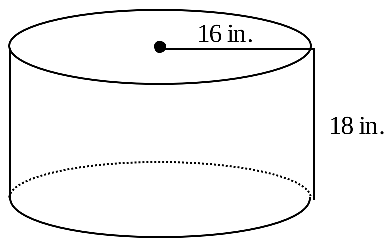
A. $\angle 3$ and $\angle 5$
B. $\angle 3$ and $\angle 4$
C. $\angle 1$ and $\angle 6$
D. $\angle 1$ and $\angle 7$

____ 35. The measure of two complementary angles are in the ratio 1 : 5. What are the degree measures of the two angles?

A. 18° and 72°
B. 30° and 150°
C. 36° and 144°
D. 15° and 75°

____ 36. What is 73% of 32? Estimate the answer.
A. about 21
B. about 30
C. about 24
D. about 27

____ 37. Find the surface area of the cylinder to the nearest whole number.



Not drawn to scale

A. 3418 in.^{2}
B. 1810 in.^{2}
C. 5887 in.^{2}
D. 12120 in.^{2}

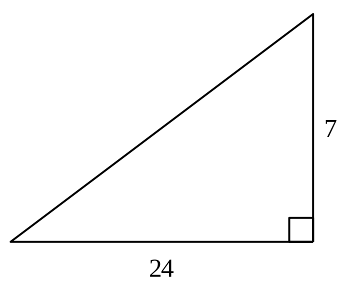
____ 38. A customer went to a garden shop and bought some potting soil for $15.00 and 9 shrubs. The total bill was $91.50. Write and solve an equation to find the price of each shrub.
A. $9p + \$15.00 = \$91.50$; $p = \$11.25$
B. $9(p + \$15.00) = \$91.50$; $p = \$6.00$
C. $9p + 15p = \$91.50$; $p = \$3.81$
D. $9p + \$15.00 = \$91.50$; $p = \$8.50$

____ 39. If $EF = 10x + 10$, $FG = 37$, and $EG = 97$, find the value of x. The drawing is not to scale.

A. $x = 5$
B. $x = 50$
C. $x = 7$
D. $x = 3$

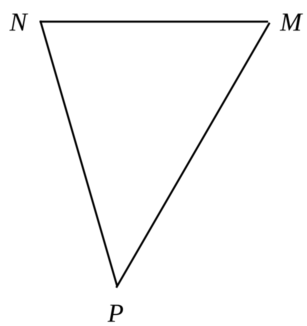
Find the length of the missing side. The triangle is not drawn to scale.

____ 40.



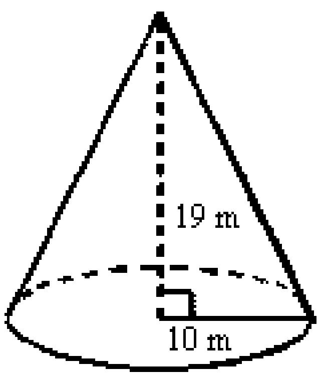
A. 625
B. 25
C. 62
D. 168

_____ 41. Name the angle included by the sides $\overline{PN}$ and $\overline{NM}$.



A. $\angle N$ B. $\angle P$ C. $\angle M$ D. none of these

_____ 42. Find the slant height of the cone to the nearest whole number.



Not drawn to scale

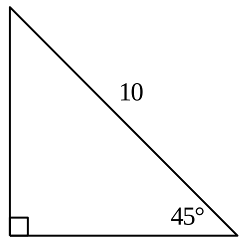
A. 22 m B. 17 m C. 19 m D. 16 m

Simplify the expression.

_____ 43. $-2x - 4x + 1 + 3$

A. $-6x + 4$ B. $-6x - 2$ C. $2x + 4$ D. $2x - 2$

____ 44. Find the length of the leg. If your answer is not an integer, leave it in simplest radical form.



Not drawn to scale

A. $\sqrt{5}$ B. 50 C. 10 D. $5\sqrt{2}$

____ 45. Describe in words the translation of *X* represented by the translation rule $T_{\langle 7,-5\rangle}(X)$.

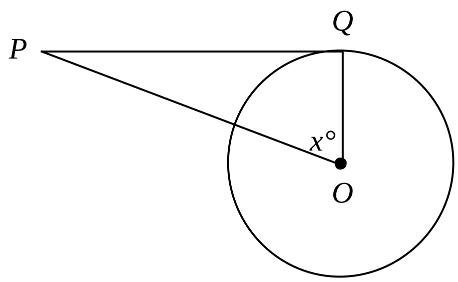
A. 7 units to the left and 5 units up
B. 7 units to the left and 5 units down
C. 7 units to the right and 5 units down
D. 5 units to the right and 7 units up

____ 46. Based on the pattern, what are the next two terms of the sequence?
6, 11, 16, 21, . . .

A. 26, 31 B. 31, 36 C. 105, 525 D. 26, 525

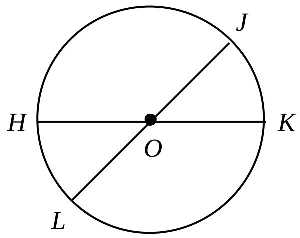
Assume that lines that appear to be tangent are tangent. *O* is the center of the circle. Find the value of *x*. (Figures are not drawn to scale.)

____ 47. $m\angle P = 21$



A. 111 B. 69 C. 42 D. 34.5

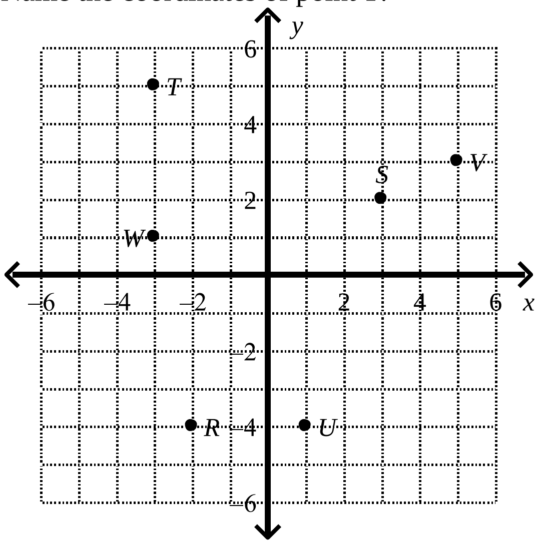
____ 48. What are the minor arcs of $\odot O$?



A. $\overset{\frown}{HJ}$ and $\overset{\frown}{KL}$
B. $\overset{\frown}{HJ}$, $\overset{\frown}{HK}$, $\overset{\frown}{JK}$, $\overset{\frown}{JL}$, $\overset{\frown}{KL}$, and $\overset{\frown}{LH}$
C. $\overset{\frown}{JK}$ and $\overset{\frown}{LH}$
D. $\overset{\frown}{HJ}$, $\overset{\frown}{JK}$, $\overset{\frown}{KL}$, and $\overset{\frown}{LH}$

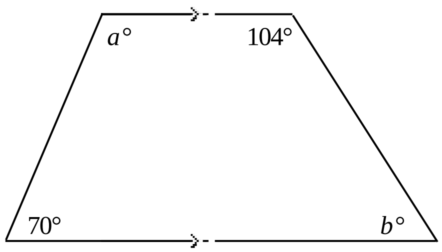
Solve the equation.

____ 49. Name the coordinates of point T.



A. $(5, -3)$ B. $(-3, -5)$ C. $(3, 5)$ D. $(-3, 5)$

____ 50. Find the values of a and b. The diagram is not to scale.



A. $a = 104,\ b = 76$
B. $a = 110,\ b = 70$
C. $a = 104,\ b = 70$
D. $a = 110,\ b = 76$

2014-2015 Geometry Final Exam
Answer Section

1. ANS: C PTS: 1 DIF: L2 REF: 13-4 Compound Probability
OBJ: 13-4.2 To find compound probabilities NAT: CC S.CP.7| CC S.CP.8| CC S.CP.9
TOP: 13-4 Problem 4 Finding the Probabilities of Overlapping Events
KEY: probability | overlapping events
2. ANS: D PTS: 1 DIF: L2
REF: 5-2 Perpendicular and Angle Bisectors
OBJ: 5-2.1 To use properties of perpendicular bisectors and angle bisectors
NAT: CC G.CO.9| CC G.CO.12| CC G.SRT.5| G.3.c
TOP: 5-2 Problem 3 Using the Angle Bisector Theorem
KEY: angle bisector | Converse of the Angle Bisector Theorem
3. ANS: D PTS: 1 DIF: L2 REF: 2-2 Conditional Statements
OBJ: 2-2.1 To recognize conditional statements and their parts
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.a
TOP: 2-2 Problem 2 Writing a Conditional
KEY: hypothesis | conclusion | conditional statement
4. ANS: C PTS: 1 DIF: L2 REF: 12-2 Chords and Arcs
OBJ: 12-2.1 To use congruent chords, arcs, and central angles NAT: CC G.C.2| G.3.h
TOP: 12-2 Problem 4 Finding Measures in a Circle
KEY: arc | central angle | congruent arcs | chord
5. ANS: C PTS: 1 DIF: L4 REF: 5-1 Midsegments of Triangles
OBJ: 5-1.1 To use properties of midsegments to solve problems
NAT: CC G.CO.10| CC G.SRT.5| G.3.c TOP: 5-1 Problem 2 Finding Lengths
KEY: midsegment | Triangle Midsegment Theorem
6. ANS: B PTS: 1 DIF: L4 REF: 3-2 Properties of Parallel Lines
OBJ: 3-2.2 To use properties of parallel lines to find angle measures
NAT: CC G.CO.9| M.1.d| G.3.g TOP: 3-2 Problem 3 Finding Measures of Angles
KEY: angle | parallel lines | transversal
7. ANS: B PTS: 1 DIF: L2 REF: 5-3 Bisectors in Triangles
OBJ: 5-3.1 To identify properties of perpendicular bisectors and angle bisectors
NAT: CC G.C.3| G.3.c TOP: 5-3 Problem 1 Finding the Circumcenter of a Triangle
KEY: point of concurrency | concurrent | circumcenter of the triangle
8. ANS: A PTS: 1 DIF: L3 REF: 8-3 Trigonometry
OBJ: 8-3.1 To use the sine, cosine, and tangent ratios to determine side lengths and angle measures in right triangles NAT: CC G.SRT.7| CC G.SRT.8| CC G.MG.1
TOP: 8-3 Problem 3 Using Inverses KEY: sine
9. ANS: A PTS: 1 DIF: L3
REF: 3-7 Equations of Lines in the Coordinate Plane
OBJ: 3-7.1 To graph and write linear equations NAT: CC G.GPE.5| G.3.g| G.4.a| G.4.d
TOP: 3-7 Problem 1 Finding Slopes of Lines KEY: slope | linear graph | graph of line
10. ANS: A PTS: 1 DIF: L2
REF: 0-6 Squaring Numbers and Finding Square Roots
OBJ: Squaring Numbers and Finding Square Roots
TOP: Skills Handbook: Squaring Numbers and Finding Square Roots
KEY: squaring numbers | rational numbers
11. ANS: B PTS: 1 DIF: L3
REF: 10-4 Perimeters and Areas of Similar Figures

OBJ: 10-4.1 To find the perimeters and areas of similar polygons
NAT: CC G.GMD.3| N.3.c| N.3.f| M.1.c| M.1.f| A.4.e
TOP: 10-4 Problem 1 Finding Ratios in Similar Figures KEY: perimeter | area | similar figures

12. ANS: B PTS: 1 DIF: L2 REF: 9-4 Compositions of Isometries
OBJ: 9-4.2 To classify isometries NAT: CC G.CO.2| CC G.CO.5| CC G.CO.6| G.2.d| G.2.g
TOP: 9-4 Problem 2 Reflections Across Intersecting Lines KEY: isometry

13. ANS: C PTS: 1 DIF: L3 REF: 5-5 Indirect Proof
OBJ: 5-5.1 To use indirect reasoning to write proofs NAT: CC G.CO.10| G.3.c| G.5.c
TOP: 5-5 Problem 1 Writing the First Step of an Indirect Proof KEY: negation

14. ANS: A PTS: 1 DIF: L3 REF: 8-3 Trigonometry
OBJ: 8-3.1 To use the sine, cosine, and tangent ratios to determine side lengths and angle measures in right triangles NAT: CC G.SRT.7| CC G.SRT.8| CC G.MG.1
TOP: 8-3 Problem 3 Using Inverses KEY: cosine

15. ANS: A PTS: 1 DIF: L2
REF: 0-11 Solving and Writing Linear Equations
OBJ: Solving and Writing Linear Equations
TOP: Skills Handbook: Solving and Writing Linear Equations KEY: solving linear equations

16. ANS: B PTS: 1 DIF: L3 REF: 1-4 Measuring Angles
OBJ: 1-4.1 To find and compare the measures of angles NAT: CC G.CO.1| M.1.d| G.3.b
TOP: 1-4 Problem 4 Using the Angle Addition Postulate KEY: Angle Addition Postulate

17. ANS: C PTS: 1 DIF: L3 REF: 2-3 Biconditionals and Definitions
OBJ: 2-3.1 To write biconditionals and recognize good definitions
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.1.c
TOP: 2-3 Problem 4 Identifying Good Definitions
KEY: biconditional statement | counterexample

18. ANS: B PTS: 1 DIF: L3
REF: 10-1 Areas of Parallelograms and Triangles
OBJ: 10-1.1 To find the area of parallelograms and triangles
NAT: CC G.GPE.7| CC G.MG.1| N.3.c| N.3.f| M.1.c| M.1.f| A.4.e
TOP: 10-1 Problem 1 Finding the Area of a Parallelogram KEY: area | parallelogram | base | height

19. ANS: C PTS: 1 DIF: L2
REF: 4-3 Triangle Congruence by ASA and AAS
OBJ: 4-3.1 To prove two triangles congruent using the ASA Postulate and the AAS theorem
NAT: CC G.SRT.5| G.2.e| G.3.e| G.5.e TOP: 4-3 Problem 1 Using ASA
KEY: ASA

20. ANS: D PTS: 1 DIF: L2
REF: 6-4 Properties of Rhombuses, Rectangles, and Squares
OBJ: 6-4.1 To define and classify special types of parallelograms
NAT: CC G.CO.11| CC G.SRT.5| G.1.c| G.3.f
TOP: 6-4 Problem 1 Classifying Special Parallelograms
KEY: reasoning | parallelogram | quadrilateral | rectangle | rhombus | special quadrilaterals

21. ANS: B PTS: 1 DIF: L2 REF: 1-5 Exploring Angle Pairs
OBJ: 1-5.1 To identify special angle pairs and use their relationships to find angle measures
NAT: CC G.CO.1| M.1.d| G.3.b TOP: 1-5 Problem 1 Identifying Angle Pairs
KEY: supplementary angles

22. ANS: C PTS: 1 DIF: L1
REF: 0-11 Solving and Writing Linear Equations
OBJ: Solving and Writing Linear Equations
TOP: Skills Handbook: Solving and Writing Linear Equations
KEY: solving linear equations | writing linear equations | word problem

23. ANS: B PTS: 1 DIF: L3
REF: 13-3 Permutations and Combinations
OBJ: 13-3.1 To use permutations and combinations to solve problems
NAT: CC S.CP.9 TOP: 13-3 Problem 1 Using the Fundamental Counting Principle
KEY: Fundamental Counting Principle

24. ANS: B PTS: 1 DIF: L2
REF: 6-1 The Polygon Angle-Sum Theorems
OBJ: 6-1.1 To find the sum of the measures of the interior angles of a polygon
NAT: CC G.SRT.5| M.1.d| G.3.f TOP: 6-1 Problem 1 Finding a Polygon Angle Sum
KEY: Polygon Angle-Sum Theorem

25. ANS: A PTS: 1 DIF: L2 REF: 7-3 Proving Triangles Similar
OBJ: 7-3.1 To use the AA Postulate and the SAS and SSS theorems
NAT: CC G.SRT.5| CC G.GPE.5| G.2.e| G.3.e| G.5.e
TOP: 7-3 Problem 1 Using the AA Postulate
KEY: Angle-Angle Similarity Postulate | Side-Side-Side Similarity Theorem | Side-Angle-Side Similarity Theorem

26. ANS: D PTS: 1 DIF: L2 REF: 3-5 Parallel Lines and Triangles
OBJ: 3-5.2 To find measures of angles of triangles NAT: CC G.CO.10| M.1.d| G.3.g
TOP: 3-5 Problem 1 Using the Triangle Angle-Sum Theorem KEY: triangle | sum of angles of a triangle

27. ANS: A PTS: 1 DIF: L4 REF: 7-1 Ratios and Proportions
OBJ: 7-1.1 To write ratios and solve proportions NAT: CC G.SRT.5| N.4.c
TOP: 7-1 Problem 4 Solving a Proportion
KEY: proportion | Cross-Product Property | extremes | means

28. ANS: D PTS: 1 DIF: L3 REF: 9-2 Reflections
OBJ: 9-2.1 To find reflection images of figures
NAT: CC G.CO.2| CC G.CO.4| CC G.CO.5| CC G.CO.6| G.2.b| G.2.c| G.2.d
TOP: 9-2 Problem 2 Graphing a Reflection Image KEY: reflection | line of reflection

29. ANS: C PTS: 1 DIF: L2
REF: 0-6 Squaring Numbers and Finding Square Roots
OBJ: Squaring Numbers and Finding Square Roots
TOP: Skills Handbook: Squaring Numbers and Finding Square Roots
KEY: square root

30. ANS: D PTS: 1 DIF: L1
REF: 0-6 Squaring Numbers and Finding Square Roots
OBJ: Squaring Numbers and Finding Square Roots
TOP: Skills Handbook: Squaring Numbers and Finding Square Roots
KEY: square root | simplify

31. ANS: D PTS: 1 DIF: L1 REF: 0-8 Simplifying Ratios
OBJ: Simplifying Ratios TOP: Skills Handbook: Simplifying Ratios
KEY: ratios | simplify

32. ANS: B PTS: 1 DIF: L2
REF: 11-4 Volumes of Prisms and Cylinders
OBJ: 11-4.1 To find the volume of a prism and the volume of a cylinder
NAT: CC G.GMD.1| CC G.GMD.2| CC G.GMD.3| CC G.MG.1| N.3.c| N.3.f| N.5.e| M.1.h| A.4.f
TOP: 11-4 Problem 4 Finding Volume of a Composite Figure
KEY: volume of a rectangular prism | problem solving | volume formulas | volume | composite space figure

33. ANS: A PTS: 1 DIF: L2
REF: 4-5 Isosceles and Equilateral Triangles
OBJ: 4-5.1 To use and apply properties of isosceles and equilateral triangles
NAT: CC G.CO.10| CC G.CO.13| CC G.SRT.5| G.1.c| G.2.e| G.3.e

TOP: 4-5 Problem 2 Using Algebra
KEY: isosceles triangle | Isosceles Triangle Theorem | Triangle Angle-Sum Theorem | word problem

34. ANS: B PTS: 1 DIF: L3 REF: 3-1 Lines and Angles
OBJ: 3-1.2 To identify angles formed by two lines and a transversal
NAT: CC G.CO.1| CC G.CO.12| M.1.d| G.3.g
TOP: 3-1 Problem 2 Identifying an Angle Pair
KEY: transversal | alternate exterior angles | parallel lines

35. ANS: D PTS: 1 DIF: L3 REF: 7-1 Ratios and Proportions
OBJ: 7-1.1 To write ratios and solve proportions NAT: CC G.SRT.5| N.4.c
TOP: 7-1 Problem 2 Dividing a Quantity into a Given Ratio KEY: ratio

