SWEETWATER COUNTY SCHOOL DISTRICT #1

MATHEMATICS

K-12 CURRICULUM MAP

MARCH 2020

Table of Contents

Acknowledgements

Special thanks go to the members of the **Mathematics Subject Area Committee** for their hard work in creating this curriculum:

Sally Allen
Angela Banks
Mark Bedard
John Beitler
Tenesa Bledsoe
Kendyl Chandler
Lyndsey Dorman
Hope Downs Lewis
Jordan Erspamer
David Galindo
Joanna Hostetter
Bernie Keslar
Joeleen Levenson
Tracy Maldonado
Nancy McNutt
Patty Mitchelson
Brandy Nutt
Debbie Stainbrook
Morgen Townsend
Barb Twomey
Robert Wilmetti

Also acknowledged are the members of the **Community Curriculum Council**:

Sally Allen
Kayci Arnoldi
Karie Chrisawn
Brad Cox
Sandra DeStaffany
Carrie Ellison
David Galindo
Jared Hardman
Fred Hollingshead
Amber Johnson
Neil Kourbelas
Tammy Macy
Wanda Maloney
Michael Moore
Lisa Plant
Tonya Torpey
Ronald Urbin
Debbie Verras
Erin Worthington

Sweetwater County School District #1 Vision Statement

As an innovative district, united with our community, we empower and inspire ALL students to academic excellence in pursuit of their interests and passions.

Sweetwater County School District #1 Mission Statement

To provide a quality education for ALL students. The district will accomplish this by:

- making students our first priority
- utilizing community partnerships
- promoting professional excellence
- being committed to excellence in education
- providing a safe, orderly and efficient environment for learning

Mathematics Subject Mission Statement

Students in Sweetwater County School District #1 completing the K-12 math curriculum will analyze, apply, and demonstrate math skills and concepts in real-world applications through perseverance, communication and problem solving.

Sweetwater County School District No. 1 Curriculum Terms	
Curriculum Term	**Definition**
Community Curriculum Council (CCC)	advisory council responsible for evaluating current systems and making recommendations regarding curriculum, instruction, and assessment practices
Subject Area Committee (SAC)	team of representatives from a specific subject area who will write the curriculum and common assessments
Curriculum map	what SCSD1 values and guarantees that students will learn
Purpose statement	identifies the purpose of a class
Benchmark	overall outcome for a unit
Learning target	individual skills that lead up to achieving the benchmark
Resource, textbook, program, etc.	resource adopted by the district to help teach the local curriculum
Pacing Guide	identifies when a benchmark will be taught and when it will be assessed
Proficiency Scale	a tool to show learning goals and the progression of learning for students.
Instructional Planning Resources (IPR)	organizational tool for planning lessons based on learning targets rather than days
Formative assessment	informal assessment used to direct instruction
Common Assessment	common assessment given within a benchmark by all teachers who teach the same class

How to Read the Mathematics Curriculum Map

Purpose Statement *identifies the purpose of a class and what is new or different at this level.*

Purpose Statement:	Students will solve equations using multiplication and division strategies within 100; show representations of fractions, especially unit fractions (fractions with numerator 1); construct and use rectangular arrays for multiplication, division, and area; and describe and analyze two-dimensional shapes.

Benchmark *overall objective for a unit*

Benchmarks:

M3.1	Students will solve problems using multiplication and division strategies with factors 2, 3, 4, 5, and 10 within 100.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
M3.1.1	Represent the concept of multiplication of whole numbers using models including, but not limited to, equal-sized groups, arrays, area models, repeated addition, and equal "jumps" on the number line.	3.OA.A.1	L.3.4	major	
M3.1.2	Represent the concept of division of whole numbers using models including, but not limited to, partitioning, repeated subtraction, sharing, and inverse of multiplication.	3.OA.A.2	CV5.3.1, CV5.3.2, L.3.4, L.3.6	major	

Learning Target Code
***M**3.1.2 = Subject area (Math)*
*M**3**.1.2 = Grade/course level*
*M3.**1**.2 = Benchmark*
*M3.1.**2** = Learning target*

Learning Targets *are individual skills that lead up to achieving the benchmark.*

CCSS Math Standard Reference
***3**.OA.A.2 = Grade*
*3.**OA**.A.2 = Domain*
*3.OA.**A**.2 = Cluster*
*3.OA.A.**2** = Standard*

"Major or minor" *identifies standards that are emphasized on state tests for grades 3-10.*

ISTE – International Society for Technology in Education

Mathematics Curriculum at a Glance

Grade Level or Course	Purpose Statement
Math - Kindergarten	Students will represent whole numbers within 20. Students will apply mathematical strategies to answer quantitative questions within 10. Students will compare both quantities and shapes.
Math - 1st Grade	Students will expand their number sense to include: adding and subtracting within 20 (fluently to 10), applying the understanding of number value to measurement, telling time, analyzing data, composing and decomposing two-dimensional and three-dimensional shapes, understanding place value of tens and ones through 120, measuring using non-standard measurement, and identify and state the value of coins.
Math - 2nd Grade	Students will demonstrate their understanding of the base-ten system, develop fluency in addition and subtraction using efficient strategies, use standard units of measurement, as well as describe and analyze two-dimensional and three-dimensional shapes.
Math - 3rd Grade	Students will solve equations using multiplication and division strategies within 100; show representations of fractions, especially unit fractions (fractions with numerator 1); construct and use rectangular arrays for multiplication, division, and area; and describe and analyze two-dimensional shapes.
Math - 4th Grade	Students will demonstrate an understanding and fluency with multi-digit multiplication (up to 2x2) and division (up to 4x1) using place value strategies; develop an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.
Math - 5th Grade	Students will fluently add and subtract fractions with like and unlike denominators and demonstrate an ability to multiply and divide. Students apply concepts of multiplying multi-digit whole numbers and decimals with relation to division. Students will identify, produce, and compare decimals. Students apply concepts of volume and will illustrate volume utilizing unit cubes. Students will apply real world applications.
Math - 6th Grade	Students will fluently add, subtract, multiply, and divide multi-digit integers and decimals. Students will analyze fractions to include division and connect with real-world statistics to identify, produce, and analyze rates and ratios. Students will illustrate rates and ratios through coordinate planes and number lines to identify and produce polygons and calculate their area and surface area. Students will

	calculate the volume of a right rectangular prism using area. Students will identify the relationship of variables within expressions and solve for the variable within equations.
Math - 7th Grade	Students will apply proportional relationships; manipulate and analyze rational numbers including expressions, linear equations and inequalities in one variable. Students will solve problems involving scale drawings, informal geometric constructions, two- and three-dimensional shapes involving area, surface area, and volume. Students will draw inferences about populations based on samples.
Math - 8th Grade	Students will formulate and reason about expressions and equations, including solving linear equations, systems of linear equations, and model an association in bivariate data with a linear equation. Students will use functions to describe quantitative relationships. Students will analyze two- and three- dimensional space figures using distance, angle similarity and congruence, and apply the Pythagorean Theorem to real-world problems.
Pre-Algebra	Students will fluently add, subtract, multiply, and divide fractions, integers, and decimals. Students will analyze graphs and properties of geometric figures. Students will interpret data from graphs and tables. PALG.1
Algebra I	Students will create and simplify algebraic expressions using laws of exponents and structures such as factored form; solve linear equations, inequalities, systems of linear equations, and factorable quadratic equations; write, graph and interpret linear and exponential functions; interpret, graph, and summarize one and two variable data.
Geometry	Students will apply inductive and deductive reasoning. Students will calculate lengths, areas, and volumes of plane and solid figures. Students will identify triangles and use their properties to solve equations, determine congruence, and determine similarity. Students will apply sine, cosine, and tangent ratios. Students will construct geometric shapes. Students will use all preceding skills to solve real life and mathematical problems.
Algebra II	Students will create, make sense of problems and persevere in solving algebraic expressions pertaining to radical, rational, polynomial, logarithmic, and exponential functions. Students will reason abstractly, quantitatively, construct viable arguments and critique the reasoning behind the arguments. Students will model with mathematics, use appropriate tools strategically, and attend to precision. Students will look for and make use of structure, express regularity in repeated reasoning.

Algebra III Trigonometry	Students will rewrite radical, rational, polynomial, logarithmic, and exponential expressions in equivalent forms. Additionally, students will create and solve linear, quadratic, radical, rational, logarithmic, and exponential equations that can model real-life problems. Students will also graph and analyze quadratic, exponential, and basic trigonometric functions, and utilize these graphs for problem solving. Finally, students will solve triangles using trigonometric ratios and the unit circle.
Pre-calculus/ Trigonometry **Pre-calculus**	Pre-calculus is intended to provide the mathematical background needed for calculus. This course will provide a general introduction to functions, operations with function, inverse functions, and graphs of functions using standard graphs with transformations. It will include an extensive study of linear functions, polynomial functions (including new methods of solving polynomial equations), rational and radical functions, exponential and logarithmic functions, circular and trigonometric functions, sequences and series. The course will include extensive use of the graphing calculator.
Consumer/Applied Math	Students will apply basic computational skills and mathematical concepts to essential consumer topics such as income, banking, saving, budgeting, taking out various types of loans, and expenses incurred in owning a business. Students will analyze and compare accounting and macro-economic concepts.

CCSS Math Progressions

<table>
<tr><th>K</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>HS</th></tr>
<tr><td>Counting & Cardinality</td><td colspan="9"></td></tr>
<tr><td colspan="6">Number & Operations in Base Ten</td><td colspan="2">Ratios & Proportional Relationships</td><td></td><td rowspan="2">Number & Quantity</td></tr>
<tr><td colspan="3"></td><td colspan="3">Number & Operations – Fractions</td><td colspan="3">The Number System</td></tr>
<tr><td colspan="6" rowspan="2">Operations & Algebraic Thinking</td><td colspan="3">Expressions & Equations</td><td>Algebra</td></tr>
<tr><td colspan="2"></td><td>Functions</td><td>Functions</td></tr>
<tr><td colspan="9">Geometry</td><td>Geometry</td></tr>
<tr><td colspan="6">Measurement & Data</td><td colspan="3">Statistics & Probability</td><td>Statistics & Probability</td></tr>
</table>

Fluency Expectations

(accurately, efficiently, and flexibly)

K	1	2	3	4	5	6	7	8
Add/subtract within 5	Add/subtract within 10	Add/subtract within 20 Add/subtract within 100 (pencil & paper)	Multiply/divide within 100 Add/subtract within 1,000	Add/subtract within 1,000,000	Multi-digit multiplication	Multi-digit division Multi-digit decimal operations	Solve $px+q=r$, $p(x+q)=r$	Solve simple 2x2 systems by inspection

Math - Kindergarten

<table>
<tr><th colspan="7">Pacing Guide</th></tr>
<tr><th rowspan="2">Code</th><th rowspan="2">Benchmark</th><th rowspan="2">Month(s) Taught</th><th colspan="4">Common Assessment Period</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>MK.1</td><td>Students will represent the relationship of numbers up to 5.</td><td>Aug - Oct</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td>MK.2</td><td>Students will represent and compare the relationship of numbers up to 10.</td><td>Oct - Nov</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>MK.3</td><td>Students will identify two-dimensional and three-dimensional shapes. Students will be able to create patterns using objects. Students will describe, compare, and classify measurable attributes of objects.</td><td>Nov - Dec</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td>MK.4</td><td>Students will solve addition and subtraction word problems within 10 using objects or drawings. Students will fluently add and subtract within 5.</td><td>Jan - Mar</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td>MK.5</td><td>Students will represent the relationship of numbers up to 20. Students will orally count to 100.</td><td>Mar - May</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td>MK.6</td><td>Students will build and draw shapes. Students will identify U.S. coins.</td><td>May</td><td></td><td></td><td></td><td>X</td></tr>
</table>

Math Standard Reference Code	
CC	Counting and Cardinality
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
MD	Measurement & Data
G	Geometry

Math - Kindergarten

Purpose Statement:	Students will represent whole numbers within 20. Students will apply mathematical strategies to answer quantitative questions within 10. Students will compare both quantities and shapes.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Fluently means accurately, efficiently, and flexibly; students need experiences beyond the standard or traditional algorithm.

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

MK.1		Students will represent the relationship of numbers up to 5.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	MK.1.1	Identify numbers 1-5.	K.CC.A.1a	K-ESS3-1	
	MK.1.2	Orally count numbers by ones to 5.	K.CC.A.1a	K-ESS3-1	

	MK.1.3	Orally count backwards by ones from 5	K.CC.A.1b	K-ESS3-1	
	MK.1.4	Count objects 1-5 (1-1 correspondence).	K.CC.B.4a K.CC.B.4b	K-ESS3-1 SL.K.5	
	MK.1.5	Write numbers 1-5.	K.CC.A.3	SL.K.5	
	MK.1.6	Use counting strategies to tell how many 1-5.	K.CC.B.5a K.CC.B.5b	K-ESS3-1 SL.K.5	
Vocabulary		How many			

MK.2		Students will represent and compare the relationship of numbers up to 10.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	MK.2.1	Identify numbers 0-10.	K.CC.A.1a	K-ESS3-1	
	MK.2.2	Orally count numbers by ones to 10.	K.CC.A.1a	K-ESS3-1	
	MK.2.3	Orally count backwards by ones from 10.	K.CC.A.1b	K-ESS3-1	
	MK.2.4	Count objects 0-10 (1-1 correspondence).	K.CC.B.4a	K-ESS3-1 SL.K.5	
	MK.2.5	Write numbers 0-10.	K.CC.A.3	SL.K.5	
	MK.2.6	Count on from a given number other than 1 (0-10).	K.CC.A.2	K-ESS3-1 FPA4.I.D.4	
	MK.2.7	State the number that is one more or one less of a given number 0-10.	K.CC.B.4c	K-ESS3-1 SL.K.5	
	MK.2.8	Count to tell how many objects in a variety of arrangements 0-10.	K.CC.B.4b K.CC.B.5	K-ESS3-1 SL.K.5	
	MK.2.9	Identify whether a number of objects in a group is greater than, less than, or equal to the number of objects in another group 1-10.	K.CC.C.6	K-PS2-2 RI.K.1 W.K.7 SL.K.5	

	MK.2.10	Compare written numbers 1-10.	K.CC.C.7	K-PS2-2 K-ESS3-2 RI.K.1 W.K.7 SL.K.3	
Vocabulary		greater than, less than, equal to, compare, how many, one more, one less, zero			

MK.3		Students will identify two-dimensional and three-dimensional shapes. Students will be able to create patterns using objects. Students will describe, compare, and classify measurable attributes of objects.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	MK.3.1	Tell where an object is based on its position *(e.g., above, below, beside, in front of, behind, next to).*	K.G.H.1		
	MK.3.2	Identify two-dimensional shapes including square, circle, rectangle, triangle, and hexagon.	K.G.H.2		
	MK.3.3	Identify three-dimensional shapes including cube, cone, cylinder, and sphere.	K.G.H.2		
	MK.3.4	Analyze and compare two-dimensional and three-dimensional shapes based on their attributes.	K.G.I.4 K.G.H.3		
	MK.3.5	Create patterns using objects.			
	MK.3.6	Describe measurable attributes of objects.	K.MD.F.1	K-PS2-2 K-ESS2-1 W.K.7 RI.K.1 HE2.3.4 HE2.4.8	3a 3d 5c
	MK.3.7	Make direct comparisons of the length, capcity, weight, and temperature of objects.	K.MD.F.2	K-PS2-2 K-PS3-1	

				RI.K.1 W.K.2 W.K7 SL.K.3	
	MK.3.8	Classify and count objects into categories.	K.MD.G.3	K-ESS2-1 W.K.7	5c
Vocabulary		flat, solid, vertices, above, below, beside, in-front of, next to, behind, circle, cone, cube, cylinder, face, hexagon, rectangle, solid, sphere, square, triangle, sort, compare, height, length, longer, shorter, taller, more, less, same, capcity, weight, temperature			

MK.4		Students will solve addition and subtraction word problems within 10 using objects or drawings. Students will fluently add and subtract within 5.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	MK.4.1	Model addition and subtraction situations within 10.	K.OA.D.1	K-PS2-2 W.K.7 HE.2.3.4	
	MK.4.2	Solve addition and subtraction word problems within 10 using objects or drawings.	K.OA.D.2	K-ESS3-1 CV.5.3.1	3a 3d 5c
	MK.4.3	Decompose numbers less than or equal to 10.	K.OA.D.3		
	MK.4.4	Produce all combinations that make 10.	K.OA.D.4		
	MK.4.5	Fluently add and subtract problems within 5.	K.OA.D.5		
Vocabulary		add, subtract, addition, subtraction, number bond, part, whole, number sentence, equal, compose, decompose			

MK.5	Students will represent the relationship of numbers up to 20. Students will orally count to 100.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference

	MK.5.1	Identify numbers 0-20.	K.CC.A.1	K-ESS3-1	
	MK.5.2	Orally count by ones from 1-100.	K.CC.A.1	K-ESS3-1	
	MK.5.3	Orally count by tens from 10-100.	K.CC.A.1	K-ESS3-1	
	MK.5.4	Orally count backwards by ones from 20.	K.CC.A.1	K-ESS3-1	
	MK.5.5	Count objects 0-20 (1-1 correspondence).	K.CC.B.4a	K-ESS3-1 SL.K.5	
	MK.5.6	Write numbers 0-20.	K.CC.A.3	SL.K.5	
	MK.5.7	Count to answer how many for a given number of objects and create a set of objects based on a given numeral 0-20.	K.CC.B.4b K.CC.B.5a K.CC.B.5b	K-ESS3-1 SL.K.5	
	MK.5.8	State the number that is one more or one less of a given number 0-20.	K.CC.B.4c	K-ESS3-1 SL.K.5	
	MK.5.9	Count on from a given number other than 1 (1-20).	K.CC.A.2	K-ESS3-1 FPA4.I.D.4	
	MK.5.10	Compose and decompose numbers 0-20 as ten ones and some more ones.	K.NBT.E.1a K.NBT.E.1b		
Vocabulary		greater than, less than, equal to, compare, one more, one less, teen number			

MK.6		Students will build and draw shapes. Students will identify U.S. coins.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	MK.6.1	Draw two-dimensional shapes.	K.G.B.5		
	MK.6.2	Build three-dimensional shapes.	K.G.B.5		
	MK.6.3	Use simple shapes to build squares, rectangles, and hexagons.	K.G.B.6		
	MK.6.4	Identify coins by name (penny, nickel, dime, quarter).	K.MD.G.4	SS.2.3.2	

Vocabulary	penny, nickel, dime, quarter

Math – 1st Grade

Pacing Guide						
Code	Benchmark	Month(s) Taught	Common Assessment Period			
			1	2	3	4
M1.1	Students will use a variety of strategies to solve addition and subtraction with fluency to 10, including word problems. Students will use properties of operations in addition and subtraction problems. Students will work with addition and subtraction equations demonstrating an understanding of equal to.	Aug - Oct	X			
M1.2	Students will understand place value using a variety of strategies to add and subtract within 20, including word problems.	Oct - Dec		X		
M1.3	Students will order objects by length and measure objects in non-standard units; organize, represent, and interpret data with up to three categories; and create graphs and tally charts using student or class-collected data relevant to length.	Jan			X	
M1.4	Students will build, write, count, and draw numbers, understanding and using place value to create, compare, and solve addition and subtraction problems to 40.	Feb - Mar			X	
M1.5	Students will reason with shapes and their attributes. Students will organize, represent, and interpret data with up to three categories.	Mar - Apr				X
M1.6	Students will build, write, count, and draw numbers. Students will understand and use place value to create, compare and solve problems to 100.	Apr - May				X
M1.7	Students will tell and write time to the hour and half-hour using both analog and digital clocks. Students will identify coins and state the value of each.	Addressed all year but focused on and assessed in May				X

Math Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
MD	Measurement & Data
G	Geometry

Math - 1st Grade

Purpose Statement:	Students will expand their number sense to include: adding and subtracting within 20 (fluently to 10), applying the understanding of number value to measurement, telling time, analyzing data, composing and decomposing two-dimensional and three-dimensional shapes, understanding place value of tens and ones through 120, measuring using non-standard measurement, and identify and state the value of coins.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Fluently means accurately, efficiently, and flexibly; students need experiences beyond the standard or traditional algorithm.

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M1.1		Students will use a variety of strategies to solve addition and subtraction with fluency to 10, including word problems. Students will use properties of operations in addition and subtraction problems. Students will work with addition and subtraction equations demonstrating an understanding of equal to.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M1.1.1	**Use addition and subtraction within 10 to solve word problems involving situations of adding to, taking from, putting together, taking**	**1.OA.A.1**	**1-ESS1-2 W.1.7**	

		apart, and comparing with unknowns in all positions, by using objects, drawings, or equations with a symbol for the unknown number to represent the problem.		**W.1.8** **CV5.3.1**	
	M1.1.2	**Apply commutative and associative properties of addition as strategies to add and subtract.**	**1.OA.B.3**		
	M1.1.3	Write equations to show subtraction as an unknown-addend problem.	1.OA.B.4		
	M1.1.4	**Relate counting to addition and subtraction using strategies such as by counting on and back.**	**1.OA.C.5**		
	M1.1.5	**Add and subtract within ten fluently using a variety of strategies.**	**1.OA.C.6**		
	M1.1.6	**Explain equal to and the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false.**	**1.OA.D.7**	**FPA4.1.M.3**	
	M1.1.7	**Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. 8 + ? = 11, 5 = ? -3, 6+6=?.**	**1.OA.D.8**		
Vocabulary		count on, track, expression, addend, doubles, doubles+1, part, total, whole, label, +,-,= signs, equation , number sentence, 5-groups, a ten, ones, unit consisting of 10 things. equal, number bond, minus, plus			

M1.2		Students will understand place value using a variety of strategies to add and subtract within 20, including word problems.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M1.2.1	**Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, by using objects, drawings, or equations with a symbol for the unknown number to represent the problem.**	**1.OA.A.1**	**1-ESS1-2** **W.1.7** **W.1.8** **CV5.3.1**	
	M1.2.2	**Solve word problems that call for the addition of three whole numbers whose sum is less than or equal to 20 by using objects, drawings, or equations.**	**1.OA.A.2**	**CV5.3.1**	
	M1.2.3	**Apply commutative and associative properties of addition as strategies to add and subtract.**	**1.OA.B.3**		

	M1.2.4	Write equations to show subtraction as an unknown-addend problem.	1.OA.B.4		
	M1.2.5	**Relate counting to addition and subtraction using strategies such as by counting on and back.**	**1.OA.C.5**		
	M1.2.6	**Add and subtract within ten fluently using a variety of strategies.**	**1.OA.C.6**		
	M1.2.7	**Explain equal to and the meaning of the equal sign, and determine if equations involving addition and subtraction are true or false.**	**1.OA.D.7**	**FPA4.1.M.3**	
	M1.2.8	**Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. 8 + ? = 11, 5 = ? -3, 6+6=?.**	**1.OA.D.8**		
	M1.2.9	**Model the two digits of a two-digit number represent amounts of tens and ones.** ● **10 ones can be bundled into 1 ten.** ● **Teen numbers (11-19) are composed of a ten and some ones.** **Decade numbers (10, 20, 30, etc.) are a number of tens and zero ones.**	**1.NBT.F.2**		
Vocabulary		count on, track, expression, addend, doubles, doubles+1, part, total, whole, label, +,-,= signs, equation , number sentence, 5-groups, a ten, ones, unit consisting of 10 things, equal, number bonds, minus, plus			

M1.3		Students will order objects by length and measure objects in non-standard units; organize, represent, and interpret data with up to three categories; and create graphs and tally charts using student or class-collected data relevant to length.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M1.3.1	**Use addition and subtraction within 40 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, by using objects, drawings, or equations with a symbol for the unknown number to represent the problem.**	**1.OA.A.1**	**1-ESS1-2** **W.1.7** **W.1.8** **CV5.3.1**	
	M1.3.2	Order three objects by length; compare the lengths of two objects indirectly by using a third object.	1.MD.H.1	1-LS3-1 RI.1.1 W.1.7 W.1.8	

				FPA4.1.M.2	
	M1.3.3	Use nonstandard units to show the length of an object as the number of same size units of lengths with no gaps or overlaps.	1.MD.H.2	1-PS4-4 FPA4.1.M.5	
	M1.3.4	**Organize, represent and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.**	**1.MD.J.4**	**W.1.7** **W.1.8** **CV5.4.4**	
Vocabulary		centimeter, centimeter cube, centimeter ruler, data, endpoint, height, length unit, poll(survey), table or graph, less than, longer than/taller than, more than, shorter than, tally marks			

M1.4		Students will build, write, count, and draw numbers, understanding and using place value to create, compare, and solve addition and subtraction problems to 40.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M1.4.1	**Use addition and subtraction within 40 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, by using objects, drawings, or equations with a symbol for the unknown number to represent the problem.**	**1.OA.A.1**	**1-ESS1-2** **W.1.7** **W.1.8** **CV5.3.1**	
	M1.4.2	**Extend the number sequence to 100. In this range:** ● **Count forward and backward starting at any number less than 100.** ● **Read numerals.** ● **Write numerals.** **Represent a number of objects with a written numeral.**	**1.NBT.E.1**		
	M1.4.3	**Model two digits of a two-digit number represent amounts of tens and ones.** ● **10 ones can be bundled into 1 ten.** ● **Teen numbers (11-19) are composed of a ten and some ones.** **Decade numbers (10, 20, 30, etc.) are a number of tens and zero ones.**	**1.NBT.F.2**		

M1.4.4	**Compare pairs of two-digit numbers based on the values of the tens digit and the ones digits, recording the results of comparisons with the words “is greater than,” “is equal to,” “is less than,” and with the symbols >,<, and =.**	**1.NBT.F.3**	**1-LS1-2 RI.1.1 RI.1.2 RI1.10**	
M1.4.5	Add within 40, using concrete models or drawings and strategies based on place value: ● Including adding a two-digit number and a one-digit number. ● Adding a two-digit number and a multiple of 10. ● Understand that in adding a two-digit numbers, adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. Relate the strategy to a written method and explain the reasoning used.	1.NBT.G.4	RI.1.1 RI.1.2 RI.1.10	
M1.4.6	**Given a two-digit number, mentally compute 10 more or 10 less than the number without having to count; explain the reasoning used.**	**1.NBT.G.5**	**RI.1.1 RI.1.2 RI.1.10**	
M1.4.7	Subtract multiples of 10 from an equal or larger multiple of 10 both within 90 using concrete models, drawings, and strategies based on place value.	1.NBT.G.6	1-LS1-2 RI.1.1 RI.1.2 RI.1.10	
Vocabulary	arrow notation, comparison symbols:<,>,=, greater than, less than, equal to, dime, hide zero cards, hundreds chart, number bond, penny, place value chart, quick ten, rekenrek, tape diagram			

M1.5	Students will reason with shapes and their attributes. Students will organize, represent, and interpret data with up to three categories.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
M1.5.1	**Distinguish defining attributes (e.g. triangles are closed and three-sided) versus non-defining attributes (e.g. color, orientation overall size); for a wide variety of shapes; build and draw shapes to possess defining attributes.**	**1.G.K.1**		

