

**Englewood Public School District
College and Career Readiness Math
First Marking Period**

Unit 1: A review of Algebra and Geometry

Overview: This unit will review the basics of Algebra, including properties of real numbers, equations, inequalities, linear equations and inequalities, exponents and exponential equations and polynomials. Students will also review Geometry topics, including angles, area and perimeter.

Time Frame: 43 to 47 Days

Enduring Understandings:

- *The properties of real numbers describe relationships that are always true.*
- *We use the order of operations to simplify expressions and equations.*
- *In a proportional relationship the ratios of two quantities are equal.*
- *To simplify a square root factor out a perfect square from the radicand.*
- *The properties of exponents can be used to simplify expressions using exponents.*
- *We use variables to represent an unknown number in an equation.*
- *Algebraic inequalities can be used to represent relationships between quantities that are not equal.*
- *Inequalities can be represented in many ways. Equivalent representations have the same solution.*
- *In the graph of a line, the ratio for the slope indicates the rate of change.*
- *Linear functions can be used to model every day, real life scenarios.*
- *Systems of equations can be solved using the graphing method, substitution method, or elimination method.*
- *Systems of inequalities can be solved graphically.*
- *Algebraic expressions can be represented in many ways. When expressions are added, subtracted, multiplied, divided, or factored, you replace one expression with an equivalent expression*
- *The absolute value of a number represents the distance that number is from 0.*
- *Exponential functions can be represented by the general equation $y = ab^x$.*
- *The measures of central tendency describe a different indication of the typical or central value in the distribution of a set of numbers.*
- *Angles can be added to form larger angles.*
- *Vertical angles are congruent.*
- *When parallel lines are intersected by a transversal, angles on opposite sides of the transversal are either congruent to each other or supplements.*
- *The perimeter of an object is the distance around the object.*
- *The area of an object is the amount of space the object takes up.*
- *We can illustrate data in a variety of ways, including using tables and graphs.*

Essential Questions:

- *How can we simplify algebraic expressions using the order of operations?*
- *How do we write ratios?*
- *How do we solve problems involving percent?*
- *How do we simplify square roots?*
- *How do we perform operations with square roots?*
- *What are the properties of exponents?*
- *What is the difference between an algebraic expression and an algebraic equation?*
- *How do we solve algebraic equations?*
- *How do we solve an algebraic inequality?*
- *How do we graph a linear equation?*
- *How can we use linear models to illustrate real life scenarios?*
- *What is a system of equations?*
- *What are the different ways we can use to solve a system of equations?*
- *How can we solve a system of inequalities?*
- *How can we simplify polynomials?*
- *What is an exponential equation and how can we solve it?*
- *When are exponential equations used in the real world?*
- *What are the measures of central tendency and how do we find them?*
- *What does the absolute value of a number represent?*
- *How do we solve equations with an absolute value?*
- *What is the relationships between angles?*
- *What does the perimeter of an object represent and how do we find it?*
- *What does the area of an object represent and how do we find it?*
- *What is the best way to illustrate a given set of data?*

Standards	Topics and Objectives	Activities	Resources	Assessments
MP1, MP2, MP3, MP4, MP5, MP6, MP7, MP8 N-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose	Topics The number system, order of operations, ratios, percent, square roots, expressions, equations, exponents, inequalities, graphing, linear function models, systems of	Linear systems: https://teacher.desmos.com/linear-systems Systems of inequalities:	https://betterlesson.com/ https://www.illustrativemathematics.org/ National Library of Virtual Manipulatives http://nlvm.usu.edu/	SAT and Accuplacer tests should be administered when appropriate

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.