36. ANS: C PTS: 1 DIF: L2 REF: 0-12 Percents
OBJ: Percents TOP: Skills Handbook: Percents KEY: percents | estimation

37. ANS: A PTS: 1 DIF: L4
REF: 11-2 Surface Areas of Prisms and Cylinders
OBJ: 11-2.1 To find the surface area of a prism and a cylinder
NAT: CC G.MG.1| N.3.c| N.3.f| N.5.e| M.1.h| A.4.f
TOP: 11-2 Problem 3 Finding Surface Area of a Cylinder
KEY: surface area of a cylinder | cylinder | surface area formulas | surface area

38. ANS: D PTS: 1 DIF: L2
REF: 0-11 Solving and Writing Linear Equations
OBJ: Solving and Writing Linear Equations
TOP: Skills Handbook: Solving and Writing Linear Equations
KEY: solving linear equations | writing linear equations | word problem | problem solving

39. ANS: A PTS: 1 DIF: L3 REF: 1-3 Measuring Segments
OBJ: 1-3.1 To find and compare lengths of segments NAT: CC G.CO.1| CC G.GPE.6| G.3.b
TOP: 1-3 Problem 2 Using the Segment Addition Postulate KEY: coordinate | distance

40. ANS: B PTS: 1 DIF: L2
REF: 8-1 The Pythagorean Theorem and Its Converse
OBJ: 8-1.1 To use the Pythagorean theorem and its converse
NAT: CC G.SRT.4| CC G.SRT.8| N.5.e| G.3.d
TOP: 8-1 Problem 1 Finding the Length of the Hypotenuse
KEY: Pythagorean Theorem | leg | hypotenuse | Pythagorean triple

41. ANS: A PTS: 1 DIF: L2
REF: 4-2 Triangle Congruence by SSS and SAS
OBJ: 4-2.1 To prove two triangles congruent using the SSS and SAS Postulates
NAT: CC G.SRT.5| G.2.e| G.3.e| G.5.e TOP: 4-2 Problem 2 Using SAS
KEY: angle

42. ANS: C PTS: 1 DIF: L2
REF: 11-3 Surface Areas of Pyramids and Cones
OBJ: 11-3.1 To find the surface area of a pyramid and a cone
NAT: CC G.MG.1| N.3.c| N.3.f| N.5.e| M.1.h| A.4.f
TOP: 11-3 Problem 4 Finding the Lateral Area of a Cone
KEY: cone | slant height of a cone | Pythagorean Theorem

43. ANS: A PTS: 1 DIF: L1
REF: 0-7 Evaluating and Simplifying Expressions
OBJ: Evaluating and Simplifying Expressions
TOP: Skills Handbook: Evaluating and Simplifying Expressions
KEY: monomial | polynomial | expression | simplify

44. ANS: D PTS: 1 DIF: L3 REF: 8-2 Special Right Triangles
OBJ: 8-2.1 To use the properties of 45-45-90 and 30-60-90 triangles

NAT: CC G.SRT.8 TOP: 8-2 Problem 2 Finding the Length of a Leg
KEY: special right triangles | hypotenuse | leg

45. ANS: C PTS: 1 DIF: L4 REF: 9-1 Translations
OBJ: 9-1.2 To find translation images of figures
NAT: CC G.CO.2| CC G.CO.4| CC G.CO.5| CC G.CO.6| G.2.b| G.2.c| G.2.d
TOP: 9-1 Problem 4 Writing a Rule to Describe a Translation KEY: translation

46. ANS: A PTS: 1 DIF: L3
REF: 2-1 Patterns and Inductive Reasoning
OBJ: 2-1.1 To use inductive reasoning to make conjectures
NAT: CC G.CO.9| CC G.CO.10| CC G.CO.11| G.5.a
TOP: 2-1 Problem 1 Finding and Using a Pattern KEY: pattern | inductive reasoning

47. ANS: B PTS: 1 DIF: L3 REF: 12-1 Tangent Lines
OBJ: 12-1.1 To use properties of a tangent to a circle NAT: CC G.C.2| G.3.h
TOP: 12-1 Problem 1 Finding Angle Measures
KEY: tangent to a circle | point of tangency | angle measure | properties of tangents | central angle

48. ANS: D PTS: 1 DIF: L3 REF: 10-6 Circles and Arcs
OBJ: 10-6.1 To find the measures of central angles and arcs
NAT: CC G.CO.1| CC G.C.1| CC G.C.2| CC G.C.5 TOP: 10-6 Problem 1 Naming Arcs
KEY: major arc | minor arc | semicircle

49. ANS: D PTS: 1 DIF: L1 REF: 0-10 The Coordinate Plane
OBJ: The Coordinate Plane TOP: Skills Handbook: The Coordinate Plane
KEY: ordered pair | coordinate plane

50. ANS: D PTS: 1 DIF: L2 REF: 6-6 Trapezoids and Kites
OBJ: 6-6.1 To verify and use properties of trapezoids and kites NAT: CC G.SRT.5| G.1.c| G.3.f
TOP: 6-6 Problem 1 Finding Angle Measures in Trapezoids KEY: trapezoid | base angles

Algebra II

Final Exam

*Do not write in this test booklet

**Record your answers for problems 1 -33 on the scan-tron.

Algebra 2 Final Examination

1) Multiply $\left(-4x^2y\right)\left(2x^3y^2\right) =$

a) $8x^6y^2$
b) $-8x^5y^3$
c) $8x^5y^3$
d) $-2x^2y^5$

2) Simplify $= \dfrac{-40a^2b}{-5ab^2}$

a) $\dfrac{-8}{b}$
b) $\dfrac{-8}{ab}$
c) $\dfrac{8a}{b}$
d) $8ab$

3) What is the value of $5x^2y$ if $x = -3$ and $y = 2$?

a) 30
b) 60
c) -90
d) 90

4) Solve for x: $6x - (3x - 4) = 14$

a) $\dfrac{10}{3}$
b) 6
c) 2
d) -6

5) Multiply: $4^2 \cdot 4^3 =$

a) 1024
b) 4096
c) 96
d) none

6) Multiply: $(x + 7)(2x - 3)$

a) $2x^2 - 11x + 21$
b) $2x^2 + 11x - 21$
c) $2x^2 - 17x + 21$
d) $2x^2 + 17x - 21$

7) Add: $18x - 2 - 5y$, $-9x - 8y - 4$ and $13x - 12 + 4y$

a) $11x + 9y + 18$
b) 22x+9y-18
c) $22x + 18$
d) $22x - 9y - 18$

8) Factor $a^2 - 8a + 16$:

a) $(a-4)(a+4)$

b) $(a-4)^2$

c) $(a+8)(a+2)$

d) $(a+4)^2$

9) If 3 less than 5 times a number is 17, the number is:

a) -4

b) 4

c) $\frac{22}{3}$

d) $\frac{14}{5}$

10) Simplify $(2x+7y-8z)-(5x+8y+12z)$

a) $-3x-y-20z$

b) $7x-y$

c) $7x-y-20z$

d) $7x-y+4z$

11) Solve for x: $x^2-3x-18=0$

a) -6, 3

b) 6, -3

c) 9, -2

d) -6,-3

12) $\sqrt{121p^6}$

a) $12p^2$

b) $13p^3$

c) $11p^2$

d) $11p^3$

13) The y-interest of the graph of the equation $y=-\frac{1}{2}x+3$ is

a) $-\frac{1}{2}$

b) $\frac{1}{2}$

c) -3

d) 3

14) The slope of the graph of $2x+y=6$ is

a) -2

b) 2

c) $\frac{1}{2}$

d) $\frac{2}{3}$

15) Simplify: $\sqrt{72x^3y^5}$

a) $xy^2\sqrt{72xy}$

b) $6xy^2\sqrt{2xy}$

c) $3xy^2\sqrt{8xy}$

d) $6\sqrt{2x^3y^5}$

16)

$$\frac{4}{\sqrt{5}}$$

a) $\frac{4\sqrt{5}}{5}$

b) $\frac{2\sqrt{5}}{25}$

c) $\frac{4\sqrt{5}}{25}$

d) $4\sqrt{5}$

17) Solve: $\begin{array}{l} 3x-7y=5 \\ 2x+y=9 \end{array}$

a) (1,4)

b) (4,1)

c) (4,-1)

d) none

18) What is the slope of the line passing through (6,-1) and (0,5) ?

a) -1

b) 1

c) $\frac{2}{3}$

d) $\frac{7}{5}$

19) Simplify: $5+8\cdot 2\div 4-11$

a) $-5\frac{3}{4}$

b) $-5\frac{1}{2}$

c) 2

d) -2

20) What is the next number in the pattern:
5, 10, 17, 26, 37, ...?

a) 48

b) 50

c) 63

d) none

21) $(5i - 3)(5i - 3)$

a) $34 - 30i$

b) $-16 - 30i$

c) -16

d) $-14 - 30i$

22) $\sqrt{-9}$

a) $-3i$

b) $3i$

c) -3

d) none

23) $\sqrt{-2} \cdot \sqrt{-2}$

a) -2

b) $2i$

c) -4

d) none

24) Solve: $5 + \sqrt{2x - 4} = 11$

a) 50

b) 20

c) 60

d) 16

25) Write $\log_{10} 0.0001 = -4$

a) $0.0001^{-4} = 10$

b) $10^{-4} = 0.0001$

c) $-4^{10} = 0.0001$

d) $10^{0.0001} = 4$

26) What is the common ratio of the geometric sequence

4, 12, 36, 108, ... ?

a) 3

b) $\frac{1}{3}$

c) 8

d) $\frac{1}{8}$

27) Evaluate: $\sum_{n=1}^{10}(3n + 1)$

a) 35

b) 135

c) 136

d) 175

28) What is the value of ${}_{10}P_4$?

a) 5040

b) 151,200

c) 30,240

d) 907,200

29) How many ways can 9 people be seated at a round table?

a) 5040

b) 20,160

c) 40,320

d) 362,880

30) What is the value of ${}_{13}C_9$?

a) 17,160

b) 715

c) 24

d) 117

31) What is the least positive angle that is coterminal with $-\frac{5\pi}{9}$?

a) $\frac{13\pi}{9}$

b) $\frac{5\pi}{9}$

c) $\frac{23\pi}{9}$

d) $\frac{10\pi}{9}$

32) What is the least positive angle measure that is coterminal with $-400°$?

a) 40°

b) 80°

c) 320°

d) 400°

33) A clown has 8 balloons, each with a different color. There are 6 children. How many different ways can the clown give each child a balloon?

a) 56

b) 262,144

c) 720

d) 20,160

Atlantic City High School

Constructed Response Tasks

Mathematics Task Force Members

Don Coleman

Colleen O'Donnell

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Director of Secondary Education

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Principal

Lina Gil

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Sherry Yahn

Name:____

Additional Performance Assessment Tasks: Yogurt

2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

A food company produces yogurt in half-cup tubs.

1. The tubs of yogurt are sold for 75¢ each.
Twenty percent of this is profit for the food company.
How much profit does the company make on each tub? _______________
Show your work.

The machine that fills the half-cup tubs with yogurt runs 10 hours a day for 5 days a week.
It fills 1600 tubs an hour.
2. How many gallons of yogurt are needed to fill 1600 tubs? ________________
Show your calculations.

3. How many gallons of yogurt are needed each week? _______________
Show your work.

4. What is the percent increase in production if the machine runs for 7 days a week instead of 5 days a week? _______________
Show how you figured it out.

	Yogurt Rubric		
		Points	Section points
1.	Gives correct answer: **15¢**	1	2
	Shows calculation such as: $\frac{20}{100} \times 75$	1	
2.	Gives correct answer: **50** gallons	1	2
	Shows calculation such as: $1600 \times \frac{1}{4} \times \frac{1}{8}$	1	
3.	Gives correct answer: **2500** gallons	2	
	Shows calculation such as: 50 x 10 x 5	1 ft	3
4.	Gives correct answer: **40%**	2	
	Partial credit Gives answer :140%	(1)	
	Shows calculation such as: $\frac{2}{5} \times 100$	1 ft	3
	Total Points		**10**

Name:____

Unit 1 Performance Task: Golf Balls in Water Day 1

Tom is doing an experiment adding golf balls to a glass jar containing water. The picture and the table show what happens to the height of the water as Tom adds golf balls.

Number of golf balls, x	Height of water in centimeters, y
0	9.0
1	10.2
2	11.5
3	12.7
4	13.8

The height of the water changes at an average rate of about ________ centimeters per golf ball. If these data were graphed with the number of golf balls as the independent variable, the y-intercept for the graph would be about ________centimeters. This means that for zero ________, the ______is 9 centimeters. Tom's table and graph can be represented by the trend line with the equation y= ______x+_______.

Bank of Answers available for blanks above		***SOME ANSWERS ARE USED TWICE***		
Golf balls	change	glass jars	water height	1.16
1.2	1.3	9.0	12.0	13.8

There are several ways that Tom could modify the conditions of his experiment.

What modifications would increase the rate of change in the height of the water level with respect to the number of golf balls? ***Select all that apply***.

	Use larger golf balls
	Decrease the diameter of the glass jar
	Drop the golf balls into the glass jar at a faster rate
	Add 5 cm of water to the glass jar
	Drop the golf balls into the glass jar two at a time

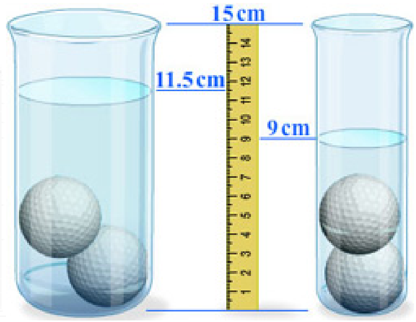
Name:____

Unit 1 Performance Task: Golf Balls in Water Day 2

Tom repeats his experiment with a different glass jar. The new glass jar, B, has a smaller radius than the original glass jar, A.

Data from Experiment with Glass Jar A

Number of golf balls, x	Height of water in centimeters, y
0	9.0
1	10.2
2	11.5
3	12.7
4	13.8



Tom forgot to write down the initial height of the water in glass jar B, but he measured the water height at 9 centimeters after adding two golf balls.

Question a: When Tom creates graphs of the data from both experiments, how will the y-intercepts of the graphs be different for glass jar A versus glass jar B? Explain how you know.

Question b: How will the rate of change in the experiment using glass jar B be different than the rate of change in the experiment using glass jar A? Explain how you know.

Question c: Suppose glass jar B has a water height of 5 centimeters with no golf balls, and the water height increases at a rate of 2 centimeters per golf ball added. Tom continues to add golf balls to each glass jar. He discovers that there is a number of golf balls at which the height of the water in each glass jar is the same. How many golf balls will be in each jar when the water in each reaches the same height?

Part	Solution	Points	Maximum points possible
a	**Student drags all 6 correct tiles to their appropriate positions:** The height of the water changes at an average rate of about **1.2** centimeters per golf ball. If these data were graphed with the number of golf balls as the independent variable, the *y*-intercept for the graph would be about **9.0** centimeters. This means that for zero **golf balls**, the **water height** is 9 centimeters. Tom's table and graph can be represented by the trend line with the equation $y =$ **1.2** $x +$ **9.0** .	1	1
b	**Student selects all correct statements that apply:** • Use larger golf balls • Decrease the diameter of the cylinder	1	1
c	**Question a** **Answer:** The *y*–intercept for glass jar B will be less OR lower than the *y*–intercept for glass jar A. **Possible explanations:** • The water height in jar B is lower than the water height in jar A when each jar contains the same number of golf balls. • The water height in jar B for two golf balls is the same as the water height in jar A for no golf balls. This means that the water height in jar B will be less than 9 centimeters when the 2 golf balls are removed. **Question b** **Answer:** The rate of change using glass jar B will be higher/greater/have a larger effect than the rate of change using glass jar A. **Possible explanation:** Because glass jar B is smaller/has a smaller	1 (Answer) 1 (Possible explanations) 1 (Answer) 1 (Possible explanation)	8

<table>
<tr>
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<td>
radius or diameter than glass jar A.

Question c
Answer: “5” OR “3”

Possible explanation: The student gives a table, equation, ordered pairs, steps, or pattern involving both cylinders to support his or her answer. Example table is shown below:

<table>
<tr><th>Number of golf balls</th><th>Height of water in centimeters in New Cylinder Y =2x+5</th><th>Height of water in centimeters in New Cylinder Y = 1.2x + 9</th></tr>
<tr><td>0</td><td>5</td><td>9</td></tr>
<tr><td>1</td><td>7</td><td>10.2</td></tr>
<tr><td>2</td><td>9</td><td>11.5</td></tr>
<tr><td>3</td><td>11</td><td>12.7</td></tr>
<tr><td>4</td><td>13</td><td>13.8</td></tr>
<tr><td>5</td><td>15</td><td>15</td></tr>
</table>
While the correct answer is 5 total golf balls, students may give an answer of 3 golf balls to indicate the number that would be added to the 2 golf balls shown to make a total of 5. Credit should be given for an answer of 3 golf balls if students clearly explain that this is what they have done.
</td>
<td>

2

2</td>
<td></td>
</tr>
<tr>
<td></td>
<td align="right">Total points possible</td>
<td></td>
<td>10</td>
</tr>
</table>

1. The table below shows selected values of a linear function $g(x)$, where the shaded cells indicate missing values.

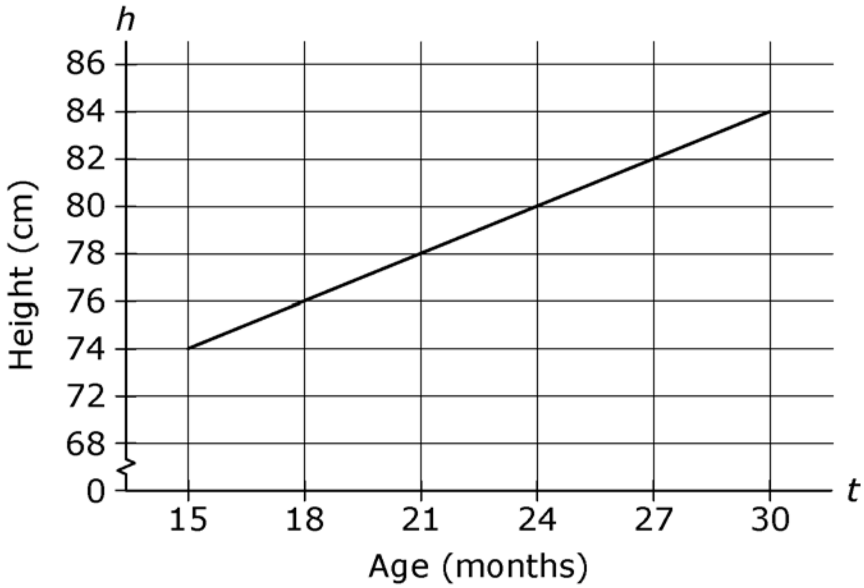
x	69	92	t	161
$g(x)$	30	40	50	s

Part A: What values for t and s will complete the table for the linear function $g(x)$?

$t =$ ____ $s =$ ____

Part B: Write the linear function $g(x)$.

2. The linear graph below represents the relationship between age t, in months, and height h, in centimeters, of a toddler.



Part A: Write the linear function $h(t)$ that expresses the height as a function of age.

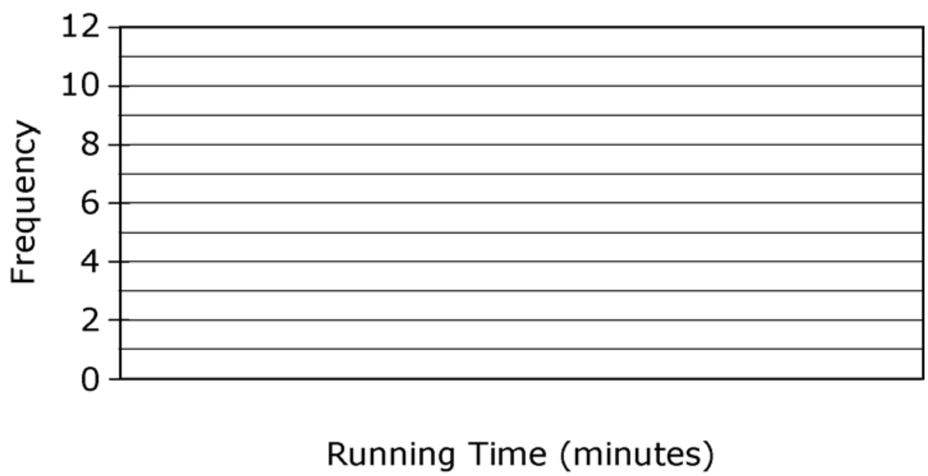
$h(t) =$ ________________

Part B: Based on the graph, describe how the toddler's height changes after 15 months for any increase in age of 1 month.