	M1.5.2	**Use two-dimensional shapes (rectangles, squares, trapezoids, rhombuses, and triangles) or three-dimensional shapes (cubes, rectangular prisms, cones, and cylinders) to create a composite figure and create new figures from the composite figure.**	**1.G.K.2**		
	M1.5.3	**Partition circles and rectangles into 2 and 4 equal shares and:** ● **Describe the shares using the words halves, fourths, and quarters, and use the phrases half of, fourth of, and quarter of.** ● **Describe the whole as two of or four of the shares.** **Recognize that decomposing into more equal shares creates smaller shares.**	**1.G.K.3**		
Vocabulary		attributes, composite shapes, three dimensional shapes: cone, rectangular prism, cube, cylinder, sphere, Two-dimensional shapes: rhombus, trapezoid, circle, hexagon, rectangle, square, triangle, clock, half of, quarter of, fourth of, halves, fourths, quarters, whole, equal share			

M1.6		Students will build, write, count, and draw numbers. Students will understand and use place value to create, compare and solve problems to 100.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M1.6.1	**Use addition and subtraction within 100 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing with unknowns in all positions, by using objects, drawings, or equations with a symbol for the unknown number to represent the problem.**	**1.OA.A.1**	**1-ESS1-2** **W.1.7** **W.1.8** **CV5.3.1**	
	M1.6.2	**Extend the number sequence to 120. In this range:** ● **Count forward and backward starting at any number less than 120.** ● **Read numerals.** ● **Write numerals.** **Represent a number of objects with a written numeral.**	**1.NBT.E.1**		

	M1.6.3	**Model two digits of a two-digit number represent amounts of tens and ones.** ● **10 ones can be bundled into 1 ten.** ● **Teen numbers (11-19) are composed of a ten and some ones.** **Decade numbers (10, 20, 30, etc.) are a number of tens and zero ones.**	**1.NBT.F.2**		
	M1.6.4	**Compare pairs of two-digit numbers based on the values of the tens digit and the ones digits, recording the results of comparisons with the words "is greater than," "is equal to," "is less than," and with the symbols >,<, and =.**	**1.NBT.F.3**	**1-LS1-2** **RI.1.1** **RI.1.2** **RI1.10**	
	M1.6.5	Add within 100, using concrete models or drawings and strategies based on place value: ● Including adding a two-digit number and a one-digit number. ● Adding a two-digit number and a multiple of 10. ● Understand that in adding a two-digit numbers, adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. Relate the strategy to a written method and explain the reasoning used.	1.NBT.G.4	RI.1.1 RI.1.2 RI.1.10	
	M1.6.6	**Given a two-digit number, mentally compute 10 more or 10 less than the number without having to count; explain the reasoning used.**	**1.NBT.G.5**	**RI.1.1** **RI.1.2** **RI.1.10**	
	M1.6.7	Subtract multiples of 10 from an equal or larger multiple of 10 both within 90 using concrete models, drawings, and strategies based on place value.	1.NBT.G.6	1-LS1-2 RI.1.1 RI.1.2 RI.1.10	
Vocabulary		compare, represent, arrow notation, comparison symbols:<,>,=, greater than, less than, equal to, dime, hide zero cards, hundreds chart, number bond, penny, place value chart, quick ten, rekenrek, tape diagram			

M1.7		Students will tell and write time to the hour and half-hour using both analog and digital clocks. Students will identify coins and state the value of each. *Note: To be instructed throughout the school year with the Common Assessment given in Quarter 4.*	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M1.7.1	**Identify hour and minute hand**	**1.MD.I.3**	**SS2.3.2** **SS2.4.2** **CV5.5.2**	
	M1.7.2	**Tell time to the hour**	**1.MD.I.3**	**SS2.3.2** **SS2.4.2** **CV5.5.2**	
	M1.7.3	**Tell time to the half-hour**	**1.MD.I.3**	**SS2.3.2** **SS2.4.2** **CV5.5.2**	
	M1.7.4	**Use tools to tell and write time**	**1.MD.I.3**	**SS2.3.2** **SS2.4.2** **CV5.5.2**	
	M1.7.5	**Identify the penny, nickel, dime and quarter**	**1.MD.I.3**	**SS2.3.2** **SS2.4.2** **CV5.5.2**	
	M1.7.6	**State the value of the penny, nickel, dime and quarter**	**1.MD.I.3**	**SS2.3.2** **SS2.4.2** **CV5.5.2**	
Vocabulary		dime, nickel, penny, quarter, compare, identify, digital clock, face, half-hour, half of, half past, hour, hour hand, minute, minute hand, O'clock, value, analog, ¢, $			

Math – 2nd Grade

Pacing Guide						
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
M2.1	Students will fluently add and subtract within 20 using mental strategies.	Aug - May	X	X	X	X
M2.2	Students will count, build, read, write, and identify the three digits in a three digit number to show their understanding of place value and compare numbers within 1,000.	Aug - Sep	X			
M2.3	Students will solve addition and subtraction problems within 100, including word problems, using multiple strategies.	Sep - Dec		X		
M2.4	Students will add and subtract within 1,000 using multiple strategies and explain why they work.	Jan - Feb			X	
M2.5	Students will determine if a number is even or odd, build arrays, create arrays from rectangles by partitioning, and write an equation to express the array.	Feb - Mar			X	
M2.6	Students will measure, compare, and estimate the length of objects and solve word problems involving length.	Mar - Apr				X
M2.7	Students will solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using appropriate dollar and cents symbols.	Apr - May				X
M2.8	Students will generate data to create line plots, picture graphs and bar graphs in order to compare the data that is represented.	Apr - May				X
M2.9	Students will identify and draw two-dimensional and three-dimensional shapes.	Apr - May				X
M2.10	Students will partition rectangles and circles into two, three, or four equal shares.	Apr - May				X

M2.11	Students will tell and write time from analog and digital clocks in 5 minute increments using a.m. and p.m.	May				X

Math Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
MD	Measurement & Data
G	Geometry

Math - 2nd Grade

Purpose Statement:	Students will demonstrate their understanding of the base-ten system, develop fluency in addition and subtraction using efficient strategies, use standard units of measurement, as well as describe and analyze two-dimensional and three-dimensional shapes. *Note: By the end of grade 2, know from memory all sums of two 1-digit number*

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Fluently means accurately, efficiently, and flexibly; students need experiences beyond the standard or traditional algorithm.

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M2.1		Students will fluently add and subtract within 20 using mental strategies. *Note: This benchmark needs to be taught all year long. There is an assessment for the end of each quarter.*	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.1.1	**Solve math facts within 20 using mental strategies.** ***(e.g., counting on by 1-3, making ten, doubles, doubles +/- 1/2, etc.).***	**2.OA.B2**		

	M2.1.2	**Demonstrate composing and decomposing numbers within 20.**	**2.OA.B2**		
	M2.1.3	**Solve problems with an unknown number in all positions.** **A+B=___, ___+B=A, B+___=A, A=___+B**	**2.OA.A.1**		
Vocabulary		addend, compose, decompose, equals, equation, minuend, number			

M2.2		Students will count, build, read, write, and identify the three digits in a three digit number to show their understanding of place value and compare numbers within 1,000.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.2.1	**Skip count by 5's, 10's and 100's within 1000 starting at any given number.**	**2.NBT.D.2**		
	M2.2.2	**Build and explain that three digits of a three-digit number represent amounts of hundreds, tens, and ones *(e.g. 706 equals 7 hundreds, 0 tens, 6 ones, Understand that 100 can be thought of as a bundle of ten tens - called a hundred. Numbers can be decomposed in multiple ways e.g. 524 can be decomposed as 5 hundreds, 2 tens and 4 ones or 4 hundreds, 12 tens, and 4 ones.)***	**2.NBT.D.1**	2-ESS1-1	
	M2.2.3	**Read and write numbers to 1,000 using base ten numerals, number names, and expanded form.**	**2.NBT.D.3**	SL.2.2	
	M2.2.4	**Compare pairs of three-digit numbers using the words "is greater than", "is less than", "is equal to", and the symbols <, >, and = to record the results of comparisons.**	**2.NBT.D.4**		
Vocabulary		expanded form, skip counting, standard form, word form, greater than, less than, equal to			

M2.3		Students will solve addition and subtraction problems within 100, including word problems, using multiple strategies.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.3.1	**Add and subtract fluently within 100 using place value, properties of operations, and/or the relationship between addition and subtraction.**	**2.NBT.E.5**	2-ESS2-1	
	M2.3.2	**Solve problems, including word problems, with an unknown number in all positions.** **A+B=___, ___+B=A, B+___=A, A=___+B**	**2.OA.A.1**		
	M2.3.3	Use a number line to add and subtract whole numbers and show that a given number is between two whole numbers.	2MD.G.6		
	M2.3.4	**Solve one step word problems within 100.**	**2.OA.A.1** **2.NBT.E.5**	2-ESS2-1	
	M2.3.5	**Solve two step word problems within 100.**	**2.OA.A.1** **2.NBT.E.5**	2-ESS2-1	
Vocabulary		hundreds place, place value, strategies, unknown, number line			

M2.4		Students will add and subtract within 1,000 using multiple strategies and explain why they work.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.4.1	Add and subtract 10 and 100 from any given number 100-900 mentally.	2.NBT.E.8		
	M2.4.2	**Add and subtract within 1,000 using concrete models or drawings, and strategies based on place value.**	**2.NBT.E.7**	RI.2.1, RI2.3, W2.6, W2.7, W2.8, SL2.2	
	M2.4.3	Add up to four two-digit numbers, using strategies based on place value and properties of operations.	2.NBT.E.6	RI.2.1, RI2.3, W2.6, W2.7, W2.8, SL2.2	

	M2.4.4	Explain why addition and subtraction strategies work, using concrete objects, drawings or words (orally or written).	2.NBT.E.9	RI.2.1, RI2.3, W2.6, W2.7, W2.8, SL2.2	
Vocabulary		thousands place			

M2.5		Students will determine if a number is even or odd, build arrays, create arrays from rectangles by partitioning, and write an equation to express the array.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.5.1	Determine whether a group of objects (up to 20) has an odd or even number of members (i.e. by pairing objects or counting by 2's). **If a number is even, write an equation to express this as the sum of two equal addends.* **If the number is odd, write an equation to express this as a sum of a doubles plus one fact.*	2.OA.C.3	FPA4.1.A.1	
	M2.5.2	Build arrays using rows and columns (up to 5x5).	2.OA.C.4		
	M2.5.3	Use repeated addition to find the total sum of objects in the array and write an equation to solve.	2.OA.C.4		
	M2.5.4	Partition a rectangle, without manipulatives, into rows and columns of same-size squares and count to find the total number of them.	2.G.J.2		
Vocabulary		array, column, equal groups, even, odd, repeated addition, row			

M2.6		Students will measure, compare, and estimate the length of objects and solve word problems involving length.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.6.1	Measure the length of an object by selecting appropriate tools.	2.MD.F.1		

	M2.6.2	Measure the length of an object twice, using different units of measure and compare them.	2.MD.F.2	FPA.4.1.M.2	
	M2.6.3	Estimate lengths using inches, feet, centimeters and meters.	2.MD.F.3		
	M2.6.4	Measure to determine how much longer one object is than another.	2.MD.F.4		
	M2.6.5	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units.	2.MD.G.5		
Vocabulary		centimeter, equal length, foot, height, inch, length, measure, meter, width, yard			

M2.7		Students will solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using appropriate dollar and cents symbols.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.7.1	Identify names and values of dollar bills, quarters, dimes, nickels and pennies.	2.D		
	M2.7.2	Count different combinations of coins and bills up to $10.	2.D		
	M2.7.3	Solve word problems up to $10 involving dollar bills, quarters, dimes, nickels and pennies.	2.MD.H.8		
Vocabulary		cent, coins, dollar, bills, quarter, dime, nickel, penny			

M2.8		Students will generate data to create line plots, picture graphs and bar graphs in order to compare the data that is represented.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.8.1	Collect measurement data based on whole units and create a line plot to show the data.	2.MD.I.9		

	M2.8.2	Collect data and create a picture graph with up to 4 categories, labeling x and y-axis (horizontal and vertical), title, and key.	2.MD.I.10	2-ETS1-1, 2ETS1-3, 2-PS1-1, PE.2.2.1, RI.2.1, RI.2.8, W.2.6, W.2.8, SL.2.5, SS2.5.3, CVE5.4.4	
	M2.8.4	Read and interpret picture graphs comparing the data represented.	2.MD.I.10	2-ETS1-1, 2ETS1-3, 2-PS1-1, PE.2.2.1, RI.2.1, RI.2.8, W.2.6, W.2.8, SL.2.5, SS2.5.3, CVE5.4.4	
	M2.8.4	Collect data and create a bar graph with up to 4 categories,, labeling x and y-axis (horizontal and vertical), title, and key.	2.MD.I.10	2-ETS1-1, 2ETS1-3, 2-PS1-1, PE.2.2.1, RI.2.1, RI.2.8, W.2.6, W.2.8, SL.2.5, SS2.5.3, CVE5.4.4	
	M2.8.5	Read and interpret bar graphs comparing the data represented.	2.MD.I.10	2-ETS1-1, 2ETS1-3, 2-PS1-1, PE.2.2.1, RI.2.1, RI.2.8, W.2.6, W.2.8,	

				SL.2.5, SS2.5.3, CVE5.4.4	
Vocabulary		bar graph, data, horizontal, key, least, line plot, most, picture graph, vertical			

M2.9		Students will identify and draw two-dimensional and three-dimensional shapes.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.9.1	Identify and describe the attributes of two-dimensional shapes *(e.g. angles, sides etc.)*.	2.G.J.1	FPA4.1.A.2	
	M2.9.2	Draw two-dimensional shapes with given attributes.	2.G.J.1	FPA4.1.A.2	
	M2.9.3	Identify and describe the attributes of three-dimensional shapes *(e.g., faces, edges, vertices etc.)*.	2.G.J.1	FPA4.1.A.2	
	M2.9.4	Draw three-dimensional shapes with given attributes.	2.G.J.1	FPA4.1.A.2	
Vocabulary		angle, attributes, base, face, edge, parallel, parallelogram, quadrilateral, symmetrical, vertices			

M2.10		Students will partition rectangles and circles into two, three, or four equal shares.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.10.1	Determine whether rectangles and circles are divided equally into halves, thirds and fourths.	2.G.J.3		
	M2.10.2	Recognize that equal shares of identical wholes do not need to be the same shape.	2.G.J.3		
	M2.10.3	Draw and partition rectangles and circles into halves, thirds, and fourths.	2.G.J.3		
Vocabulary		divide, equal shares, fourths, halves, identical, thirds, whole			

M2.11		Students will tell and write time from analog and digital clocks in 5 minute increments using a.m. and p.m.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	M2.11.1	Tell and write time from analog and digital clocks in five minute increments.	2MD.H.7		
	M2.11.2	Use a.m. or p.m. to tell whether the time/activity presented happened in the morning or afternoon.	2.MD.H.7		
Vocabulary		a.m., half past, hour, minute, p.m., quarter to, quarter past			

Math – 3rd Grade

Pacing Guide						
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
M3.1	Students will solve problems using multiplication and division strategies with factors 2, 3, 4, 5, and 10 within 100.		X			
M3.2	Students will solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.		X			
M3.3	Use place value understanding and properties of operations to perform multi-digit arithmetic (a range of algorithms may be used).		X			
M3.4	Students will represent and solve problems involving multiplication and division strategies using 0, 1, and 6-9 within 100, and identify arithmetic patterns and multiply one-digit whole numbers by multiples of 10.			X		
M3.5	Students will demonstrate concepts of area and relate area to multiplication and addition including real world problems.			X		
M3.6	Students will develop understanding of fractions as numbers.				X	
M3.7	Students will use measuring tools to solve problems involving measurement. Students will generate data, create graphs and interpret graphs.				X	
M3.8	Students will categorize shapes that share attributes and solve real world word problems, involving perimeters of polygons *(e.g., rhombus, rectangles, etc.)*.					X

Math Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
MD	Measurement & Data
G	Geometry

Math - 3rd Grade

Purpose Statement:	Students will solve equations using multiplication and division strategies within 100; show representations of fractions, especially unit fractions (fractions with numerator 1); construct and use rectangular arrays for multiplication, division, and area; and describe and analyze two-dimensional shapes.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Fluently means accurately, efficiently, and flexibly; students need experiences beyond the standard or traditional algorithm.

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M3.1		Students will solve problems using multiplication and division strategies with factors 2, 3, 4, 5, and 10 within 100.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.1.1	Represent the concept of multiplication of whole numbers using models including, but not limited to, equal-sized groups, arrays, area models, repeated addition, and equal "jumps" on the number line.	3.OA.A.1	L.3.4	major	

	M3.1.2	Represent the concept of division of whole numbers using models including, but not limited to, partitioning, repeated subtraction, sharing, and inverse of multiplication.	3.OA.A.2	CV5.3.1, CV5.3.2, L.3.4, L.3.6	major	
	M3.1.3	Solve multiplication and division word problems within 100 using appropriate modeling strategies and equations.	3.OA.A.3	CV5.3.1 CV5.3.2	major	
	M3.1.4	Determine the unknown whole number in a multiplication or division equation by relating three whole numbers when the unknown is a missing factor, product, dividend, divisor, or quotient. (Students do not need to know formal terms.)	3.OA.A.4	L.3.4	major	
	M3.1.5	Apply properties of multiplication (commutative, distributive, associative) as strategies to multiply and divide with factors 2, 3, 4, 5 and 10, understanding division as an unknown factor problem. (Students do not need to use formal terms for these properties.)	3.OA.B.5 3.OA.B.6		major	
	M3.1.6	Fluently multiply and divide with factors 2-5 and 10 using mental strategies such as the relationship between multiplication and division or properties of operations.	3.OA.C.7	L.3.4	major	
	M3.1.7	Solve two-step word problems using the four basic operations. Students should apply Order of Operations when there are no parentheses to specify a particular order.	3.OA.D.8	L.3.4 L.3.6	major	3c,d
Vocabulary		array, compare, digit, division, equation, estimate, expression, equal groups, tape diagram, unit, multiplication, parentheses, rotate, row, column, unknown, distribute				

M3.2		Students will solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.2.1	Use analog clocks to tell and write time to the nearest minute.	3.MD.G.1		minor	
	M3.2.2	Measure time intervals in minutes.	3.MD.G.1		minor	
	M3.2.3	Solve word problems involving addition and subtraction of time intervals in minutes.	3.MD.G.1		minor	
	M3.2.4	Estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). *Note: Emphasize students developing benchmarks for measurement (e.g., a paper clip is approximately 1 gram).*	3.MD.G.2	C.5.3.1 CV5.3.2	minor	
	M3.2.5	Measure liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).	3.MD.G.2		minor	
Vocabulary		elapsed time, estimate, half hour, half past, interval, minute, quarter, time interval, benchmarks, grams, kilograms, liters, liquid volume, mass, measure, volume, capacity, meter, millimeter				

M3.3		Use place value understanding and properties of operations to perform multi-digit arithmetic (a range of algorithms may be used).	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.3.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	3.NBT.E.1		minor	
	M3.3.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of addition, and/or the relationship between addition and subtraction.	3.NBT.E.2		minor	

	M3.3.3	Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 X 80, 5 X 60) using strategies based on place value and properties of multiplication.	3.NBT.E.3		minor	
	M3.3.4	Solve one-step word problems, using the four operations, involving volume or masses that are given in the same unit.	3.MD.G.2	CV5.3.1 CV5.3.2	minor	
Vocabulary		about, capacity, continuous, endpoint, gram, interval, halfway, kilogram, liquid volume, liter, milliliter, plot, point, reasonable, round, second, standard algorithm				

M3.4		Students will represent and solve problems involving multiplication and division strategies using 0, 1, and 6-9 within 100, and identify arithmetic patterns and multiply one-digit whole numbers by multiples of 10. *Note: By the end of grade 3, know automatically all products of two one-digit numbers.*	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.4.1	Solve word problems with multiplication and division using appropriate modeling strategies and equations.	3.OA.A.3		major	
	M3.4.2	Determine the unknown whole number in a multiplication and/or division equation relating three whole numbers when the unknown is a missing factor, product, dividend, divisor, or quotient. *(Students need not know formal terms.)*	3.OA.A.4		major	
	M3.4.3	Apply properties of multiplication (commutative, distributive, associative) as strategies to multiply and divide with factors 0,1 and 6-9. (Students do not need to use formal terms for these properties.)	3.OA.B.5		major	

	M3.4.4	Fluently multiply and divide with factors 1-10 using mental strategies such as the relationship between multiplication and division or properties of operations.	3.OA.C.7	L.3.4	major	
	M3.4.5	Solve two-step word problems using the four basic operations. Students should apply Order of Operations.	3.OA.D.8	L.3.4 L.3.6	major	
	M3.4.6	Identify arithmetic patterns and explain the relationships using properties of operations. (*e.g., 4 times a number is always even or 4 times a number can be decomposed into 2 equal addends)*.	3.OA.D.9		major	
	M3.4.7	Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9x80, 5x60) using strategies based on place value and properties of multiplication.	3.NBT.E.3		major	
Vocabulary		array, compare, digit, division, equation, estimate, expression, equal groups, tape diagram, unit, multiplication, parentheses, rotate, row, column, unknown, distribute, multiple, product				

M3.5		Students will demonstrate concepts of area and relate area to multiplication and addition including real world problems.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.5.1	Understand area as an attribute of plane figures and understand concepts of area measurement, such as square units without gaps or overlaps.	3.MD.I.5		major	
	M3.5.2	Measure areas by counting unit squares (square cm, square m, square in., square ft., and improvised units).	3.MD.I.6	L.3.4 L.3.6	major	
	M3.5.3	Find the area of a rectangle with whole-number side lengths (dimensions) by multiplying them. Show that this area is the same as when counting unit squares.	3.MD.I.7A	L.3.4 L.3.6	major	

	M3.5.4	Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.	3.MD.I.7B	L.3.4 L.3.6	major	
	M3.5.5	Use area models to represent the distributive property in mathematical reasoning. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and b + c is the sum of a x b and a x c.	3.MD.I.7C	L.3.4 L.3.6	major	
	M3.5.6	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different area or with the same area and different perimeter.	3.MD.J.8	L.3.4 L.3.6	major	
Vocabulary		area, area model, square unit, tile, unit square, whole number, array, geometric shape, length				

M3.6		Students will develop understanding of fractions as numbers. *Note: Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8. Use horizontal fractions.*	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.6.1	Partition rectangles, regular polygons, and circles into equal parts with equal areas. Express the area of each part as a unit fraction of the whole.	3.G.A.2		major	
	M3.6.2	Understand a fraction as 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts;	3.NF.A.1		major	

		understand a fraction a/b as the quantity formed by a parts of size 1/b.				
	M3.6.3	Understand and represent fractions as a number on a number line diagram defining the interval from 0. Represent a fraction a/b on a number line diagram by marking off a lengths 1/b from 0. Recognize that the resulting interval has size a/b and that its endpoint locates the number a/b on the number line.	3.NF.A.2a-b	L.3.4 L.3.6	major	
	M3.6.4	Understand two fractions as equivalent if they are the same size *(e.g., 3/4 = 6/8)*, or on the same point on a number line.	3.NF.A.3a	CV5.3.1 CV5.3.2 L.3.4 L.3.5	major	
	M3.6.5	Recognize and generate simple equivalent fractions *(e.g., 1/2 = 2/4, 4/6 = 2/3)* and explain why the fractions are equivalent.	3.NF.A.3b	CV5.3.1 CV5.3.2 L.3.4 L.3.5	major	
	M3.6.6	Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers (*e.g., express 3 as 3/1, and 4/4 is the same as 1).*	3.NF.A.3c	CV5.3.1 CV5.3.2 L.3.4 L.3.5	major	
	M3.6.7	Compare two fractions with the same numerator or the same denominator by reasoning about their size, using the inequality symbols (<, >, or =) (e.g., 5/7 > 1/7 or 1/8 < 1/5).	3.NF.A.3d	CV5.3.1 CV5.3.2 L.3.4 L.3.5	major	
Vocabulary		copies, equivalent fractions, fraction form, fractional unit, non-unit fraction, unit form, unit fraction, unit interval, equal parts				

M3.7		Students will use measuring tools to solve problems involving measurement. Students will generate data, create graphs and interpret graphs.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.7.1	Generate measurement data by measuring lengths using rulers marked with whole numbers, halves and quarters of an inch.	3.MD.H.4		major	5b
	M3.7.2	Use measurement data to create a line plot, where the horizontal scale is marked off in appropriate units (whole numbers, halves, or quarters).	3.MD.H.4		major	5b
	M3.7.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information represented in scaled graphs.	3.MD.H.3, 3.MD.B.4	3ESS2-1 CV5.3.1 CV5.3.2 PE5.2.1 HE4.4.7	major	5b
	M3.7.4	Solve one and two-step word problems using the information in the scaled graphs (*e.g., “how many more” and “how many less”).*	3.MD.H.3	3ESS2-1 CV5.3.1 CV5.3.2 PE5.2.1 HE4.4.7	major	
Vocabulary		frequent, key, measurement data, scaled graphs, bar graph, picture graph, line plot, data, scale, survey				

M3.8		Students will categorize shapes that share attributes and solve real world word problems, involving perimeters of polygons *(e.g., rhombus, rectangles, etc.).*	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M3.8.1	Use attributes of quadrilaterals to classify rhombuses, rectangles, and squares. Understand that the shared attributes can define a larger category (e.g., quadrilaterals).	3.G.K.1	SL.3.1 L.3.6 CV5.3.1	major	

				CV5.3.2 FPA.4.1.A.3 FPA.4.4.A.1		
	M3.8.2	Draw examples of quadrilaterals that do not belong to any of these subcategories: rhombuses, rectangles, and squares.	3.G.K.1	SL.3.1 L.3.6 CV5.3.1 CV5.3.2 FPA.4.1.A.3 FPA.4.4.A.1	major	
	M3.8.3	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different area or with the same area and different perimeter.	3.MD.J.8	L.3.4 L.3.6	major	
Vocabulary		diagonal, perimeter, regular polygon, attribute, quadrilateral, rectangle, rhombus, square, polygon, right angle, octagon, hexagon, parallelogram				

Math – 4th Grade

Pacing Guide						
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
M4.1	Students will indicate that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	Aug	X			
M4.2	Students will read, write, analyze, round, and illustrate their understanding of place value up to 1,000,000.	Sept	X			
M4.3	Students will fluently use standard algorithms in addition and subtraction and explain why they work. Students will solve multi-step word problems using addition and subtraction.	Oct	X			
M4.4	Students multiply a whole number up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and properties of operations, including word problems. Students will illustrate and explain using, rectangular arrays, area models, and/or equations.	Nov		X		
M4.5	Students will find whole number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division, including word problems. Students will illustrate and explain the calculation by rectangular arrays, area models, and/or equations.	Dec		X		
M4.6	Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money.	Jan			X	
M4.7	Students will analyze fraction equivalence and compare fractions.	Feb			X	
M4.8	Students will build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers, including measurement and interpreting data, to solve real-world problems using addition, subtraction and multiplication.	Feb - Mar			X	

M4.9	Students will identify decimal notation for fractions and compare decimal fractions and justify comparisons of decimals using visual models. Students will solve words problems using the four operations involving simple fractions or decimals.	Mar - Apr				X
M4.10	Students will draw and identify lines and angles, and classify two-dimensional figures by properties of their lines and angles. Students will draw and identify lines of symmetry and create patterns using shapes.	Apr - May				X
M4.11	Students will use concepts of angles and angle measurement to sketch and find unknown angles in real world and math problems.	May				X