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

N-RN.A.2 Rewrite expressions involving radicals and rational exponents using properties of exponents

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

equations, systems of inequalities, polynomials, interest, exponential equations, measures of central tendency, absolute value equations, graphs and tables, area, perimeter, supplementary angles, complementary angles, vertical angles, angles formed by a transversal and parallel lines, triangles

Twenty-First Century Themes and Skills include:

- The Four C's
- [Global awareness](#)
- [Financial, economic, business and entrepreneurial literacy](#)

Objectives

Students will

- Understand the rational number system and be able to identify numbers specifically
- Use the order of operations to simplify algebraic expressions and equations
- Simplify square roots
- Perform operations with square roots
- Simplify expressions with exponents

http://www.doe.virginia.gov/testing/solsearch/sol/math/A/m_ess_a-5d.pdf

Exponential growth and decay:
<https://www.stem.org.uk/resources/elibrary/resource/74824/exponential-growth-and-decay>

Zombies – exponential growth and decay:
<http://a4a.learnport.org/forum/topics/how-to-survive-a-zombie-attack>

Measures of central tendency:
<http://www.mathconcentration.com/profiles/blogs/measures-of-central-tendency-activities>

Numb3rs tv show worksheets:
<http://www.math.cornell.edu/~numb3rs/lipa/Episodes/>

Alabama Learning Exchange
http://alex.state.al.us/search.php?fa_submit=ALLPLANS

Mathematics Assessment Project

<http://map.mathshell.org/>

<http://www.jmap.org/>

<https://www.khanacademy.org/>

kutasoftware.com

<https://www.emathinstruction.com/>

<https://www.teacherspayteachers.com/>

<https://collegereadiness.collegeboard.org/sat/practice>

<https://blog.prepscholar.com/complete-list-of-free-sat-math-practice>

<https://accuplacer.collegeboard.org/student/practice>

that the product of a nonzero rational number and an irrational number is irrational

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.2 Use the structure of an expression to identify ways to rewrite it.

A-CED.A.1 Create equations and inequalities in one variable and use them to solve problems.

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-REI.D.10 Understand that the graph of an equation in two variables is

- Evaluate expressions with exponents
- Understand the difference between an expression and an equation
- Solve algebraic equations
- Create a ratio between two quantities
- Solve equations involving percent
- Solve algebraic inequalities
- Graph a linear equation and a linear inequality
- Create a linear function model to illustrate a given set of data
- Interpret a linear function model
- Solve a system of equations by graphing, substitution or elimination
- Solve a system of inequalities by graphing
- Simplify a polynomial expression
- Write and solve exponential growth and decay problems
- Find the measures of central tendency given a set of data

the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

A-REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters

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

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.

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

A-REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of

- Solve equations involving absolute values
- Given a graph or a table, be able to interpret key features and points
- Find the perimeter and area of different shapes, including non-traditional shapes
- Solve equations involving angles, including complementary, supplementary and vertical angles, alternate interior angles and alternate exterior angles
- Solve equations involving angles in a triangle

linear equations in two variables.

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

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 the intersection of the corresponding half-planes

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.B.3c Use the properties of exponents to transform expressions for exponential functions

F-IF.C.7e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude

F-IF.C.8b Use the properties of exponents to interpret expressions for exponential functions

F-LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions

F-LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function

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.

F-LE.A.3 Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function

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.

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.

G-CO.C.9 Prove theorems about lines and angles

G-CO.C.10 Prove theorems about triangles

Modifications:

- New Jersey Department of Education – Instructional Supports and Scaffolds
- Suggested Strategies for English Language Learners
- Secondary activities were created to allow for greater personalized learning to meet the needs of all learners including students with gifts and talents

Key Vocabulary: order of operations, ratio, percent, square root, radical, radicand, index, exponent, expression, equation, variable, inequality, x and y axes, coordinates, slope, y-intercept, polynomial, coefficient, exponential growth, exponential decay, mean, median, mode, range, first quartile, second quartile, third quartile, inter-quartile range, absolute value, area, perimeter, complementary angles, supplementary angles, vertical angles, alternate interior angles, alternate exterior angles, triangle angle sum theorem, exterior angle of a triangle.