3) A runner records the time, in minutes, it takes her to run 1 mile on 30 different days. The times are shown in the table below.

7.4	7.4	7.4	7.5	7.5
7.5	7.7	7.7	7.8	7.8
7.8	7.9	7.9	8.1	8.2
8.2	8.3	8.3	8.3	8.4
8.4	8.5	8.5	8.6	8.6
8.7	8.7	9.0	9.0	10.1

Part A: Construct a histogram of the 30 running times. For each time interval that defines the width for a histogram bar, include the left-end time value in the interval but not the right-end time value.



Part B: Is the distribution roughly symmetric or is it skewed? Explain how you know.

Part C: The data contains an outlier. How does the mean change if the outlier is removed from the data?

Scoring Rubric for Tasks

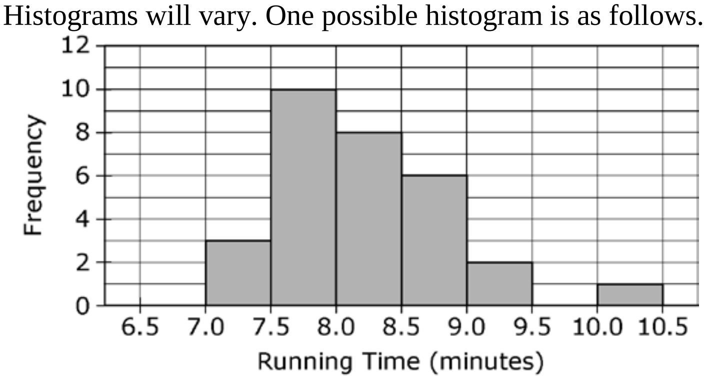
Task 1

Part A: $t = 115$ and $s = 70$ Part B: $g(x) = \frac{10}{23}x$ or $g(x) \approx 0.43x$	2 points: Student provides a correct response to both parts of the problem. 1 point: Student provides a correct response to either Part A or Part B but not both. 0 points: Student does not provide a correct response to Part A and does not provide a correct response to Part B.

Task 2

Part A: $h(t) = \frac{2}{3}t + 64$ or $h(t) \approx 0.67t + 64$ Part B: Answers will vary. One possible answer is as follows. For every increase in age of 1 month after 15 months, the toddler's height increases by $\frac{2}{3}$ centimeter, or approximately 0.67 centimeter. For example, from 15 to 16 months, the toddler's height increased from 74 cm to $74\frac{2}{3}$ cm.	2 points: Student provides a correct response to both parts of the problem. 1 point: Student provides a correct response to either Part A or Part B but not both. 0 points: Student does not provide a correct response to Part A and does not provide a correct response to Part B.

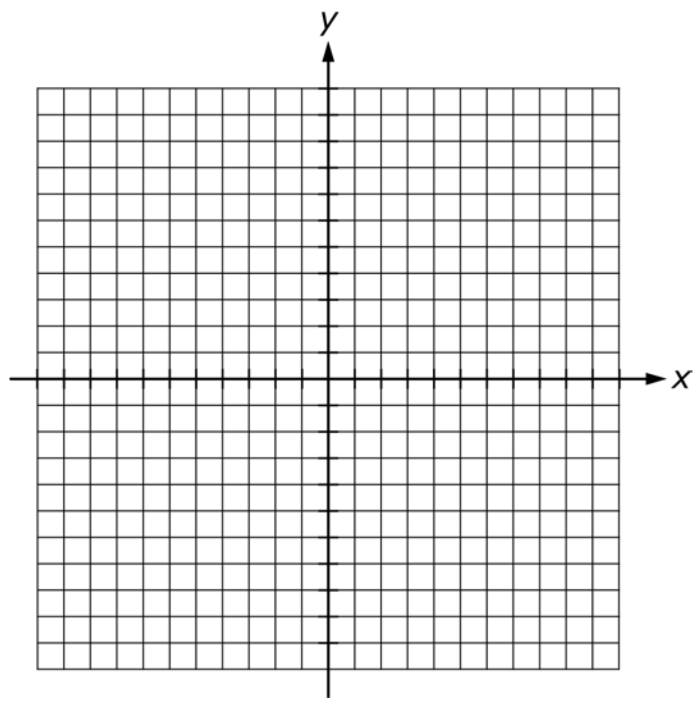
Task 3

Part A: Histograms will vary. One possible histogram is as follows. 	2 points: Student provides a correct response to all 3 parts of the problem. 1 point: Student provides a correct response to either Part A or to both Part B and Part C. (Part A should also be marked correct if student draws it correctly using the opposite convention that assumes the upper bound of an interval is included in the histogram bar.) 0 points: Student neither provides a correct response to Part A nor provides correct responses to both Part B and Part C.

Part B: Explanations will vary. One possible explanation is as follows. The majority of the data falls on the left side and tapers to the right, so the distribution is skewed positively, or skewed to the right. Part C: Answers will vary. One possible answer is as follows. Removing the largest value, the outlier in this case, will decrease the mean.	

1)Mr. Barnes hired a plumber to fix a leak. The total cost, in dollars, that the plumber charges for a job can be modeled by the function $p(x) = 45 + 35x$, where x represents the time, in hours, that the plumber used to complete the job.

Part A: Graph $p(x)$ for $x \geq 0$ on the coordinate plane below.



Part B: If Mr. Barnes budgeted $200 to pay the plumber for the job, at what time will the cost of the job exceed Mr. Barnes's budget?

2) The circumference, C, of a circle with radius r is given by the equation $C = 2\pi r$. The area, A, of a circle with radius r is given by the equation $A = \pi r^2$.

Part A: If the radius of a circle is increased from 2 feet to 4 feet, calculate the average rate of change of the circumference and the area.

Average rate of change of circumference:
______ feet of circumference per foot of radius

Average rate of change of area:
______ square feet of area per foot of radius

Part B: If the radius of the circle is increased from 4 feet to 6 feet, calculate the average rate of change of the circumference and the area.

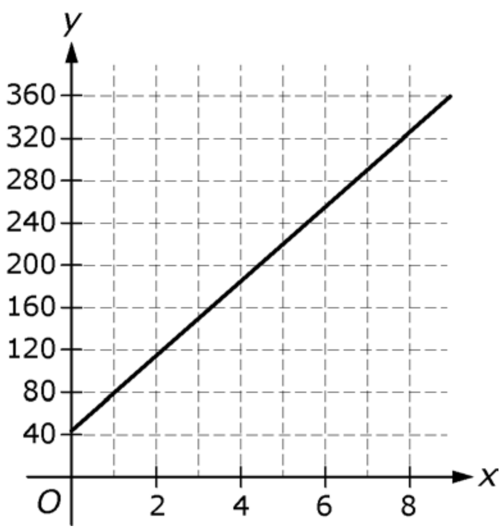
Average rate of change of circumference:
______ feet of circumference per foot of radius

Average rate of change of area:
______ square feet of area per foot of radius

Part C: Compare the average rates of change of circumference that you found in Parts A and B. Compare the average rates of change of area that you found in Parts A and B. How are the comparisons related to the circumference and area equations? Explain.

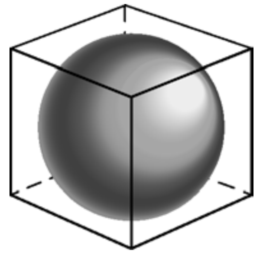
Scoring Rubric for Tasks

Task 1

Part A: Graphs may vary depending on the scale; one graph is  Part B: The cost of the job will exceed Mr. Barnes's budget **after** $4\frac{3}{7}$ hours, or about 4.4 hours.	2 points: Student provides a complete and correct response to the entire problem. 1 point: Student provides a correct response to either Part A or to Part B but not to both. 0 points: Student provides an incorrect response to both Part A and Part B.

Task 2

Part A: 2π, 6π Part B: 2π, 10π Part C: The equation for circumference is linear, so the slope 2π is the average rate of change. The average rate of change is constant, no matter what two radius values are used. So the average rate of change for circumference is the same in both Part A and Part B. The equation for area is not linear, so the average rate of change is not constant. The average rate of change is 6π in Part A and then is 10π in Part B.	2 points: Student calculates the correct rates of change in Parts A and B, and provides a correct explanation in Part C. 1 point: Student calculates the correct rates of change in Parts A and B, and provides an explanation in Part C that is incomplete or contains some errors; or student provides correct explanation in Part C but student's answers for Part A and Part B have one error. 0 points: Student calculates incorrect rates of change in Parts A and B, or does not provide an explanation.



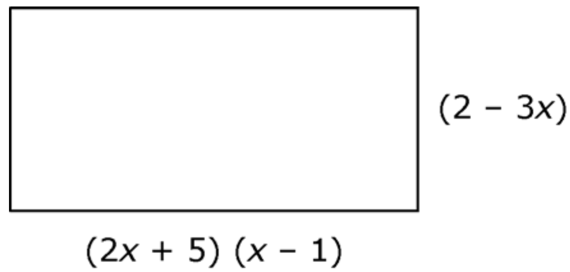
1)The figure above shows a sphere inscribed inside a cube. The volume of the cube outside the sphere can be found using the following formula.

$$V = (x \cdot x \cdot x) - \frac{4}{3}\pi\left(\frac{1}{2}x\right)^3$$

Part A: What does $(x \cdot x \cdot x)$ in the formula represent?

Part B: How does $\left(\frac{1}{2}x\right)$ in the formula relate to the sphere?

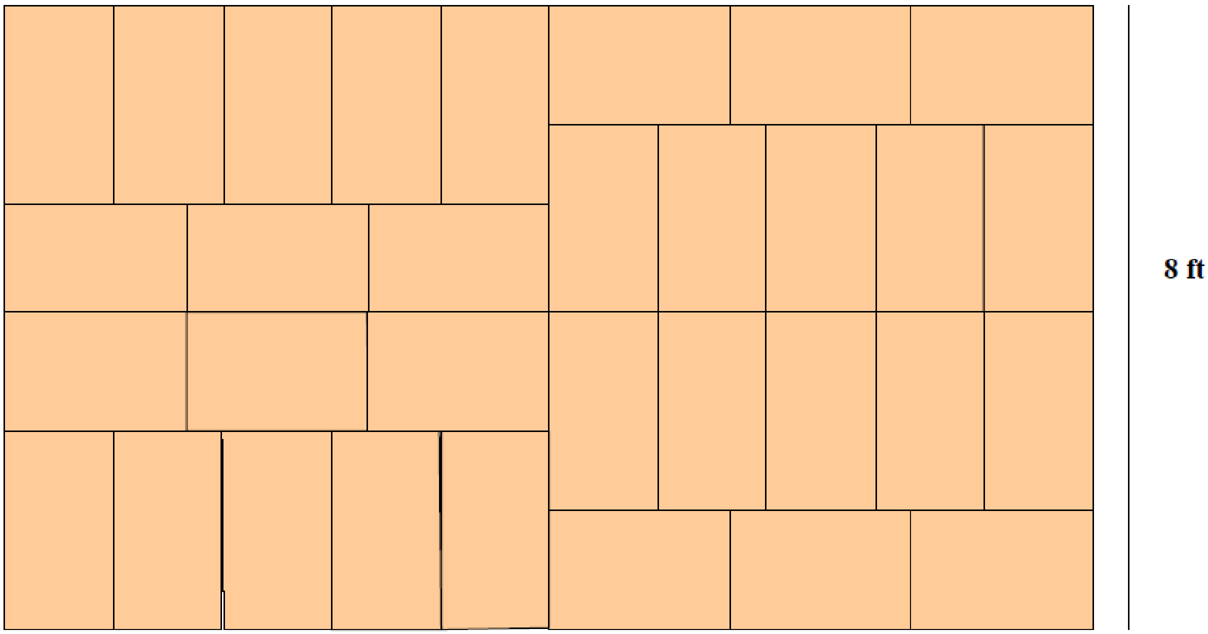
Part C: Rewrite the given formula as an equation of the form $V = ax^n$, where a and n are constants. Show your work.



2) Part A: Create an expression that represents the perimeter of the rectangle above. Write the expression as a polynomial in standard form. Show your work.

Part B: Create an expression that represents the area of the rectangle above. Write the expression as a polynomial in standard form. Show your work.

3) You work for a tile company that makes tiles for patios. A customer sent you the following picture of his patio. He said the patio is made up of the same tiles, positioned either vertically or horizontally. He says he wants to replace three tiles that are cracked. He didn't tell you the dimensions of the tile itself but did tell you that the width of the patio was 8 ft.



A) Write and expression for the side of the patio that is 8 ft. long, using 'l' for the length of the tile and 'w' for the width of the tile.

B) Write and expression for how the length relates to the width of each tile using the same variables.

C) Determine the dimensions of a tile in the patio using a system of equations.

D) Determine the dimensions of the patio.

E) Determine the area of the patio.

SCORING RUBRIC FOR TASKS

Task 1

A. The expression $(x \cdot x \cdot x)$ represents the volume of the cube. B. The expression $\left(\frac{1}{2}x\right)$ represents the radius of the sphere. C. $V = \left(1 - \frac{\pi}{6}\right)x^3$ $V = x^3 - \frac{4}{3}\pi\left(\frac{1}{2}x\right)^3$ $V = x^3 - \frac{4}{3}\pi\left(\frac{1}{8}x^3\right)$ $V = x^3 - \frac{1}{6}\pi x^3$ $V = \left(1 - \frac{\pi}{6}\right)x^3$	2 points: Student answers all three parts correctly. 1 point: Student answers two of three parts correctly. 0 points: Student answers fewer than two parts correctly.

Task 2

A: $\text{P} = 2(2x+5)(x-1)+2(2-3x)$ $\text{P} = (4x+10)(x-1)+4-6x$ $\text{P} = 4x^2+6x-10+4-6x$ $\text{P} = 4x^2+6x-6x-10+4$ $\text{P} = 4x^2-6$ B: $\text{A} = \left[(2x+5)(x-1)\right](2-3x)$ $\text{A} = (2x^2+3x-5)(2-3x)$ $\text{A} = 4x^2+6x-10-6x^3-9x^2+15x$ $\text{A} = -6x^3-5x^2+21x-10$	2 points: Student answers both parts correctly. 1 point: Student answers only one part correctly. 0 points: Student does not answer either part correctly.

Task 3

A) 2l + 2w =8 B) 5w=3l or 10w = 6l C) Solve using substitution or elimination whichever is preferred by student. w=1.5ft and l = 2.5ft D) 8ft by 15 ft E) E) 120 sq.ft.	5 points: 5 parts are correct. 4 points: 4 parts are correct. 3 points: 3 parts are correct. 2 points: 2 parts are correct. 1 point: 1 part is correct. 0 points : No parts are correct.

Name:____

Additional Performance Assessment Tasks: Yogurt

2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

A food company produces yogurt in half-cup tubs.

1. The tubs of yogurt are sold for 75¢ each.
Twenty percent of this is profit for the food company.
How much profit does the company make on each tub? ______________
Show your work.

The machine that fills the half-cup tubs with yogurt runs 10 hours a day for 5 days a week.
It fills 1600 tubs an hour.
2. How many gallons of yogurt are needed to fill 1600 tubs? ______________
Show your calculations.

3. How many gallons of yogurt are needed each week? ______________
Show your work.

4. What is the percent increase in production if the machine runs for 7 days a week instead of 5 days a week? ______________
Show how you figured it out.

	Yogurt	Rubric	
		Points	Section points
1.	Gives correct answer: **15¢** Shows calculation such as: $\frac{20}{100} \times 75$	1 1	2
2.	Gives correct answer: **50** gallons Shows calculation such as: $1600 \times \frac{1}{4} \times \frac{1}{8}$	1 1	2
3.	Gives correct answer: **2500** gallons Shows calculation such as: 50 x 10 x 5	2 1 ft	3
4.	Gives correct answer: **40%** *Partial credit* Gives answer :140% Shows calculation such as: $\frac{2}{5} \times 100$	2 (1) 1 ft	3
	Total Points		**10**

Name:____

Unit 1 Performance Task: Golf Balls in Water Day 1

Tom is doing an experiment adding golf balls to a glass jar containing water. The picture and the table show what happens to the height of the water as Tom adds golf balls.

Number of golf balls, x	Height of water in centimeters, y
0	9.0
1	10.2
2	11.5
3	12.7
4	13.8

The height of the water changes at an average rate of about ________ centimeters per golf ball. If these data were graphed with the number of golf balls as the independent variable, the y-intercept for the graph would be about ________centimeters. This means that for zero ________, the ______is 9 centimeters. Tom's table and graph can be represented by the trend line with the equation y= ______x+_______.

Bank of Answers available for blanks above			****SOME ANSWERS ARE USED TWICE****	
Golf balls	change	glass jars	water height	1.16
1.2	1.3	9.0	12.0	13.8

There are several ways that Tom could modify the conditions of his experiment.

What modifications would increase the rate of change in the height of the water level with respect to the number of golf balls? ***Select all that apply***.

	Use larger golf balls
	Decrease the diameter of the glass jar
	Drop the golf balls into the glass jar at a faster rate
	Add 5 cm of water to the glass jar
	Drop the golf balls into the glass jar two at a time

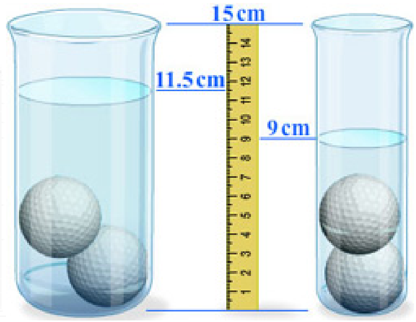
Name:____

Unit 1 Performance Task: Golf Balls in Water Day 2

Tom repeats his experiment with a different glass jar. The new glass jar, B, has a smaller radius than the original glass jar, A.

Data from Experiment with Glass Jar A

Number of golf balls, x	Height of water in centimeters, y
0	9.0
1	10.2
2	11.5
3	12.7
4	13.8



Tom forgot to write down the initial height of the water in glass jar B, but he measured the water height at 9 centimeters after adding two golf balls.

Question a: When Tom creates graphs of the data from both experiments, how will the *y*-intercepts of the graphs be different for glass jar A versus glass jar B? Explain how you know.

Question b: How will the rate of change in the experiment using glass jar B be different than the rate of change in the experiment using glass jar A? Explain how you know.

Question c: Suppose glass jar B has a water height of 5 centimeters with no golf balls, and the water height increases at a rate of 2 centimeters per golf ball added. Tom continues to add golf balls to each glass jar. He discovers that there is a number of golf balls at which the height of the water in each glass jar is the same. How many golf balls will be in each jar when the water in each reaches the same height?

Part	Solution	Points	Maximum points possible
a	**Student drags all 6 correct tiles to their appropriate positions:** The height of the water changes at an average rate of about **1.2** centimeters per golf ball. If these data were graphed with the number of golf balls as the independent variable, the y-intercept for the graph would be about **9.0** centimeters. This means that for zero **golf balls**, the **water height** is 9 centimeters. Tom's table and graph can be represented by the trend line with the equation $y =$ **1.2** $x +$ **9.0** .	1	1
b	**Student selects all correct statements that apply:** • Use larger golf balls • Decrease the diameter of the cylinder	1	1
c	**Question a** **Answer:** The y–intercept for glass jar B will be less OR lower than the y–intercept for glass jar A. **Possible explanations:** • The water height in jar B is lower than the water height in jar A when each jar contains the same number of golf balls. • The water height in jar B for two golf balls is the same as the water height in jar A for no golf balls. This means that the water height in jar B will be less than 9 centimeters when the 2 golf balls are removed. **Question b** **Answer:** The rate of change using glass jar B will be higher/greater/have a larger effect than the rate of change using glass jar A. **Possible explanation:** Because glass jar B is smaller/has a smaller	 1 1 1 1	8

radius or diameter than glass jar A.