Math Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
NF	Number & Operations – Fractions
MD	Measurement & Data
G	Geometry

Math - 4th Grade

Purpose Statement:	Students will demonstrate an understanding and fluency with multi-digit multiplication (up to 2x2) and division (up to 4x1) using place value strategies; develop an understanding of fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M4.1		Students will indicate that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.1.1	Identify place value up to 1,000,000.	4.D			
	M4.1.2	Multiply a given multi-digit whole number by 10 to determine the value of a digit in a larger number	4.NBT.D.1		major	

		(e.g., 354x10=3,540, the four in the product is ten times more than the four in the first number).				
	M4.1.3	Use strategies for powers of 10 to multiply and divide multiples of 10.	4.NBT.D.1		major	
	M4.1.4	Find the product of ten and any other number, then justify why the number now has a 0 at the end.	4.NBT.D.1		major	
Vocabulary		hundred-thousands, millions, multi-digit				

M4.2		Students will read, write, analyze, round, and illustrate their understanding of place value up to 1,000,000.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.2.1	Read and write multi-digit whole numbers in standard, expanded, written, and unit form.	4.NBT.D.2	ELA L.3.4, L.3.6	major	
	M4.2.2	Compare two multi-digit numbers using >, < and = symbols and explain with place value reasoning.	4.NBT.D.2	ELA L.3.4, L.3.6	major	
	M4.2.3	Use place value to round multi-digit whole numbers to the millions place.	4.NBT.D.3		major	
	M4.2.4	Explain why a number is rounded to a given place.	4.NBT.D.3		support	
	M4.2.5	Show place value understanding through drawings, charts, tables, diagrams and more.	4.NBT.D.3		support	
Vocabulary		compare, expanded form, number form, unit form, word form				

M4.3		Students will use standard algorithms in addition and subtraction and explain why they work. Students will solve multi-step word problems using addition and subtraction.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.3.1	Demonstrate regrouping with drawings, charts, or tables and explain why it works.	4.NBT.D.4		major	
	M4.3.2	Add and subtract multi-digit whole numbers using the standard algorithm up to 1,000,000.	4.NBT.D.4		major	
	M4.3.3	Use variables to represent unknown quantities in addition and subtraction word problems.	4.OA.A.3	ELA-L.3.4, L.3.6 CVE-CV5.3.1, CV5.3.2	major	
	M4.3.4	Solve multi-step word problems by applying mental computation and estimation strategies to assess the reasonableness of answers in addition and subtraction problems.	4.OA.A.3 4.NBT.E.4	ELA-L.3.4, L.3.6 CVE-CV5.3.1, CV5.3.2	major	
Vocabulary		algorithm				

M4.4		Multiply a whole number up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and properties of operations, including word problems. Students will illustrate and explain using, rectangular arrays, area models, and/or equations.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.4.1	Identify all factor pairs for a whole number and count the multiples of a factor up to 100.	4.OA.B.4	ELA-L.3.4, L.3.6	support	
	M4.4.2	Identify a prime or composite number up to 100 and explain why the numbers are prime or composite.	4.OA.B.4	ELA-L.3.4, L.3.6	support	

	M4.4.3	Use a variety of strategies *(e.g., rectangular arrays, distributive property, partial product),* including the area model specifically, to solve multi-digit by one digit, and two-digit by two digit multiplication problems, including word problems.	4.NBT.E.5 4.OA.A.2		major	
	M4.4.4	Illustrate and explain a multiplication problem using rectangular arrays, area models, and properties of operations or equations, including word problems.	4.NBT.E.5 A.OA.A.2		major	
	M4.4.5	Solve multi-step word problems using a variety of multiplication strategies, including multiplicative comparison.	4.OA.B.4	ELA-L.3.4, L.3.6	support	
	M4.4.6	Use the area formula $A=lw$ and the perimeter formula $P=2l + 2w$ to solve problems.	4.MD.I.3 4.OA.A.2		major	
	M4.4.7	Apply the area and perimeter formulas for rectangles in real world mathematical problems.	4.MD.I.3		major	
	M4.4.8	Generate a number pattern that follows a given rule, using multiplication.	4.OA.C.5	FPA4.1.M.4		
Vocabulary		area model, operations, formula, area, perimeter, length, width				

M4.5		Students will find whole number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division, including word problems. Students will illustrate and explain the calculation by rectangular arrays, area models, and/or equations.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.5.1	Use strategies and appropriate models based on place value, and the relationship between multiplication and division to find quotients and remainders with up to four-digit dividends and one-digit divisors.	4.NBT.E.6 4.OA.A.2 4.OA.A.3	ELA-L.3.4, L.3.6 CVE-CV5.3.1, CV5.3.2	major	
	M4.5.2	Use the area formula A=lw and the perimeter formula P=2l + 2w to find unknown variables.	4.MD.I.3 4.OA.A.3	ELA-L.3.4, L.3.6 CVE-CV5.3.1, CV5.3.2	major	
	M4.5.3	Apply the area and perimeter formulas for rectangles to find the unknown variable in real world mathematical problems.	4.MD.I.3		major	
	M4.5.4	Generate a number pattern that follows a given rule, using multiplication or division.	4.OA.C.5			
Vocabulary		dividend, divisor, quotient, remainder, growing pattern, repeating pattern, rule, features				

M4.6		Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.6.1	Identify relative sizes of measurement units within one system of units (km, m, cm; kg, g; lb, oz; l, ml; hr, min, sec,	4.MD.I.1	ELA-L.3.4, L.3.6	major	

		ft, in, gal, qt, pt, c) and use appropriate tools for measuring.				
	M4.6.2	Record measurement equivalents in a two-column table.	4.MD.I.1	ELA-L.3.4, L.3.6	major	
	M4.6.3	Solve multi-step word problems involving measurement unit conversions with distance, elapsed time, money, and capacity.	4.MD.I.2		major	ISTE-3c
Vocabulary		convert, customary, equivalent, metric, standard, unit, diagram, elapsed time, capacity, volume				

M4.7		Students will analyze fraction equivalence and compare fractions. *Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.*	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.7.1	Explain why fraction a/b is equivalent to a fraction (n x a)/(n x b) using visual fraction models.	4.NF.F.1		major	
	M4.7.2	Recognize and generate equivalent fractions.	4.NF.F.1		major	
	M4.7.3	Compare two fractions with different numerators and different denominators by creating common denominators and using the symbols <, >, or =.	4.NF.F.2	FPA-4.1.M.5	major	
Vocabulary		numerator, denominator, equivalent, benchmark fraction, common denominator, thirds, fifths, sixths, eighths, tenths, twelfths, hundredths				

M4.8		Students will build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers, including measurement and interpreting data, to solve real-world problems using addition, subtraction and multiplication. *Note: Grade 4 expectations are limited to fractions with denominators 2, 3, 4, 5, 6, 8, 10, 12, and 100.*	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.8.1	Use number bonds to show addition and subtraction of fractions as joining and separating parts referring to the same whole.	4.NF.G.3a	ELA- L3.4, L3.6 CVE-CV5.3.1, CV5.3.2	major	
	M4.8.2	Decompose a fraction into a sum of fractions with the same denominator in more than one way, recording decomposition by an equation *(e.g., 3/8= 1/8+1/8+1/8 and 3/8=1/8+2/8).*	4.NF.G.3b	ELA- L3.4, L3.6 CVE-CV5.3.1, CV5.3.2	major	
	M4.8.3	Convert mixed numbers into fractions greater than one *(e.g., 5/2)* and add and subtract mixed numbers with like denominators.	4.NF.G.3c	ELA- L3.4, L3.6 CVE-CV5.3.1, CV5.3.2	major	
	M4.8.4	Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.	4.NF.G.3d	ELA- L3.4, L3.6 CVE-CV5.3.1, CV5.3.2	major	
	M4.8.5	Identify fraction a/b as a multiple of 1/b *(e.g., 5/4 is the product of 5 x (1/4))* and use this understanding to multiply a fraction by a whole number.	4.NF.G.4a 4.NF.G.4b	CVE-CV5.3.1, CV5.3.2	major	
	M4.8.6	Solve real-world problems involving multiplication of a fraction by a whole number by using visual fraction models and equations.	4.NF.G.4c	CVE-CV5.3.1, CV5.3.2	major	

	M4.8.7	Use the four operations to solve word problems involving measurement using simple fractions.	4.MD.I.2		major	ISTE-3c
	M4.8.8	Create a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4 and 1/8) and solve problems involving addition and subtraction of fractions by using information presented in line plots.	4.MD.J.4	PE-5.2.1 Health-HE4.4.7	support	ISTE-5b
Vocabulary		joining parts, separating parts, whole, sub, fraction greater than one, mixed number, line plot, data				

M4.9		Students will identify decimal notation for fractions and compare decimal fractions and justify comparisons of decimals using visual models. Students will solve words problems using the four operations involving simple fractions or decimals. *Note: Use denominators of 2, 4, 8, and decimals up to hundredths.*	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.9.1	Identify the tenths and hundredths place.	4.D			
	M4.9.2	Write fractions with denominator 10 as an equivalent fraction with denominator 100 *(e.g., 3/10 = 30/100).*	4.NF.H.5		major	
	M4.9.3	Add two fractions with respective denominators 10 and 100 *(e.g., 3/10 + 4/100= 34/100).*	4.NF.H.5		major	
	M4.9.4	Use decimal notation for fractions with denominators 10 or 100 *(e.g., 0.62=62/100).*	4.NF.H.6	ELA-L.3.4, L.3.6	major	
	M4.9.5	Compare two decimals to the hundredths place by reasoning about their size and using <, >, and = symbols. Recognize that comparisons are valid only when the two decimals refer to the same whole.	4.NF.H.7	ELA-L.3.4, L.3.6	major	

	M4.9.6	Use the four operations to solve word problems involving measurement using simple fractions and decimals.	4.MD.I.2		major	ISTE-3c
Vocabulary		tenths, hundredths, decimals				

M4.10		Students will draw and identify lines and angles, and classify two-dimensional figures by properties of their lines and angles. Students will draw and identify lines of symmetry and create patterns using shapes.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.10.1	Draw points, lines, line segments, rays, angles (right, obtuse, acute), and perpendicular and parallel lines. Identify these in two dimensional figures.	4.G.L.1	ELA-L.3.4, L.3.6 FPA 4.1.A.3, FPA 4.4.A.1	support	
	M4.10.2	Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size.	4.G.L.2	FPA 4.1.A.3, FPA 4.4.A.1	support	
	M4.10.3	Identify and categorize right triangles by property.	4.G.L.2	FPA 4.1.A.3, FPA 4.4.A.1	support	
	M4.10.4	Identify line-symmetric figures and draw lines of symmetry.	4.G.L.3	FPA 4.1.A.3, FPA 4.4.A.1	support	
	M4.10.5	Generate a shape pattern that follows a given rule.	4.OA.C.5	FPA 4.1.M.4		
Vocabulary		acute, obtuse, right angle, parallel, perpendicular, ray, line segment, two-dimensional shapes, classify, right triangle, symmetry, polygons				

M4.11		Students will use concepts of angles and angle measurement to sketch and find unknown angles in real world and math problems.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M4.11.1	Recognize and identify angles as geometric shapes that are formed where two rays share a common endpoint.	4.MD.K.5		support	
	M4.11.2	Measure angles to show what a degree is within a circle.	4.MD.K.5a		support	
	M4.11.3	Measure angles in whole-number degrees using a protractor.	4.MD.K.6		support	
	M4.11.4	Sketch angles to a specified measure.	4.MD.K.6		support	
	M4.11.5	Compose and decompose angles.	4.MD.K.7		support	
	M4.11.6	Solve real world problems to find the unknown angle measurement.	4.MD.K.7		support	
Vocabulary		arc, endpoint, intersect, protractor, degrees, decompose				

Math – 5th Grade

Pacing Guide						
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
M5.1	Students will use the place value system to the thousandths place to solve problems extending to the use of rounding and comparing decimals.	Aug – Oct	X			
M5.2	Students will construct multi-digit numbers to include decimals representing patterns and the power of 10.	Aug - Oct	X			
M5.3	Students will add and subtract decimals to the hundredths place using a variety of strategies based on place value, properties of operations, relationship of addition and subtraction. Students will relate the strategy to a written method and explain the strategy used.	Oct - Nov	X			
M5.4	Students will fluently multiply multi-digit whole numbers and decimals using the standard algorithm to include real world application.	Oct - Nov		X		
M5.5	Students will find quotients of whole numbers and decimals with up to a two-digit divisor and four-digit dividends using a variety of strategies based on place value, properties of operations, relationship of multiplication and division. Students will relate the strategy to an illustration, equations, rectangular arrays or area models and explain the strategy used.	Nov - Dec		X		
M5.6	Students will add and subtract fractions with unlike denominators including mixed numbers using a variety of strategies, additionally solving real world problem.	Dec - Jan			X	
M5.7	Students will multiply fractions, which are parts of a whole, to include mixed numbers and real world problems, as well as interpret multiplication as scaling. Students will illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Jan - Feb			X	

M5.8	Students will interpret and explain dividing a fraction by a whole number using visual models and applying it to real world situations.	Feb - Mar			X	
M5.9	Students will use unit cubes and formulas to find the volume of rectangular prisms using the operations of multiplication and addition including real world problems.	Mar - Apr				X
M5.10	Students will convert various units of measurement within the customary and metric system and use these conversions in solving multi-step, real world problems. Additionally, students will create a line plot.	Apr - May				X
M5.11	Students will use ordered pairs to plot on a coordinate plane. Students will represent and interpret real world and math problems by plotting points on a coordinate plane.	Apr - May				X
M5.12	Students will identify and classify two-dimensional figures.	Apr - May				X

Math Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
NF	Number & Operations – Fractions
MD	Measurement & Data
G	Geometry

Math - 5th Grade

Purpose Statement:	Students will fluently add and subtract fractions with like and unlike denominators and demonstrate an ability to multiply and divide. Students apply concepts of multiplying multi-digit whole numbers and decimals with relation to division. Students will identify, produce, and compare decimals. Students apply concepts of volume and will illustrate volume utilizing unit cubes. Students will apply real world applications.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Fluently means accurately, efficiently, and flexibly; students need experiences beyond the standard or traditional algorithm.

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M5.1		Students will use the place value system to the thousandths place to solve problems extending to the use of rounding and comparing decimals.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.1.1	Build and represent whole numbers.	NBT.A.3	L.5.4 L.5.6	5.NBT.C.3	

	M5.1.2	Build and represent decimals to the thousandths.	NBT.A.3	L.5.4 L.5.6	5.NBT.C.3	
	M5.1.3	**Read and write decimals in a variety of ways *(e.g., base-ten numerals, number names, and expanded form)*.**	**NBT.A.3a**	**L.5.4 L.5.6**	**5.NBT.C.3**	
	M5.1.4	**Show the next nearest number to the designated decimal to the thousandths.**	**NBT.A.3 NBT.A.4**	**L.5.4 L.5.6**	**5.NBT.C.3**	
	M5.1.5	**Compare decimals using the inequality symbols to demonstrate >, < or = to the thousandths.**	**5.NBT.A.3**	**L.5.4 L.5.6**	**5.NBT.C.3**	
	M5.1.6	**Round decimals to the nearest required place value to the thousandths.**	**NBT.A.3**	**L.5.4 L.5.6**	**5.NBT.C.4**	
Vocabulary		decimal, digit, inequality				

M5.2		Students will construct multi-digit numbers to include decimals representing patterns and the power of 10.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.2.1	**Demonstrate what the digits represent in a multi- digit number.**	**5.NBT.A.1**		**5.NBT.C.1**	**3a,d 5c**
	M5.2.2	**Identify and explain patterns when multiplying numbers of power of 10.**	**5.NBT.A.2**		**5.NBT.C.1**	**3a,d 5c**
	M5.2.3	**Identify and explain the placement of the decimal point when a number is multiplied or divided by 10.**	**5.NBT.A.1 5.NBT.A.2**	**L.5.4 L.5.6**	**5.NBT.C.2**	
	M5.2.4	**Use whole number exponents to denote powers of 10.**	**5.NBT.A.2**	**L.5.4 L.5.6**	**5.NBT.C.2**	
Vocabulary		factors, multiple, product				

M5.3		Students will add and subtract decimals to the hundredths place using a variety of strategies based on place value, properties of operations, relationship of addition and subtraction. Students will relate the strategy to a written method and explain the strategy used.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.3.1	**Use concrete or pictorial representation to add decimals to the hundredths using a variety of strategies.**	**NBT.B.7**		**5.NBT.D.7**	
	M5.3.2	**Use concrete or pictorial representation to subtract decimals to the hundredths using a variety of strategies.**	**NBT.B.7**		**5.NBT.D.7**	
	M5.3.3	**Relate the strategies to a written method and explain the reasoning used.**	**NBT.B.7**		**5.NBT.D.7**	
Vocabulary						

M5.4		Students will fluently multiply multi-digit whole numbers and decimals using the standard algorithm to include real world application.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.4.1	**Multiply multi-digit whole numbers using place value strategies including the standard algorithm.**	**5.NBT.B.5**		**5.NBT.D.5**	
Vocabulary		array				

M5.5		Students will find quotients of whole numbers and decimals with up to a two-digit divisor and four-digit dividends using a variety of strategies based on place value, properties of operations, relationship of multiplication and division. Students will relate the strategy to an illustration, equations, rectangular arrays or area models and explain the strategy used.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.5.1	Identify the relationship between multiplication and division.	5.NBT.B.6		5.NBT.D.6	
	M5.5.2	**Illustrate and explain the calculation by using equations, rectangular arrays, concrete models, drawings and or area models.**	**5.NBT.B.6**		**5.NBT.D.6**	
	M5.5.3	Relate strategy to a written method and explain the reasoning used within a real world problem.	5.NBT.B.6		5.NBT.D.6	
	M5.5.4	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	5.OA.A.1	L.5.4	5.OA.A.2	
	M5.5.5	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	5.OA.A.2	L.5.4	5.OA.A.2	
Vocabulary		divisible, dividend, divisor, quotient, parentheses, brackets, braces, exponents, expressions, associative property of addition, associative property of multiplication, communicative property of addition, communicative property of multiplication				

M5.6		Students will add and subtract fractions with unlike denominators including mixed numbers using a variety of strategies, additionally solving real world problem.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.6.1	**Demonstrate equivalent fractions.**	**5.NF.A.1**		**5.NF.E.1**	
	M5.6.2	**Add fractions with unlike denominators (with mixed numbers).**	**5.NF.A.1**		**5.NF.E.1**	
	M5.6.3	**Subtract fractions with unlike denominators (with mixed numbers).**	**5.NF.A.1**		**5.NF.E.1**	
	M5.6.4	**Subtract fractions with unlike denominators to include regrouping.**	**5.NF.A.1**		**5.NF.E.1**	
	M5.6.5	**Solve word problems involving addition and subtraction of fractions with uncommon denominators, must use visual fraction models, benchmark fractions, or equations to present the problem.**	**5.NF.A.2**	**CV5.3.1** **CV5.3.2**	**5.NF.E.2**	
Vocabulary		equivalent, denominator, numerator, whole number, simplify, reduce, mixed number, improper fraction				

M5.7		Students will multiply fractions, which are parts of a whole, to include mixed numbers and real world problems, as well as interpret multiplication as scaling. Students will illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.7.1	**Multiply fractions or whole number by a fraction.**	**5.NF.B.4**		**5.NF.F.4**	
	M5.7.2	Find the area of a rectangle using fractional sides, tiling it with squares of appropriate length.	5.NF.B.4b		5.NF.F.4	

	M5.7.3	Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication (scaling).	5.NF.B.5a	SL.5.1 SL.5.1.a SL.5.1.b SL.5.1.c SL.5.1.d SL.5.2 SL.5.3	5.NF.F.5	
	M5.7.4	Explain why multiplying a given number by a fraction is greater than or less than 1 results in a product greater than or less than the given number.	5.NF.B.5b	SL.5.1 SL.5.1.a SL.5.1.b SL.5.1.c SL.5.1.d SL.5.2 SL.5.3	5.NF.F.5	
	M5.7.5	**Solve real world problems involving multiplication of fractions and mixed numbers by illustrating and explaining the calculation by using equations, rectangular arrays, and/or area models.**	**5.NF.B.5b**	**CV5.3.1** **CV5.3.2**	**5.NF.F.6**	**3c**
Vocabulary		Scaling				

M5.8		Students will interpret and explain dividing a fraction by a whole number using visual models and applying it to real world situations.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.8.1	**Apply and extend previous understanding of division to divide unit fractions by whole numbers and whole numbers by unit fractions**	**5.NF.B.7**	**CV5.3.1** **CV5.3.2**	**5.NF.F.7**	**3c**
	M5.8.2	Explain the relationship between multiplication and division of whole numbers by fractions and fractions by	5.NF.B.7b	CV5.3.1 CV5.3.2	5.NF.F.7	3c

		whole numbers *(e.g., 1/3 ÷4 =1/12 because 1/12 × 4=⅓, 4 ÷ 1/5=20 because 20 × 1/5=4)*				
	M5.8.3	**Interpret a fraction as division of the numerator by the denominator.** $(a/b = a \div b)$			**5.NF.F.3**	
	M5.8.4	**Solve real world problems involving division of unit fractions by whole numbers and division of whole numbers by unit fractions by using visual fraction models *(e.g., How much chocolate will each person get if 3 people share a 1⁄2 pound of chocolate equally? Or How many 1/3 cup servings are in 2 cups of raisins?).***	**5.NF.B.7c**	**CV5.3.1 CV5.3.2**	**5.NF.F.7**	**3c**
Vocabulary						

M5.9		Students will use unit cubes and formulas to find the volume of rectangular prisms using the operations of multiplication and addition including real world problems.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.9.1	Identify volume as an attribute of three - dimensional solid figures and understand concepts of volume measurement, with the label "unit cube".	5.MD.C.3 5.MD.C.3a 5.MD.C.3b	L.5.4 L.5.6	5.MD.I.3	
	M5.9.2	Measure volume by counting unit cubes (cubic cm., cubic in., cubic ft., and improvised units).	5.MD.C.4		5.MD.I.4	
	M5.9.3	Relate the concept of volume to the operations of multiplication to solve real world problems involving volume.	5.MD.C.5		5.MD.I.5 5.NBT.D.5	
	M5.9.4	Find the volume of a right rectangular prism with whole number dimensions by multiplying them. Show that this volume is the same as when counting unit cubes.	5.MD.C.5a		5.MD.I.5.A	

	M5.9.5	Find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems given the formula V = (l)(w)(h) and V = (B)(h) for rectangular prisms.	5.MD.C.5b NBT.B.5		5.MD.I.5.A 5.NBT.D.5.B	
Vocabulary		base, length, height, width, rectangular prism, cube, associative property, unit				

M5.10		Students will convert various units of measurement within the customary and metric system and use these conversions in solving multi-step, real world problems. Additionally, students will create a line plot.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.10.1	Convert among different sized standard measurement units within the customary system and use these conversions in solving multi-step, real world problems.	5.MD.A.1		5.MD.G.1	
	M5.10.2	Convert among different sized standard measurement units within the metric system and use these conversions in solving multi-step, real world problems.	5.MD.A.1		5.MD.G.1	
	M5.10.3	Create a line plot to display a data set of measurement in fractions of a unit (1/2, 1/4, 1/8).	5.MD.B.2		5.MD.H.2	
Vocabulary		mass, capacity, weigh, centi, kilo, milli, hecto, deca, deci, unit				

M5.11		Students will use ordered pairs to plot on a coordinate plane. Students will represent and interpret real world and math problems by plotting points on a coordinate plane.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.11.1	Generate two numerical patterns using two given rules.	5.OA.B.3	L.5.4 FPA 8.1.M.4	5.OA.B.3	

	M5.11.2	The x and y axes are perpendicular lines that intersect at 0 (the origin).		L.5.4 L.5.6 PE 5.2.1	5.G.J.1	5b 1B-DA-06 AB-DA-07
	M5.11.3	Identify the pattern and understand the relationship of given coordinates points.	5.OA.B.3	L.5.4 FPA 8.1.M.4	5.OA.B.3	
	M5.11.4	Plot points on a coordinate grid, using x- and y-axis, demonstrating the x is the first number and y is the second number in the ordered pair.	5.G.A.1	L.5.4 L.5.6 PE 5.2.1	5.G.J.1	5b 1B-DA-06 1B-DA-07
	M5.11.5	Represent and interpret real world problems by graphing points in the first quadrant on the coordinate plane.	5.G.A.2	L.5.4 L.5.6 5-ESS1-2 4-ESS2-1 CV5.3.1 CV5.3.2	5.G.J.2	5b 1B-DA-06 1B-DA-07
Vocabulary		axis, coordinate plane, quadrant, ordered pair,origin, x axes, y axes				

M5.12		Students will identify and classify two-dimensional figures.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M5.12.1	Understand the attributes of two-dimensional figures. (polygons only)	5.G.B.3	FPA 8.1.A.3 FPA 8.4.A.1	5.G.K.3	
	M5.12.2	Identify the sub-categories of two-dimensional figures.	5.G.B.3	FPA 8.1.A.3 FPA 8.4.A.1	5.G.K.3	
	M5.12.3	Classify polygons in a hierarchy based on properties *(e.g., all rectangles have four right angles and squares are rectangles, so all squares have four right angles).*	5.G.B.4	FPA 8.1.A.3 FPA 8.4.A.1	5.G.K.4	

Vocabulary	congruent, perpendicular, isosceles, scalene, parallel	

Math – 6th Grade

Pacing Guide						
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
M6.1	Students will use ratio and rate reasoning to solve real-world and mathematical problems by interpreting tables of equivalent ratios, or equations.	Aug - Oct	X			
M6.2	Students will fluently multiply and divide multi-digit integers and decimals using the standard algorithm for each operation using concrete, pictorial, and abstract strategies. Students will identify the greatest common factor and least common multiple of two numbers.	Oct - Nov		X		
M6.3	Students will identify a number's distance from zero as absolute value to represent real world situations, write, interpret, and explain statements of order for rational numbers.	Nov - Dec		X		
M6.4	Students will explain that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. Students will use variables to represent numbers within written algebraic expressions including exponents and mathematical properties when solving real-world or mathematical problems. Students will write, read, and evaluate expressions and expressions.	Dec - Feb			X	
M6.5	Students will construct polygons within the coordinate plane, utilizing x, y coordinates for the vertices and calculate the dimensions of polygons to determine area and surface area. Students will calculate the volume of rectangular prisms, through real-world examples, and mathematical problems.	Mar - Apr				X
M6.6	Students will develop an understanding of statistical variability by recognizing a statistical question, collecting, analyzing, and summarize data, and represent through number line, dot plots, histograms, and box plots.	Apr - May				X

Math Standard Reference Code	
RP	Ratios & Proportional Relationships
NS	Number System
EE	Expressions & Equations
G	Geometry
SP	Statistics & Probability

Math - 6th Grade

Purpose Statement:	Students will fluently add, subtract, multiply, and divide multi-digit integers and decimals. Students will analyze fractions to include division and connect with real-world statistics to identify, produce, and analyze rates and ratios. Students will illustrate rates and ratios through coordinate planes and number lines to identify and produce polygons and calculate their area and surface area. Students will calculate the volume of a right rectangular prism using area. Students will identify the relationship of variables within expressions and solve for the variable within equations.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Fluently means accurately, efficiently, and flexibly; students need experiences beyond the standard or traditional algorithm.