Question c 2

Answer: “5” OR “3”

Possible explanation: The student gives a table, equation, ordered pairs, steps, or pattern involving **both** cylinders to support his or her answer. Example table is shown below: 2

Number of golf balls	Height of water in centimeters in New Cylinder Y =2x+5	Height of water in centimeters in New Cylinder Y = 1.2x + 9
0	5	9
1	7	10.2
2	9	11.5
3	11	12.7
4	13	13.8
5	15	15

While the correct answer is 5 total golf balls, students may give an answer of 3 golf balls to indicate the number that would be added to the 2 golf balls shown to make a total of 5. Credit should be given for an answer of 3 golf balls if students clearly explain that this is what they have done.

	Total points possible		10

1. The table below shows selected values of a linear function $g(x)$, where the shaded cells indicate missing values.

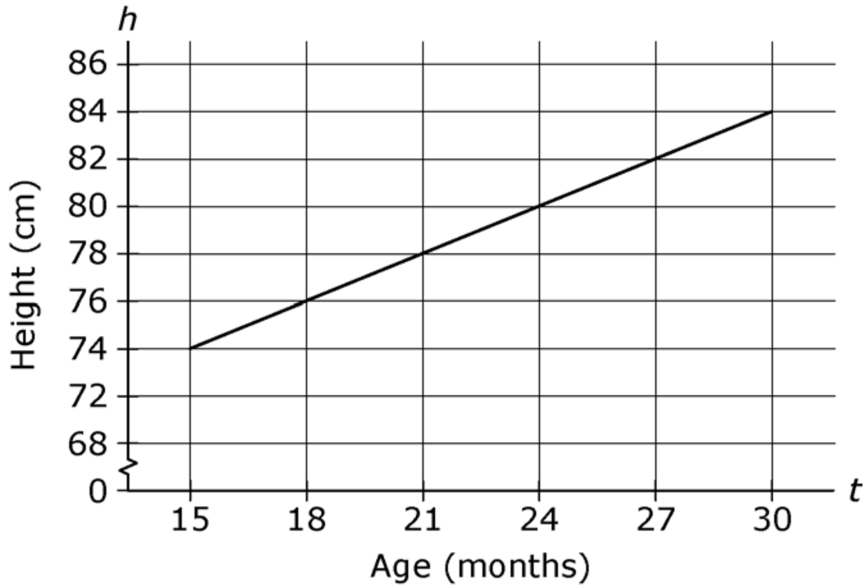
x	69	92	t	161
$g(x)$	30	40	50	s

Part A: What values for t and s will complete the table for the linear function $g(x)$?

$t =$ ____ $s =$ ____

Part B: Write the linear function $g(x)$.

2. The linear graph below represents the relationship between age t, in months, and height h, in centimeters, of a toddler.



Part A: Write the linear function $h(t)$ that expresses the height as a function of age.

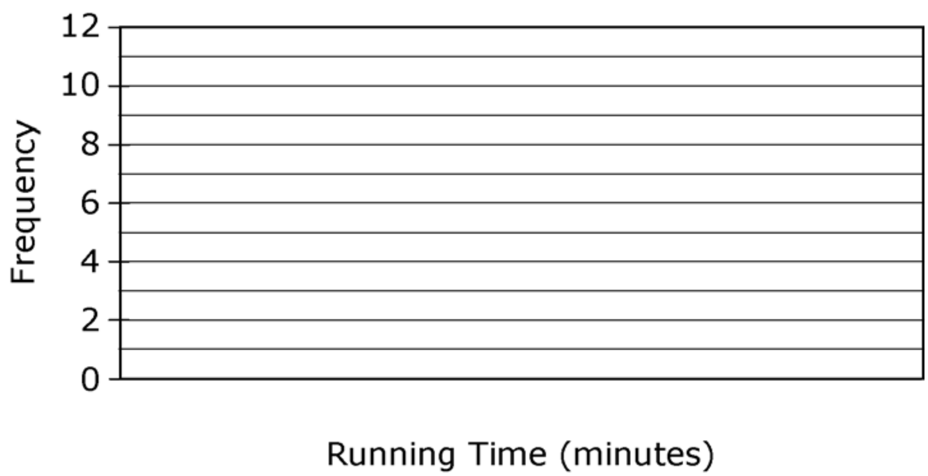
$h(t) =$ ________________

Part B: Based on the graph, describe how the toddler's height changes after 15 months for any increase in age of 1 month.

3) A runner records the time, in minutes, it takes her to run 1 mile on 30 different days. The times are shown in the table below.

7.4	7.4	7.4	7.5	7.5
7.5	7.7	7.7	7.8	7.8
7.8	7.9	7.9	8.1	8.2
8.2	8.3	8.3	8.3	8.4
8.4	8.5	8.5	8.6	8.6
8.7	8.7	9.0	9.0	10.1

Part A: Construct a histogram of the 30 running times. For each time interval that defines the width for a histogram bar, include the left-end time value in the interval but not the right-end time value.



Part B: Is the distribution roughly symmetric or is it skewed? Explain how you know.

Part C: The data contains an outlier. How does the mean change if the outlier is removed from the data?

Scoring Rubric for Tasks

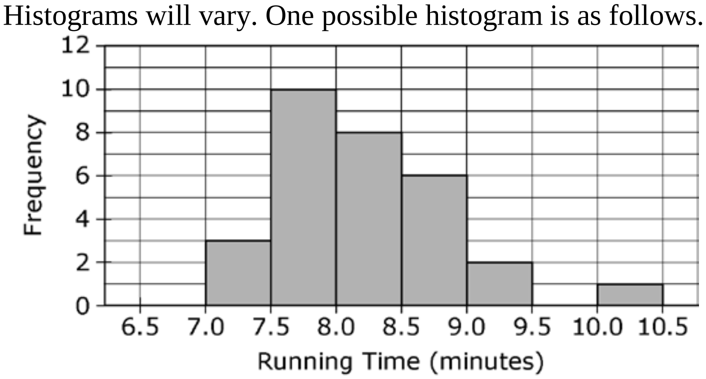
Task 1

Part A: $t = 115$ and $s = 70$ Part B: $g(x) = \frac{10}{23}x$ or $g(x) \approx 0.43x$	2 points: Student provides a correct response to both parts of the problem. 1 point: Student provides a correct response to either Part A or Part B but not both. 0 points: Student does not provide a correct response to Part A and does not provide a correct response to Part B.

Task 2

Part A: $h(t) = \frac{2}{3}t + 64$ or $h(t) \approx 0.67t + 64$ Part B: Answers will vary. One possible answer is as follows. For every increase in age of 1 month after 15 months, the toddler's height increases by $\frac{2}{3}$ centimeter, or approximately 0.67 centimeter. For example, from 15 to 16 months, the toddler's height increased from 74 cm to $74\frac{2}{3}$ cm.	2 points: Student provides a correct response to both parts of the problem. 1 point: Student provides a correct response to either Part A or Part B but not both. 0 points: Student does not provide a correct response to Part A and does not provide a correct response to Part B.

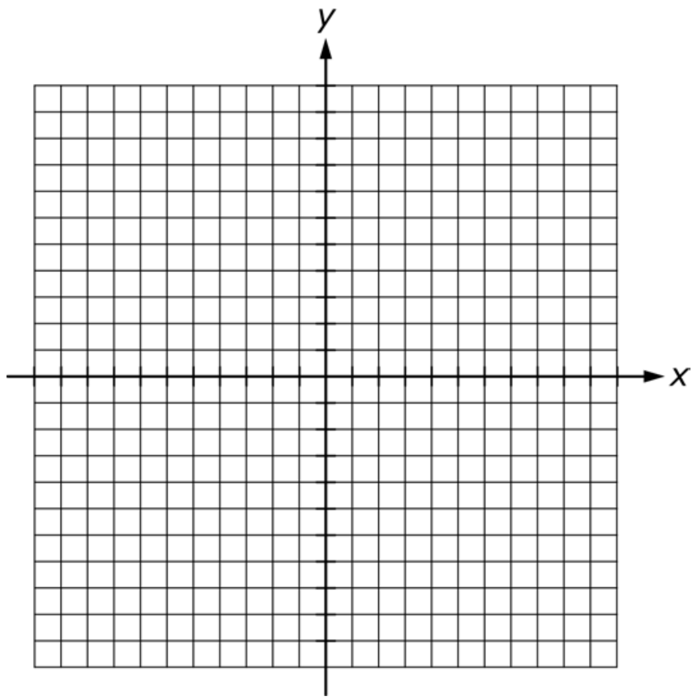
Task 3

Part A: Histograms will vary. One possible histogram is as follows. 	2 points: Student provides a correct response to all 3 parts of the problem. 1 point: Student provides a correct response to either Part A or to both Part B and Part C. (Part A should also be marked correct if student draws it correctly using the opposite convention that assumes the upper bound of an interval is included in the histogram bar.) 0 points: Student neither provides a correct response to Part A nor provides correct responses to both Part B and Part C.

Part B: Explanations will vary. One possible explanation is as follows. The majority of the data falls on the left side and tapers to the right, so the distribution is skewed positively, or skewed to the right. Part C: Answers will vary. One possible answer is as follows. Removing the largest value, the outlier in this case, will decrease the mean.	

1)Mr. Barnes hired a plumber to fix a leak. The total cost, in dollars, that the plumber charges for a job can be modeled by the function $p(x) = 45 + 35x$, where x represents the time, in hours, that the plumber used to complete the job.

Part A: Graph $p(x)$ for $x \geq 0$ on the coordinate plane below.



Part B: If Mr. Barnes budgeted \$200 to pay the plumber for the job, at what time will the cost of the job exceed Mr. Barnes's budget?

2) The circumference, C, of a circle with radius r is given by the equation $C = 2\pi r$. The area, A, of a circle with radius r is given by the equation $A = \pi r^2$.

Part A: If the radius of a circle is increased from 2 feet to 4 feet, calculate the average rate of change of the circumference and the area.

Average rate of change of circumference:
______ feet of circumference per foot of radius

Average rate of change of area:
______ square feet of area per foot of radius

Part B: If the radius of the circle is increased from 4 feet to 6 feet, calculate the average rate of change of the circumference and the area.

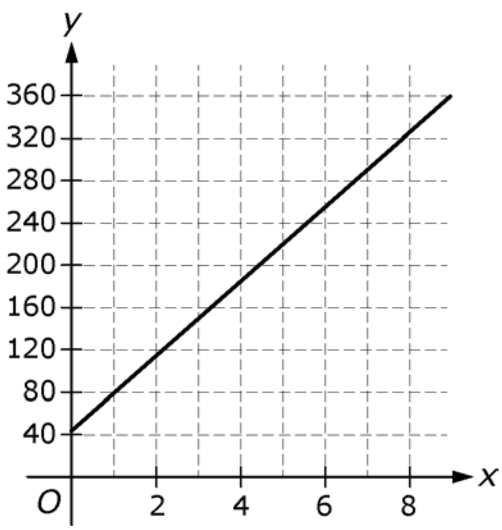
Average rate of change of circumference:
______ feet of circumference per foot of radius

Average rate of change of area:
______ square feet of area per foot of radius

Part C: Compare the average rates of change of circumference that you found in Parts A and B. Compare the average rates of change of area that you found in Parts A and B. How are the comparisons related to the circumference and area equations? Explain.

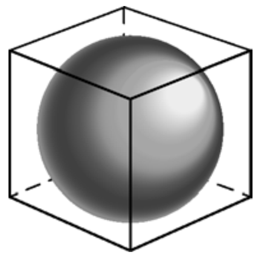
Scoring Rubric for Tasks

Task 1

Part A: Graphs may vary depending on the scale; one graph is  Part B: The cost of the job will exceed Mr. Barnes's budget **after** $4\frac{3}{7}$ hours, or about 4.4 hours.	2 points: Student provides a complete and correct response to the entire problem. 1 point: Student provides a correct response to either Part A or to Part B but not to both. 0 points: Student provides an incorrect response to both Part A and Part B.

Task 2

Part A: $2\pi,\ 6\pi$ Part B: $2\pi,\ 10\pi$ Part C: The equation for circumference is linear, so the slope 2π is the average rate of change. The average rate of change is constant, no matter what two radius values are used. So the average rate of change for circumference is the same in both Part A and Part B. The equation for area is not linear, so the average rate of change is not constant. The average rate of change is 6π in Part A and then is 10π in Part B.	2 points: Student calculates the correct rates of change in Parts A and B, and provides a correct explanation in Part C. 1 point: Student calculates the correct rates of change in Parts A and B, and provides an explanation in Part C that is incomplete or contains some errors; or student provides correct explanation in Part C but student's answers for Part A and Part B have one error. 0 points: Student calculates incorrect rates of change in Parts A and B, or does not provide an explanation.



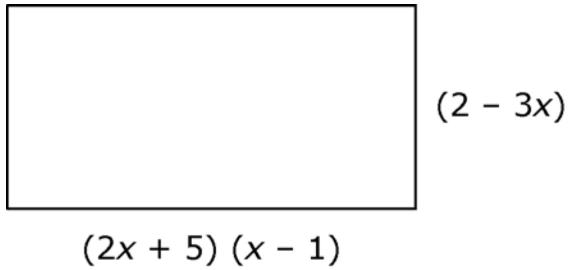
1)The figure above shows a sphere inscribed inside a cube. The volume of the cube outside the sphere can be found using the following formula.

$$V = (x \cdot x \cdot x) - \frac{4}{3}\pi\left(\frac{1}{2}x\right)^3$$

Part A: What does $(x \cdot x \cdot x)$ in the formula represent?

Part B: How does $\left(\frac{1}{2}x\right)$ in the formula relate to the sphere?

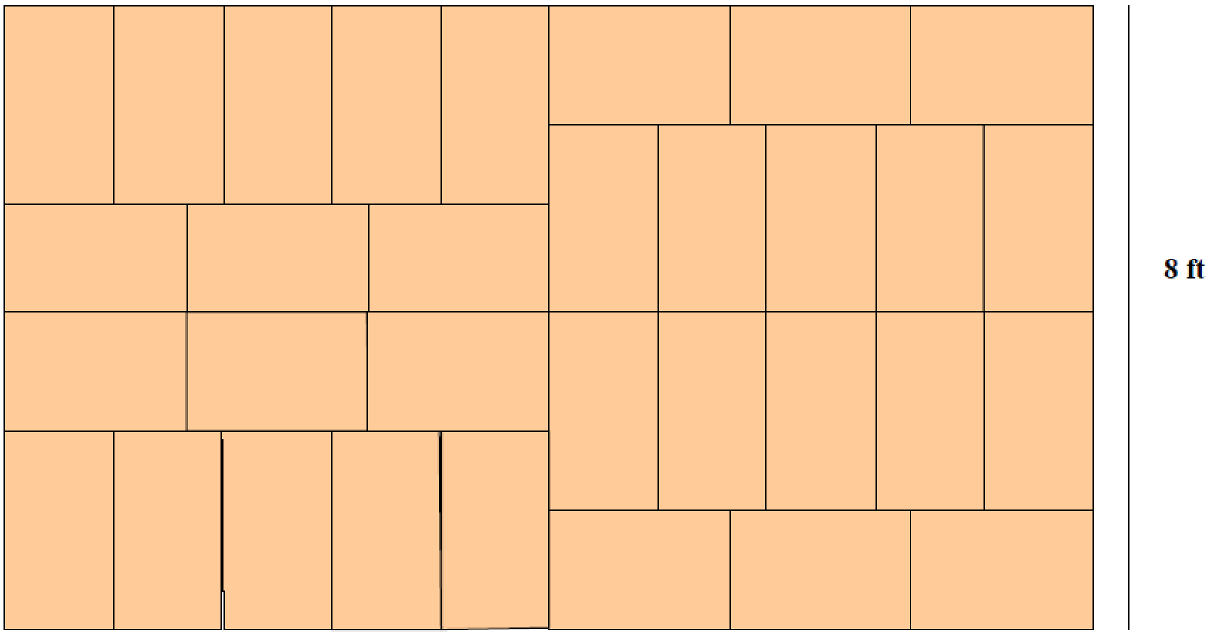
Part C: Rewrite the given formula as an equation of the form $V = ax^n$, where a and n are constants. Show your work.



2) Part A: Create an expression that represents the perimeter of the rectangle above. Write the expression as a polynomial in standard form. Show your work.

Part B: Create an expression that represents the area of the rectangle above. Write the expression as a polynomial in standard form. Show your work.

3) You work for a tile company that makes tiles for patios. A customer sent you the following picture of his patio. He said the patio is made up of the same tiles, positioned either vertically or horizontally. He says he wants to replace three tiles that are cracked. He didn't tell you the dimensions of the tile itself but did tell you that the width of the patio was 8 ft.



A) Write and expression for the side of the patio that is 8 ft. long, using 'l' for the length of the tile and 'w' for the width of the tile.

B) Write and expression for how the length relates to the width of each tile using the same variables.

C) Determine the dimensions of a tile in the patio using a system of equations.

D) Determine the dimensions of the patio.

E) Determine the area of the patio.

SCORING RUBRIC FOR TASKS

Task 1

A. The expression $(x \cdot x \cdot x)$ represents the volume of the cube. B. The expression $\left(\frac{1}{2}x\right)$ represents the radius of the sphere. C. $V = \left(1 - \frac{\pi}{6}\right)x^3$ $V = x^3 - \frac{4}{3}\pi\left(\frac{1}{2}x\right)^3$ $V = x^3 - \frac{4}{3}\pi\left(\frac{1}{8}x^3\right)$ $V = x^3 - \frac{1}{6}\pi x^3$ $V = \left(1 - \frac{\pi}{6}\right)x^3$	2 points: Student answers all three parts correctly. 1 point: Student answers two of three parts correctly. 0 points: Student answers fewer than two parts correctly.

Task 2

A: $P = 2(2x+5)(x-1)+2(2-3x)$ $P = (4x+10)(x-1)+4-6x$ $P = 4x^2+6x-10+4-6x$ $P = 4x^2+6x-6x-10+4$ $P = 4x^2-6$ B: $A = \left[(2x+5)(x-1)\right](2-3x)$ $A = (2x^2+3x-5)(2-3x)$ $A = 4x^2+6x-10-6x^3-9x^2+15x$ $A = -6x^3-5x^2+21x-10$	2 points: Student answers both parts correctly. 1 point: Student answers only one part correctly. 0 points: Student does not answer either part correctly.

Task 3

A) 2l + 2w =8 B) 5w=3l or 10w = 6l C) Solve using substitution or elimination whichever is preferred by student. w=1.5ft and l = 2.5ft D) 8ft by 15 ft E) E) 120 sq.ft.	5 points: 5 parts are correct. 4 points: 4 parts are correct. 3 points: 3 parts are correct. 2 points: 2 parts are correct. 1 point: 1 part is correct. 0 points : No parts are correct.

ACHS Geometry unit 5 performance task

Cereal Box Project

Project Introduction:
Geometry is a subject that has many real life applications. Therefore, the purpose of this project is to have the students produce a cereal box and have them determine given certain factors if their cereal box is cost effective. Along the way students will be given the opportunity to reflect on their own work and evaluate their peer'swork. This project will be used during the surface area and volume chapter and the students will be able to take an in-depth look at these figures and their applications. Also, this project will be done in a series of pieces as we complete different parts of the topic.