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M6.1		Students will use ratio and rate reasoning to solve real-world and mathematical problems by interpreting tables of equivalent ratios, or equations.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M6.1.1	**Analyze the relationship of unit rates to ratios.**	**6.RP.1** **6.RP.2**	**MS-PS2-4** **MS-PS3-1, 5** **MS-PS4-1,** **MS-LS1-8** **MS-LS4-4,6** **MS-ESS1-1,2,3** **MS-ESS3-1,3,4** **FPA8.4.M.2**	**major**	
	M6.1.2	**Use ratio reasoning to convert and manipulate between measurement units *(e.g., 12 in = 1 ft how many inches in 3 ft?).***	**6.RP.3d**	**MS-PS3-1** **MS-ESS3-1**	**major**	
	M6.1.3	**Create table of equivalent ratios and rates.**	**6.RP.3a** **6.RP.3b** **6.RP.3c** **6.RP.3d**	**MS-PS3-1,5** **MS-PS2-4** **MS-PS4-1** **MS-LS1-8** **MS-LS2-3,4,5** **MS-ESS1-3** **MS-ESS3-1** **FPA8.4.M.2** **SS8.3.4** **CV.85.2**	**major**	
	M6.1.4	**Solve unit rate problems.**	**6.RP.3a** **6.RP.3b** **6.RP.3c** **6.RP.3d**	**MS-PS3-1** **MS-ESS3-1**	**major**	

	M6.1.5	**Calculate a percent of a quantity using part to whole relationship and vice versa including fraction, decimal, percent *(e.g., 12 is 20% of the whole. What is the whole?).***	**6.RP.3c**	**MS-PS3-1,5 MS-PS2-4 MS-PS4-1 MS-LS1-8 MS-LS2-3,4,5 MS-ESS1-3 MS-ESS3-1 FPA8.4.M.2 SS8.3.4 CV.85.2**	**major**	
Vocabulary		ratio, rates, units, measurement				

M6.2		Students will fluently multiply and divide multi-digit integers and decimals using the standard algorithm for each operation using concrete, pictorial, and abstract strategies. Students will identify the greatest common factor and least common multiple of two numbers.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M6.2.1	Interpret and compute quotients of fractions and solve word problems.	6.NS.1	MS-PS2-4	minor	
	M6.2.2	**All operations multi-digit integers and decimals using the standard algorithm.**	**6.NS.2 6.NS.3**		**major**	**ISTE 1c**
	M6.2.3	**Use greatest common factor and least common multiple of two whole numbers to identify common denominators.**	**6.NS.4**		**major**	**ISTE 1c**
Vocabulary		multiples, part to whole, numerator, denominator, mixed number, improper fraction, fraction greater than one				

M6.3		Students will identify a number’s distance from zero as absolute value to represent real world situations, write, interpret, and explain statements of order for rational numbers.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M6.3.1	**Add and subtract integers and produce on a number line to represent real world situations.**	**6.NS.5**	**MS-PS1-4 MS-PS2-1 MS-ESS2-5,6**	**major**	**ISTE 1c**
	M6.3.2	Identify a number’s distance from zero as absolute value.	6.NS.6a 6.NS.6b 6.NS.6c 6.NS.7a 6.NS.7b 6.NS.7c 6.NS.7d 6.NS.8		minor	ISTE 1c
	M6.3.3	Write, interpret, and explain statements of order for rational numbers in real-world context *(e.g. write -3 oC>-7oC to express the fact that -3 oC is warmer than -7oC).*	6.NS.7b		minor	ISTE 1c
	M6.3.4	Interpret statement of inequalities on a number line.	6.NS.7a		minor	ISTE 1c
	M6.3.5	Display x, y coordinates on a coordinate plane.	6.NS.8		minor	ISTE 1c
Vocabulary		integers, rational, irrational, credits/debits, quantities, positive and negative, inequalities, absolute value, coordinates				

M6.4		Students will explain that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set. Students will use variables to represent numbers within written algebraic expressions including exponents and mathematical properties when solving real-world or mathematical problems. Students will write, read, and evaluate expressions and expressions.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M6.4.1	**Write and evaluate numerical expressions involving whole-number exponents.**	**6.EE.1**		**major**	**ISTE 1c**
	M6.4.2	**Write, read, and evaluate expressions in which letters stand for numbers.**	**6.EE.2a**	**MS-PS2-1,2**	**major**	**ISTE 1c**
	M6.4.3	**Identify parts of an expression using mathematical terms including sum, term, product, factor, quotient, and coefficient.**	**6.EE.2b**		**major**	**ISTE 1c**
	M6.4.4	**Evaluate expressions at specific values of variables.**	**6.EE.2c**		**major**	**ISTE 1c**
	M6.4.5	**Apply the properties of operations to generate equivalent expressions including distributive, commutative, and associative properties.**	**6.EE.3**		**major**	**ISTE 1c**
	M6.4.6	**Identify when two expressions are equivalent *(e.g., the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for)*.**	**6.EE.4**		**major**	**ISTE 1c**
	M6.4.7	**Determine if a value is a solution to a given equation or inequality.**	**6.EE.5**		**major**	**ISTE 1c**
	M6.4.8	**Use variables to represent numbers when writing expressions.**	**6.EE.6**	**2-AP-11**	**major**	**ISTE 1c**

	M6.4.9	**Solve real-world and mathematical problems by writing and solving equations.**	**6.EE.7**	**MS-LS2-3,4,5 MS-ESS2-6**	**major**	**ISTE 1c**
	M6.4.10	**Write an inequality *(e.g., 5>4)*.**	**6.EE.8**	**CV8.3.1**	**major**	**ISTE 1c**
	M6.4.11	**Use variables to represent two quantities (independent and dependent variables).**	**6.EE.9**	**MS-PS3-1 MS-LS1-1,2,3,6,7 2-AP-11**	**major**	**ISTE 1c**
Vocabulary		coefficient, term, unlike term, independent and dependent variable, distributive, associative, commutative, exponents, order of operations, unknown/known				

M6.5		Students will construct polygons within the coordinate plane, utilizing x, y coordinates for the vertices and calculate the dimensions of polygons to determine area and surface area. Students will calculate the volume of rectangular prisms, through real-world examples, and mathematical problems.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M6.5.1	**Construct polygons in a coordinate plane.**	**6.G.3**		**major**	**ISTE 1c**
	M6.5.2	**Find area of right triangles, other triangles, special quadrilaterals, and polygons.**	**6.G.1**	**MS-ESS2-1,2,3 2-AP-14**	**major**	**ISTE 1c**
	M6.5.3	Represent 3-D figures using nets and use them to find the surface area.	6.G.4		minor	ISTE 1c
	M6.5.4	Calculate the volume of a rectangular prism including fractional edge lengths.	6.G.2	2-AP-14	minor	ISTE 1c
Vocabulary		polygons, parallelogram, trapezoid, quadrilateral, surface area, net, volume, prism, rectangular prism, three-dimensional, two-dimensional				

M6.6		Students will develop an understanding of statistical variability by recognizing a statistical question, collecting, analyzing, and summarize data, and represent through number line, dot plots, histograms, and box plots.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M6.6.1	**Recognize a statistical question.**	**6.SP.1**	**MS-LS1-4,5,8** **MS-LS2-1,2,4,5** **MS-LS4-1,2,4,6** **MS-ESS2-3,5** **MS-ESS3-2 3** **MS-ETS1-1,2** **MS-ETS2-1** **HE8.2.5**	**major**	**ISTE 1c** **ISTE 5b**
	M6.6.2	**Analyze a set of data.**	**6.SP.2**	**MS-LS1-3,4,5,8** **MS-LS2-1,2,4,5** **MS-LS4-4,6** **MS-ESS2-3,5** **MS-ESS3-2,3** **MS-ETS1-1,2** **MS-ETS2-1** **HE8.2.5**	**major**	**ISTE 1c** **ISTE 5b**
	M6.6.3	**Recognize that a measure of center for a numerical data set.**	**6.SP.3**	**MS-LS1-4,5,8** **MS-LS2-1,2,4,5** **MS-LS4-1,2,4,6** **MS-ESS2-3,5**	**major**	**ISTE 1c** **ISTE 3b**

				MS-ESS3-1,2,3 **MS-ETS1-3** **MS-ETS2-1** **RL.6.7**		
	M6.6.4	Display numerical real- world data.	6.SP.4	MS-LS1-3,4,5,8 MS-LS2-1,2,4,5 MS-LS4-1,2,4,6 MS-ESS2-3,5 MS-ESS3-2,3 MS-ETS1-3 MS-ETS2-1 RL.6.1	minor	ISTE 1c ISTE 3b ISTE 5b ISTE 6a,c,d
	M6.6.5	Summarize, record, and describe the data.	6.SP.5a-b	MS-PS3-4 MS-LS1-3,4,5,8 MS-LS2-1,2,4,5 MS-LS4-1,2,4,6 MS-ESS2-3,5 MS-ESS3-1,2,3 MS-ETS1-3 MS-ETS2-1 RI.6.1 W.6.7 SS8.6.3	minor	ISTE 1c

				PE8.2.1		
	M6.6.6	Interpret the mean, median, mode, and range of data.	6.SP.5c-d	MS-PS3-4 MS-LS1-3,4,5,8 MS-LS2-1,2,4,5 MS-LS4-1,2,4,6 MS-ESS2-3,5 MS-ESS3-1,2,3 MS-ETS1-3 MS-ETS2-1 RI.6.1 W.6.7 SS8.6.3 PE8.2.1	minor	ISTE 1c
Vocabulary		statistical question, validity, variability, data set, stats, box plots, mean absolute deviation (MAD), mean, median, mode, range, probability, unlikely, likely, certainty				

Math – 7th Grade

Pacing Guide						
Code	Benchmark	Month(s) Taught	Common Assessment Period			
			1	2	3	4
M7.1	Students will analyze proportional relationships and use them to solve real world and mathematical problems.	Aug - Sep	X			
M7.4	Students will draw, construct, and describe geometrical figures and describe the relationships between them	Sep - Oct	X			
M7.2	Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	Oct	X			
M7.2	Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	Oct - Nov		X		
M7.3	Students will use properties of operations to generate equivalent expressions.	Nov - Dec		X		
M7.3	Students will use properties of operations to generate equivalent expressions.	Jan			X	
M7.4	Students will draw, construct, and describe geometrical figures and describe the relationships between them.	Jan			X	
M7.3	Students will use properties of operations to generate equivalent expressions.	Feb			X	
M7.4	Students will draw, construct, and describe geometrical figures and describe the relationships between them.	Feb - Mar			X	
M7.4	Students will draw, construct, and describe geometrical figures and describe the relationships between them.	Mar				X
M7.1	Students will analyze proportional relationships and use them to solve real world and mathematical problems.	Mar				X
M7.6	Students will use random sampling to draw inferences about a population.	Apr				X

Math Standard Reference Code	
RP	Ratios & Proportional Relationships
NS	Number System
EE	Expressions & Equations
G	Geometry
SP	Statistics & Probability

Math - 7th Grade

Purpose Statement:	Students will apply proportional relationships; manipulate and analyze rational numbers including expressions, linear equations and inequalities in one variable. Students will solve problems involving scale drawings, informal geometric constructions, two- and three-dimensional shapes involving area, surface area, and volume. Students will draw inferences about populations based on samples.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M7.1		Students will analyze proportional relationships and use them to solve real world and mathematical problems.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M7.1.1	Compute unit rates, including those involving complex fractions, with like or different units.	7.RP.A.1	MS-ESS1-3	Major	1c

	M7.1.2	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities in a table or graph are in a proportional relationship. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships with equations. d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	7.RP.A.2	MS-PS3-1 MS-PS3-5 MS-PS4-1 MS-LS1-6 MS-LS1-7 MS-LS2-3 MS-LS2-4 MS-LS2-5 MS-LS3-2 MS-LS4-4 MS-LS4-6 MS-ESS1-1 MS-ESS1-2 MS-ESS1-3 MS-ESS3-1 MS-ESS3-3 MS-ESS3-4 FPA8.4.M.2 CV8.5.2	Major	1c
	M7.1.3	Solve multistep real world and mathematical problems involving ratios and percentages.	7.RP.A.3	MS-LS1-3 MS-LS1-6 MS-LS1-7 MS-LS3-2 MS-ESS1-3 MS-ESS3-1 CVE CV8.5.2	Major	1c
	M7.1.4	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale	7.G.E.1	MS-LS1-1 MS-ESS2-1 MS-ESS2-3 SS8.5.1	Major	1c, 5c

Vocabulary	proportional to, proportional relationship, constant of proportionality, one-to-one correspondence, scale drawing, scale factor	

M7.2		Students will apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M7.2.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers. a. Describe situations in which opposite quantities combine to make zero (the additive identity). b. Understand that p + q represents the distance |q| from p whose placement is determined by the sign of q. Interpret sums of rational numbers by describing realworld contexts. c. Show that a number and its opposite have a sum of 0 (are additive inverses). d. Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (- q). Apply this principal in real-world contexts. e. Apply properties of addition as strategies to add and subtract rational numbers.	7.NS.B.1	MS-ESS2-6 MS-ESS3-5	Major	1c
	M7.2.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. a. 1. Understand that the multiplicative inverse of a number is its reciprocal and their product is equal to one (the multiplicative identity). 2. Understand positive and negative sign rules for multiplying	7.NS.B.2		Major	1c

		rational numbers. Interpret products of rational numbers by describing real-world contexts. b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers is a rational number. Recognize that if p and q are integers then –(p/q) = (–p)/q = p/(–q). Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of multiplication (commutative, associative, distributive, or properties of identity and inverse elements) to multiply and divide rational numbers. d. Convert a rational number to a decimal. Recognize that rational numbers can be written as fractions or decimal numbers that terminate or repeat.				
	M7.2.3	Solve real-world and mathematical problems involving the four arithmetic operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)	7.NS.B.3	MS-LS1-6 MS-LS1-7	Major	1c
	M7.2.4	Recognize that algebraic expressions may have a variety of equivalent forms that reveal different information, and determine an appropriate form for a given real-world situation.	7.EE.C.2	CVE CV8.5.2	Major	1c
	M7.2.5	Apply the concepts of linear equations and inequalities in one variable to real-world and mathematical situations. a. Write and fluently solve linear equations of the form ax +b = c and a(x + b) = c where a, b, and c are rational numbers.	7.EE.C.4	MS-PS2-1 MS-PS2-2 MS-LS2-3 MS-LS2-4 MS-LS2-5 MS-ESS1-2 MS-ESS1-4	Major	1c

				MS-ESS2-6 MS-ESS3-1 MS-ESS3-3 MS-ESS3-4 MS-ESS3-5		
Vocabulary		additive identity, additive inverse, break-even point, distance formula, loss, multiplicative identity, profit, repeating decimal, terminating decimal				

M7.3		Students will use properties of operations to generate equivalent expressions.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M7.3.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	7.EE.C.1		Major	1c
	M7.3.2	Recognize that algebraic expressions may have a variety of equivalent forms that reveal different information, and determine an appropriate form for a given real-world situation.	7.EE.C.2	CV8.5.2	Major	1c
	M7.3.3	Solve multi-step real-world and mathematical problems involving rational numbers. Include fraction bars as a grouping symbol.	7.EE.D.3	MS-PS2-1 MS-PS2-2 CVE CV8.5.2 CV8.3.1	Major	1c
	M7.3.4	Apply the concepts of linear equations and inequalities in one variable to real-world and mathematical situations. a. Write and fluently solve linear equations of the form ax +b = c and a(x + b) = c where a, b, and c are rational numbers.	7.EE.D.4	MS-PS2-1 MS-PS2-2 MS-LS2-3 MS-LS2-4 MS-LS2-5 MS-ESS1-2	Major	1c

		b. Write and solve multi-step linear equations that include the use of the distributive property and combining like terms. Exclude equations that contain variables on both sides. c. Write and solve two-step linear inequalities. Graph the solution set on a number line and interpret its meaning. d. Identify and justify the steps for solving multi-step linear equations and two-step linear inequalities.		MS-ESS1-4 MS-ESS2-6 MS-ESS3-1 MS-ESS3-3 MS-ESS3-4 MS-ESS3-5 CVE CV8.3.1		
Vocabulary						

M7.4		Students will draw, construct, and describe geometrical figures and describe the relationships between them.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M7.4.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing.	7.G.E.1	MS-LS1-1 MS-ESS2-1 MS-ESS2-3 SS8.5.1	Major	1c, 5c
	M7.4.2	Draw geometric shapes with given conditions using a variety of tools (e.g., ruler and protractor, or technology). Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	7.G.E.2		Major	1c, 1d, 4b
	M7.4.3	Describe the two-dimensional figures that result from slicing three-dimensional figures parallel to the base, as in plane sections of right rectangular prisms and right rectangular pyramids.	7.G.E.3	L.7.4.b	Major	1c
	M7.4.4	Investigate the concept of circles.	7.G.F.4	MS-LS1-1	Major	1c

		a. Demonstrate an understanding of the proportional relationships between diameter, radius, and circumference of a circle. b. Understand that pi is defined by the constant of proportionality between the circumference and diameter. c. Given the formulas for circumference and area of circles, solve real-world and mathematical problems.		MS-ESS1-2 MS-ESS2-6		
	M7.4.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	7.G.F.5		Major	1c
	M7.4.6	Solve real-world and mathematical problems involving A. area and surface area of objects composed of triangles and quadrilaterals; B. volume of objects composed only of right prisms having triangular or quadrilateral bases.	7.G.F.6	MS-LS1-1 MS-ESS1-2 MS-ESS2-2 MS-ESS2-3	Major	1c, 5c
Vocabulary		circle, diameter of a circle, circumference, pi, circular region or disk				

M7.5		Students will convert between fractions, decimals and percents, represent multi-step percent scenarios using algebraic expressions and equations, solve percent increase and decrease problems with and without equations, find and interpret word problems involving mark up, mark down, simple interest, sales tax, commisions, fees and percent error and solve problems in which the scale factor is given as a percent. Identify the constant of proportionality (unit rate) in multiple form.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M7.5.1	Compute unit rates, including those involving complex fractions, with like or different units.	7.RP.A.1	MS-ESS1-3	Major	1c

	M7.5.2	Recognize and represent proportional relationships between quantities. a. Decide whether two quantities in a table or graph are in a proportional relationship. b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. c. Represent proportional relationships with equations. d. Explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, r) where r is the unit rate.	7.RP.A.2	MS-PS3-1 MS-PS3-5 MS-PS4-1 MS-LS1-6 MS-LS1-7 MS-LS2-3 MS-LS2-4 MS-LS2-5 MS-LS3-2 MS-LS4-4 MS-LS4-6 MS-ESS1-1 MS-ESS1-2 MS-ESS1-3 MS-ESS3-1 MS-ESS3-3 MS-ESS3-4 FPA8.4.M.2 CV8.5.2	Major	1c
	M7.5.3	Solve multistep real world and mathematical problems involving ratios and percentages.	7.RP.A.3	MS-LS1-3 MS-LS1-6 MS-LS1-7 MS-LS3-2 MS-ESS1-3 MS-ESS3-1 CV8.5.2	Major	1c
	M7.5.4	Solve multi-step real-world and mathematical problems involving rational numbers. Include fraction bars as a grouping symbol.	7.EE.D.3	MS-PS2-1 MS-PS2-2 CV8.5.2 CV8.3.1	Major	1c

	M7.5.5	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing.	7.G.E.1	MS-LS1-1 MS-ESS2-1 MS-ESS2-3 SS8.5.1	Major	1c, 5c
Vocabulary		Absolute Error, Percent Error, Area, Circumference, Coefficient of the Term, Complex Fraction, Constant of Proportionality, Discount price, Equation, Equivalent Ratios				

M7.6		Students will use random sampling to draw inferences about a population.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M7.6.1	Solve real-world and mathematical problems involving: a. Understand that a sample is a subset of a population. b. Differentiate between random and nonrandom sampling. c. Understand that generalizations from a sample are valid only if the sample is representative of the population. d. Understand that random sampling is used to gather a representative sample and tends to support valid inferences about the population.	7.SP.G.1	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1 MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-2 MS-ESS3-3 MS-ETS1-1 MS-ETS1-2 ELA RI.7.1 W.7.7	Major	1c, 1e 3a, 3b, 3c, 3d 5b

				W.7.8		
	M7.6.2	Draw inferences about a population by collecting multiple random samples of the same size to investigate variability in estimates of the characteristic of interest.	7.SP.G.2	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1 MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-2 MS-ESS3-3 MS-ETS1-1 MS-ETS1-2 RI.7.1 W.7.7 W.7.8 SS8.6.1 HE8.2.5	Major	1c, 1e 3a, 3b, 3c, 3d 5b
	M7.6.3	Visually compare the centers, spreads, and overlap of two displays of data (e.g., back-to-back stem and leaf plots, dot plots, histograms, box plots) that are graphed on the same scale and draw inferences about this data.	7.SP.H.3	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1	Major	1c 3b, 3d 5b

				MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-1 MS-ESS3-2 MS-ESS3-3 MS-ETS1-3 RI.7.1 W.7.7 W.7.8 SS8.6.1		
	M7.6.4	Given measures of center and variability (mean, median and/or mode; range, interquartile range, and/or standard deviation), for numerical data from random samples, draw appropriate informal comparative inferences about two populations.	7.SP.H.4	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1 MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-2 MS-ESS3-3 MS-ETS1-3 RI.7.1 W.7.7	Major	1c 3b, 3d 5b

				W.7.8 SS8.6.1		
Vocabulary						

M7.7		Students will investigate chance processes and develop, use, and evaluate probability models.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M7.7.1	Find and interpret the probability of a random event. Understand that the probability of a random event is a number between, and including, 0 and 1 that expresses the likelihood of the event occurring.	7.SP.I.5	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1 MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-2 MS-ESS3-3 RI.7.1 W.7.7 W.7.8	Minor	1c
	M7.7.2	Collect multiple samples to compare the relationship between theoretical and experimental probabilities for simple events.	7.SP.I.6	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1	Minor	1c

				MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1 MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-2 MS-ESS3-3 RI.7.1 W.7.7 W.7.8 2-DA-08		
	M7.7.3	Apply the concepts of theoretical and experimental probabilities for simple events. a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. c. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancies.	7.SP.I.7	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1 MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-2 MS-ESS3-3 RI.7.1	Minor	1c

				W.7.7 W.7.8		
	M7.7.4	Find probabilities of compound events using organized lists, tables, and tree diagrams. a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. b. Represent sample spaces for compound events using methods such as organized lists, tables, and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.	7.SP.I.8	MS-LS1-4 MS-LS1-5 MS-LS1-8 MS-LS2-1 MS-LS2-2 MS-LS2-4 MS-LS2-5 MS-LS4-1 MS-LS4-2 MS-LS4-4 MS-LS4-6 MS-ESS2-3 MS-ESS2-5 MS-ESS3-2 MS-ESS3-3 RI.7.1 W.7.7 W.7.8	Minor	1c
Vocabulary						

Math – 8th Grade

Pacing Guide						
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
M8.1	Students will extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations and identify equations having one, none or infinite solutions through simplifying equations.	Aug – Sept	X			
M8.2	Students will verify experimentally basic rigid motions (i.e. translations, rotations, and reflections) properties preserving angle measurements, as well as segment lengths; verify experimentally the sequence of basic rigid motions leading to an image; apply rigid motions to explain angle relationships (angle pairs).	Sept –Oct	X			
M8.3	Students will calculate the length of a missing side of a right triangle using the Pythagorean Theorem, apply the Pythagorean Theorem to real-world mathematical problems and investigate square and cube roots involving rational and irrational solutions.	Oct - Nov		X		
M8.4	Students will transcribe written statements using symbolic notation; write and solve linear equations in real-world and mathematical situations; identify equations having one, none or infinite solutions through simplifying equations, organize them in a table, and plot the solutions on a coordinate plane; verify the graph of an equation in standard form (Ax + By = C); derive $y = mx$ and $y = mx + b$ for linear equations; generate graphs of linear equations in two variables; write equations of lines given slope and a point, write an equation given two points.	Nov -Dec		X		
M8.5	Students will solve, graph and analyze simultaneous linear equations to find the point of intersection and then verify that the point of intersection is a solution to each equation in the system; verifying a system can have a unique solution, no solution, or infinitely many solutions and describe how those solutions	Jan -Feb			X	

	appear on a graph; apply systems to solve problems in real-world contexts.					
M8.6	Students will represent linear functions by using tables and graphs and by specifying rate of change and initial value; use linear functions to model the relationship between two quantitative variables (bivariate); build scatter plots and analyze the associations; use linear and nonlinear models to answer questions in context; interpret the rate of change and the initial value in context; use the equation of a linear fun and its graph to make predictions; calculate and use the relative frequencies calculated from tables to informally assess possible associations between two categorical variables.	Feb - Mar			X	

Math Standard Reference Code	
NS	Number System
EE	Expressions & Equations
F	Functions
G	Geometry
SP	Statistics & Probability

Math - 8th Grade

Purpose Statement:	Students will formulate and reason about expressions and equations, including solving linear equations, systems of linear equations, and model an association in bivariate data with a linear equation. Students will use functions to describe quantitative relationships. Students will analyze two- and three- dimensional space figures using distance, angle similarity and congruence, and apply the Pythagorean Theorem to real-world problems.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

M8.1		Students will extend concepts of linear equations and inequalities in one variable to more complex multi-step equations and inequalities in real-world and mathematical situations and identify equations having one, none or infinite solutions through simplifying equations.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.1.1	Solve linear equations and inequalities with rational number coefficients that include the use of the distributive	8.EE.D.7A	MS-PS3-4 MS-PS3-5	Major	1c, 5a

		property, combining like terms, and variable terms on both sides.		MS-PS4-1 MS-LS2-3 MS-LS2-4 MS-LS2-5 MS-LS2-6 MS-ESS3-4		
	M8.1.2	Recognize the three types of solutions to linear equations: one solution, infinitely many solution, or no solutions.	8.EE.D.7B		Major	1c, 5a
	M8.1.3	Generate linear equations with the three types of solutions.	8.EE.D.7C		Major	1c, 5a
	M8.1.4	Justify why linear equations have a specific solution type.	8.EE.D.7D		Major	1c, 5a
Vocabulary		variable, coefficient, equation, solution				

M8.2		Students will verify experimentally basic rigid motions (i.e. translations, rotations, and reflections) properties preserving angle measurements, as well as segment lengths; verify experimentally the sequence of basic rigid motions leading to an image; apply rigid motions to explain angle relationships (angle pairs).	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.2.1	Verify experimentally the properties of rotations, reflections, and translations: • Lines are taken to lines, and line segments to line segments of the same length. • Angles are taken to angles of the same measure. • Parallel lines are taken to parallel lines.	8.G.G.1	MS-PS3-3 MS-ESS2-1 MS-ESS2-2 MS-ESS2-3	Major	
	M8.2.2	Recognize through visual comparison that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations;	8.G.G.2	MS-PS4-2	Major	

		given two congruent figures, describe a sequence that exhibits the congruence between them.				
	M8.2.3	Describe the effect of dilations, translations, rotations and reflections on two-dimensional figures using coordinates.	8.G.G.3		Major	
	M8.2.4	Recognize through visual comparison that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	8.G.G.4		Major	
	M8.2.5	Use informal arguments to establish facts about the angle sum and exterior angles of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles.	8.G.G.5		Major	
Vocabulary		transformation, basic rigid motion, translation, rotation, reflection, image, sequence, vector, congruence, transversal				

M8.3		Students will calculate the length of a missing side of a right triangle using the Pythagorean Theorem, apply the Pythagorean Theorem to real-world mathematical problems and investigate square and cube roots involving rational and irrational solutions.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.3.1	Use models or diagrams to explain the Pythagorean Theorem and its converse.	8.G.H.6		Major	
	M8.3.2	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems.	8.G.H.7		Major	

	M8.3.3	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	8.G.H.8		Major	
	M8.3.4	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually into a rational number. Explore the real number system and its appropriate usage in real world situations.	8.NS.A.1	MS-PS4-3 L.8.5.b SS8.4.2		1c
	M8.3.5	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions.	8.NS.A.2			1c
	M8.3.6	Investigate concepts of square and cube roots.	8.EE.B.2	MS-PS3-1 MS-LS2-3,4,5 MS-ESS1-2,3		1c
Vocabulary		hypotenuse, leg, square, square root, cube root, rational, irrational				

M8.4		Students will transcribe written statements using symbolic notation; write and solve linear equations in real-world and mathematical situations; identify equations having one, none or infinite solutions through simplifying equations, organize them in a table, and plot the solutions on a coordinate plane; verify the graph of an equation in standard form (Ax + By = C); derive $y = mx$ and $y = mx + b$ for linear equations; generate graphs of linear equations in two variables; write equations of lines given slope and a point, write an equation given two points.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.4.1	Graph Proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.	8.EE.C.5	MS-ESS3-4	Major	1c
	M8.4.2	Explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at (0,b).	8.EE.C.6	MS-ESS2-6 MS-ESS1-2	Major	1c
Vocabulary		slope, intercepts, variable, equation, rate of change				

M8.5		Students will solve, graph and analyze simultaneous linear equations to find the point of intersection and then verify that the point of intersection is a solution to each equation in the system; verifying a system can have a unique solution, no solution, or infinitely many solutions and describe how those solutions appear on a graph; apply systems to solve problems in real-world contexts.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.5.1	Analyze and solve pairs of simultaneous linear equations; Understand that solutions to systems of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	8.EE.D.8A	MS-LS1-2 MS-LS1-3 MS-LS1-4 MS-LS1-5 MS-ESS3-1	Major	1c, 1d 5a
	M8.5.2	Solve systems of two linear equations in two variables with integer solutions by graphing the equations.	8.EE.D.8B	MS-LS1-2 MS-LS1-3 MS-LS1-4 MS-LS1-5 MS-ESS3-1	Major	1c, 1d 5a
	M8.5.3	Solve simple real-world and mathematical problems leading to two linear equations in two variables given y = mx + b form with integer solutions.	8.EE.D.8C			
Vocabulary		slope, system of linear equations, solution to a system of linear equations				

M8.6		Students will represent linear functions by using tables and graphs and by specifying rate of change and initial value; use linear functions to model the relationship between two quantitative variables (bivariate); build scatter plots and analyze the associations; use linear and nonlinear models to answer questions in context; interpret the rate of change and the initial value in context; use the equation of a linear fun and its graph to make predictions; calculate and use the relative frequencies calculated from tables to informally assess possible associations between two categorical variables.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.6.1	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe the association by form (linear/nonlinear), direction (positive/negative), strength (correlation) and unusual features.	8.SP.J.1	MS-LS1-4,5,8 MS-LS4-1,2,4,6 MS-ESS2-3,5 MS-ESS3-2,3 MS-ETS2-2 MS-ETS1-3,4	Major	1c 3b, 3c, 3d 4a 6a, 6c, 6d
	M8.6.2	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points on the line.	8.SP.J.2	MS-LS1-4,5,8 MS-LS4-1,2,4,6 MS-ESS2-3,5 MS-ESS3-2,3 MS-ETS2-2 MS-ETS1-3,4	Major	1c 6a, 6c, 6d
	M8.6.3	Use an equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept	8.SP.J.3	MS-LS1-4,5,8 MS-LS4-1,2,4,6 MS-ESS2-3,5 MS-ESS3-2,3 MS-ETS2-2	Major	1c 3b, 3c, 3d 4a 5a

				MS-ETS1-3,4		
	M8.6.4	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. a. Construct and interpret two-way table summarizing data on two categorical variables collected from the same subjects. b. Use relative frequencies calculated for rows and columns to describe possible association between the two variables.	8.SP.J.4	S-LS1-4,5,8 MS-LS4-1,2,4,6 MS-ESS2-3,5 MS-ESS3-2,3 MS-ETS2-2 MS-ETS1-3,4	Major	1c 3b, 3c, 3d 4a 6a, 6c, 6d
Vocabulary		association, relative frequency, two-way table, correlation, strength, direction				

M8.7		Students will use the defining qualities of functions to classify and graph functions; explain correlation between slope and rate of change in functions and differentiate between discrete and continuous data.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.7.1	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output (function notation not required in 8th grade).	8.F.E.1	CVE8.3.1	Major	1c
	M8.7.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	8.F.E.2	CVE8.3.1	Major	1c
	M8.7.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.	8.F.E.3	MS-PS3-1,3 MS-PS4-1	Major	1c

	M8.7.4	Apply the concepts of linear functions to real-world and mathematical situations. a. Understand that the slopes the constant rate of change and the y- intercept is the point where x = 0. b. Determine the slope and the y-intercept of a linear function given multiple representations, including two points, tables, graphs, equations, and verbal descriptions. c. Construct a function in slope-intercept form that models a linear relationship between two quantities. Interpret the meaning of the slope and the y-intercept of a linear function in the context of the situation.	8.F.F.4	MS-LS1-2 MS-LS2-3,4,5	Major	1c 5a
	M8.7.5	Describe qualitatively the functional relationship between two quantities by analyzing a graph where the function is increasing, decreasing, constant, linear, or nonlinear. Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	8.F.F.5	RI.8.1 W.8.2.b W.8.7 W.8.8	Major	1c
Vocabulary		function, input, output, increasing, decreasing, constant, linear, non-linear, rate of change, y-intercept, slope				

M8.8		Students will evaluate integer exponents; express very large and very small numbers in scientific notation; compare the relative magnitude of two numbers written in scientific notation; use scientific notation and choose appropriately sized units as they represent, compare, and make calculations; and calculate the volume and surface area of cylinders, cones and spheres given formulas.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Emphasis	ISTE Standard Reference
	M8.8.1	Understand and apply the laws of exponents (i.e. product rule, quotient rule, power to a power, product to a power, quotient to a power, zero power property, negative exponents) to generate equivalent numerical expressions limited to integer exponents.	8.EE.B.1	MS-PS3-1 MS-ESS1-3	Minor	
	M8.8.2	Explore the relationship between quantities in decimal and scientific notation. a. Express very large and very small quantities, p, in scientific notation in the form of a x 10b= p where 1≤ a <10 and b is an integer. b. Translate between decimal notation and scientific notation. Estimate and compare the relative size of two quantities in scientific notation.	8.EE.B.3	MS-PS1-1 MS-LS1-3,8 MS-ESS1-3,4 MS-ESS2-2,3,4,5,6 MS-ESS3-4	Minor	1c
	M8.8.3	Apply the concepts of decimal and scientific notation to real-world and mathematical problems. a. Select appropriate units of measure when representing answers in scientific notation. b. Interpret scientific notation that has been generated by a variety of technologies.	8.EE.B.4	MS-ESS1-3 MS-ESS2-6 MS-ESS3-1 MS-ESS3-4	Minor	1c

	M8.8.4	Given the formulas, solve real-world and mathematical problems involving volume and surface area of cylinders, cones and spheres.	8.G.I.9		Major	1c
Vocabulary		scientific notation, order of magnitude, volume, surface area				

Math Standard Reference Codes									
Number & Quantity		Algebra		Functions		Geometry		Statistics & Probability	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Pre-Algebra

Purpose Statement:	Students will fluently add, subtract, multiply, and divide fractions, integers, and decimals. Students will analyze graphs and properties of geometric figures. Students will interpret data from graphs and tables. PALG.1

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

PALG.1		Students will solve examples involving exponents, number lines, and scientific notation in various scenarios.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.1.1	Arrange multiple values based on the number line.	6.NS.D.6		1c

	PALG.1.2	Multiply and divide values with common bases and non-negative exponents.	RN.A.1		
	PALG.1.3	Multiply and divide values with common bases and integer exponents.	RN.A.1		
	PALG.1.4	Calculate the square root or cube root of a value.	8.EE.B.2	MS-PS3-1 MS-LS2-3 MS-LS2-4 MS-LS2-5 MS-EES1-2 MS-EES1-3	1c
	PALG.1.5	Convert between standard notation and scientific notation and perform operations with scientific notation.	8.EE.B.4	MS-ESS1-3 MS-ESS2-6 MS-ESS3-1 MS-ESS3-4	1c
Vocabulary		number line, base, exponent, integer, square root, cube root, standard notation, scientific notation			

PALG.2		Students will analyze rigid transformations and dilations with similar figures. Students will calculate angle measures with parallel lines and triangles.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.2.1	Interpret translations.	8.G.G.2 8.G.G.3	MS-PS4-2	1c, 1d
	PALG.2.2	Interpret reflections and rotations.	8.G.G.2 8.G.G.3	MS-PS4-2	1c, 1d
	PALG.2.3	Identify rigid translations of congruent figures.	8.G.G.2 8.G.G.3	MS-PS4-2	1c, 1d
	PALG.2.4	Calculate scale factors for similar figures.	SRT.A.1		
	PALG.2.5	Name angle pairs and calculate angle measures formed by parallel lines with transversals.	8.G.G.5		1c
	PALG.2.6	Calculate missing angle measures for triangles both interior and exterior.	8.G.G.5		1c

Vocabulary	translation, reflection, rotation, congruent, scale factor, similar figures, corresponding, alternate exterior, consectutive interior, dilation

PALG.3		Students will use or rearrange formulas to calculate unknown values.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.3.1	Solve for an unknown side length of a right triangle with The Pythagorean Theorem.	8.G.H.7		1c
	PALG.3.2	Find distance on a coordinate plane with The Pythagorean Theorem	8.G.H.8		1c
	PALG.3.3	Calculate volumes of cylinders, cones, and spheres.	8.G.I.9		1c
	PALG.3.4	Find a missing dimension for a cylinder, cone, or sphere when given the volume.	8.G.I.9		1c
Vocabulary		right triangle, Pythagorean Theorem, volume, cylinder, cone, sphere			

PALG.4		Students will identify and interpret components of functions and their graphs.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.4.1	Identify functions using graphs, coordinate pairs, or data.	8.F.E.1	CVE.8.3.1	1c
	PALG.4.2	Interpret graphs of linear functions.	8.F.E.3	MS-PS3-1 MS-PS3-5 MS-PS4-1	1c
	PALG.4.3	Interpret graphs of non-linear functions.	8.F.F.5	R1.8.1 W.8.2.b W.8.8	1c
Vocabulary		input, output, independent variable, dependent variable, vertical line test, linear function, non-linear function			

PALG.5		Students will solve examples of linear and non-linear functions using graphs, data, and equations.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.5.1	Calculate unit rates and slopes.	8.EE.C.5	MS-ESS3-4	1c
	PALG.5.2	Identify slope or y-intercept from the slope-intercept form.	8.EE.C.6	MS-ESS2-6 MS-ESS1-3	1c
	PALG.5.3	Identify slope-intercept form when given initial value and rate of change.	8.EE.C.6	MS-ESS2-6 MS-ESS1-3	1c
	PALG.5.4	Find initial value or rate of change when given slope-intercept form.	8.EE.B.6	MS-ESS2-6 MS-ESS1-3	1c
	PALG.5.5	Analyze data from non-linear functions.	F.IF.A.1		
Vocabulary		unit rate, slope, y-intercept, slope-intercept form, initial value, rate of change, linear function, non-linear function			

PALG.6		Students will solve examples involving scatter plots with lines of best fit and frequency tables.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.6.1	Identify correlation on scatter plots.	8.SP.J.1	MS-LS1-4, 5, 8 MS-LS4-1, 2, 4, 6 MS-ESS2-3, 5 MS-ESS3-2 MS-ETS2-2 MS-ESS3-2, 3 MS-ETS1-3, 4 MS-ETS2-2	1c, 3b, 3c, 3d 4a, 6a, 6c, 6d
	PALG.6.2	Identify lines of best fit for scatter plots.	8.SP.J.2	MS-LS1-4, 5, 8	1c, 6a, 6c, 6d

				MS-LS4-1, 2, 4, 6 MS-ESS2-3, 5 MS-ESS3-2, 3 MS-ETS1-3, 4	
	PALG.6.3	Interpret lines of best fit.	8.SP.J.2	MS-LS1-4, 5, 8 MS-LS4-1, 2, 4, 6 MS-ESS2-3, 5 MS-ESS3-2, 3 MS-ETS1-3, 4	1c, 6a, 6c, 6d
	PALG.6.4	Calculate missing values on frequency tables.	S.ID.B.5	W.9-10.2d, e W.11-12.1.d W.11-12.2.d	1c, 5a, 5b, 5c
Vocabulary		correlation, scatter plots			

PALG.7		Students will solve equations that are one-step, multi-step, linear, and have variables on both sides.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.7.1	Solve one-step equations.	6.EE.F.7	MS-LS2-3, 4, 5 MS-ESS2-6	1c
	PALG.7.2	Solve multi-step equations.	7.EE.D.3	MS-PS2-1, 2 CV8.5.2 CV8.3.1	1c
	PALG.7.3	Solve linear equations.	8.EE.D.7	MS-PS3, 4 MS-PS4-1 MS-LS2-3, 4, 5 MS-ESS2-6 MS-ESS3-4	1c, 5a

	PALG.7.4	Solve equations with variables on both sides.	8.EE.D.7	MS-PS3, 4 MS-PS4-1 MS-LS2-3, 4, 5 MS-ESS2-6 MS-ESS3-4	1c, 5a
	PALG.7.5	Solve equations with rational coefficients.	8.EE.D.7	MS-Ps3, 4 PS-PS4-1 MS-LS2-3, 4, 5 MS-ESS2-6 MS-ESS3-4	1c, 5a
Vocabulary		variable, equation, coefficient			

PALG.8		Students will solve and create systems of equations utilizing various methods.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PALG.8.1	Identify systems of equations.	8.EE.D.8	MS-LS1-2 MS-LS2-3, 4, 5 MS-ESS3-1	1c, 1d, 5a
	PALG.8.2	Solve systems of equations by graphing.	A.REI.J.6		
	PALG.8.3	Solve systems of equations by substitution.	A.REI.J.6		
	PALG.8.4	Solve systems of equations by elimination.	A.REI.J.6		
	PALG.8.5	Create systems of equations.	A.REI.J.6		
Vocabulary		system of equations, graphing, substitution, elimination			

Algebra I

Pacing Guide						
Code	Benchmark	Month(s) Taught	Common Assessment Period			
			1	2	3	4
ALG1.	Students will solve multistep equations; model and solve real life problems by creating equations and using appropriate units and formulas.	Aug – Sept	X			
ALG1.2	Students will solve inequalities in one variable and model real life problems by creating inequalities.	Sept	x			
ALG1.3	Students will determine the relationship between variables, whether a relationship is a function, create functions, graph and transform linear functions and graph absolute functions, and use function notation.	Oct - Nov		x		
ALG1.4	Students will write linear equations/functions, fit a function to a scatter plot and analyze the function.	Nov – Dec		x		
ALG1.5	Students will solve systems of two linear equations and inequalities and relate them to real world situations.	Jan – Feb				
ALG1.6	Students will organize data in tables, graphs, histograms and scatter plots. Students will also calculate the central tendencies and standard deviation of data	Feb – Mar				
ALG1.7	Students will use properties of exponents, including radicals, rational, exponential, growth and decay.	Mar – Apr				
ALG1.8	Students will add, subtract, and multiply polynomials; they will factor and solve quadratic equations	Apr - May				
ALG1.9	Students will graph quadratic functions	May				

Math Standard Reference Codes

Number & Quantity		Algebra		Functions		Geometry		Statistics & Probability	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Algebra I

Purpose Statement:	Students will create and simplify algebraic expressions using laws of exponents and structures such as factored form; solve linear equations, inequalities, systems of linear equations, and factorable quadratic equations; write, graph and interpret linear and exponential functions; interpret, graph, and summarize one and two variable data.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

ALG1.1		Students will solve multistep equations; model and solve real life problems by creating equations and using appropriate units and formulas.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.1.1	Solve linear equations using multiple steps.	A.REI.I.3	None	5a Computational Thinker
	ALG1.1.2	Solve linear equations with variables on both sides.	A.REI.I.3	None	5a Computational Thinker
	ALG1.1.3	Explain each step in solving a simple equation using properties of equality and inverse operations.	A.REI.H.1	CVE CV12.44	3d Knowledge Constructor 4d Innovative Designer 5c Computational Thinker 6a,b,c,d Creative Communicator
	ALG1.1.4	Create equations with one variable and use them to solve problems.	A.CED.G.1 N.Q.C.2	Science HS-PS2-1.	3d Knowledge Constructor 4d Innovative Designer 5a Computational Thinker 6b Creative Communicator
	ALG1.1.5	Rewrite equations and formulas to highlight a quantity of interest.	A.CED.G.4 N.Q.C.1	Science HS-PS2-1.	4d Innovative Designer

				HS-PS2-2 HS-ESS1-1 HS-ESS1-2 HS-ESS1-4 HS-PS4-1.	5c Computational Thinker
	ALG1.1.6	Use dimensional analysis to solve computational problems with formulas.	N.Q.C.1 N.Q.C.3		4d Innovative Designer 5c Computational Thinker 6b Creative Communicator
Vocabulary		equation, equality, solution, extraneous solution, variable, coefficient, inverse operation, formula, units of measurement and conversions.			

ALG1.2		Students will solve inequalities in one variable and model real life problems by creating inequalities.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.2.1	Represent solutions to inequalities verbally, algebraically, and graphically.	A.REI.I.3	None	5a Computational Thinker
	ALG1.2.2	Solve multistep inequalities and graph the solution set on a number line.	A.REI.I.3 A.REI.H.1	CVE CV12.44	3d Knowledge Constructor 4d Innovative Designer 5c Computational Thinker

					6a,b,c,d Creative Communicator
	ALG1.2.3	Solve multistep inequalities with variables on both sides, including those with empty sets or all real number solutions.	A.REI.I.3 A.REI.H.1	CVE CV12.44	3d Knowledge Constructor 4d Innovative Designer 5c Computational Thinker 6a,b,c,d Creative Communicator
	ALG1.2.4	Create inequalities in one variable and use them to solve problems.	A.CED.G.1 N.Q.C.2	Science HS-PS2-1.	3d Knowledge Constructor 4d Innovative Designer 5a Computational Thinker 6b Creative Communicator
Vocabulary		inequality, solution set, equivalent inequalities, and all vocabulary from previous benchmark.			

ALG1.3		Students will determine the relationship between variables, whether a relationship is a function, create functions, graph and transform linear functions and graph absolute functions, and use function notation.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.3.1	Determine if a relation is a function and identify the domain, range, independent and dependent variables using a graph, table, equation, or application.	F.IF.A.1 F.IF.A.3 A.REI.K.10	None	4a Innovative Designer

	ALG1.3.2	Identify and graph linear equations using discrete and continuous data.	A.REI.K.10 F.IF.B.4 F.IF.B.5 F.IF.C.7a F.IF.C.9	Science HS-ESS1-6 HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	4a, d Innovative Designer 3d Knowledge Constructor 1c Empowered Learner
	ALG1.3.3	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	F.IF.A.2 A.CED.G.2	None	4a,d Innovative Designer 3d Knowledge Constructor 5c Computational Thinker
	ALG1.3.4	Graph linear equations given in standard and slope-intercept forms.	A.CED.G.2 F.IF.A.2 F.IF.B.4 F.IF.C.7a F.IF.C.9	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c Empowered Learner 4a,d Innovative Designer 3d Knowledge Constructor 5c Computational Thinker
	ALG1.3.5	Calculate and interpret the average rate of change of a function	F.IF.B.6 N.Q.C.1 N.Q.C.2	None	4a,d Innovative Designer 5c Computational Thinker 6b Creative Communicator
	ALG1.3.6	Graph absolute value function and apply transformations.	A.REI.K.10 F.IF.B.4	HS-PS2-1 HS-LS1-4	1c Empowered Learner

			F.IF.C.7.b F.BF.E.3	HS-LS1-5 HS-LS1-6	4a,d Innovative Designer 3d Knowledge Constructor
Vocabulary		linear function, function notation, domain, range, continuous, discrete, independent and dependent variables, y-intercept, x-intercept, rate of change, slope, absolute value function, transformations in the coordinate plane			

ALG1.4		Students will write linear equations/functions, fit a function to a scatter plot and analyze the function.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.4.1	Write equations in two variables in slope-intercept form, given a graph, a table, slope and a point, or two points.	A.REI.K.10 F.IF.B.4 F.IF.C.9 F.BF.D.1a F.LE.F.2	Science HS-PS2-1 HS-PS2-2 HS-ESS1-1 HS-ESS1-2 HS-ESS1-4 HS-LS1-3 HS-LS1-4 ELA W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4a,d Innovative Designer 5c Computational Thinker 3d Knowledge Constructor
	ALG1.4.2	Create an equation to model the relationship between two quantities and use the equation to solve problems.	A.CED.G.2 F.BF.D.1a	Science HS-PS2-1 HS-PS2-2 HS-ESS1-1 HS-ESS1-2 HS-ESS1-4	3d Knowledge Constructor 4d Innovative Designer 4a Innovative Designer

				HS-LS1-3 HS-LS1-4 ELA W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	5a,c Computational Thinker
	ALG1.4.3	Write equations of parallel and perpendicular lines.	G.GPE.L.5 A.CED.G.2	ELA W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	6a,b,c,d Creative Communicator
	ALG1.4.4	Write the terms of an arithmetic sequence, and write the sequence as a linear function.	F.IF.A.3 F.BF.D.1a	Science HS-PS2-1 HS-PS2-2 HS-ESS1-1 HS-ESS1-2 HS-ESS1-4 HS-LS1-3 HS-LS1-4 ELA W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4a Innovative Designer 5a,c Computational Thinker
	ALG1.4.5	Create a scatter plot to calculate a best-fit linear function; interpret the slope (rate of change) and the intercept (constant term) of this function in the context of the data.	S.ID.B.6.a S.ID.C.7 S.ID.C.9 F.BF.D.1 N.Q.C.1	Science HS-LS1-3 HS-LS1-4 HS-ESS1-6 ELA	1c Empowered Learner 3d Knowledge Constructor 4a,d Innovative Designer

				W.9-10.2.d, e W.9-10.8 W.11-12.1.d W.11-12.2.d	5a,b, c Computational Thinker 6a,b,c,d Creative Communicator
	ALG1.4.6	Use technology to calculate, then interpret the least-squares regression line and the correlation coefficient for a scatterplot.	S.ID.B.6.c	ELA W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	1c Empowered Learner 3d Knowledge Constructor 4a,d Innovative Designer 5a,b Computational Thinker
	ALG1.4.7	Distinguish between correlation and causation given real-life examples.	S.ID.B.6.c	ELA W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	1c Empowered Learner 3d Knowledge Constructor 4a,d Innovative Designer 5a,b Computational Thinker
Vocabulary		Linear function, slope-intercept form, point-slope form, standard form, parallel, perpendicular, arithmetic sequence, correlation, causation, least-squares regression, correlation coefficient			

ALG1.5		Students will solve systems of two linear equations and inequalities and relate them to real world situations.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.5.1	Solve system of equations by graphing and relate them to real world situations, including those with no or infinite solutions.	N.Q.C.1 A.REI.I.3 A.REI.J.6 A.REI.K.10 F.IF.C.7a	Science HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	5a,c Computational Thinker 1c Empowered Learner 4a,d Innovative Designer
	ALG1.5.2	Solve systems of equations algebraically and relate them to real world situations, including those with no or infinite solutions.	A.REI.K.10 A.REI.J.5 A.REI.J.6	ELA W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	6a,b,c,d Creative Communicator
	ALG1.5.3	Use graphs and tables from technology to find approximate solutions to equations in one variable by graphing each side as a separate function.	F.IF.C.7a A.REI.K.10 A.REI.K.11	Science HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c Empowered Learner
	ALG1.5.4	Graph the solutions to a linear inequality in two variables.	A.REI.K.10 A.REI.K.12	None	1c Empowered Learner 4a,d Innovative Designer
	ALG1.5.5	Graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes, and relate them to real-world situations.	A.REI.K.12	None	1c Empowered Learner
Vocabulary		Solution for an equation in two variables, system of equations, half-plane, boundary line, solution to system of inequalities.			

ALG1.6		Students will use properties of exponents, including radicals, rational, exponential, growth and decay.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.6.1	Re-write expressions using properties of exponents.	N.RN.A.1	none	none
	ALG1.6.2	Multiply and divide numbers expressed in both decimal and scientific notation to solve real world and mathematical problems. Add and subtract numbers in scientific notation with the same integer exponent.	N.RN.A.1 A.SSE.B.3.c	Science HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5	5c Computational Thinker
	ALG1.6.3	Distinguish rational and irrational numbers; know when the sum or product of rational and irrational numbers is rational or irrational.	N.RN.B.3	none	6a,b,c,d Creative Communicator
	ALG1.6.4	Rewrite expressions involving radicals and rational exponents using the properties of exponents.	N.RN.A.1 N.RN.A.2	none	none
	ALG1.6.5	Determine whether a table, rule, or situation is linear or exponential.	F.LE.F.1.a F.LE.F.1.b F.LE.F.3 F.LE.F.5	ELA W.9-10.9 W.9-10.2.d W.11-12.2.d	1c Empowered Learner 3d Knowledge Constructor 5a Computational Thinker 6a,b,c,d Creative Communicator 4a,d Innovative Designer
	ALG1.6.6	Construct exponential functions using a graph, a description of a relationship, or two or more input-output pairs.	F.IF.B.4 F.IF.B.5 F.IF.C.7e F.LE.F.2	Science HS-ESS1-6 HS-PS2-1 HS-PS2-4 HS-PS4-1	4a,d Innovative Designer 5c Computational Thinker

				HS-PS4-5	3d Knowledge Constructor
	ALG1.6.7	Graph and solve problems using exponential growth and decay.	F.LE.F.1.c F.LE.F.5 F.IF.C.8b F.BF.D.1b	Science HS-LS1-3 HS-LS1-4 ELA W.9-10.9.d W.9-10.2.e W.11-12.2.d W.9-10.2.e W.11-12.1.d	4a,d Innovative Designer 1c Empowered Learner 3d Knowledge Constructor 5a Computational Thinker 6a,b,c,d Creative Communicator
	ALG1.6.8	Identify and generate geometric sequences, and relate these sequences as exponential functions.	F.LE.F.1.a-c F.LE.F.2 F.LE.F.3 A.SSE.B.4	None	4a,d Innovative Designer 5c Computational Thinker 1c Empowered Learner
Vocabulary		exponent, base, nth root, radical, rational exponent, exponential function, exponential growth and decay, rate of growth and decay, compound interest, geometric sequence.			