Introduction for students:
The idea behind this project is for you to create a cereal box to sell in stores. You will have to look at many real-life factors that go into designing and producing a good marketable product. Throughout the course of this project you will have to make decisions about the material that goes into making your cereal and the design of the cereal itself. Along the way you will also have to make predictions and reflections about how well your cereal box is designed and how it compares to the other groups' designs.

TASK #1: Creating Your Cereal Box

1) Name your figure the way it looks in "Net Form."

____

2) Fold your figure appropriately transforming it into "3-D form." Is it the figure that
you thought it was from question #1.

____

3) How many vertices does your figure have?

____

4) How many faces does you figure have?

____

5) How many edges does your figure have?

____

6) What is the name of the polygon base of your figure?

____

7) This is going to be your cereal box. Come up with a name for your cereal and decorate your cereal box.

TASK #2: Cereal Prediction

1) Looking at all of the groups' cereal boxes which one do you think will hold the most
cereal? Explain using the properties we have learned.

____
____
____
____
____
____
____
____

2) Which cereal box would hold the least amount of cereal?

____
____
____
____

3) As a consumer, which design do you think will sell the best on the shelf? Give a brief
justification.

____
____
____
____

TASK #3: Finding the Surface Area

*use cm for all of your measuring and calculations

1) Measure the height of your prism and record below.

h = _____________

2) Measure the dimensions of you prism's base

b = _____________

h = _____________

3) Calculate the area of your prism's base (be careful which variables you use).

4) Use the appropriate formula to calculate your prism's Surface Area (be

careful which
variables you use).
SA = _____________

TASK #4: Finding the Cost of your Materials

*Cereal Box Cardboard is $.10 per 100 square cm
*Recycled Cereal Box Cardboard $.07 per 100 square cm
*Plastic Liner Bag $.30
NOTE: To have a sturdy enough cereal box you must use one of the following two options.
* Use only cereal box cardboard
* Use recycled cereal box cardboard and a plastic liner bag

1) Using the above pricesfor cardboard, how much would it cost to produce your cereal box
using only cereal box cardboard.

2) Using the above prices for cardboard, how much would it cost to produce your cereal box
using the recycled cereal box cardboard option.

3) Which type of cardboard is would you choose? Explain why you chose that option?

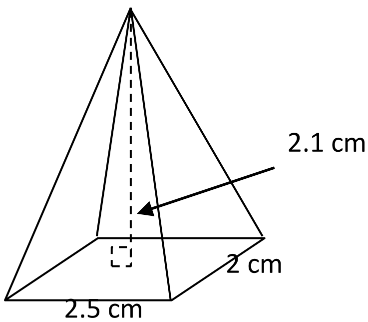
TASK 5: Find the Volume of the Cereal Box

*use cm for all of your measuring and calculations
Directions: Use the measurements from task 3 when you had to find the surface area of
your figure. Be careful what variables you use for your formula.
1) Re-write your measurements
h = _________________
B = ________________

2) Use the formula V = Bh to calculate the volume of your cereal box.

TASK 6: Volume and Cost of the Cereal

Directions: Find the volume of each one of these types of cereal. Then, based on each type of cereal's cost, choose the one type that is the least expensive to fill up your cereal box.

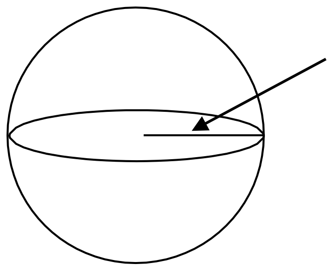


Cost per piece = $0.005

V = ____________________

Total cost to fill your cereal box with this cereal

____



0.9 cm

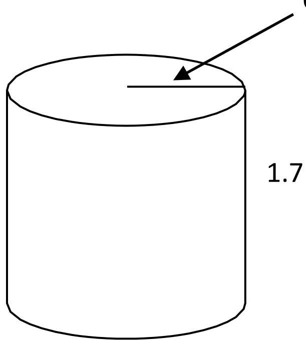
Cost per piece = $0.004

V = ____________________

Total cost to fill your cereal box with this cereal

____

0.6 cm



1.7 cm

Cost per piece = $0.003

V = ____________________

Total cost to fill your cereal box with this cereal__________________

TASK 7: Total Cost of your Cereal Box

Directions: Identify prices you calculated from earlier tasks.

1) From Task 4: cost of material you chose ________________________

2) From Task 6: cost to fill your cereal box ________________________

3) Calculate the total cost to produce your box of cereal.
Total Cost = ________________________

4) Given the total cost of your product, decide on a price to sell your cereal box that you think is reasonable. Considering that price, do you think people would buy your cereal?
Explain you reasoning

TASK 8: Evaluation of Your Peers

Directions: Put your product and written tasks out so that others will be able to evaluate them. Go around to each group and write a brief, thoughtful, response to each of the following questions. Leave your responses at that group.

1) What was the product's mark-up (how much higher is the selling price than the cost was to produce the cereal)?

2) Do you think that their selling price is fair? Would you buy their cereal at that price?

3) Write any constructive comments or suggestions for this group's product.

TASK 9: Reflection

Directions: Give a brief response to each of the following questions.

1) Look back at your prediction from task 1. Was your final design as good/bad as you thought it was?

2) Look at the responses that your peers gave you on task 8. Reflect on their judgments: do you agree with what they said? Were their comments different from your thoughts about your product?

3) If you could choose any group's cereal box design, whose would you choose? Use information like total cost to produce, shelf appeal, etc to justify your decision.

Rubrics

Task #1:

Criteria	0	1	2	3
Identify properties of 3-D figure	None	1 Correct	2 Correct	All are Correct
Cereal box built correctly	No	Yes		
Box design	None	Has a title and design, but shows little effort	Has a title, creatively designed, and is colorful	

Total Score____/ 6

Task #2:

Criteria	0	1	2
Made prediction about cereal box volume in question #1 and #2	Made 0 to 1 prediction	Made prediction for both	
*Used convincing arguments in question #1	Did not give explanation	Gave explanation, but did not use the properties	Gave explanation using the properties
*Used convincing arguments in question #3	Did not answer the question	Chose a best design, but gave little to no justification	Chose a best design and gave sufficient justification

Total Score____/ 5

Task #3:

Criteria	0	1	2	3
Measure of Dimensions	None measured correctly	1 measured correctly	2 measured correctly	3 measured correctly
Base Area	Did not calculate or used incorrect variables	Used correct formula, variables, and answer		
Surface Area	Did not calculate or used wrong process	Used correct process, but found incorrect answer	Used correct process to get the right answer	

Total Score____/ 6

Task #4:

Criteria	0	1	2
Calculate cost of materials	None are calculated correctly	1 calculated correctly	Both calculated correctly
*Used constructive thinking to choose material	Did not answer the question or poor explanation of material choice	Chose material and gave a satisfactory explanation	Chose material and gave thorough explanation

Total Score____/ 4

Task #5:

Criteria	0	1	2
Used correct variables	No	Used 1 correct variable	Used 2 correct variables
Calculated Volume	Did not calculate	Used correct variables, but calculated correctly	Calculated correctly

Total Score____/ 4

Task #6:

Criteria	0	1	2
Pyramid	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Sphere	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Cylinder	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Cone	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Chose most cost effective cereal	No	Yes	

Total Score____/ 9

Criteria	0	1	2	3
Calculated total cost to produce cereal box	Did not calculate		Calculated correctly	
*Constructed convincing arguments regarding the selling price	Did not answer	Chose price, but gave no support of argument	Chose price, but gave weak support of argument	Chose price and gave strong support of their argument

Total Score___________/ 5

Task #8:

Criteria	0	1	2	3
Evaluated each group	Did not evaluate all groups	Evaluated all groups		
Calculated mark-up price	Did not calculate an groups' mark-ups	Calculated some of the groups' mark-ups	Calculated all the groups' mark-ups	
*Constructed convincing arguments for each groups' product	Did not comment on most of the groups	Made only "yes" or "no" comments on most to all groups	Made comments with little support	Made comments with support and suggestions

Total Score____/ 6

Task #9:

Criteria	0	1	2	3
Reflection on peer evaluations	Did not answer	Gave a basic reflection or didn't use peer feedback	Gave a fair reflection considering peer feedback	Gave a good reflection using the peer feedback to evaluate their product
*Constructed convincing arguments to choose a group's product	Did not answer or chose without any explanation	Chose a product and gave a weak explanation	Chose a product and gave an explanation with strong justification	

Total Score____/ 5

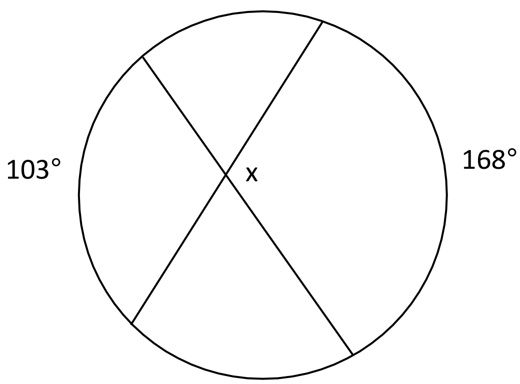
Total Project Score: __

ACHS Geometry unit 4 performance task

Chord Chord Angles and Arcs

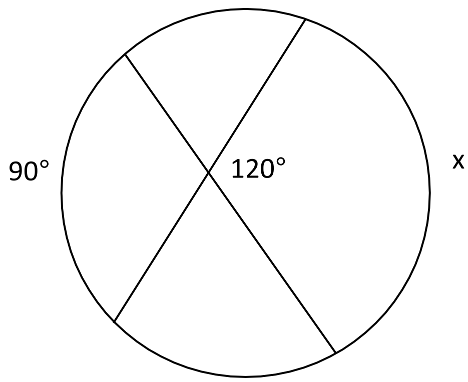
Directions: With this assignment you will be describing in writing how to solve problems related to circles.

1) Solve the following problem below. Check your answer with your neighbor.



2) Write down in words what steps you used to solve the above problem.

3) Solve the following problem below. Check your answer with your neighbor.



4) Describe in words how you would solve this problem.

5) How were the steps you used different in problems #1 and #3? How were they the same?

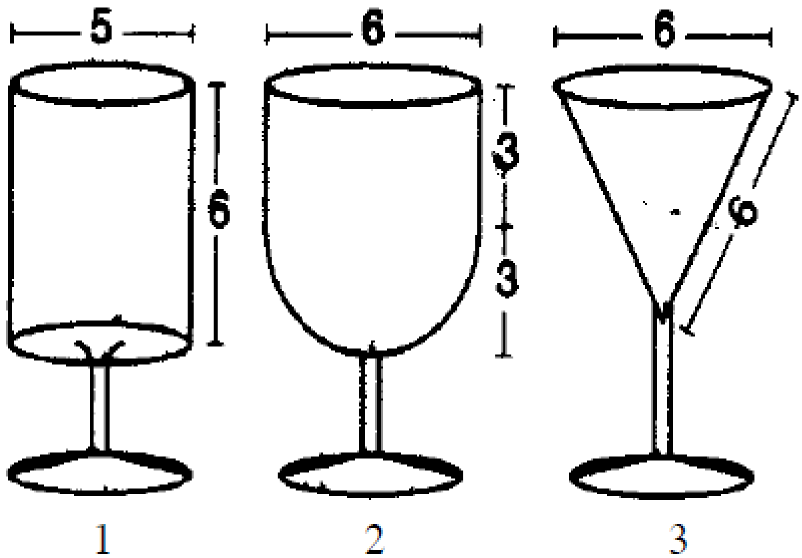
GRADING RUBRIC

Criteria	0	1	2	3
Calculations for problem #1	Did not calculate correctly	Gave a correct answer with no work	Gave a correct answer with correct work	
Calculations for problem #3	Did not calculate correctly	Gave a correct answer with no work	Gave a correct answer with correct work	
Description of Steps	Gave an incorrect description of steps	Gave a poor description or had missing steps		Complete description of steps
Comparison of Problems #1 and #3	No comparison	Gave an answer with no supporting evidence		Gave an answer with well thought out supporting evidence

Total Points: ________________

Name:____

Performance Assessment Tasks: Glasses



The volume of a cylinder $= \pi r^2 h$

The volume of a sphere $= \dfrac{4\pi r^3}{3}$

The volume of a cone $= \dfrac{\pi r^2 h}{3}$

This diagram shows three glasses (not drawn to scale).

The measurements are all in centimeters.

The bowl of glass 1 is cylindrical. The diameter is 5 cm and the height is 6 cm.

The bowl of glass 2 is a cylinder with a hemispherical bottom. The diameter is 6 cm and the height of the cylinder is 3 cm.

The bowl of glass 3 is an inverted cone. The diameter is 6 cm and the slant height is 6 cm.

1. Find the vertical height of the bowl of glass 3. Show your work.

2. Calculate the volume of the bowl of each of these glasses. Show your work.

    a. Glass 1

    b. Glass 2

    c. Glass 3

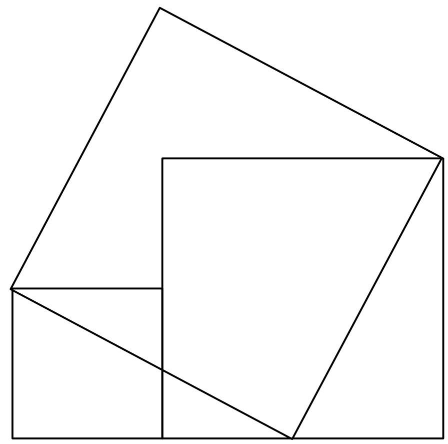
3. Find the height of liquid in Glass 2 when it is half full. Show your calculations.

Glasses			Rubric
		Points	Section points
1.	Gives correct answer: **$3\sqrt{3}$** or **5.2** cm	1	
	Shows work such as: $h^2 = 6^2 - 3^2$	1	2
2.(a)	Gives correct answer: **37.5π** or **118** cm^3	1	
(b)	Gives correct answer: **45π or 141** cm^3	1	
	Shows correct work such as: $\pi \times 3^2 \times 3 + 2/3\ \pi \times 3^3$	1	
(c)	Gives correct answer: **15.6π** or **49** or **$9\sqrt{3}\pi$** cm^3	1 ft	4
3	Gives correct answer: **3.5** cm	1	
	Shows work such as: $45\pi \div 2 = 22.5\pi$ $22.5\pi - 18\pi = 4.5\pi$ $\pi \times 3^2 \times h = 4.5\ \pi$ $h = 0.5$	3 ft	4
	Total Points		**10**

ACHS Geometry unit 1 Performance Task

The Company Logo

A company has designed a new logo using overlapping squares.

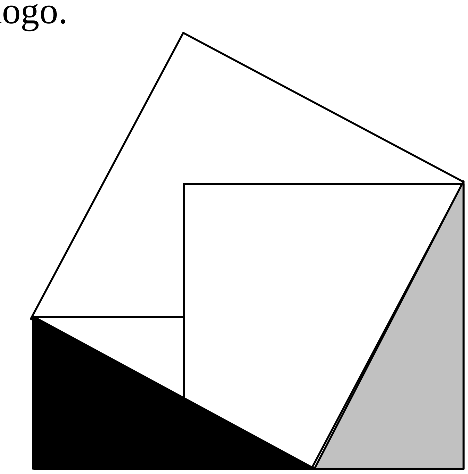


1. How many squares do you see in the logo? ______________________________

   Describe where you see the squares.

2. The logo designer colored two triangles in the logo.

   How are the two triangles related?
   Justify your answer.



3. What are the relationships between the sizes of the three squares in the original logo? Explain your findings.

The Company Logo		**Rubric**
The elements of performance required by this task are: • Visualizes geometric shapes, identifies plane figures and their attributes, proves triangles are congruent, determines the area relationships of quadrilaterals, makes geometric conjectures and proves/justifies geometric arguments.	Points	Section Points
1. There are three squares. Describes the square such as: The figure contains a small square ◊ABIG that shares an adjacent side with a medium size square ◊BDEH. There is a large square ◊CEFG that intersects the small square at vertex G and the medium square at vertex E and point C.	1 1	2
2. The two triangles are congruent (ΔACG = ΔDEC). Justifies answer such as: Both triangles ΔACG and ΔDEC are right triangles because they share an angle with a square, <A and <D. Both hypotenuses are congruent because they both share a side of the large triangle, GC = CE. <CED = <GCA because the are both complements of the same angle, <ECD. Therefore the two triangles are congruent by the Hypotenuse Angle Theorem. *Partial Credit* Some correct geometric reasoning	1 3 (1)	4
3. The sum of the areas of the two smaller squares is equal area of the largest square. Justify their conjecture such as: From part two, ΔACG = ΔDEC. Therefore in both triangles the small leg is the length of the small square, the other leg is the length of the medium square, and the hypotenuse is the length of the large square. Using the Pythagorean Theorem the sum of area of the two squares (small and medium) equals the area of the largest square. Accept proof that two outside triangles fit exactly inside large square along with the remaining parts of the smaller square, either through transformations or Euclidean theorems.	1 3	4
Total Points		**10**

Performance Level Descriptions and Cut Scores

Performance is reported at four levels: 1 through 4, with 4 as the highest.

Level 1: Demonstrates Minimal Success (0-2 points)

The student's response shows few of the elements of performance that the tasks demand. The work shows a minimal attempt on the problem and struggles to make a coherent attack on the problem. Communication is limited and shows minimal reasoning. The student's response rarely uses definitions in their explanations. The student struggles to recognize patterns or the structure of the problem situation.

Level 2: Performance Below Standard (3-4 points)

The student's response shows some of the elements of performance that the tasks demand and some signs of a coherent attack on the core of some of the problems. However, the shortcomings are substantial and the evidence suggests that the student would not be able to produce high-quality solutions without significant further instruction. The student might ignore or fail to address some of the constraints. The student may occasionally make sense of quantities in relationships in the problem, but their use of quantity is limited or not fully developed. The student's response may not state assumptions, definitions, and previously established results. While the student makes an attack on the problem it is incomplete. The student may recognize some patterns or structures, but has trouble generalizing or using them to solve the problem.

Level 3: Performance at Standard (5-6 points)

For most of the task, the student's response shows the main elements of performance that the tasks demand and is organized as a coherent attack on the core of the problem. There are errors or omissions, some of which may be important, but of a kind that the student could fix with more time for checking and revision and some limited help. The student explains the problem and identifies constraints. Student makes sense of quantities and their relationships in the problem situations. They often use abstractions to represent a problem symbolically or with other mathematical representations. The student may use assumptions, definitions, and previously established results in constructing arguments. They may make conjectures and build a logical progression of statements to explore the truth of their conjectures. The student might discern patterns or structures and make connections between representations.

Level 4: Achieves Standards at a High Level (7-10 points)

The student's response meets the demands of nearly all of the task, with few errors. With some more time for checking and revision, excellent solutions would seem likely. The student response shows understanding and use of stated assumptions, definitions and previously established results in construction arguments. The student is able to make conjectures and build a logical progression of statements to explore the truth of their conjecture. The student routinely interprets their mathematical results in the context of the situation and reflects on whether the results make sense. The communication is precise, using definitions clearly. Student looks closely to discern a pattern or structure. The body of work looks at the overall situation of the problem and process, while attending to the details.

ACHS Geometry unit 2 performance task

Proving Triangles Similar

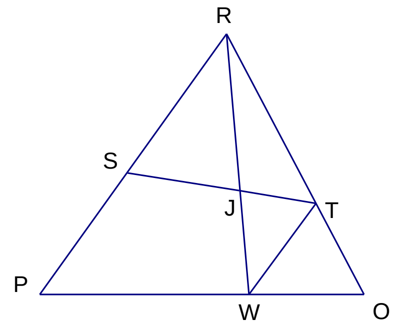
Task:
We have learned two methods in order to prove triangles similar. You will complete proofs on your own. When finished, you will compare with your partner on how each of you completed your proofs. Afterwards, you will look at your own work and write a paragraph reflecting on how you did with the proofs.

Criteria:

- Statements in proof are correct
- Reasons in proof are correct
- Paragraph reflects on student work

Name ________________

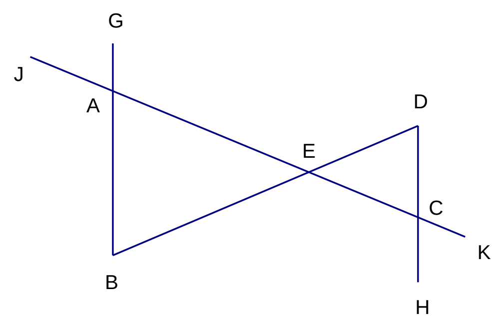
Complete a two-step proof.



1. Given: $\overline{RP} \parallel \overline{TW}$

   Prove: $\triangle RSJ \sim \triangle WTJ$

STATEMENTS	REASONS



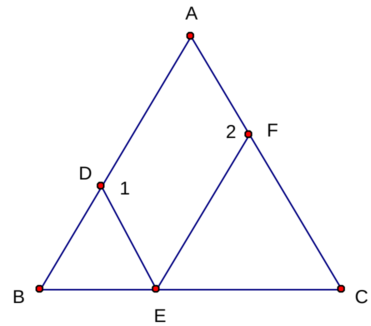
2. Given: $\angle JAG \cong \angle HCK$

   Prove: $\triangle ABE \sim \triangle CDE$

STATEMENTS	REASONS

3. Given: $\overline{AB} \cong \overline{AC}$, $\angle 1 \cong \angle 2$

Prove: $\Delta DBE \sim \Delta FCE$



STATEMENTS	REASONS

After you compare your proofs with your partner, write a paragraph to reflect on how you did. Did you have all the steps for your proofs? Were you missing any specific steps? Did you write your reasons correctly? Write any other comments you have.

ACHS Geometry unit 2 Performance Task

Similar Triangles

Rubric

Criteria	Poor	Satisfactory	Great
Statements in proof are correct	Statements in proofs are not all correct or very little correct (0 – 2 pts)	Many statements in proofs are correct and many are incorrect (3 – 4 points)	Statements in proofs are almost all correct (5 – 6 pts)
Reasons in proof are correct	Reasons in proofs are not all correct or very little correct (0 – 2 pts)	Many reasons in proofs are correct and many are incorrect (3 – 4 points)	Reasons in proofs are almost all correct (5 – 6 pts)
Self-reflection	Did not self-reflect (0 pts)	Little self-reflection (1 pt)	Complete self-reflection (2 pts)

Total___________/14

ACHS Geometry unit 3 performance task

Trigonometry and Careers

Lesson Title: Trigonometry and Careers Performance Task   Duration: 2-3 Days

Goals(s) for a Specific Lesson
My students will be able to...relate how trigonometry is used in different careers and demonstrate their learning of trigonometry and the Pythagorean Theorem.

Curriculum Expectations
Students will describe, through participation in an activity, the application of trigonometry in an occupation. Students will solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean Theorem.

Big Idea(s)
BIG1: Many attributes of a geometric shape are measurable, and some qualitative attributes can be described quantitatively.
BIM2: Shapes can have measurements that are independent, but sometimes one measure of a shape can be determined simply by knowing other measurements of that shape.

Have students individually select a role/career to investigate. They will do research in the computer lab to figure out how trigonometry fits into their selected role.
Roles: Interior Design, Stage Lighting (AV), Teacher, Metal Fabricator, BMX Rider, Architecture, Shoe Design, Fashion Design, Fitness Trainer, Pipe Fitter, Carpenter, Airplane Navigator, Car Customizer, Ergonomics, Massage Therapy, Car Customizer,

Criteria: Research education/pathway required to become that role, come up with 2 detailed examples of how trigonometry relates to the job. Students will be provided with an exemplar.

Based on the career chosen, each student will be given an audience and a format to use to answer a topic question within their chosen career (**RAFT ASSIGNMENT – attached below, modified from Differentiated Instruction Teaching/Learning Examples, Ministry of Education – 2005, TIPS4RM 10APP**). Students will have the option to create their own audience/format/topic question to use for this part of the assignment. Teacher approval must be given for students to use their own question for evaluation.

Scaffolding Questions

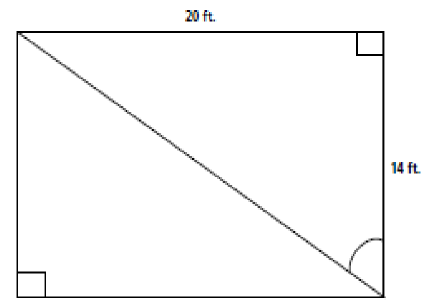
1. **Students creating their own audience/format/topic question can use the given examples as a guide.**

Consolidate/Debrief

1. *Work will be done individually in class and evaluated with a rubric provided to the students in advance.*

2. **Students may be asked to share their information with the class in a discussion/show-and-tell format. Students will have options to present: a pamphlet, presentation, or poster. This may be evaluated for communication using a rubric provided to the students in advance.**

Materials Needed: Computer Lab, RAFT Rubric, Career Research Exemplar, RAFT assignment questions

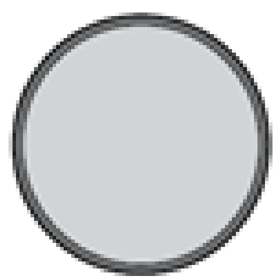
Role	Audience	Format	Topic
Metal Fabricator	Shop Supervisor	Physical model	This drawing shows the way that metal supports will have to be  constructed to frame the outside wall in a new building. Calculate the length of the diagonal piece of metal and all of the unknown angles. Create a scale model of the wall and support beams, showing all dimensions and angles.

Role	Audience	Format	Topic
BMX Rider	Builder	Drawing with measurements	A new motocross course is being built and the starting ramp is being designed. A higher and longer ramp gives riders more speed to start the race. Draw a ramp that would have a length of at least 15 metres with an angle of elevation between 30° and 65°. Include all measurements on your drawing.

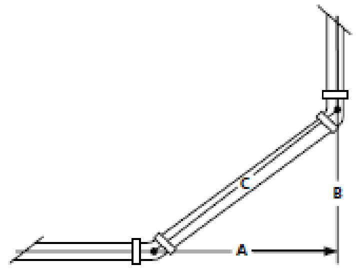
Role	Audience	Format	Topic
Airplane Navigator	Pilot	Technical description	An airplane is 1500 m in the air. The Navigator sees that the airport is at a 20° angle of depression.

			How far away from the airport is the airplane? If the airplane were to descend immediately, how long is the diagonal path to the airport?

Role	Audience	Format	Topic
Personal Trainer	Client	Oral explanation with drawing and calculations	Investigate at least three different angles of elevation and how they affect the height of the treadmill. Comment on how the differences would benefit the client.
Role	Audience	Format	Topic
Shoe Designer	Health Canada	Drawing and written letter	This drawing shows the way that most high heel shoes are designed. Health Canada has done studies that show that an angle of elevation greater than 30° in a shoe will cause foot problems.  Use the drawing measurements to design a stylish shoe with a heel of maximum height that would be approved by Health Canada. Write a letter explaining why your shoe should be recommended as safe.

Role	Audience	Format	Topic
Car Customizer	Machinist	Drawing with calculations and measurements	Create a drawing of a design for a new tire rim that uses right triangles as a central theme.  The drawing must include the side lengths and angles of at least two triangles. Most tire rims have a diameter of 15 inches.

Role	Audience	Format	Topic

Pipe Fitter	Co-Worker	Oral description of solution with drawing and calculations	A pipe offset is pictured to the right:  The length of pipe C is 24” and the length of measurement A is 13.75°. How can you find the angle of the joints at the ends of pipe C?

Role	Audience	Format	Topic
Interior Designer	Painter	Drawing with calculations and measurements	Your client wants a creative geometric pattern on their bedroom wall that includes at least 2 right-angled triangles. The wall has a length of 11 feet and a height of 9 feet. Create a detailed drawing of your design to be submitted to a professional painter. Make sure to include measurements of the sides and angles so that the painter can do it accurately.

Role	Audience	Format	Topic
Audio-Visual Stage Technician	Band	Physical model with diagram and calculations	The spotlight is located 15 feet above the stage level. The spotlight booth is 35 feet away from center stage. The singer wants the spotlight on him the whole time. Calculate the length of the light beam and the angle of depression for the spotlight. Create a scale model of the stage and spotlight, showing all dimensions and angles.

Role	Audience	Format	Topic
Veterinary Technician	Dog Owners	Oral explanation with drawing and calculations	A cat ran through a dog show causing a doggy stampede. Some of the owners bring their dogs to you with a broken paw. A Great Dane has a fracture 9” from the

			end of its paw. A miniature schnauzer has a fracture 3” from the end of its paw. A Chihuahua has a fracture 1” from the end of its paw. Oddly each dog’s bone needs to be reset 1”. As their veterinarian what is the angle that the fractured bones need to be reset for each dog? Explain to the dog owners how much you have to reset the bones and whose dog is most injured.

Trigonometry Career Research

Name: ____________________

Career Chosen: ______________________

How to Become a ______________________:

How Trigonometry Relates to Being a ___________________:

1.

	Level 1	**Level 2**	**Level 3**	**Level 4**
Knowledge and Understanding				
The student shows knowledge of content and understanding of	-demonstrates limited knowledge of content and understanding of	-demonstrates some knowledge of content and some	-demonstrates considerable knowledge of content	-demonstrates thorough knowledge of content and thorough

2.

the concepts in trigonometry	concepts	understanding of concepts	and considerable understanding of concepts	understanding of concepts
Thinking				
The student shows use of planning skills.	-uses planning skills with limited effectiveness	-uses planning skills with some effectiveness	-uses planning skills with considerable effectiveness	-uses planning skills with a high degree of effectiveness
The student effectively judges the reasonableness of their results and makes a convincing argument.	-demonstrates limited judgement and makes a weak argument	-demonstrates some judgement and makes an argument	-demonstrates considerable judgement and makes a good argument	-demonstrates thorough judgement and makes an effective argument.
Communication				
The student clearly explains and logically justifies solutions orally, visually and/or in writing with the correct conventions, vocabulary, and terminolgy	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with limited effectiveness	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with some effectiveness	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with considerable effectiveness	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with a high degree of effectiveness
The student presents in an interesting format.	-presents information with limited interest and few visuals	-presents information with some interest and some visuals	-presents information with considerable interest and meaningful visuals	-presents information with great interest and uses visuals with a high degree of effectiveness
Application				
The student selects appropriate computational strategies to solve for unknown sides or angles in right triangles	-demonstrates a limited ability to select a suitable strategy	-demonstrates some ability to select a suitable strategy	-demonstrates considerable ability to select a suitable strategy	-demonstrates the ability to select a suitable strategy with a high degree of effectiveness
The student describes relevant examples of problem solving using trigonometry in an occupation.	-describes examples with limited relevance	-describes examples with some relevance	-describes examples with considerable relevance	-describes examples with a high degree of relevance

Trigonometry Unit Culminating Activity Rubric

ACHS Geometry unit 2 Performance Task

Similar Triangles

Rubric

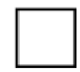
Criteria	Poor	Satisfactory	Great
Statements in proof are correct	Statements in proofs are not all correct or very little correct (0 – 2 pts)	Many statements in proofs are correct and many are incorrect (3 – 4 points)	Statements in proofs are almost all correct (5 – 6 pts)
Reasons in proof are correct	Reasons in proofs are not all correct or very little correct (0 – 2 pts)	Many reasons in proofs are correct and many are incorrect (3 – 4 points)	Reasons in proofs are almost all correct (5 – 6 pts)
Self-reflection	Did not self-reflect (0 pts)	Little self-reflection (1 pt)	Complete self-reflection (2 pts)

Total___________/14

Name:____

Additional Performance Assessment Task: Patchwork

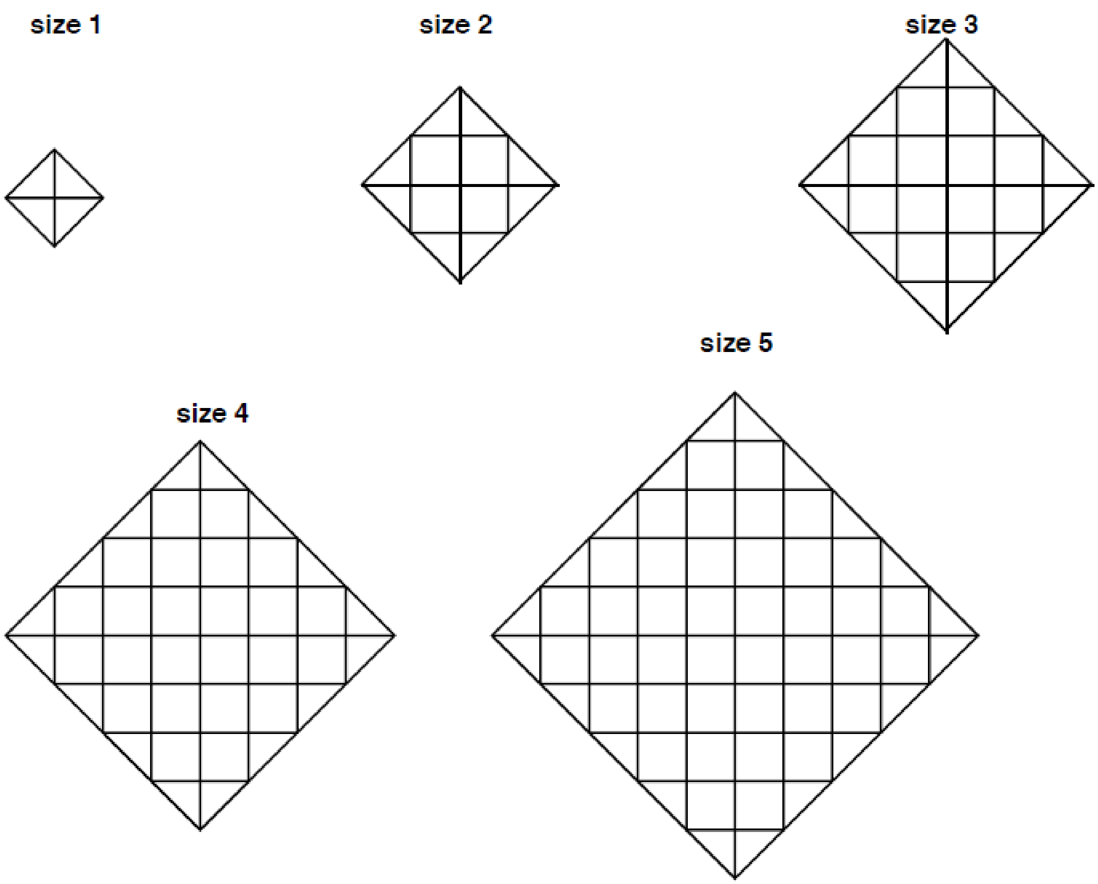
A sheet of square dot paper is provided for use with this item.
Kate makes patchwork cushions.

She uses right triangles  and squares. 

She uses triangles along the edges of each cushion. The rest is made from squares.

The backs of the cushions are made of plain material, not patchwork.

Here are the first five sizes of patchwork cushions.



Kate makes cushions in many other different sizes.

She begins to figure out how many triangles and squares she needs for each size.

For size 1, she needs 4 triangles and 0 squares.

For size 2, she needs 8 triangles and 4 squares.

1. Complete this table to show how many triangles and squares she needs for each of these five

sizes?

Size (n)	Number of triangles (t)	Number of squares (s)

2. Find a rule, or a formula, that will help Kate figure out the number of triangles that she needs for cushions of different sizes. Explain how you figured it out.

3. Use the number patterns in the table to find a rule, or a formula, that will help Kate figure out the number of squares she needs for cushions of different sizes. Explain why your rule works.

4. Kate has a cushion made with 180 squares.
How many triangles are in this cushion? __________
Show how you found the number of triangles.

<table>
<tr><td></td><td>Patchwork</td><td colspan="2">Rubric</td></tr>
<tr><td></td><td></td><td>Points</td><td>Section points</td></tr>
<tr><td>1.</td><td>Correctly completes the table: 1 point triangles , 2 points squares
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<tr><th>Size (n)</th><th>Number of triangles (t)</th><th>Number of squares (s)</th></tr>
<tr><td>1</td><td>4</td><td>0</td></tr>
<tr><td>2</td><td>8</td><td>4</td></tr>
<tr><td>3</td><td>12</td><td>12</td></tr>
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or An algebraic rule: $t = 4n$
Explanation: Each cushion has four edges: each edge has the same number of triangles as the size.
or From the table, as the size of the cushion increases by 1' the number of t riangles increases by 4.</td><td>1
or 2
1
or
1</td><td>3</td></tr>
<tr><td>3.</td><td>A stepwise verbal rule:
The number of squares increases by 4, then 8, then 12, then 16 ....: increasing multiples of 4.
or The number of squares + the number of triangles for any size is equal to the number of squares for the next size. e.g.: 16 + 24 = 40
or An algebraic rule: $s = 2n(n - 1)$ or equivalent algebraic rule.
Explanations relating to the cushion design, such as the following.
Stepwise rule: Each triangle of one size becomes a square in the next size. or
Algebraic rule: Each cushion has four sections: if we put two sections together, we get two rectangles, size n by $(n - 1)$.</td><td>1
or
1
or
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1</td><td>3</td></tr>
<tr><td>4.</td><td>Stepwise rule: continues sequence to find that when $s = 180$, $t =$ 40
or
Algebraic rule: finds that when $s = 180$, $n = 10$: when $n = 10$, $\boldsymbol{t} = \mathbf{40}$.</td><td>1
or
1</td><td>1</td></tr>
<tr><td></td><td>Total Points</td><td></td><td>10</td></tr>
</table>

Name:____

Unit 2 Performance Assessment Task : Bill's Jerseys

Bill wants to order new jerseys for his baseball team.

He sees the following advertisements for two printing companies, "PRINT IT" and "TOP PRINT".

Bill doesn't know which company to choose.

PRINT IT

Get your baseball jerseys printed with own names here.

Only $21 per jersey.

TOP PRINT

We will print your baseball jerseys—just supply us with your design.

We will then print each jersey for only $18

A one-time set up fee of $45 applies to each new order.

1. Give Bill some advice on which company he should buy from. When should he choose "PRINT IT"? When should he choose "TOP PRINT"? Explain your answer fully.

   A) Graph each scenario on one graph. (Systems of Equations)

   B) Use the graph to help you decide which company would be better for different quantities of jerseys.

2. A third company called "VALUE PRINTING" wants to start trading.

It wants its prices to be between those of "PRINT IT" and "TOP PRINT".

It wants its prices to be between those most expensive and never wants to be the cheapest.

Can you complete this posted for the new company?

Use the Graph you created for Part 1 to help you answer this question.

Value Printing

We print baseball jerseys.

Pay a one-time set up fee of $_____

Then each jersey will cost $_______

ACHS Geometry unit 5 performance task

Cereal Box Project

Project Introduction:
Geometry is a subject that has many real life applications. Therefore, the purpose of this project is to have the students produce a cereal box and have them determine given certain factors if their cereal box is cost effective. Along the way students will be given the opportunity to reflect on their own work and evaluate their peer'swork. This project will be used during the surface area and volume chapter and the students will be able to take an in-depth look at these figures and their applications. Also, this project will be done in a series of pieces as we complete different parts of the topic.

Introduction for students:
The idea behind this project is for you to create a cereal box to sell in stores. You will have to look at many real-life factors that go into designing and producing a good marketable product. Throughout the course of this project you will have to make decisions about the material that goes into making your cereal and the design of the cereal itself. Along the way you will also have to make predictions and reflections about how well your cereal box is designed and how it compares to the other groups' designs.

TASK #1: Creating Your Cereal Box

1) Name your figure the way it looks in “Net Form.”

____

2) Fold your figure appropriately transforming it into “3-D form.” Is it the figure that
you thought it was from question #1.

____

3) How many vertices does your figure have?