ALG1.7		Students will add, subtract, and multiply polynomials; they will factor and solve quadratic equations.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.7.1	Identify and interpret parts of a polynomial expression, such as terms, factors, and coefficients.	A.SSE.A.1	Science HS-PS4-1 HS-ESS1-2	1c Empowered Learner

				HS-PS2-4 HS-ESS1-1 HS-PS2-1 HS-ESS1-4 W.9-10.2.d W.11-12.2.d	
	ALG1.7.2	Add, subtract, and multiply polynomials.	N.RN.A.1 A.APR.C.1	None	None
	ALG1.7.3	Solve polynomial equations in factored form.	A.SSE.B.3.a	Science HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5	5c Computational Thinker
	ALG1.7.4	Rewrite quadratic expressions in factored form with a leading coefficient of 1.	A.SSE.A.2 A.SSE.B.3.a F.IF.C.7a,c	Science HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5	4d Innovative Designer
	ALG1.7.5	Rewrite quadratic expressions in factored form with leading coefficient not equal to 1.	A.SSE.A.2 A.SSE.B.3.a F.IF.C.7a,c	Science HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5	4d Innovative Designer
Vocabulary		monomial, degree of monomial, polynomial, degree of polynomial, standard form of a polynomial, leading coefficient, quadratic, cubic, binomial, trinomial, perfect square trinomial, difference of two squares			

ALG1.8		Students will graph quadratic functions.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.8.1	Graph and interpret quadratic functions in the form $f(x)=ax^2$ and $f(x)=ax^2+k$ as they apply to real life problems.	F.IF.C.7	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c Empowered Learner 4a,d Innovative Designer
	ALG1.8.2	Graph quadratic functions using vertex form, and compare to $f(x)=x^2$, focusing on problems related to real life.	F.IF.C.9 F.BF.E.3		4a Innovative Designer
Vocabulary		Quadratic function, vertex, transformation, intercepts, maximum and minimum values, axis of symmetry, parabola, vertical stretching and shrinking,			

ALG1.9		Students will organize data in tables, graphs, histograms and scatter plots. Students will also calculate the central tendencies and standard deviation of data.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG1.9.1	Represent data with plots on the real number line (dot plots, histograms, and box plots) by hand or using technology.	N.Q.C.1 S.ID.A.1	HS-PS2-1 HS-LS2-6 W.9-10.2.d W.11-12.2.d	1c Empowered Learner 4a,d Innovative Designer 5a,b Computational Thinker
	ALG1.9.2	Calculate statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of one or more different data sets	S.ID.A.2	W.9-10.2.d W.11-12.2.d	1c Empowered Learner 5a,b,c Computational Thinker

	ALG1.9.3	Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme values.	S.ID.A.3	W.9-10.2.d W.11-12.2.d	3d Knowledge Constructor 5b Computational Thinker 6a,b,c,d Creative Communicator
Vocabulary		mean, median, range, outlier, quartile, inner quartile range, box and whisker plots, histogram, skew, symmetric, percentile			

Math Standard Reference Codes									
Number & Quantity		**Algebra**		**Functions**		**Geometry**		**Statistics & Probability**	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Geometry

Purpose Statement:	Students will apply inductive and deductive reasoning. Students will calculate lengths, areas, and volumes of plane and solid figures. Students will identify triangles and use their properties to solve equations, determine congruence, and determine similarity. Students will apply sine, cosine, and tangent ratios. Students will construct geometric shapes. Students will use all preceding skills to solve real life and mathematical problems.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

GEO.1		Students will identify basic geometric elements and calculate the midpoints and distances of segments.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.1.1	Name, sketch, and define the basic elements of geometry *(e.g., point, line, plane, angle, etc.)*.	G.CO.A.1	W.9-10.2.d W.11-12.2.d	WY-TOPP 10th	
	GEO.1.2	Use coordinate locations to find midpoints and calculate distances with the distance formula.	G.CO.A.1 G.GPE.L.6 G.GPE.L.7	W.9-10.2.d W.11-12.2.d	WY-TOPP 10th	
	GEO.1.3	Calculate the area and perimeters of polygons in a coordinate plane.	G.GPE.L.6 G.GPE.L.7		WY-TOPP 10th	
Vocabulary		undefined terms, defined terms, line segment, end-points, ray, opposite-rays, postulate, axiom, congruent segments, midpoint, segment bisector, acute, right, obtuse, straight angles, congruent angles, angle bisector, linear pair, vertical angles, polygon, convex, concave, n-gon, equilateral, equiangular, regular				

GEO.2		Students will analyze patterns of logic and support their reasoning in formal proofs.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.2.1	Use inductive reasoning, deductive reasoning, and conditional statements to establish logical arguments.	G.CO.C.9	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	6a, 6b, 6c, 6d
	GEO.2.2	Support an argument using logical reasoning (postulates, diagrams, proofs – segment, angle pairs, angles).	A.REI.H.1 G.CO.C.9	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th (A.REI.H.1 not explicitly tested)	6a, 6b, 6c, 6d

Vocabulary		conjecture, inductive reasoning, deductive reasoning, counter-example, conditional statement, converse, inverse, contrapositive, if-then form (hypothesis, conclusion), negation, equivalent statements, perpendicular line, bi-conditional statement, proof, two column proof, theorem

GEO.3		Students will investigate relationships of slopes, classify angles, and prove theorems related to lines and angles in formal proofs.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.3.1	Measure and classify angles (interior, exterior, and relationships).	G.CO.A.1 G.CO.C.9	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	6a, 6b, 6c, 6d
	GEO.3.2	Prove theorems involving parallel lines and their transversals and apply to triangles.	G.CO.A.1 G.CO.C.9 G.CO.C.10 G.CO.C.11	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	6a, 6b, 6c, 6d
	GEO.3.3	Use criteria of parallel and perpendicular lines to solve geometric problems.	G.GPE.L.5 G.CO.A.1	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	6a, 6b, 6c, 6d
Vocabulary		parallel lines, skew, parallel planes, transversal, corresponding angles, alternate interior angles, alternate exterior angles, consecutive interior angles, paragraph proof, slope, slope-intercept form, standard from, distance from a point to a line				

GEO.4		Students will draw and describe transformations of geometric figures and use transformations to prove theorems.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.4.1	Draw and describe transformed figures using rotation, reflection, and translation.	G.CO.A.2 G.CO.A.3	W.9-10.2.d W.11-12.2.d	WY-TOPP 10th	1c, 4a, 5c

			G.CO.A.4 G.CO.A.5			
	GEO.4.2	Use transformations to prove that when a transversal crosses parallel lines, corresponding angles are congruent.	G.CO.C.9	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	6a, 6b, 6c, 6d
Vocabulary		congruent, rotation, transformation, reflection, translation				

GEO.5		Students will compare triangles and prove and apply relationships between and within triangles.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.5.1	Show and prove that two triangles are congruent (SSS, SAS, HL, ASA, AAS) and use to prove theorems about parallelograms.	G.CO.B.7 G.CO.B.8 G.CO.C.10 G.C.O.11 G.SRT.F.5	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	1c, 4a 6a, 6b, 6c, 6d
	GEO.5.2	Prove and apply theorems for isosceles and equilateral triangles.	G.CO.C.10 G.SRT.F.5	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	4a 6a, 6b, 6c, 6d
	GEO.5.3	Show that two triangles are congruent after rigid motion ASA, SAS, SSS.	G.CO.B.6 G.CO.B.7 G.CO.B.8	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	6a, 6b, 6c, 6d
	GEO.5.4	Prove theorems about triangles (medians, angle and perpendicular bisectors).	G.CO.C.9 G.CO.C.10 G.SRT.F.5	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	4a 6a, 6b, 6c, 6d
Vocabulary		ASA, SSS, SAS, AAS, HL, altitude, median				

GEO.6		Students will determine if geometric figures are similar or congruent and apply properties of similar figures.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.6.1	Decide if triangles are similar (AA, SSS, SAS).	G.SRT.E.2 G.SRT.E.3 G.SRT.F.5		WY-TOPP 10th	1c, 4a
	GEO.6.2	Prove criteria of parallel and perpendicular lines (slopes and graphing).	G.GPE.L.5 G.CO.A.1 G.SRT.F.5	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	4a 6a, 6b, 6c, 6d
	GEO.6.3	Apply and verify the properties of similar figures including dilations (ratios, proportions).	G.SRT.E.1 G.SRT.F.4		WY-TOPP 10th	1c 6a, 6b, 6c, 6d
	GEO.6.4	Compare transformations that preserve distance and angle to those that do not.	G.CO.A.2 G.SRT.F.5		WY-TOPP 10th	1c, 4a
Vocabulary		similar, ratio, proportion, scale factor of two similar polygons, dilation, center of dilation, scale factor of dilation, reduction, enlargement, AA, SSS, SAS				

GEO.7		Students will solve for unknowns by: investigating how side lengths and angle measures relate within triangles; and simplifying radicals.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.7.1	Write expressions in simplest radical form.	N.RN.A.2			
	GEO.7.2	Solve right triangles through the use of Pythagorean Theorem, its converse and the special right triangle properties. Use Pythagorean triples when applicable.	G.SRT.G.8 A.APR.E.4		WY-TOPP 10th (A.APR.E.4 not explicitly tested)	4d

	GEO.7.3	Solve right triangles through the use of tangent, sine, and cosine.	G.SRT.G.6 G.SRT.G.7 G.SRT.G.8	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th (G.SRT.G.7 not explicitly tested)	4d 6a, 6b, 6c, 6d
Vocabulary		right triangle, converse, Pythagorean Theorem, radical, square root, factoring, sine, cosine, tangent, inverse sine, inverse cosine, inverse tangent				

GEO.8		Students will investigate aspects of circles to calculate measures, describe relationships, prove that all circles are similar, and utilize appropriate tools to make formal constructions.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.8.1	Identify and describe relationships of circles and their tangents, secants, chords, and radii.	G.C.I.2 G.C.I.3	W.9-10.2.d W.11-12.2.d	WY-TOPP 10th (G.C.I.3 not explicitly tested)	6a, 6b, 6c, 6d
	GEO.8.2	Calculate arc lengths.	G.C.J.5			
	GEO.8.3	Prove that all circles are similar.	G.C.I.1		WY-TOPP 10th	6a, 6b, 6c, 6d
	GEO.8.4	Make formal constructions with a variety of tools.	G.C.I.3 G.CO.D.12 G.CO.D.13		WY-TOPP 10th (G.C.I.3 not explicitly tested)	
Vocabulary		circle, center, radius, diameter, chord, secant, tangent, central angle, minor arc, major arc, semi-circle, congruent circles, congruent arcs, inscribed angle, intercepted arc, construction, inscribed				

GEO.9		Students will solve for areas, volumes, and density utilizing appropriate units of measurement and levels of accuracy as indicated and explore cross sections of solids.	Math Standard Reference	Cross-curricular Standard Reference	State Assessment Reference	ISTE Standard Reference
	GEO.9.1	Choose appropriate units of measurement and levels of accuracy as indicated for areas, volumes, and density.	G.MG.O.2 N.Q.C.1 N.Q.C.2 N.Q.C.3		WY-TOPP 10th (N.Q.C.1,2,3 not explicitly tested)	
	GEO.9.2	Solve problems involving surface area and volume of solids.	G.GMD.M.1 G.GMD.M.3 G.MG.O.1 G.MG.0.3	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	WY-TOPP 10th	5a 6a, 6b, 6c, 6d
	GEO.9.3	Calculate areas of sectors of circles.	G.C.J.5			
	GEO.9.4	Describe two-dimensional cross-sections of three-dimensional objects.	G.GMD.N.4		WY-TOPP 10th	
Vocabulary		polyhedron (face, edge, vertex), platonic solid, cross section, prism, surface area, lateral area, net, right prism, oblique prism, cylinder, right cylinder, pyramid, regular pyramid, cone, right cone, volume, sphere, great circle, hemisphere, similar solids.				

Algebra II

Pacing Guide							
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
ALG2.1	Students will identify families of functions, describe transformations of parent functions, and write functions representing combinations of transformations. Students will write linear equations using points and slopes. Students will incorporate lines of fit and lines of best fit.	Aug-Sept	X			
ALG2.2	Students will describe and write transformations of quadratic functions, and graph quadratic functions using *x*-intercepts. Students will write equations of parabolas and write quadratic equations to model data sets.	Sept-Oct	X			
ALG2.3	Students will solve quadratic equations for real and complex solutions. Add, subtract, and multiply complex numbers, and solve systems of nonlinear equations. Students solve and graph quadratic inequalities in two variables.	Oct-Nov		X		
ALG2.4	Students will graph and analyze the graphs of polynomial functions, including transformations. Students will add, subtract, multiply, divide, and factor polynomials, and find solutions of polynomial equations and zeros of polynomial functions. Students will use the Fundamental Theorem of Algebra, and write polynomial functions.	Nov-Dec		X		
ALG2.5	Students will evaluate expressions using properties of rational exponents. Students will graph radical functions and solve equations containing radicals and rational exponents. Students will explore inverses of functions.	Jan-Feb			X	
ALG2.6	Students will define and evaluate logarithms, using the properties of logarithms and the change of base formula. Students will graph and solve logarithmic functions. Students will write logarithmic models for data sets.	Feb-Mar			X	

Math Standard Reference Codes									
Number & Quantity		**Algebra**		**Functions**		**Geometry**		**Statistics & Probability**	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Algebra II

Purpose Statement:	Students will create, make sense of problems and persevere in solving algebraic expressions pertaining to radical, rational, polynomial, logarithmic, and exponential functions. Students will reason abstractly, quantitatively, construct viable arguments and critique the reasoning behind the arguments. Students will model with mathematics, use appropriate tools strategically, and attend to precision. Students will look for and make use of structure, express regularity in repeated reasoning.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

ALG2.1			Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.1.1	Students will identify families of functions, describe transformations of parent functions, and create functions representing combinations of transformations. Create linear equations using points and slopes. Incorporate lines of fit and lines of best fit. Identify families of functions. Describe transformations of parent functions. Describe combinations of transformations.	F.IF.B.4 F.IF.B.5 F.BF.D.1.B F.BF.E.3 F.LE.F.4 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-ESS1-6 HS-LSI-3 HS-LSI-4 W.9-10.2.d,e W.9-10.9 W.11-12.1.d W.11-12.2.d	3d 4a,d 5a,c 6d Computational Thinking Financial Literacy
	ALG2.1.2	Write functions representing translations and reflections, stretches and shrinks, and combinations of transformations.	F.IF.B.4 F.IF.C.8 F.BF.E.3 F.BF.E.4 F.BF.E.5 (+) F.LE.F.1	W.9-10.9 W.9-10.2.d, e W.11-12.1.d W.11-12.2.d	1c 3d 4a, d 5a 6a, b, c, d Computational Thinking Financial Literacy
	ALG2.1.3	Write equations of linear functions using points and slopes. Find line of fit and lines of best fit.	A.CED.G.1 F.IF.A.1 F.BF.D.2 (+) F.LE.F.1 F.LE.F.2 S.ID.B.6	HS-PS2-1 HS-ESS1-6 HS-LSI-3 HS-LSI-4 W.9-10.9 W.9-10.2.d,e	1c 3c, d 4a, d 5a, b, c 6a, b, c, d

			S.ID.C.7	W.11-12.1.d W.11-12.2.d	Computational Thinking Financial Literacy
Vocabulary		transformations, line of fit and line of best fit, correlation coefficient, and systems of equations			

ALG2.2		Students will describe and write transformations of quadratic functions, and graph quadratic functions using *x*-intercepts. Create equations of parabolas and write the quadratic equations to model data sets.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.2.1	Describe transformations of quadratic equations.	F.IF.C.7.A G.SRT.E.2	HS-PS2-1 HS-LS1-4 HS-LSI-5 HS-LS1-6	1c 4a, d
	ALG2.2.2	Explore properties of parabolas. Analyze maximum and minimum values of quadratic equations. Graph quadratic equations using *x*-intercepts when solving real-life situations.	F.IF.B.4 F.IF.C.7.A F.IF.C.9 A.APR.D.3 N.Q.C N.Q.C.1 N.Q.C.2 N.Q.C.3	F.IF.C.7A HS-PS2-1 HS-LS1-4 HS-LSI-5 HS-LS1-6 HS-PS2-1 HS-LSI-4, HS-LS1-5 HS-LS1-6	1c 3d 4a, d 5a, c 6b Computational Thinking Financial Literacy
	ALG2.2.3	Explore the focus and directrix of a parabola. Write equations of parabolas when solving real-life problems.	F.IF.B.4 F.IF.C.7.A F.IF.C.8.A G.SRT.E.2 N.Q.C	HS-PS2-1 HS-LS1-4 HS-LSI-5 HS-LS1-6 W.9-10.2.d	1c 4a, d 5a, c 6b

			N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.e W.11-12.1.d W.11-12.2.d	Computational Thinking Financial Literacy
	ALG2.2.4	Write equations of quadratic functions using vertices, points, and *x*-intercepts. Create quadratic equations to model data sets.	A.CED.G.1 F.IF.B.4 F.IF.C.8 F.BF.D.1 S.ID.B.6 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-ESS1-6 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	1c 3d 4a,d 5a, b, c 6b Computational Thinking Financial Literacy
Vocabulary		axis of symmetry, minimum and maximum values, average rate of change, focus, and directrix			

ALG2.3		Students will solve quadratic equations for real and complex solutions. Add, subtract, and multiply complex numbers. Solve systems of nonlinear equations. Analyze, solve and graph quadratic inequalities in two variables.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.3.1	Analyze and solve quadratic equations by graphing. Solve quadratic equations algebraically.	A.SSE.A.2 A.SSE.B.3 A.SSE.B.4 A.APR.C.1 A.ARP.D.2 A.ARP.D.3 A.ARP.E.4 A.REI.H.1 F.IF.C.7.A F.IF.C.8.A	HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d CV12.44	3d 4a,d 5a, c 6a, b, c, d Computational Thinking Financial Literacy

			N.Q.C N.Q.C.1 N.Q.C.2 N.Q.C.3		
	ALG2.3.2	Define and use the imaginary unit *i*. Add, subtract, and multiply complex numbers. Find complex solutions and zeros.	N.CN.D N.CN.D.1 N.CN.D.2 N.CN.D.3 (+) N.CN.E.4 (+) N.CN.E.6 (+) N.CN.E.5 (+) N.CN.F.7 N.CN.F.8 (+) N.CN.F.9 (+) N.CN.F.9 (+) A-REI.I.4.B N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W.9-10.2. e W.11-12.1.d W.11-12.2.d	6a, b, d 5a,c 4d Computational Thinking Financial Literacy
	ALG2.3.3	Solve quadratic equations using square roots, and completing the square. Write quadratic functions in vertex form.	N.CN.F.7 A.REI.I.4.A F.IF.C.8.A N.Q.C N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W.9-10.2. e W.11-12.1.d W.11-12.2.d	5a, c 4d 6b Computational Thinking Financial Literacy
	ALG2.3.4	Solve quadratic equations using the Quadratic Formula. Analyze the discriminant to determine the number and type of solutions.	N.CN.F.7 A.REI.H.1 A.REI.H.2 N.Q.C.	CV12.44 W.9-10.2.d W.9-10.2.e W.11-12.1.d	3d 4d 5c 6a, b, c, d

			N.Q.C.1 N.Q.C.2 N.Q.C.3	W.11-12.2.d	Computational Thinking Financial Literacy
	ALG2.3.5	Solve systems of nonlinear equations. Solve quadratic equations by graphing.	A.CED.G.3 A.REI.I.4 A.REI.J.7 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W.9-10.2 e W.11-12.1.d W.11-12.2.d	1c 4d 5a, c 6d Computational Thinking Financial Literacy
	ALG2.3.6	Graph quadratic inequalities in two variables. Solve quadratic inequalities in one variable.	A.CED.G.1 A.CED.G.3 A.REI.1.4.A A.REI.1.4.B A.REI.1.4.C (+) A.REI.J.5 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W-9-10.2 e W.11-12.1.d W.11-12.2.d	5a, c 1c 3d 4d 6a, b, c, d Computational Thinking Financial Literacy
Vocabulary		root of a function, zero of a function, imaginary unit, complex number, completing the square, quadratic formula, discriminant, system of nonlinear equations, quadratic inequalities in one and two variables			

ALG2.4		Students will graph and analyze the graphs of polynomial functions, including transformations. Add, subtract, multiply, divide, and factor polynomials. Find solutions of polynomial equations and zeros of polynomial functions. Implement the Fundamental Theorem of Algebra, and create polynomial functions.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.4.1	Identify polynomial functions. Graph polynomial functions using tables and end behavior.	F.IF.B.4 F.IF.B.5 F.IF.B.6 F.IF.C.7.A N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	3d 4a,d 1c 5a, c 6b Computational Thinking Financial Literacy
	ALG2.4.2	Add, subtract, and multiply polynomials.	A.APR.C.1 A.APR.E.4 F.BF.D.1.B	HS-LS1-3 HS-LS1- 4 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4a 5a,c Computational Thinking Financial Literacy
	ALG2.4.3	Use long division to divide polynomials by other polynomials. Use synthetic division to divide polynomials by binomials. Use the Remainder Theorem.	A.APR.C.1 A.APR.D.2		
	ALG2.4.4	Factor polynomials. Implement the Factor Theorem.	A.APR.D.3 A.APR.E.4 A.APR.E.5 (+)	W.9-10.2.d W.9-10.2.e W.11-12.1.d	5a, c 1c 4d

			A.SSE.A.1.A A.SSE.A.1.B A.SSE.A.2 A.SSE.B.3.A A.APR.D.3 A.REI.1.4.A A.REI.1.4.B	W.11-12.2.d HS-PS4-1 HS-PS4-4 HS-ESS1-1 HS-ESS1-2 HS-PS2-1 HS-PS2-4 HS-PS4-5 HS-ESS1-4	Computer Science 3A-DA-12 Computational Thinking
	ALG2.4.5	Find solutions of polynomial equations and zeros of polynomial functions. Implement the Irrational Conjugates Theorem and Rational Root Theorem.	A.APR.F.6 A.REI.I.4.A A.REI.I.4.B N.RN.A N.RN.A.1 N.RN.A.2 N.RN.B N.RN.B.3 N.Q.C N.Q.C.1 N.Q.C.2 N.CN.D.1 N.CN.D.2 N.CN.D.3 (+)	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4d 6b, c 5a, c Computational Thinking Financial Literacy
	ALG2.4.6	Utilize the Fundamental Theorem of Algebra. Find conjugate pairs of complex zeros of polynomial functions.	N.CN.D.2 N.CN.D.3 (+) N.CN.F.8 (+) N.CN.F.7 N.CN.F.8 (+) N.CN.F.9 (+)		6d
	ALG2.4.7	Describe transformations of polynomial functions. Create transformations of polynomial functions.	F.BF.E.3		4a

	ALG2.4.8	Analyze x-intercepts to graph polynomial functions. Apply concepts of turning points and identify maximums and minimums. Critique even and odd functions.	A.APR.B.3 A.APR.D.3 F.IF.B.4 F.IF.C.7C F.BF.B.3 N.Q.C N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5	5a, c 4d 6b Computational Thinking Financial Literacy
Vocabulary		root of a function, zero of a function, imaginary unit, complex number, completing the square, quadratic formula, discriminant, system of nonlinear equations, quadratic inequalities in one and two variables			

ALG2.5		Students will evaluate expressions using properties of rational exponents. Graph radical functions and solve equations containing radicals and rational exponents. Apply concepts and explore inverses of functions.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.5.1	Find n^{th} root of numbers. Evaluate expressions with rational exponents. Solve equations using n^{th} root.	A.APR.E.5 (+) A.APR.F.6 A.APR.F.7 (+) N.RN.A.1 N.RN.A.2		
	ALG2.5.2	Compare properties of rational exponents to simplify expressions with rational exponents. Use properties of radicals to simplify and write radical expressions in simplest form.	N.RN.A.2 N.RN.B.3 A.REI.H.2	W.9-10.2.d W9-10.2.e W.11-12.1.d W.11-12.2.d CV12.44	4d
	ALG2.5.3	Graph radical functions. Write transformations of radical functions. Graph parabolas and circles.	F.IF.C.7.B F.IF.C.7.C F.BF.B.3 G.GPE.K.1	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c 4a, d

			G.GPE.K.2 (+)		
	ALG2.5.4	Solve equations containing radicals and rational exponents.	A.REI.H.1 A.REI.H.2 N.RN.A N.RN.A.1 N.RN.A.2 N.RN.B.3 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	CV12.44 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	3d 4d 6a, b, c, d 5a, c Computational Thinking Financial Literacy
	ALG2.5.5	Add, subtract, multiply, and divide functions.	F.BF.D.1.B F.BF.D.1.C (+) F.BF.E.3	HS-LS1-3 HS-LS1-4 W.9-10.2.d W.9-10-2.e W.11-12.1.d W.11-12.2.d	4a 5a, c Computational Thinking Financial Literacy
	ALG2.5.6	Explore inverses of functions. Find and verify inverses of functions. Solve real-life problems using inverse functions.	F.BF.E.4.A F.BF.E.4.B (+) F.BR.E.4.C (+) N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3		4d 5a, c 6b Computational Thinking Financial Literacy
Vocabulary		nth root of p, index of a radical, simplest form of a radical, like radicals, power function, composition, inverse relation, inverse function, radical function, radical equation, and extraneous solutions			

ALG2.6		Students will define and evaluate logarithms, using the properties of logarithms and the Change of Base formula. Students will graph and analyze logarithmic functions. Create logarithmic models for data sets.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.6.1	Graph exponential growth and decay functions. Utilize exponential models to solve real-life problems.	F.IF.C.7.E F.IF.C.8.B F.LE.F.1.A F.LE.F.1.C F.LE.F.2 F.LE.F.3 F.LE.F.4 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d W.9-10.9	4a, d 5a, c 1c 3d 6a, b, c, d Computational Thinking Financial Literacy
	ALG2.6.2	Define and use the natural base *e*. Graph natural base functions. Solve real-life situations.	F.LE.F.1C F.LE.F.4 F.LE.F.5 F.IF.C.7E N.Q.C N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.9 HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c 3d 4a, d 5a 6a, b, c, d Computer Science 3B-DA-05 Computational Thinking Financial Literacy
	ALG2.6.3	Define and evaluate logarithms. Implement inverse properties of logarithmic and exponential functions. Graph logarithmic functions.	F.IF.C.7.E F.LE.F.1.C F.LE.F.4 F.LE.F.4	W.9-10.9 HS-PS2-1 HS-LS1-4, 5, 6	1c 3d 4a, d 5a, c

			F.BF.E4A		6a, b, c, d Computational Thinking Financial Literacy
	ALG2.6.4	Utilize the properties of logarithms to evaluate, expand and condense logarithmic expressions.	A.SSE.A.1.A A.SSE.A.1.B	HS-PS4-1 HW-ESS1-2 HS-PS2-4 HS-ESS1-1 HS-PS2-1 HS-ESS1-4 W.9-10.2.d W.11-12.2.d Computer Science 3A-DA-12	1c Computational Thinking
	ALG2.6.5	Solve exponential and logarithmic equations.	F.LE.F.1.C F.LE.F.4 A.SSE.A.2 A.SSE.B.3C N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.9 W.9-10.2.e W.11-12.1.d HS-PS2-1, 4 HS-PS4-1, 5	1c 3d 4d 5a, c 6a, b, c, d Computational Thinking Financial Literacy
	ALG2.6.6	Apply concepts to solve and create exponential and power functions.	A.SSE.A.2 A.SSE.B.3.C F.IF.B.4 F.IF.B.5 F.IF.C.8.B	HS-ESS1-6 W.9-10.2.d, e W.11-12.2.d W.11-12.1.d	3 4a, d 5a, c 6a, b, c, d