____

4) How many faces does you figure have?

____

5) How many edges does your figure have?

____

6) What is the name of the polygon base of your figure?

____

7) This is going to be your cereal box. Come up with a name for your cereal and decorate your cereal box.

TASK #2: Cereal Prediction

1) Looking at all of the groups' cereal boxes which one do you think will hold the most
cereal? Explain using the properties we have learned.

____
____
____
____
____
____
____
____

2) Which cereal box would hold the least amount of cereal?

____
____
____
____

3) As a consumer, which design do you think will sell the best on the shelf? Give a brief
justification.

____
____
____
____

TASK #3: Finding the Surface Area

*use cm for all of your measuring and calculations

1) Measure the height of your prism and record below.

h = ____________

2) Measure the dimensions of you prism's base

b = ____________

h = ____________

3) Calculate the area of your prism's base (be careful which variables you use).

4) Use the appropriate formula to calculate your prism's Surface Area (be

careful which
variables you use).
SA = _____________

TASK #4: Finding the Cost of your Materials

*Cereal Box Cardboard is $.10 per 100 square cm
*Recycled Cereal Box Cardboard $.07 per 100 square cm
*Plastic Liner Bag $.30
NOTE: To have a sturdy enough cereal box you must use one of the following two options.
* Use only cereal box cardboard
* Use recycled cereal box cardboard and a plastic liner bag

1) Using the above pricesfor cardboard, how much would it cost to produce your cereal box
using only cereal box cardboard.

2) Using the above prices for cardboard, how much would it cost to produce your cereal box
using the recycled cereal box cardboard option.

3) Which type of cardboard is would you choose? Explain why you chose that option?

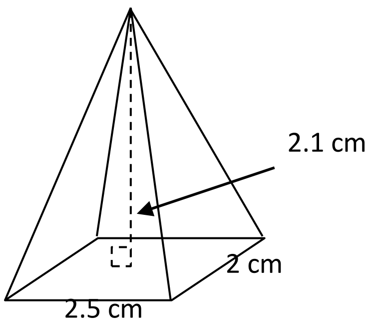
TASK 5: Find the Volume of the Cereal Box

*use cm for all of your measuring and calculations
Directions: Use the measurements from task 3 when you had to find the surface area of
your figure. Be careful what variables you use for your formula.
1) Re-write your measurements
h = _________________
B = ________________

2) Use the formula V = Bh to calculate the volume of your cereal box.

TASK 6: Volume and Cost of the Cereal

Directions: Find the volume of each one of these types of cereal. Then, based on each type of cereal's cost, choose the one type that is the least expensive to fill up your cereal box.

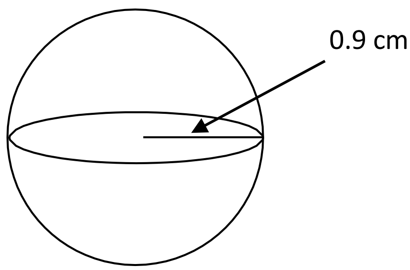


Cost per piece = $0.005

V = ____________________

Total cost to fill your cereal box with this cereal

____

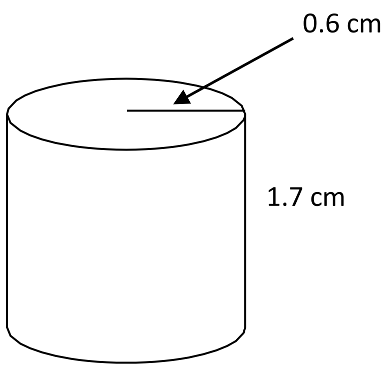


Cost per piece = $0.004

V = ____________________

Total cost to fill your cereal box with this cereal

____



Cost per piece = $0.003

V = ____________________

Total cost to fill your cereal box with this cereal__________________

TASK 7: Total Cost of your Cereal Box

Directions: Identify prices you calculated from earlier tasks.

1) From Task 4: cost of material you chose _________________________

2) From Task 6: cost to fill your cereal box _________________________

3) Calculate the total cost to produce your box of cereal.
Total Cost = _________________________

4) Given the total cost of your product, decide on a price to sell your cereal box that you think is reasonable. Considering that price, do you think people would buy your cereal?
Explain you reasoning

TASK 8: Evaluation of Your Peers

Directions: Put your product and written tasks out so that others will be able to evaluate them. Go around to each group and write a brief, thoughtful, response to each of the following questions. Leave your responses at that group.

1) What was the product's mark-up (how much higher is the selling price than the cost was to produce the cereal)?

2) Do you think that their selling price is fair? Would you buy their cereal at that price?

3) Write any constructive comments or suggestions for this group's product.

TASK 9: Reflection

Directions: Give a brief response to each of the following questions.

1) Look back at your prediction from task 1. Was your final design as good/bad as you thought it was?

2) Look at the responses that your peers gave you on task 8. Reflect on their judgments: do you agree with what they said? Were their comments different from your thoughts about your product?

3) If you could choose any group's cereal box design, whose would you choose? Use information like total cost to produce, shelf appeal, etc to justify your decision.

Rubrics

Task #1:

Criteria	0	1	2	3
Identify properties of 3-D figure	None	1 Correct	2 Correct	All are Correct
Cereal box built correctly	No	Yes		
Box design	None	Has a title and design, but shows little effort	Has a title, creatively designed, and is colorful	

Total Score____/ 6

Task #2:

Criteria	0	1	2
Made prediction about cereal box volume in question #1 and #2	Made 0 to 1 prediction	Made prediction for both	
*Used convincing arguments in question #1	Did not give explanation	Gave explanation, but did not use the properties	Gave explanation using the properties
*Used convincing arguments in question #3	Did not answer the question	Chose a best design, but gave little to no justification	Chose a best design and gave sufficient justification

Total Score____/ 5

Task #3:

Criteria	0	1	2	3
Measure of Dimensions	None measured correctly	1 measured correctly	2 measured correctly	3 measured correctly
Base Area	Did not calculate or used incorrect variables	Used correct formula, variables, and answer		
Surface Area	Did not calculate or used wrong process	Used correct process, but found incorrect answer	Used correct process to get the right answer	

Total Score____/ 6

Task #4:

Criteria	0	1	2
Calculate cost of materials	None are calculated correctly	1 calculated correctly	Both calculated correctly
*Used constructive thinking to choose material	Did not answer the question or poor explanation of material choice	Chose material and gave a satisfactory explanation	Chose material and gave thorough explanation

Total Score____/ 4

Task #5:

Criteria	0	1	2
Used correct variables	No	Used 1 correct variable	Used 2 correct variables
Calculated Volume	Did not calculate	Used correct variables, but calculated correctly	Calculated correctly

Total Score____/ 4

Task #6:

Criteria	0	1	2
Pyramid	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Sphere	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Cylinder	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Cone	Did not answer or used incorrect formula	Used correct formula, but found incorrect answer	Used correct formula and found correct answer
Chose most cost effective cereal	No	Yes	

Total Score____/ 9

Criteria	0	1	2	3
Calculated total cost to produce cereal box	Did not calculate		Calculated correctly	
*Constructed convincing arguments regarding the selling price	Did not answer	Chose price, but gave no support of argument	Chose price, but gave weak support of argument	Chose price and gave strong support of their argument

Total Score___________/ 5

Task #8:

Criteria	0	1	2	3
Evaluated each group	Did not evaluate all groups	Evaluated all groups		
Calculated mark-up price	Did not calculate an groups' mark-ups	Calculated some of the groups' mark-ups	Calculated all the groups' mark-ups	
*Constructed convincing arguments for each groups' product	Did not comment on most of the groups	Made only "yes" or "no" comments on most to all groups	Made comments with little support	Made comments with support and suggestions

Total Score____/ 6

Task #9:

Criteria	0	1	2	3
Reflection on peer evaluations	Did not answer	Gave a basic reflection or didn't use peer feedback	Gave a fair reflection considering peer feedback	Gave a good reflection using the peer feedback to evaluate their product
*Constructed convincing arguments to choose a group's product	Did not answer or chose without any explanation	Chose a product and gave a weak explanation	Chose a product and gave an explanation with strong justification	

Total Score____/ 5

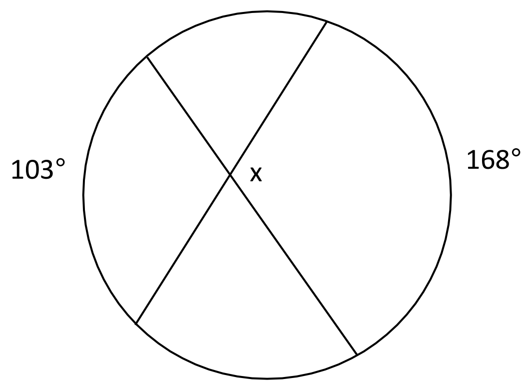
Total Project Score: __

ACHS Geometry unit 4 performance task

Chord Chord Angles and Arcs

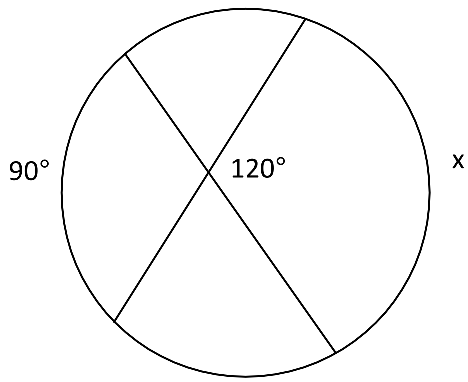
Directions: With this assignment you will be describing in writing how to solve problems related to circles.

1) Solve the following problem below. Check your answer with your neighbor.



2) Write down in words what steps you used to solve the above problem.

3) Solve the following problem below. Check your answer with your neighbor.



4) Describe in words how you would solve this problem.

5) How were the steps you used different in problems #1 and #3? How were they the same?

GRADING RUBRIC

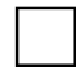
Criteria	0	1	2	3
Calculations for problem #1	Did not calculate correctly	Gave a correct answer with no work	Gave a correct answer with correct work	
Calculations for problem #3	Did not calculate correctly	Gave a correct answer with no work	Gave a correct answer with correct work	
Description of Steps	Gave an incorrect description of steps	Gave a poor description or had missing steps		Complete description of steps
Comparison of Problems #1 and #3	No comparison	Gave an answer with no supporting evidence		Gave an answer with well thought out supporting evidence

Total Points: _________________

Name:____

Additional Performance Assessment Task: Patchwork

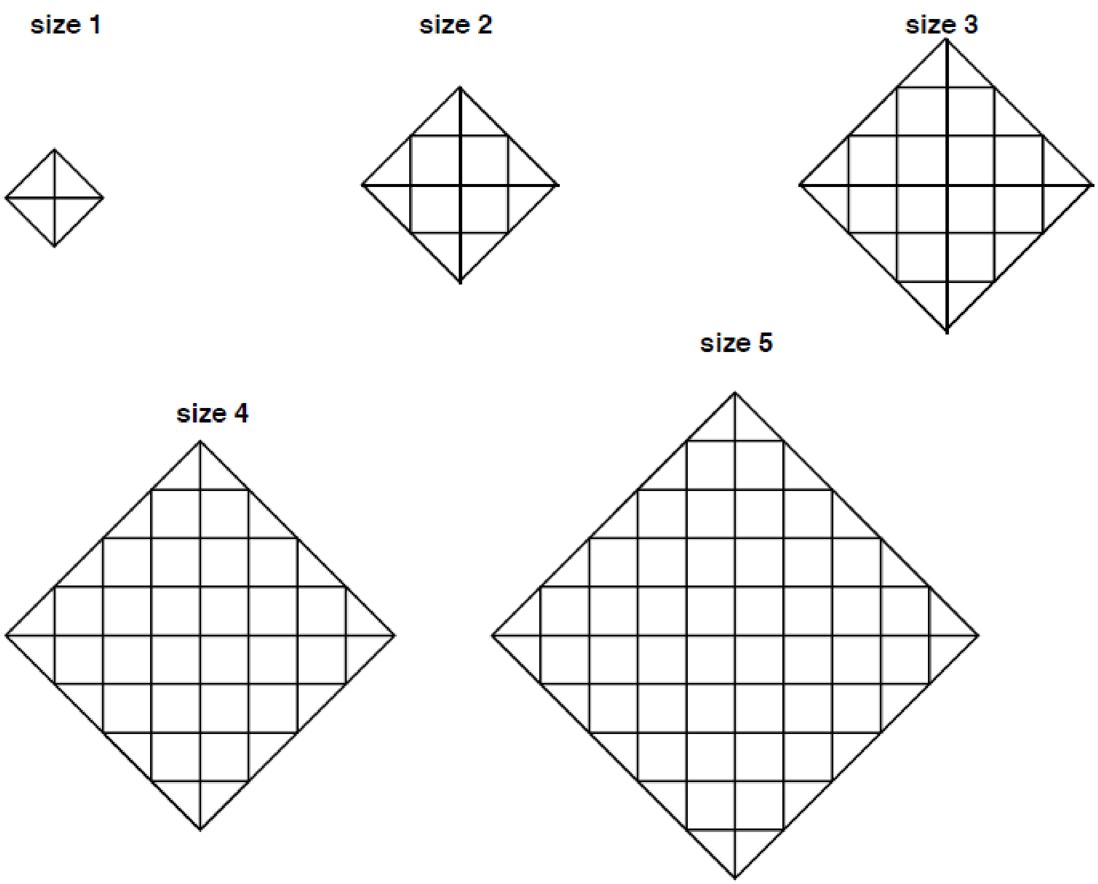
A sheet of square dot paper is provided for use with this item.
Kate makes patchwork cushions.

She uses right triangles  and squares. 

She uses triangles along the edges of each cushion. The rest is made from squares.

The backs of the cushions are made of plain material, not patchwork.

Here are the first five sizes of patchwork cushions.



Kate makes cushions in many other different sizes.

She begins to figure out how many triangles and squares she needs for each size.

For size 1, she needs 4 triangles and 0 squares.

For size 2, she needs 8 triangles and 4 squares.

1. Complete this table to show how many triangles and squares she needs for each of these five

sizes?

Size (n)	Number of triangles (t)	Number of squares (s)

2. Find a rule, or a formula, that will help Kate figure out the number of triangles that she needs for cushions of different sizes. Explain how you figured it out.

3. Use the number patterns in the table to find a rule, or a formula, that will help Kate figure out the number of squares she needs for cushions of different sizes. Explain why your rule works.

4. Kate has a cushion made with 180 squares.
How many triangles are in this cushion? __________
Show how you found the number of triangles.

<table>
<tr><td></td><td colspan="2">Patchwork</td><td>Rubric</td></tr>
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<tr><td>1.</td><td>Correctly completes the table: 1 point triangles , 2 points squares
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<tr><td>2.</td><td>Verbal rule: The number of triangles is four times the size of the cushion.
or An algebraic rule: $t = 4n$
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or The number of squares + the number of triangles for any size is equal to the number of squares for the next size. e.g.: 16 + 24 = 40
or An algebraic rule: $s = 2n(n - 1)$ or equivalent algebraic rule.
Explanations relating to the cushion design, such as the following.
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or
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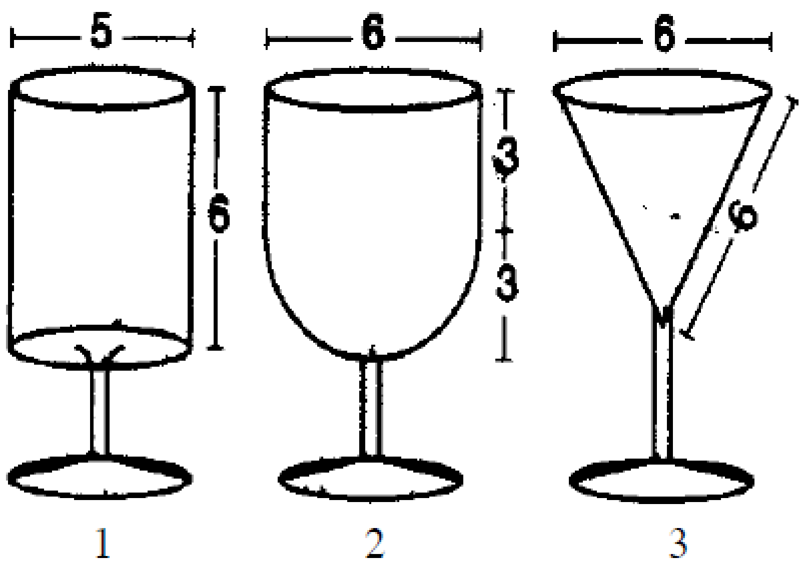
or
1</td><td>1</td></tr>
<tr><td></td><td>Total Points</td><td></td><td>10</td></tr>
</table>

Name:____

Performance Assessment Tasks: Glasses



The volume of a cylinder $= \pi r^2 h$
The volume of a sphere $= \frac{4\pi r^3}{3}$
The volume of a cone $= \frac{\pi r^2 h}{3}$

This diagram shows three glasses (not drawn to scale).

The measurements are all in centimeters.

The bowl of glass 1 is cylindrical. The diameter is 5 cm and the height is 6 cm.

The bowl of glass 2 is a cylinder with a hemispherical bottom. The diameter is 6 cm and the height of the cylinder is 3 cm.

The bowl of glass 3 is an inverted cone. The diameter is 6 cm and the slant height is 6 cm.

1. Find the vertical height of the bowl of glass 3. Show your work.

2. Calculate the volume of the bowl of each of these glasses. Show your work.

    a. Glass 1

    b. Glass 2

    c. Glass 3

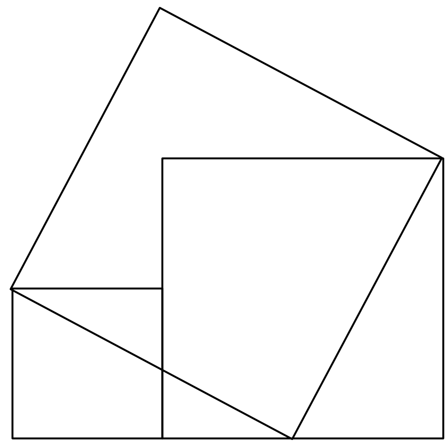
3. Find the height of liquid in Glass 2 when it is half full. Show your calculations.

Glasses		Rubric
	Points	Section points
1. Gives correct answer: **$3\sqrt{3}$** or **5.2** cm	1	
Shows work such as: $h^2 = 6^2 - 3^2$	1	2
2.(a) Gives correct answer: **37.5π** or **118** cm^3	1	
(b) Gives correct answer: **45π or 141** cm^3	1	
Shows correct work such as: $\pi \times 3^2 \times 3 + 2/3\ \pi \times 3^3$	1	
(c) Gives correct answer: **15.6π** or **49** or **$9\sqrt{3}\pi$** cm^3	1 ft	4
3 Gives correct answer: **3.5** cm	1	
Shows work such as: $45\pi \div 2 = 22.5\pi$ $22.5\pi - 18\pi = 4.5\pi$ $\pi \times 3^2 \times h = 4.5\ \pi$ $h = 0.5$	3 ft	4
Total Points		**10**

ACHS Geometry unit 1 Performance Task

The Company Logo

A company has designed a new logo using overlapping squares.

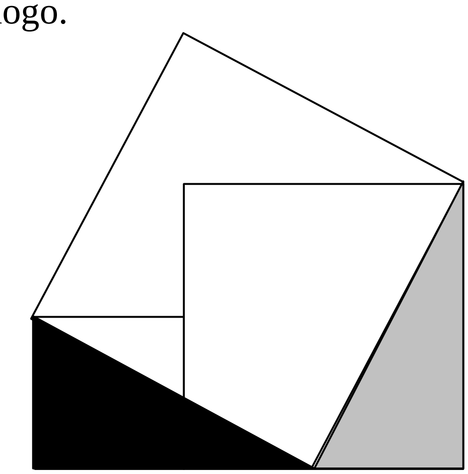


1. How many squares do you see in the logo? ______________________________

   Describe where you see the squares.

2. The logo designer colored two triangles in the logo.

   How are the two triangles related?
   Justify your answer.



3. What are the relationships between the sizes of the three squares in the original logo? Explain your findings.

The Company Logo		Rubric
The elements of performance required by this task are: • Visualizes geometric shapes, identifies plane figures and their attributes, proves triangles are congruent, determines the area relationships of quadrilaterals, makes geometric conjectures and proves/justifies geometric arguments.	Points	Section Points
1. There are three squares. Describes the square such as: The figure contains a small square ◊ABIG that shares an adjacent side with a medium size square ◊BDEH. There is a large square ◊CEFG that intersects the small square at vertex G and the medium square at vertex E and point C.	1 1	2
2. The two triangles are congruent (ΔACG = ΔDEC). Justifies answer such as: Both triangles ΔACG and ΔDEC are right triangles because they share an angle with a square, <A and <D. Both hypotenuses are congruent because they both share a side of the large triangle, GC = CE. <CED = <GCA because the are both complements of the same angle, <ECD. Therefore the two triangles are congruent by the Hypotenuse Angle Theorem. *Partial Credit* Some correct geometric reasoning	1 3 (1)	4
3. The sum of the areas of the two smaller squares is equal area of the largest square. Justify their conjecture such as: From part two, ΔACG = ΔDEC. Therefore in both triangles the small leg is the length of the small square, the other leg is the length of the medium square, and the hypotenuse is the length of the large square. Using the Pythagorean Theorem the sum of area of the two squares (small and medium) equals the area of the largest square. Accept proof that two outside triangles fit exactly inside large square along with the remaining parts of the smaller square, either through transformations or Euclidean theorems.	1 3	4
Total Points		**10**

Performance Level Descriptions and Cut Scores

Performance is reported at four levels: 1 through 4, with 4 as the highest.

Level 1: Demonstrates Minimal Success (0-2 points)

The student's response shows few of the elements of performance that the tasks demand. The work shows a minimal attempt on the problem and struggles to make a coherent attack on the problem. Communication is limited and shows minimal reasoning. The student's response rarely uses definitions in their explanations. The student struggles to recognize patterns or the structure of the problem situation.

Level 2: Performance Below Standard (3-4 points)

The student's response shows some of the elements of performance that the tasks demand and some signs of a coherent attack on the core of some of the problems. However, the shortcomings are substantial and the evidence suggests that the student would not be able to produce high-quality solutions without significant further instruction. The student might ignore or fail to address some of the constraints. The student may occasionally make sense of quantities in relationships in the problem, but their use of quantity is limited or not fully developed. The student's response may not state assumptions, definitions, and previously established results. While the student makes an attack on the problem it is incomplete. The student may recognize some patterns or structures, but has trouble generalizing or using them to solve the problem.

Level 3: Performance at Standard (5-6 points)

For most of the task, the student's response shows the main elements of performance that the tasks demand and is organized as a coherent attack on the core of the problem. There are errors or omissions, some of which may be important, but of a kind that the student could fix with more time for checking and revision and some limited help. The student explains the problem and identifies constraints. Student makes sense of quantities and their relationships in the problem situations. They often use abstractions to represent a problem symbolically or with other mathematical representations. The student may use assumptions, definitions, and previously established results in constructing arguments. They may make conjectures and build a logical progression of statements to explore the truth of their conjectures. The student might discern patterns or structures and make connections between representations.

Level 4: Achieves Standards at a High Level (7-10 points)

The student's response meets the demands of nearly all of the task, with few errors. With some more time for checking and revision, excellent solutions would seem likely. The student response shows understanding and use of stated assumptions, definitions and previously established results in construction arguments. The student is able to make conjectures and build a logical progression of statements to explore the truth of their conjecture. The student routinely interprets their mathematical results in the context of the situation and reflects on whether the results make sense. The communication is precise, using definitions clearly. Student looks closely to discern a pattern or structure. The body of work looks at the overall situation of the problem and process, while attending to the details.

Name:____

Unit 2 Performance Assessment Task : Bill's Jerseys

Bill wants to order new jerseys for his baseball team.

He sees the following advertisements for two printing companies, "PRINT IT" and "TOP PRINT".

Bill doesn't know which company to choose.

PRINT IT

Get your baseball jerseys printed with own names here.

Only $21 per jersey.

TOP PRINT

We will print your baseball jerseys—just supply us with your design.

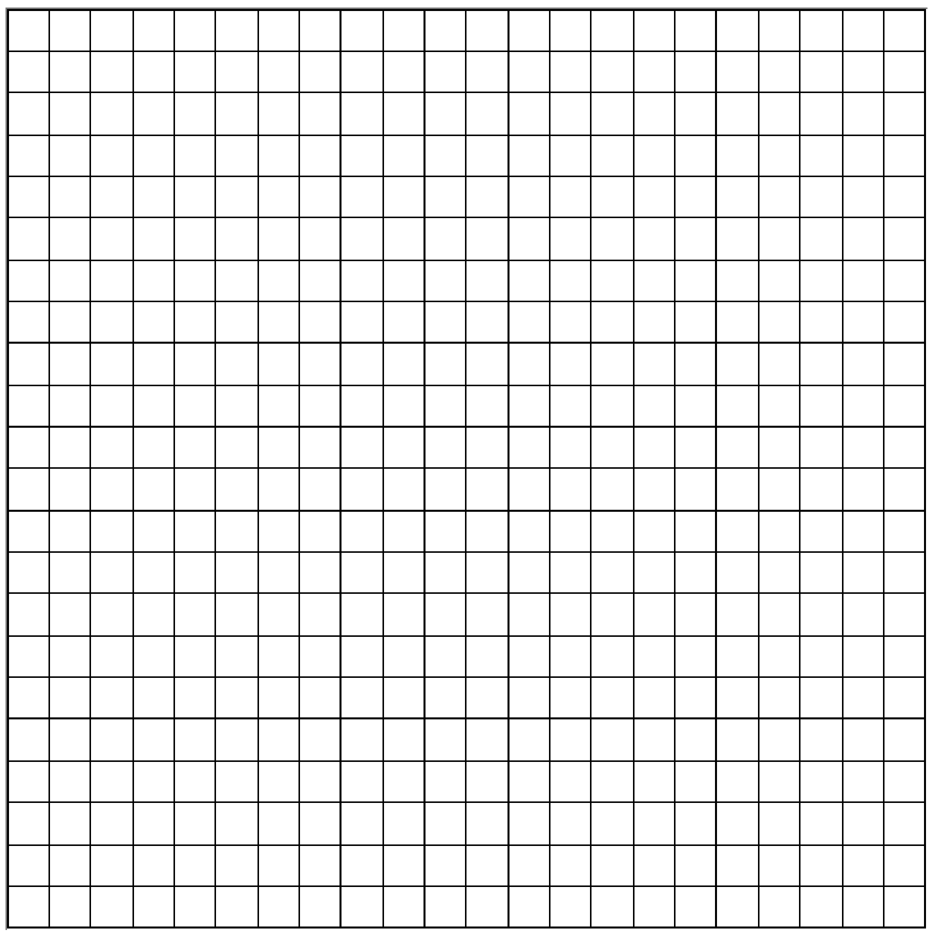
We will then print each jersey for only $18

A one-time set up fee of $45 applies to each new order.

1. Give Bill some advice on which company he should buy from. When should he choose "PRINT IT"? When should he choose "TOP PRINT"? Explain your answer fully.

   A) Graph each scenario on one graph. (Systems of Equations)

   B) Use the graph to help you decide which company would be better for different quantities of jerseys.



2. A third company called "VALUE PRINTING" wants to start trading.

It wants its prices to be between those of "PRINT IT" and "TOP PRINT".

It wants its prices to be between those most expensive and never wants to be the cheapest.

Can you complete this posted for the new company?

Use the Graph you created for Part 1 to help you answer this question.

Value Printing

We print baseball jerseys.

Pay a one-time set up fee of $_____

Then each jersey will cost $_______

ACHS Geometry unit 2 performance task

Proving Triangles Similar

Task:

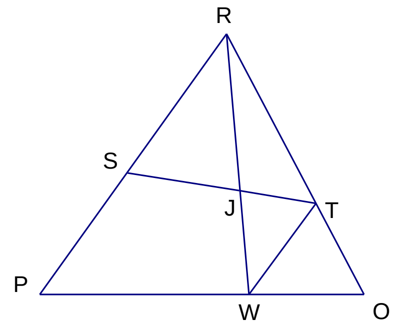
We have learned two methods in order to prove triangles similar. You will complete proofs on your own. When finished, you will compare with your partner on how each of you completed your proofs. Afterwards, you will look at your own work and write a paragraph reflecting on how you did with the proofs.

Criteria:

- Statements in proof are correct
- Reasons in proof are correct
- Paragraph reflects on student work

Name ________________

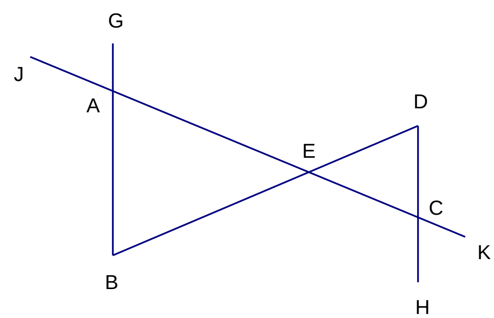
Complete a two-step proof.



1. Given: $\overline{RP} \parallel \overline{TW}$

   Prove: $\triangle RSJ \sim \triangle WTJ$

STATEMENTS	REASONS



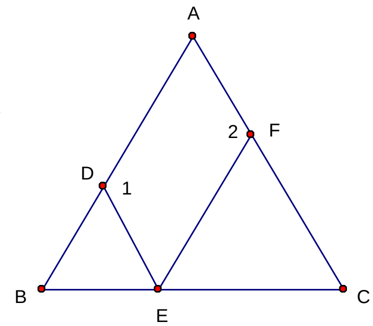
2. Given: $\angle JAG \cong \angle HCK$

   Prove: $\triangle ABE \sim \triangle CDE$

STATEMENTS	REASONS

3. Given: $\overline{AB} \cong \overline{AC}$, $\angle 1 \cong \angle 2$

Prove: $\Delta DBE \sim \Delta FCE$



STATEMENTS	REASONS

After you compare your proofs with your partner, write a paragraph to reflect on how you did. Did you have all the steps for your proofs? Were you missing any specific steps? Did you write your reasons correctly? Write any other comments you have.

ACHS Geometry unit 2 Performance Task

Similar Triangles

Rubric

Criteria	Poor	Satisfactory	Great
Statements in proof are correct	Statements in proofs are not all correct or very little correct (0 – 2 pts)	Many statements in proofs are correct and many are incorrect (3 – 4 points)	Statements in proofs are almost all correct (5 – 6 pts)
Reasons in proof are correct	Reasons in proofs are not all correct or very little correct (0 – 2 pts)	Many reasons in proofs are correct and many are incorrect (3 – 4 points)	Reasons in proofs are almost all correct (5 – 6 pts)
Self-reflection	Did not self-reflect (0 pts)	Little self-reflection (1 pt)	Complete self-reflection (2 pts)

Total___________/14

ACHS Geometry unit 3 performance task

Trigonometry and Careers

Lesson Title: Trigonometry and Careers Performance Task   Duration: 2-3 Days

Goals(s) for a Specific Lesson
My students will be able to...relate how trigonometry is used in different careers and demonstrate their learning of trigonometry and the Pythagorean Theorem.

Curriculum Expectations
Students will describe, through participation in an activity, the application of trigonometry in an occupation. Students will solve problems involving right triangles, using the primary trigonometric ratios and the Pythagorean Theorem.

Big Idea(s)
BIG1: Many attributes of a geometric shape are measurable, and some qualitative attributes can be described quantitatively.
BIM2: Shapes can have measurements that are independent, but sometimes one measure of a shape can be determined simply by knowing other measurements of that shape.

Have students individually select a role/career to investigate. They will do research in the computer lab to figure out how trigonometry fits into their selected role.
Roles: Interior Design, Stage Lighting (AV), Teacher, Metal Fabricator, BMX Rider, Architecture, Shoe Design, Fashion Design, Fitness Trainer, Pipe Fitter, Carpenter, Airplane Navigator, Car Customizer, Ergonomics, Massage Therapy, Car Customizer,

Criteria: Research education/pathway required to become that role, come up with 2 detailed examples of how trigonometry relates to the job. Students will be provided with an exemplar.

Based on the career chosen, each student will be given an audience and a format to use to answer a topic question within their chosen career (**RAFT ASSIGNMENT – attached below, modified from Differentiated Instruction Teaching/Learning Examples, Ministry of Education – 2005, TIPS4RM 10APP**). Students will have the option to create their own audience/format/topic question to use for this part of the assignment. Teacher approval must be given for students to use their own question for evaluation.

Scaffolding Questions

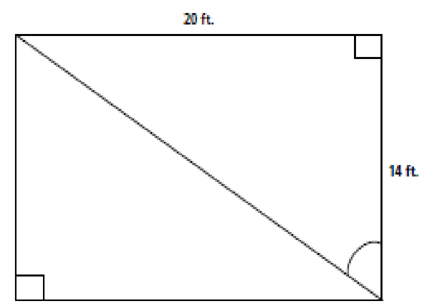
1. **Students creating their own audience/format/topic question can use the given examples as a guide.**

Consolidate/Debrief

1. *Work will be done individually in class and evaluated with a rubric provided to the students in advance.*

2. **Students may be asked to share their information with the class in a discussion/show-and-tell format. Students will have options to present: a pamphlet, presentation, or poster. This may be evaluated for communication using a rubric provided to the students in advance.**

Materials Needed: Computer Lab, RAFT Rubric, Career Research Exemplar, RAFT assignment questions

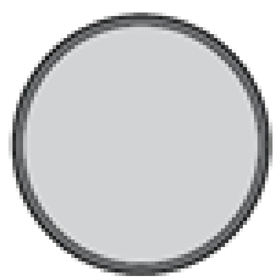
Role	Audience	Format	Topic
Metal Fabricator	Shop Supervisor	Physical model	This drawing shows the way that metal supports will have to be  constructed to frame the outside wall in a new building. Calculate the length of the diagonal piece of metal and all of the unknown angles. Create a scale model of the wall and support beams, showing all dimensions and angles.

Role	Audience	Format	Topic
BMX Rider	Builder	Drawing with measurements	A new motocross course is being built and the starting ramp is being designed. A higher and longer ramp gives riders more speed to start the race. Draw a ramp that would have a length of at least 15 metres with an angle of elevation between 30° and 65°. Include all measurements on your drawing.

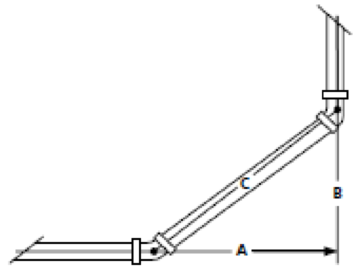
Role	Audience	Format	Topic
Airplane Navigator	Pilot	Technical description	An airplane is 1500 m in the air. The Navigator sees that the airport is at a 20° angle of depression.

			How far away from the airport is the airplane? If the airplane were to descend immediately, how long is the diagonal path to the airport?

Role	Audience	Format	Topic
Personal Trainer	Client	Oral explanation with drawing and calculations	Investigate at least three different angles of elevation and how they affect the height of the treadmill. Comment on how the differences would benefit the client.
Role	Audience	Format	Topic
Shoe Designer	Health Canada	Drawing and written letter	This drawing shows the way that most high heel shoes are designed. Health Canada has done studies that show that an angle of elevation greater than 30° in a shoe will cause foot problems.  Use the drawing measurements to design a stylish shoe with a heel of maximum height that would be approved by Health Canada. Write a letter explaining why your shoe should be recommended as safe.

Role	Audience	Format	Topic
Car Customizer	Machinist	Drawing with calculations and measurements	Create a drawing of a design for a new tire rim that uses right triangles as a central theme.  The drawing must include the side lengths and angles of at least two triangles. Most tire rims have a diameter of 15 inches.

Role	Audience	Format	Topic

Pipe Fitter	Co-Worker	Oral description of solution with drawing and calculations	A pipe offset is pictured to the right: The length of pipe C is 24” and the length of measurement A is 13.75°. How can you find the angle of the joints at the ends of pipe C? 

Role	Audience	Format	Topic
Interior Designer	Painter	Drawing with calculations and measurements	Your client wants a creative geometric pattern on their bedroom wall that includes at least 2 right-angled triangles. The wall has a length of 11 feet and a height of 9 feet. Create a detailed drawing of your design to be submitted to a professional painter. Make sure to include measurements of the sides and angles so that the painter can do it accurately.

Role	Audience	Format	Topic
Audio-Visual Stage Technician	Band	Physical model with diagram and calculations	The spotlight is located 15 feet above the stage level. The spotlight booth is 35 feet away from center stage. The singer wants the spotlight on him the whole time. Calculate the length of the light beam and the angle of depression for the spotlight. Create a scale model of the stage and spotlight, showing all dimensions and angles.

Role	Audience	Format	Topic
Veterinary Technician	Dog Owners	Oral explanation with drawing and calculations	A cat ran through a dog show causing a doggy stampede. Some of the owners bring their dogs to you with a broken paw. A Great Dane has a fracture 9” from the

			end of its paw. A miniature schnauzer has a fracture 3” from the end of its paw. A Chihuahua has a fracture 1” from the end of its paw. Oddly each dog’s bone needs to be reset 1”. As their veterinarian what is the angle that the fractured bones need to be reset for each dog? Explain to the dog owners how much you have to reset the bones and whose dog is most injured.

Trigonometry Career Research

Name: ____________________

Career Chosen: ______________________

How to Become a ______________________:

How Trigonometry Relates to Being a ___________________:
1.

	Level 1	Level 2	Level 3	Level 4
Knowledge and Understanding				
The student shows knowledge of content and understanding of	-demonstrates limited knowledge of content and understanding of	-demonstrates some knowledge of content and some	-demonstrates considerable knowledge of content	-demonstrates thorough knowledge of content and thorough

2.

the concepts in trigonometry	concepts	understanding of concepts	and considerable understanding of concepts	understanding of concepts
Thinking				
The student shows use of planning skills.	-uses planning skills with limited effectiveness	-uses planning skills with some effectiveness	-uses planning skills with considerable effectiveness	-uses planning skills with a high degree of effectiveness
The student effectively judges the reasonableness of their results and makes a convincing argument.	-demonstrates limited judgement and makes a weak argument	-demonstrates some judgement and makes an argument	-demonstrates considerable judgement and makes a good argument	-demonstrates thorough judgement and makes an effective argument.
Communication				
The student clearly explains and logically justifies solutions orally, visually and/or in writing with the correct conventions, vocabulary, and terminolgy	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with limited effectiveness	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with some effectiveness	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with considerable effectiveness	-expresses and organizes mathematical thinking, and uses conventions, vocabulary, and terminology with a high degree of effectiveness
The student presents in an interesting format.	-presents information with limited interest and few visuals	-presents information with some interest and some visuals	-presents information with considerable interest and meaningful visuals	-presents information with great interest and uses visuals with a high degree of effectiveness
Application				
The student selects appropriate computational strategies to solve for unknown sides or angles in right triangles	-demonstrates a limited ability to select a suitable strategy	-demonstrates some ability to select a suitable strategy	-demonstrates considerable ability to select a suitable strategy	-demonstrates the ability to select a suitable strategy with a high degree of effectiveness
The student describes relevant examples of problem solving using trigonometry in an occupation.	-describes examples with limited relevance	-describes examples with some relevance	-describes examples with considerable relevance	-describes examples with a high degree of relevance

<u>Trigonometry Unit Culminating Activity Rubric</u>

ACHS Geometry unit 2 Performance Task

Similar Triangles

Rubric

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Total__________/14