			N.RN.A N.RN.A.1 N.RN.A.2 N.RN.B.3 N.Q.C N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1, 4 HS-PS4-1, 5	Computational Thinking Financial Literacy
Vocabulary		exponential function, exponential growth function, growth factor, asymptote, exponential decay function, decay factor, natural base *e*, logarithm of y with base b, common logarithm, natural logarithm, exponential equation, logarithmic equation			

ALG2.7		Students will model problem situations by creating inverse variation and joint variation equations. Add, subtract, multiply, and divide rational expressions. Analyze and solve rational equations.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.7.1	Model inverse and joint variation.	F.BF.E.4.A F.BF.E.4.B (+) F.BF.E.4.C (+) F.BF.E..5 (+) N.Q.C N.Q.C.1 N.Q.C.2 N.Q.C.3 A.SSE.A.1.A	HS-PS4-1 HS-ESS1-2 HS-PS2-4 HS-ESS1-1 HS-ESS1-4 HS-PS2-1 W.9-10.2.d W.11-12.2.d Computer Science 3A-DA-12	1c 4d 5a, c 6b Computational Thinking Financial Literacy
	ALG2.7.2	Multiply and divide rational expressions.	A.APR.F.6		

			A.APR.F.7 (+)		
	ALG2.7.3	Add and subtract rational expressions.	A.APR.F.6 A.APR.7(+)		
	ALG2.7.4	Apply concepts to solve rational equations.	A.REI.H.2 A.APR.F.6 A.CED.G.4 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d CV12.44 HS-PS2-1, 2 HS-ESS1-1, HS-ESS1-2 HS-ESS1- 4 HS-PS4-1	4d 5a, c 6b Computational Thinking Financial Literacy
Vocabulary		inverse variation, constant of variation, joint variation, rational function, simplified form of a rational expression, complex fraction, cross multiplying			

ALG2.8		Students will calculate and interpret probabilities of independent, dependent, and compound events. They will extend the Fundamental Counting Principle to the use of permutations and combinations for compound probability calculations.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG2.8.1	Determine whether events are independent; find probabilities of independent and dependent events.	S.CP.F.1 S.CP.F.2 (+) S.CP.F.5	ELA W.9-10.2.d W.11-12.2.d	1c Empowered Learner 3d Knowledge Constructor 5b Computational Thinker 6a,b,c,d Creative Communicator

	ALG2.8.2	Make and use two-way tables to find conditional probabilities.	S.CP.F.3(+) S.CP.F.4(+) S.CP.F.5	ELA W.9-10.2.d W.11-12.2.d	1c Empowered Learner 3d Knowledge Constructor 5b,c Computational Thinker 6a,b,c,d Creative Communicator
	ALG2.8.3	Use the rules of probability to compute probabilities of compound events in a uniform probability model	S.CP.G.7(+) S.CP.G.8(+)	none	none
	ALG2.8.4	Use permutations and combinations to compute probabilities of compound events and solve problems	S.CP.G.7(+) S.CP.G.8(+) S.CP.G.9(+)	none	none
Vocabulary		Sample space, outcome, event, counting principal, tree diagram, experimental and theoretical probability, independent and dependent events, two-way tables, conditional probability, compound events, mutually exlusive, disjoint, permutation, combination, factorial, Addition Rule, Multiplication Rule			

Algebra III Trigonometry

Pacing Guide						
Code	**Benchmark**	**Month(s) Taught**	**Common Assessment Period**			
			1	**2**	**3**	**4**
ALG3.1	Students will write the equation and sketch the graphs of circles using symmetry. Use the order of operations to manipulate the imaginary unit *i* and use its' conjugate to write the quotient of two complex numbers in standard form. Find complex solutions and radical solutions of quadratic equations. Solve polynomial equations of degree two or greater using: factoring, completing the square, square/cubic rooting both sides, quadratic formula, and graphing. Solve/simplify radical and rational expressions/equations, and absolute value expressions/equations. Students will use the properties of inequalities to write equivalent inequalities and absolute value inequalities, for mathematical modeling purposes of real world examples of revenue/profit, heart rate, salaries, etc. problems.	Aug - Sept	X			
ALG3.2	Students will model equations and use slope as a rate of change in real-life examples. Find the domain and range of functions such as; Piece-wise, Position, etc., use vertical/ horizontal line tests, determine zeros of functions, identify even or odd functions in addition to, recognize and compute translated graphs while using parent functions. Add, subtract, multiply, and divide functions, along with discovering and using combinations and compositions of functions to model real-world situations.	Sept - Oct	X			
ALG3.3	Students will analyze graphs of quadratic functions by using verifiability of real, rational, and complex zeros, use the Leading Coefficient Test to find the minimum and maximum values in real-life applications. Write equations for direct, inverse and joint variations, and work with the regression feature of a graphing calculator.	Oct – Nov		X		

ALG3.4	Students will use the substitution and elimination methods to solve systems of linear and quadratic equations algebraically in two variables. Verify solutions and/or solve for solutions, of linear and quadratic equations by graphing and locating the points of intersection.	Nov - Dec		X		
ALG3.5	Students will recognize, evaluate, and graph exponential functions with base "a" and "e". Determine the One-to-One Property by analyzing a function that preserves distinctness. Utilize the properties of logarithmic functions to model and solve real-life applications, such as; compound and continuous interest, radioactive decay, population, etc.	Jan – Mar			X	
ALG3.6	Students will utilize degree and radian measure to describe angles. Use fundamental trigonometric functions and their reference angles, to help sketch the basic trigonometric functions. Determine the period, shifts and amplitudes of the basic trigonometric functions. Apply real-life applications by performing calculations with arc length along a circle, to discover linear and angular linear speeds. Find answers to problems pertaining to altitude, distance, elevation, and depression by using angles with right triangle trigonometry.	Apr - May				X
ALG3.7	Students will identify, solve, and explain the fundamental trigonometric identities. Implement the identities to evaluate and rewrite trigonometric expressions, using various methods, in order to simplify expressions. Perform operations with the trigonometric identities.	May				X

Math Standard Reference Codes									
Number & Quantity		Algebra		Functions		Geometry		Statistics & Probability	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Algebra III Trigonometry

Purpose Statement:	Students will rewrite radical, rational, polynomial, logarithmic, and exponential expressions in equivalent forms. Additionally, students will create and solve linear, quadratic, radical, rational, logarithmic, and exponential equations that can model real-life problems. Students will also graph and analyze quadratic, exponential, and basic trigonometric functions, and utilize these graphs for problem solving. Finally, students will solve triangles using trigonometric ratios and the unit circle.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

			Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
ALG3.1		Students will write the equation and sketch the graphs of circles using symmetry. Use the order of operations to manipulate the imaginary unit *i* and use its' conjugate to write the quotient of two complex numbers in standard form. Find complex solutions and radical solutions of quadratic equations. Solve polynomial equations of degree two or greater using: factoring, completing the square, square/cubic rooting both sides, quadratic formula, and graphing. Solve/simplify radical and rational expressions/equations, and absolute value expressions/equations. Students will use the properties of inequalities to write equivalent inequalities and absolute value inequalities, for mathematical modeling purposes of real world examples of revenue/profit, heart rate, salaries, etc. problems.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG3.1.1	Sketch graphs of equations and circles using symmetry, *x* and *y* intercepts, and solutions points.	F.IF.B.4 F.IF.B.5 F.IF.C.7.A F.IF.C.7.B F.IF.C.7.C F.IF.C.7.E N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-ESS1-6 HS-P52-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c 4a, d 5a, c 6d Computational Thinking Financial Literacy
	ALG3.1.2	Identify different types of equations. Solve linear equations in one variable including rational equations that lead to linear equations.	N.RN.A.1 N.RN.A.2 N.RN.B.3 A.CED.G.1 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1	6a, b, c, d 3d 4d 5a, c Computational Thinking Financial Literacy

	ALG3.1.3	Write and use Mathematical Models to solve real-life problems using common formulas.	A.REI.H.1 A.REI.H.2 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	CV12.44 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	3d 4d 5a, c 6a, b, c, d Computational Thinking Financial Literacy
	ALG3.1.4	Solve quadratic and cubic equations by factoring, extracting square roots/cubic roots, completing the square, and quadratic formula.	A.REI.I.4.A A.REI.I.4.B N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	5a, c 4d 6b Computational Thinking Financial Literacy
	ALG3.1.5	Use operations with complex numbers and its' conjugates to find solutions of quadratic/cubic equations.	N.CN.D.1 N.CN.D.2 N.CN.D.3 (+)		6c
	ALG3.1.6	Solve polynomial equations of degree two or higher, radical equations, rational equations, and absolute value equations.	N.RN.A.1 N.RN.A.2 A.APR.F.6		6a, b, c, d
	ALG3.1.7	Use properties of inequalities to solve linear, quadratic, and absolute value inequalities stating the answers in inequality notation and interval notation.	A.CED.G A.REI.I.3		4d, 5c 5a Computational Thinking
	ALG3.1.8	Use nonlinear inequalities to model and **solve real-life problems** using the algebraic "string method" with line graphing, and providing the answers in inequality notation and interval notation.	A.CED.G A.REI.J.5 A.REI.J.7 N.Q.C. N.Q.C.1 N.Q.C.2	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	6a, b, c, d 5a, c 4d Computational Thinking Financial

			N.Q.C.3		Literacy
Vocabulary		solution point, symmetry with respect to the *x- and y-* axes, and the origin, radical and rational equations, inequality and interval notation, "string method", complex number, conjugate,			

ALG3.2		Students will use slope as a rate of change in real-life examples. Find the domain and range of functions such as; Piece-wise, Position, etc., use vertical/ horizontal line tests, determine zeros of functions, and identify even or odd functions. Recognize and analyze translated graphs while using parent functions. Add, subtract, multiply, and divide functions along with discovering and using combinations and compositions of functions to model real-world situations.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG3.2.1	Use slope to write and graph translated linear equations given two points. Model linear equations given real-world application situations and solve for the answer. Identify parallel and perpendicular lines.	F.IF.B.6 F.LE.F.1.A F.LE.F.1.B G.CO.A.1	W.9-10.9 W.9-10.2.d W.11-12.2.d	4a, d 1c 3d 5a 6a, b, c, d Computational Thinking Financial Literacy
	ALG3.2.2	Evaluate and resolve domain and range values using Piece-wise, Position Functions, etc. Determine whether given relations are functions and where the domain/range may be open or closed.	F.IF.A.1 F.IF.A.2 F.IF.A.3 F.IF.B.4 F.IF.B.5 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-ESS1-6	4a, d 3d 5a, c 6d Computational Thinking Financial Literacy

	ALG3.2.3	Implement the Vertical/Horizontal Line Test for functions, analyze intervals of increasing and decreasing, analyze relative maximum and minimum values. Identify odd and even functions.	F.IF.B.4 F.IF.B.5 F.IF.B.6 F.IF.C.7.A F.IF.C.7.B F.IF.C.7.C F.IF.C.7.E F.IF.C.7.D (+) F.IF.C.7.F (+) N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	3d 4a, d 1c 5a, c 6d Computational Thinking Financial Literacy
	ALG3.2.4	Categorize and identify linear, quadratic, cubic, square root, reciprocal, step, absolute value, and other piecewise-defined functions.	F.IF.A.2 F.IF.A.3 F.IF.B.4 F.IF.B.5 F.IF.C.7.A F.IF.C.7.B F.IF.C.7.C F.IF.C.7.E F.IF.C.7.D (+) F.IF.C.7.F (+) F.IF.C.8.B F.IF.C.9 F.LE.F.B F.LE.F.C	HS-ESS1-6 HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12-2.d W.9-10.9	4a, d 3d 1c 5a 6a, b, c, d Financial Literacy
	ALG3.2.5	Use Parent Functions with transformations (vertical shifts, horizontal shifts, and reflections) to sketch graphs. Analyze where graphs are increasing, decreasing, or constant over specific intervals.	F.LE.F.2 F.LE.F.3 F.LE.F.4 G.CO.A.1	W.9-10.2.d W.11-12.2.d	4a, d 5c 1c

			G.CO.A.2 G.CO.A.4 G.CO.A.5 G.CO.B.6		Computational Thinking
	ALG3.2.6	Add, subtract, multiply, and divide functions. Create a new function using combinations and compositions with two separate functions.	F.BF.D.1 F.BF.D.1.A F.BF.D.1.B F.BF.D.1.C (+) F.BF.D F.BF.D.2 (+) F.BF.E.3	HS-LS1-3 HS-LS1-4 W.9-10.2d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4a 5a, c Computational Thinking Financial Literacy
	ALG3.2.7	Identify and implement inverse functions informally, situationally, and graphically, by using the horizontal/vertical line tests or algebraically.	F.BF.E.4.A F.BF.E.4.B (+) F.BF.E.4.C (+) F.BF.E.4.D (+) F.BF.E.5 (+) N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3		4d 5a, c 6b Computational Thinking Financial Literacy
Vocabulary		parent function, odd and even functions, step function, piecewise functions, position function, relative maximum and minimum, vertical and horizontal line tests, combination and composition of functions			

ALG3.3		Students will analyze graphs of quadratic functions by using verifiability of real, rational, and complex zeros, use the Leading Coefficient Test to find the minimum and maximum values in real-life applications. Examine turning points and multiplicity zeros. Create equations for direct, inverse, and joint variation, investigate the regression feature of a graphing calculator.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG3.3.1	Analyze and interpret graphs of quadratic functions, utilizing the number of turning points related to maximums and minimums, in order to create the	F.IF.A.2 F.IF.A.3	W.9-10.2.d W.9-10.2.e	4a, d 3d

		graph's equation in Standard Form. Examine the maximum and minimum values (points of inflection) in real-life situations.	F.IF.B.4 F.IF.C.7.A F.IF.C.8 F.IF.C.9 A.APR.D.3 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.11-12.1.d W.11-12.2.d	5a, c 6b Computational Thinking Financial Literacy
	ALG3.3.2	Use transformations, Leading Coefficient Test (to determine end behavior), and real zeros of polynomial functions to compose a sketch of their graphs. Analyze graphs with turning points.	A.APR.C.1 A.APR.D.3 G.CO.A.2 G.CO.A.4 G.CO.A.5 F.IF.C.7.C F.IF.C.7.E F.IF.C.7.D (+)	W.9-10.2.d W.11-12.2.d HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c 4a, d 5c Computational Thinking
	ALG3.3.3	Use long division, synthetic division, Remainder Theorem, and Factor Theorem to determine the factors (zeros) of polynomials including the multiplicity of each. Given a function's value and using synthetic substitution, students will discover specific points associated with a graph.	F.IF.C.8 F.IF.C.8.A A.APR.D.2 A.APR.D.3 A.APR.F.6	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4a Financial Literacy
	ALG3.3.4	Write mathematical models for direct, inverse, joint, and combined variations with given values. Implement the regression feature of a graphing calculator to attain equations.	F.BF.D.1 F.BF.D.1.A F.BF.D.1.B F.BF.D.1.C (+) A.SSE.A.2 S.ID.B.6.C S.ID.B.6.B (+) N.Q.C. N.Q.C.1	HS-LS1-3 HS-LS1-4 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d HS-ESS1-6	4a, d 5a, b, c 1c 3d 6b Computational Thinking Financial Literacy

			N.Q.C.2 N.Q.C.3		
Vocabulary		Standard Form, maximum, minimum, leading coefficient, long division, synthetic division, synthetic substitution, regression feature, rational and complex zeros, and conjugate pairs			

ALG3.4		Students will use the substitution and elimination methods to solve systems of linear and quadratic equations algebraically in two variables. Verify solutions and/or solve for solutions, of linear and quadratic equations by graphing and locating the points of intersection.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG3.4.1	Interpret the method of substitution and graphing (by sketching and by the use of a calculator) to solve systems of (linear and nonlinear) equations and inequalities in two variables.	A.CED.G.1 A.CED.G.3 A.REI.J.5 A.REI.J.6 A.REI.J.7 A.REI.J.8 (+) N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	3d 4d 5a, c 6a, b, c, d 1c Computational Thinking Financial Literacy
	ALG3.4.2	Interpret the two methods of elimination graphing, (by sketching and by the use of a calculator), to solve systems of (linear and nonlinear) equations and inequalities in two variables.	A.CED.G.1 A.CED.G.3 A.REI.J.5 A.REI.J.6 A.REI.J.7 A.REI.J.8 (+) N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	3d 4d 5a, c 6a, b, c, d 1c Computational Thinking Financial Literacy

Vocabulary	substitution method, two-solution case, no-real-solution case, point of intersection, elimination method, no-solution case, infinitely-many-solutions case, equilibrium point

ALG3.5		Students will recognize and evaluate exponential functions with base "*a*" and "*e*". Graph exponential functions and use the One-to-One Property to assess functions that preserve distinctness. Analyze, evaluate and graph logarithmic functions and use the properties of logarithmic functions to model and solve equations and real-life problems.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG3.5.1	Recognize, evaluate, and graph exponential functions with base "*a*", and "*e*" model and analyze real-life problems such as; compound/continuous interest, radioactive decay, etc.)	A.SSE.B.3.C F.IF.C.7.E F.IF.C.8.B F.LE.F.1.C F.LE.F.2 F.LE.F.3 F.LE.F.4 F.LE.F.5 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5 HS-LS1-4 HS-LS1-5 HS-LS1-6 W.9-10.9 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	5a, c 1c 4a, d 3d 6a, b, c, d 4d 5c Computer Science 3B-DA-05 Computational Thinking Financial Literacy
	ALG3.5.2	Recognize, and apply concepts to graph logarithmic functions with base "*a*" and the natural logarithmic function.	F.IF.C.7.E F.LE.F.4	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c 4a,d

	ALG3.5.3	Utilize the change-of-base formula and the properties of logarithms to evaluate, re-write, expand, and condense logarithmic expressions. Model and find solutions regarding real-life applications.	F.IF.C.8 F.LE.F.4 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4a Financial Literacy
	ALG3.5.4	Apply concepts and analyze more complicated exponential and logarithmic equations using various methods.	A.SSE.B.3.A A.SSE.B.3.B A.SSE.B.3.C F.IF.C.7.E F.LE.F.1.A F.LE.F.1.B F.LE.F.1.C N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5 HS-LS1-4 HS-LS1-5 HS-LS1-6 W.9-10.9	1c 4a, d 3d 5a, c 6a, b, c, d Computational Thinking Financial Literacy
	ALG3.5.5	Recognize the graphs of exponential and logarithmic functions to draw conclusions and model real-life applications.	A.SSE.B.3.C F.IF.B.4 F.IF.C.7.E F.IF.C.8.B F.LE.F.1.C F.LE.F.2 F.LE.F.3 F.LE.F.4 F.LE.F.5 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	HS-PS2-1 HS-PS2-4 HS-PS4-1 HS-PS4-5 HS-LS1-4 HS-LS1-5 HS-LS1-6 W.9-10.9 W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	5a, c 1c 4a, d 3d 6a, b, c, d Computer Science 3B-DA-05 Computational Thinking Financial Literacy

Vocabulary	exponential functions with base "*a*" and "*e*", exponential growth/decay function, growth/decay factor, asymptote, natural base "*e*", common and natural logarithmic functions, exponential and logarithmic equations.

			Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
ALG3.6		Students will utilize degree and radian measure to describe angles. Use fundamental trigonometric functions and their reference angles, to help sketch the basic trigonometric functions. Determine the period, shifts and amplitudes of the basic trigonometric functions. Apply real-life applications by performing calculations with arc length along a circle, to discover linear and angular linear speeds. Find answers to problems pertaining to altitude, distance, elevation, and depression by using angles with right triangle trigonometry.			
	ALG3.6.1	Describe angles, convert degree and radian measures. Calculate arc length and apply it to linear and angular speed.	F.TF.H F.TF.H.1 (+) F.TF.H.2 (+) G.CO.C.9 G.SRT.F.4 G.SRT.G.7 G.SRT.G.8 N.Q.C. N.Q.C.1 N.Q.C.2 N.Q.C.3	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	6a, b, c, d 4d 5a, c Computational Thinking Financial Literacy
	ALG3.6.2	Evaluate trigonometric functions of acute angle and perform fundamental trigonometric identities.	F.TF.H F.TF.H.1 (+) F.TF.H.2 (+) F.TF.H.3 (+) F.TF.H.4 (+) F.TF.J.8 (+) F.TF.J.9 (+) G.SRT.G.6	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	6a, b, c, d 4d

			G.SRT.G.8		
	ALG3.6.3	Employ reference angles to evaluate trigonometric functions of any angle, or real number.	F.TF.H. F.TF.H.2 (+) F.TF.H.3 (+) G.SRT.G.7 G.SRT.G.8	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	4d 6a, b, c, d
	ALG3.6.4	Sketch the graphs of basic sine and cosine functions involving period and amplitude.	F.BF.E.E F.TF.H.4 (+) F.TF.I.5 (+) F.TF.I.6 (+) F.TF.I.7 (+)		4a
	ALG3.6.5	Describe and solve real-life applications using right triangle trig.	F.TF.H.1 G.SRT.F.4 G.SRT.G.6 G.SRT.G.7 G.SRT.G.8 N.Q.C. N.Q.C.1 N.Q.C.2	W.9-10.2.d W.9-10.2.e W.11-12.1.d W.11-12.2.d	6a, b, c, d 4d 5c Computational Thinking Financial Literacy
Vocabulary		radian measure, initial and terminal side, coterminal angle, arc length, linear and angular speed, area of sector, cosecant, secant, cotangent, reference angle, periodic functions, even and odd functions, inverse trigonometric functions, amplitude and period of sine and cosine curves.			

ALG3.7		Students will identify, solve, and explain the fundamental trigonometric identities. Implement the identities to evaluate and rewrite trigonometric expressions, using various methods, in order to simplify expressions. Perform operations with the trigonometric identities.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	ALG3.7.1	Identify and solve the fundamental trigonometric identities. Use the trigonometric identities to evaluate and rewrite trigonometric expressions by	F.TF.H.3 (+) F.TF.H.4 (+) F.TF.J.8 (+)	W.9-10.2.d W.9-10.2.e W.11-12.1.d	6a, b, c, d 4d 5a, c

		using various methods (which may include sketching triangles, factoring, using algebraic operations, etc.) in order to simplify expressions.	F.TF.J.9 (+) G.SRT.G.6 G.SRT.G.7 N.Q.C. N.Q.C.1 N.Q.C.2	W.11-12.2.d	Computational Thinking Financial Literacy
Vocabulary		reciprocal, quotient, Pythagorean, equivalent functions, not equivalent, cofunction, and even/odd identities.			

Math Standard Reference Codes									
Number & Quantity		Algebra		Functions		Geometry		Statistics & Probability	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Integrated Math

Purpose Statement:	This class is designed to be a transition course between Geometry and Algebra II. Students will write and evaluate expressions; solve, write and graph linear equations and inequalities; and interpret patterns and functions. Students will interpret data, calculate central tendency and basic probability. Students will transform shapes on a coordinate plane and solve similarity problems including ones that involve right triangle trigonometry.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

INT.1	Students will interpret and create function rules from tables. Students will extend these rules to arithmetic sequences and patterns related to geometric shapes.	Math Standard Reference	Cross-curricular	ISTE Standard Reference

				Standard Reference	
	INT.1.1	Use patterns in tables to create mathematical expressions.	A.SSE.1		
	INT.1.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	F.IF.2		
	INT.1.3	Write conjectures and look for counterexamples in arithmetic sequences.	F.IF.3		
	INT.1.4	Relate the domain of a function, to the quantitative relationship it describes.	F.IF.5		
	INT.1.5	Write function rules related to geometric relationships. For example, sum of interior polygon angles.	G.CO.10		
Vocabulary		function, function notation, domain, range, conjecture, counterexample, arithmetic sequence			

INT.2		Students will write and solve 1 and 2 variable linear equations/inequalities that model real-life problems.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	INT.2.1	Rewrite algebraic expressions using the properties of real numbers.	A.SSE.2		
	INT.2.2	Create algebraic expressions to model real life problems.	A.SSE.2		
	INT.2.3	Solve linear equations in 1 variable, and explain the reasoning behind each step.	A.REI.1 A.REI.3		
	INT.2.4	Create linear equations in 1 variable to model real-life problems.	A.CED.1		
	INT.2.5	Solve linear inequalities in 1 variable.	A.REI.3		
	INT.2.6	Solve compound inequalities.	A.REI.3		
Vocabulary		expression, real numbers, equation, variable, inequality, compound inequality			

			Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
INT.3		Students will interpret and build linear functions that model a relationship between two quantities given a graph, a description of a relationship, or two input-output pairs. Students will compute and interpret rate of change.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	INT.3.1	Choose and interpret the scale and the origin in graphs.	N.Q.1		
	INT.3.2	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 and slope.	F.IF.4		
	INT.3.3	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes *(e.g., 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).*	F.IF.5		
	INT.3.4	Calculate and interpret average rate of change given tables, graphs, and ordered pairs.	F.IF.6		
	INT.3.5	Graph functions expressed symbolically and show key features of the graph (intercepts and slope).	F.IF.7a		
	INT.3.6	Write a function that describes a relationship between two quantities.	F.BF.1		
Vocabulary		scale, origin, y-intercept, x-intercept, rate of change, slope, ordered pairs			

IN.T4		Students will interpret 2 or more linear functions, solve systems of equations graphically and algebraically, and graph linear inequalities and systems of linear inequalities.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	INT.4.1	Graph and interpret 2 or more linear functions.	REI.CI.6 REI.D.11		
	INT.4.2	Solve systems of linear equations graphically and algebraically.	REI.CI.5		

			REI.CI.6		
	INT.4.3	Graph linear inequalities.	REI.D.12		
	INT.4.4	Graph systems of linear inequalities.	REI.D.12		
Vocabulary		linear function, system of linear equations, solution to a system of linear equations, system of linear inequalities			

INT.5		Students will calculate and interpret measures of central tendency, represent data with plots on the real number line, and display and interpret center and spread of data.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	INT.5.1	Calculate and interpret in context measures of central tendency appropriate to the shape of the data distribution.	S.ID.2 S.ID.3		
	INT.5.2	Represent data with plots on the real number line (dot plots and histograms).	S.ID.1		
	INT.5.3	Display and interpret both center and spread of data in context using a box plot.	S.ID.1 S.ID.3		
Vocabulary		mean, median, mode, histogram, range, outlier, first quartile, third quartile, interquartile range, spread			

INT.6		Students will find probabilities of compound events using organized lists, tables, tree diagrams, and simulations. Students will differentiate and apply independent and dependent events to interpret data. Students will calculate expected value using an area model or tree diagram.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	INT.6.1	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	7.SP.6		

	INT.6.2	Use tree diagrams and the counting principle to determine the sample space for events.	S.CP.1		
	INT.6.3	Find probabilities of simple events from a model and compare to experimental or observed probability.	7.SP.7		
	INT.6.4	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.	7.SP.8		
	INT.6.5	Design and use a simulation to generate frequencies for compound events. For example, use random digits from a table or a calculator as a simulation tool.	7.SP.8c		
	INT.6.6	Find the probability of independent and dependent events.	S.CP.2		
	INT.6.7	Calculate expected value for events based on chance using an area model or tree diagram, such as the expected win/loss of buying raffle tickets, or playing the lottery.	S.MD.2		
Vocabulary		relative frequency, sample space, counting principle, experimental probability, observed probability, compound events, independent events, dependent events, expected value			

INT.7		Students will apply concepts of similar figures, Pythagorean theorem, and right triangle trigonometry to solve real-world, indirect measurement problems.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	INT.7.1	Solve real-world indirect measurement problems using similar figures.	G.SRT.2		
	INT.7.2	Use the Pythagorean Theorem to solve right triangles in applied problems.	G.SRT.8		
	INT.7.3	Develop definitions of trigonometric ratios for acute angles using the concept of similar triangles.	G.SRT.6		
	INT.7.4	Use trigonometric ratios to solve right triangles in applied problems.	G.SRT.8		
Vocabulary		indirect measurement, hypotenuse, Pythagorean Theorem, trigonometric ratios, similar triangles, right triangles, acute angles			

			Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
INT.8		Students will transform functions and shapes using translations, reflections, rotations, and dilations. Students will also describe the rotational and line symmetry of polygons.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	INT.8.1	Describe transformations as functions that take points in the plane as inputs and give other points as outputs.	G.CO.2		
	INT.8.2	Compare transformations that preserve distance and angle measurements to those that do not *(e.g. a translation vs. a horizontal stretch)*.	G.CO.2		
	INT.8.3	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using graph paper, tracing paper, or geometry software.	G.CO.5		
	INT.8.4	Apply a function rule to perform a transformation without the coordinate plane.	G.CO.2		
	INT.8.5	Verify experimentally and apply the properties of dilations given by a center and a scale factor.	G.SRT.1		
	INT.8.6	Describe the rotational and line symmetry of polygons.	G.CO.3		
Vocabulary		transformation, translation, reflection, rotation, dilation, center of dilation, scale factor, center of rotation, rotational symmetry, line symmetry			

Math Standard Reference Codes									
Number & Quantity		**Algebra**		**Functions**		**Geometry**		**Statistics & Probability**	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Pre-Calculus
Pre-Calculus Trigonometry

Purpose Statement:	Pre-calculus is intended to provide the mathematical background needed for calculus. This course will provide a general introduction to functions, operations with function, inverse functions, and graphs of functions using standard graphs with transformations. It will include an extensive study of linear functions, polynomial functions (including new methods of solving polynomial equations), rational and radical functions, exponential and logarithmic functions, circular and trigonometric functions, sequences and series. The course will include extensive use of the graphing calculator.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

PCAL.1		Students will learn about the real number system, relations, and functions. Students will study different number patterns including arithmetic and geometric sequences, and review the concepts of lines and linear models.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.1.1	Identify sets of numbers, create a scatter plot for given data for the purpose of making predictions. Identify domain and range of relations and functions.	N.RN.3 F.IF.5	HS-ESS1-6	6a, 6b, 6c, 6d 4a
	PCAL.1.2	Define a sequence, write the recursive form, graph, and apply sequences to real world situations.	F.IF.3 F.BF.1	HS-LS1-3 HS-LS1-4 W.9-10.2.d,e W.11-12.1.d W.11-12.2.d	4a, 5a, 5c
	PCAL.1.3	Write recursive and explicit formulas for Arithmetic Sequences, then find terms in the sequence based on real world problems. Find the sum of an Arithmetic Series (sigma) and apply to real world problems.	F.IF.3 F.BF.2 F.LE.2 (Modeling)		4a, 4d, 5c
	PCAL.1.4	Apply the concept of slope, parallel, and perpendicular to write the equations for lines and graph lines. Describe the connection between arithmetic sequences and lines, and use this connection to solve real world problems.	F.IF.3 F.BF.2 F.LE.2 (Modeling)		4a, 4d, 5c
	PCAL.1.5	Write Geometric Sequences recursively and explicitly. Graph a geometric sequence.	A.SSE.4 F.BF.3		4a, 5c
Vocabulary		arithmetic sequence and series, geometric sequence, recursive and explicit form, sigma (summation notation)			

			Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
PCAL.2		Students will solve equations and inequalities. Students will use algebraic, graphical, and geometric techniques. Equations and inequalities will involve expressions of the following types: polynomial (including quadratic), absolute value, radical, and rational. Students will solve real world problems from each type of equations and inequalities.			
	PCAL.2.1	Solve an equation graphically and describe the meaning of the solution based on the graph.	A.REI.10		
	PCAL.2.2	Solve quadratic equations by factoring, square rooting both sides, completing the square, and the quadratic function. Solve equations that are in quadratic form.	A.REI.4a F.IF.7 F.IF.8	W.9-10.2.d,e W.11-12.1.d W.11-12.2.d HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 4a, 4d, 5a
	PCAL.2.3	Solve real world problems that are linear, quadratic, and cubic both algebraically and graphically.	A.REI.11 (Modeling)		
	PCAL.2.4	Solve absolute value equations, radical and rational equations both algebraically and graphically. Solve real world problems involving absolute value equations, radical and rational equations.	A.REI.7		1c, 4d
	PCAL.2.5	Solve single linear and compound linear inequalities. Solve higher power and rational inequalities both algebraically and graphically.	A.REI.8 A.REI.12		1c
	PCAL.2.6	Solve absolute value inequalities algebraically and graphically.	F.IF.7b	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 4a, 4d
Vocabulary		interval notation, extraneous solutions			

PCAL.3		Students will study functions and their graphs, transformations, operations on functions, inverse functions, and rates of change.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.3.1	Determine whether a relation is a function. Find the domain and range of functions and relations. Evaluate and graph piecewise-defined and greatest integer functions.	F.IF.1 F.IF.2		4a
	PCAL.3.2	Analyze graphs to determine if they are functions or not, to determine their domain and range, local and absolute maxima and minima, inflection points, intervals where they are concave up and concave down. Graph parametric equations.	F.IF.4 F.IF.5	HS-ESS1-6	3d, 4a, 4d
	PCAL.3.3	Define three forms of quadratic function. Find the vertex and intercepts of a quadratic function and sketch the graph. Convert one form of a quadratic function to another.	F.IF.7	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 4a, 4d
	PCAL.3.4	Define parent functions then graph new functions using transformations on each. Describe the symmetry of a graph from a graph and proving its symmetry with the equation.	F.BF.3		4a
	PCAL.3.5	The functions: Build sum, difference, product, and quotient and their domains. Composite functions and their domain.	F.IF.7	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 4a, 4d
	PCAL.3.6	Define inverse relations and functions. Find inverse functions and relations from tables, graphs, and equations. Determine whether an inverse relation is a function using the concept one-to-one. Verify inverses using compositions.	F.BF.4 F.BF.5		
	PCAL.3.7	Rates of change	S.ID.7 F.IF.6 F.LE.1	W.9-10.2.d W.9-10.2.e W.9-10.9 W.11-12.1.d	1c, 3c, 3d 4a, 4d, 5a, 5c 6a, 6b, 6c, 6d

				W.11-12.2.d	
Vocabulary		one-to-one functions, horizontal line test, composition of inverse functions, restricting domains, difference quotients and rates of change			

PCAL.4		Students will learn about polynomial functions and their quotients called rational functions. Students will study their graphs, zeros (both real and complex), and applications.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.4.1	Define a polynomial then divide polynomials, apply the remainder theorem, the factor theorem, and determine the maximum number of zeros of a polynomial.	A.APR.2 A.APR.3		
	PCAL.4.2	Find all rational zeros of a polynomial function. Use the factor theorem to factor polynomials completely, and find the upper and lower bounds of the zeros of a polynomial function.	A.APR.3		
	PCAL.4.3	Recognize the shape of basic polynomial functions, and describe the graphs of polynomial functions. Identify properties of polynomial functions: continuity, end behavior, intercepts, extrema, and inflection points. Identify and find complete graphs of polynomial functions.	F.IF.7c	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 4a, 4d
	PCAL.4.4	Find and explain the domain of rational functions. Find intercepts, vertical and horizontal asymptotes, identify holes in the graph, describe end behavior, then graph rational functions.	F.IF.7d	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 4a, 4d
	PCAL.4.5	Write complex numbers in standard form. Add, subtract, multiply and divide complex numbers. Find and use conjugates to simplify complex numbers. Simplify square roots of negative numbers, and find ALL solutions of polynomial equations.	A.REI.4 N.CN.1 N.CN.2 N.CN.3 N.CN.7 N.CN.8	W.9-10.2.d,e W.11-12.1.d W.11-12.2.d	5a, 6a, 6d

	PCAL.4.6	Use the fundamental theorem of algebra, find complex conjugate roots, find the number of zeros of a polynomial, and factor polynomial expressions completely.	N.CN.9		
Vocabulary		remainder theorem, factor theorem, division algorithm, number of zeros, factors of polynomials, end behavior, local extrema, points of inflection, big-little concept, vertical asymptotes, holes, properties of complex number system, conjugate solutions			

PCAL.5		Students will explore radicals, rational exponents, and exponential functions. Students will study common and natural logarithms, including their properties and laws, as well as logarithmic functions to other bases. Students will solve exponential and logarithmic equations, and solve real world applications with these models.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.5.1	Define and apply rational and irrational exponents. Simplify expressions containing radicals or rational exponents.	N.RN.1 N.RN.2		
	PCAL.5.2	Graph and identify transformations of exponential functions. Use exponential functions to solve real world problems.	F.LE.1 F.LE.2 F.LE.3 F.LE.4 (Modeling)	W.9-10.9	1c, 3d, 4a, 4d 5a, 5c 6a, 6b, 6c, 6d
	PCAL.5.3	Create and use exponential models for a variety of exponential growth and decay application problems.	F.LE.1 F.LE.4 F.IF.7 (Modeling)	W.9-10.9 HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 3d, 4a, 4d 5a 6a, 6b, 6c, 6d
	PCAL.5.4	Evaluate common and natural logarithms with and without a calculator. Solve common and natural logarithmic equations. Graph and identify transformations of common and natural logarithmic functions.	F.IF.7e	HS-PS2-1 HS-LS1-4 HS-LS1-5 HS-LS1-6	1c, 4a, 4d
	PCAL.5.5	Use properties and laws of logarithms to simplify and evaluate expressions.	F.LE.4		

	PCAL.5.6	Solve exponential and logarithmic equations. Solve a variety of real world problems using exponential and logarithmic equations. Use formulas for future value and present value of an annuity.	F.LE.4 F.IF.8 (Modeling)	W.9-10.2.d,e W.11-12.1.d W.11-12.2.d	4a
Vocabulary		product law, quotient law, power law, change of base formula, compound and continuous interest, future value and present value of annuities			

PCAL.6		Students will use right triangle trigonometry and the six trigonometric ratios to explore application problems. Students will analyze trigonometry using the unit circle.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.6.1	Define the six trigonometric ratios of an acute angle in terms of a right triangle. Evaluate trigonometric ratios using right triangles and on a calculator.	F.TF.1 F.TF.2 F.TF.3		
	PCAL.6.2	Solve triangles using trigonometric ratios. Solve real world problems using triangles.	F.TF.2 F.TF.3		
	PCAL.6.3	Extend the definition of angle measure to negative angles and angles greater than 180 degrees. Define radian measure and convert angle measures between radians and degrees.	F.TF.1 F.TF.2		
	PCAL.6.4	Define the trigonometric ratios in terms of the coordinate plane and in terms of the Unit Circle.	F.TF.2		
	PCAL.6.5	Develop basic trigonometric identities.	F.TF.8 F.TF.9		
Vocabulary		reference angles, coterminal angles, quotient identities, reciprocal identities, Pythagorean identities			

PCAL.7		Students will study graphs of the six trigonometric functions applying prior knowledge of transformations. Students will utilize the new vocabulary associated with applying these concepts: periodic graphs, amplitude, and phase shift.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.7.1	Graph the basic sine, cosine, and tangent functions and find the domain and range of these basic functions.	F.TF.4 F.TF.5 F.TF.7e		
	PCAL.7.2	Graph the cosecant, secant, and cotangent functions and their transformations.	F.TF.6 F.TF.7		
	PCAL.7.3	State the period, amplitude, vertical shift, phase shift of the sine, cosine, and tangent functions and relate this to transformations, including reflections.	F.TF.4 F.TF.5 F.TF.7e		
	PCAL.7.4	Graph transformations of these functions.	F.TF.4 F.TF.5 F.TF.7e		
Vocabulary		cosecant, secant, cotangent, vertical shift, phase shift, amplitude, and period of graphs			

PCAL.8		Students will formulate and solve trigonometric equations algebraically and by graphing.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.8.1	Solve trigonometric equations graphically. Find solutions on a specific interval and complete solutions.	F.TF.9		
	PCAL.8.2	Find inverse trig functions.	F.TF.7		
Vocabulary		domain and range of inverse trig functions, inverse trig notation			

PCAL.9		Students will utilize the basic trigonometric identities learned previously to prove new identities. Students will utilize the new properties to identify exact values of trigonometric functions, solve equations, and simplify expressions.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.9.1	Identify possible identities using graphs. Prove trigonometric identities by applying strategies involving already proven identities.	F.TF.8 F.TF.9		
	PCAL.9.2	Use the addition and subtraction identities for sine, cosine, and tangent.	F.TF.9		
	PCAL.9.3	Use the double angle and half angle identities for sine, cosine, and tangent equations.	F.TF.8		
	PCAL.9.4	Use the above identities to solve trigonometric equations.	F.TF.7		
Vocabulary		double angle, power reducing, half angle, product to sum, sum to product identities			

PCAL.10		Students will discover how to apply concepts of trigonometry to real world situations. Students will study the Law of Sines and the Law of Cosines.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	PCAL.10.1	Solve oblique triangles using the Law of Cosines.	G.SRT.9 G.SRT.10 (Modeling)		
	PCAL.10.2	Solve oblique triangles using the Law of Sines. Find the area of a triangle using trigonometric formulas.	G.SRT.11 (Modeling)		
Vocabulary		Law of Sines and Law of Cosines formulas			

Math Standard Reference Codes									
Number & Quantity		**Algebra**		**Functions**		**Geometry**		**Statistics & Probability**	
N-RN	The Real Number System	A-SSE	Seeing Structure in Expressions	F-IF	Interpreting Functions	G-CO	Congruence	S-ID	Interpreting Categorical & Quantitative Data
N-Q	Quantities	A-APR	Arithmetic with Polynomials & Rational Expressions	F-BF	Building Functions	G-SRT	Similarity, Right Triangles & Trigonometry	S-IC	Making Inferences & Justifying Conclusions
N-CN	The Complex Number System	A-CED	Creating Equations	F-LE	Linear, Quadratic & Exponential Models	G-C	Circles	S-CP	Conditional Probability & Rules of Probability
N-VM	Vector & Matrix Quantities	A-REI	Reasoning with Equations & Inequalities	F-TF	Trigonometric Functions	G-GPE	Expressing Geometric Properties with Equations	S-MD	Using Probability to Make Decisions
						G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Consumer/Applied Math

Purpose Statement:	Students will apply basic computational skills and mathematical concepts to essential consumer topics such as income, banking, saving, budgeting, taking out various types of loans, and expenses incurred in owning a business. Students will analyze and compare accounting and macro-economic concepts.

Vocabulary listed are essential for demonstration of benchmark mastery. Any additional words related to the benchmark may be used at the teacher's discretion.

Math practices are not explicitly listed as benchmarks or learning targets; however, all eight math practices should be incorporated into all benchmarks and learning targets (see Appendix A for Math Practices).

Bolded items identify learning targets that must be taught to mastery. These are considered a priority. Please note, however, that all learning targets must still be taught and assessed, but those in bold should be given extra emphasis.

CM.1		Students will calculate employee pay through hourly, yearly, individual production, and commission payroll scenarios. Scenarios include withholding taxes, insurance and voluntary deductions.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.1.1	Calculate fixed income.	N.Q.C.1 N.Q.C.2 A.SSE.A.1.A	3A-DA-12	1c, 4d 5a, 5c 6b
	CM.1.2	Calculate variable income	N.Q.C.1 N.Q.C.2		4d 5a, 5c 6b
	CM.1.3	Calculate tax deductions.	A.SSE.A.1.A	3A-DA-12	1c
	CM.1.4	Calculate health insurance, social security and other deductions.	N.Q.C.1 N.Q.C.2		4d 5a, 5c 6b
Vocabulary		hourly rate, straight time pay, overtime pay, time and a half, double time, weekly time card, piecework, salary, commission, commission rate, straight commission, graduated commission, Federal income tax, personal exemptions, graduated income tax, social security, FICA, Medicare, group insurance, net pay			

CM.2		Students will computer average monthly expenditures and compare actual expenditure to those budgeted.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.2.1	Compute average monthly expenditure.	A.SSE.A.1.A	3A-DA-12	1c
	CM.2.2	Prepare a budget sheet.	A.SSE.A.1.A	3A-DA-12	1c
	CM.2.3	Compare a budgeted amount to actual expenditures.	A.SSE.A.1.A	3A-DA-12	1c
Vocabulary		record keeping, expenditures, budget sheet, living expenses, fixed expenses, annual expenses, emergency fund, expense summary			

CM.3		Students will manage, balance, and compare checking and savings accounts, which include simple and compound interest.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.3.1	Manage a checking account.	A.SSE.A.1.A	RST.9-10.7	1c
	CM.3.2	Balance a checking account with a monthly statement.	A.SSE.A.1.A	RST.9-10.7	1c
	CM.3.3	Utilize online banking for bill pay and accessing information of the account.	N.Q.C.1 N.Q.C.2	WHST.11-12.7	4d 5a, 5c 6b
	CM.3.4	Manage a savings account.	A.SSE.A.1.A	RST.9-10.7	1c
	CM.3.5	Calculate simple and compound interest.	N.RN.A.1		
	CM.3.6	Compare compound interest and continuous annuities.	N.Q.C.1 N.RN.A.1		4d, 5c
Vocabulary		deposit, automatic teller machine - ATM, personal identification number - PIN, checking account, check register, balance, bank statement, service account statement, interest, simple interest, annual interest rate, compound			

CM.4		Students will calculate and compare purchasing options including cost with sales tax, cost after discounts or rebates, and finance charges.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.4.1	Calculate and compare total purchase price and unit price including sales tax.	A.CED.A.1		
	CM.4.2	Calculate sales prices using coupons, rebates and markdowns.	A.CED.A.1		
	CM.4.3	Calculate balance and finance charges on a charge account.	A.CED.A.2		
Vocabulary		sales tax, sales receipt, total purchase price, unit pricing, coupons, rebates, markdown, markdown rate, sale price, credit card, charge account, finance charge, unpaid-balance method, average daily balance method, account statement			

CM.5		Students will calculate costs associated with student loans, personal loans, vehicle loans, and home loans.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.5.1	Calculate APR, length of loan, total interest, monthly payment and loan payoff for student and personal loans.	N.RN.A.1		
	CM.5.2	Calculate vehicle loans including licensing, taxes and insurance.	N.Q.C.1 N.Q.C.2	RST.11-12.7	4d, 5a, 5c 6c
	CM.5.3	Calculate home mortgages including closing costs, taxes and insurance.	SSE.B.4	RST.11-12.7 RST.9-10.7	5c
Vocabulary		single payment loan, promissory note, maturity value, term, ordinary interest, exact interest, installment loan, down payment, amount financed, simple interest installment loan, annual percentage rate - APR, repayment schedule, final payment, down payment, mortgage loan, interest closing costs, principal, real estate taxes, assessed value, tax rate, market value, rate of assessment, home owner's insurance, loss-of-use coverage, personal liability, medical coverage, replacement value, premium, fire protection class, utility costs			

CM.6		Students will calculate and compare costs associated with life and health insurance.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.6.1	Calculate health insurance premiums	N.Q.C.1 N.Q.C.2	RST.11-12.7	4d, 5a, 5c 6b
	CM.6.2	Calculate the amount the patient pays for health care	N.Q.C.1 N.Q.C.2	RST.11-12.7	4d, 5a, 5c 6b
	CM.6.3	Utilize tables to compute annual premiums for term life insurance	N.Q.C.1 N.Q.C.2	RST.9-10.7	4d, 5a, 5c 6b
	CM.6.4	Compare whole life insurance, universal life insurance, and limited payment policy	N.Q.C.1 N.Q.C.2	RST.11-12.7	4d, 5a, 5c 6b

Vocabulary	health insurance, preferred provider organization - PPO, health maintenance organization - HMO, deductible, co-insurance, co-payment, life insurance, term life insurance beneficiary, whole life insurance, cash value, limited payment policy, universal life insurance	

CM.7		Students will calculate gains and costs of investments including certificates of deposits, stocks, and bonds.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.7.1	Compute interest and effective annual yield on a certificate of deposit	N.Q.C.1	RST.11-12.7	4d, 5c
	CM.7.2	Calculate the cost, annual yield, annual dividend and profit or loss on stock and bond investments.	N.Q.C.1		4d, 5c
Vocabulary		certificate of deposit, annual yield, stocks, stock certificate, dividend, profit, loss, bonds			

CM.8		Students will calculate the associated costs with owning a business including maintaining, training, and benefits of employees along with manufacturing and break-even values of products.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.8.1	Calculate the cost of hiring, maintaining and training employees.	N.Q.C.1 N.Q.C.2	RST.11-12.9 RST.11-12.7	4d, 5a, 5c 6b
	CM.8.2	Calculate employee benefits including insurance, disability, workers compensation and unemployment insurance.	N.Q.C.1 N.Q.C.2	RST.11-12.9 RST.11-12.7	4d, 5a, 5c 6b
	CM.8.3	Calculate the cost of manufacturing a product and determine profit, loss and break-even values.	N.Q.C.1 N.Q.C.2	RST.9-10.7 RST.11-12.9	4d, 5a, 5c 6b
Vocabulary		recruiting, salary scale, cost of living adjustment - COLA, merit increase, employee benefits, disability insurance, workers compensation insurance, unemployment insurance, travel expenses, release time, manufacture, direct material costs, direct labor costs, prime costs, break-even analysis, break-even point, profit, fixed costs, variable costs, quality control, defective time study, packaging			

CM.9		Students will calculate selling price, net profit, and mark-downs associated with the purchasing and selling of products. The trade discounts, chain discounts, and the complement method will be used.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.9.1	Calculate the selling price of products using trade discounts, chain discounts and the complement method.	N.Q.C.1 N.Q.C.2		4d, 5a, 5c 6b
	CM.9.2	Calculate the net profit as a percent of the selling price.	N.Q.C.1 N.Q.C.2		4d, 5a, 5c 6b
	CM.9.3	Calculate the mark-down of products as a percent of the selling price.	N.Q.C.1 N.Q.C.2		4d, 5a, 5c 6b
Vocabulary		list price, trade discount, trade discount rate, net price, compliment method, chain discounts, net price rate, single equivalent discount, invoice, cash discount, ordinary dating, end of month dating, costs, selling price, mark up, gross profit, net profit, mark up rate, operating expenses, net profit rate, mark down, mark down rate			

CM.10		Students will calculate costs associated with marketing including researching, advertising, storage, and distribution of the products.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.10.1	Calculate the costs of advertising and the possible ways to advertise to increase projected sales.	N.Q.C.1 N.Q.C.2		4d, 5a, 5c 6b
	CM.10.2	Calculate the costs of warehouse storage and utilities.	N.Q.C.1 N.Q.C.2		4d, 5a, 5c 6b
	CM.10.3	Calculate the costs associated with inventory and shipping the products.	N.Q.C.1 N.Q.C.2		4d, 5a, 5c 6b
Vocabulary		product tests, opinion research firm, opinion survey, sales potential, sample, market share, sales projection, factor, factor method, warehouse, inventory, inventory card, average cost method, first in first out - FIFO, last in last out - LIFO, rent, lease, labor charge, utilities, monthly service charge, demand charge, energy charge, peak load, kilowatts, fuel adjustment charge, consultants, consultant fees			

CM.11		Students will create and analyze income statements and balance sheets along with calculating the total cost of expanding a business.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.11.1	Calculate business expenses using income statements.	N.Q.C.1	RST.9-10.7	4d, 5c
	CM.11.2	Calculate assets, liabilities and owners' equity using a balance sheet and MACRS.	N.Q.C.1	RST.9-10.7	4d, 5c
	CM.11.3	Analyze and compare two or more income statements and balance sheets.	N.Q.C.1	RST.9-10.7	4d, 5c
	CM.11.4	Calculate the total cost of expanding a business.	N.Q.C.1	RST.9-10.7	4d, 5c
Vocabulary		payroll register, apportion, depreciation, straight line method, estimated life, salvage value, book value, accumulated depreciation, modified accelerated cost recovery system - MACRS, assets, liability, owner's equity, net worth, capital, balance sheet, cost of good sold, income statement, profit and loss statement, net income, net profit, current ratio, quick ratio, vertical and horizontal analysis, base figure, amount of change, growth expenses			

CM.12		Students will calculate and explain macro-economic concepts and analyze a budget with revenue and expenses.	Math Standard Reference	Cross-curricular Standard Reference	ISTE Standard Reference
	CM.12.1	Calculate the inflation rate, current price, and original price	N.Q.C.1	RST.9-10.7	4d, 5c
	CM.12.2	Explain and compute gross domestic product	N.Q.C.1	RST.9-10.7	4d, 5c
	CM.12.3	Calculate consumer price index, the current cost, and cost of commodity	N.Q.C.1	RST.9-10.7	4d, 5c
	CM.12.4	Allocate revenue and expenses and analyze a budget	N.Q.C.1	RST.9-10.7	4d, 5c
Vocabulary		inflation, gross domestic product - GDP, real GDP, per capita GDP, consumer price index - CPI, budget			

Appendix A

CCSS Math Practices

CCSS.MATH.PRACTICE.MP1 Make sense of problems and persevere in solving them.

Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

CCSS.MATH.PRACTICE.MP2 Reason abstractly and quantitatively.

Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to *decontextualize*—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to *contextualize*, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.

CCSS.MATH.PRACTICE.MP3 Construct viable arguments and critique the reasoning of others.

Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.

CCSS.MATH.PRACTICE.MP4 Model with mathematics.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

CCSS.MATH.PRACTICE.MP5 Use appropriate tools strategically.

Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

CCSS.MATH.PRACTICE.MP6 Attend to precision.

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

CCSS.MATH.PRACTICE.MP7 Look for and make use of structure.

Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.

CCSS.MATH.PRACTICE.MP8 Look for and express regularity in repeated reasoning.

Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Appendix B

Sweetwater County School District #1
Pacing Guide

Grade/Course:		Teacher:	

Code	Outcomes	Time Frame*	Assessment Period **			
			1	2	3	4

Appendix C

Instructional Planning Resource

School:		**Teacher:**	
Subject/Course:		**Time required:**	

Benchmark:	
Learning Target:	**Standard Reference:**
	Tech Standard Reference:
	Cross-Curricular Standard Reference:
Formative Assessment: ☐ **Oral** ☐ **Written** ☐ **Product** ☐ **Performance**	
Criterion:	

Context (Relevancy) :		
Teacher Methods	**Student Activities**	**Resources**
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.
6.	6.	6.
7.	7.	7.

Intervention	Enrichment