SWEETWATER COUNTY SCHOOL DISTRICT #1

MATHEMATICS

K-12 CURRICULUM MAP

JULY 2018

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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
Michelle Blake
Tenesa Bledsoe
Kendyl Chandler
Lyndsey Dorman
Hope Downs Lewis
Mark Ellwein
Jordan Erspamer
Tammy Fausett
David Galindo
Kelly Heitzmann
Terri Hueckstaedt
Bernie Keslar
Joeleen Levenson
Tracy Maldonado
Nancy McNutt
Patty Mitchelson
Brandy Nutt
Cheryl Rideout
Devon Sloan
Debbie Stainbrook
Jacob Summers
Morgen Townsend
Barb Twomey
Robert Wilmetti

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Lorna Bath
Michelle Blake
Andrea Carroll
Lisa Coursey
Michelle Davies
Rick Edwards
Tammy Fausett
John Firme
Annie Fletcher
Shannon Garrison
Chris Jacobsen
Lollie Lebario
Colby Lynch
Tammy Macy
Wanda Maloney
Daryl Michael
Cheryl Notman
Cristy Pelham
Angie Spann
Casey Walker
Karl Wells
Karen Zahn-Anderson

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 2, 3, 4, 5, and 10 within 100.	Standard Reference
	M3.1.1	Model and explain the concept of "groups of" *(e.g., 5 x 7 is the total number of objects in 5 groups of 7 objects).*	3.0A.A.1 (major)
	M3.1.2	Model and explain the concept of whole number quotients as number being divided into equal groups *(e.g., 56 as a number of objects and shared equally in 8 groups, 7 times).*	3.0A.A.2 (major)
	M3.1.3	Solve 1 and 2-step word problems with multiplication and division.	3.0A.A.3 (major)
	M3.1.4	Determine the unknown whole number in a multiplication and/or division equation *(e.g., emphasize the inverse relationship).*	3.0A.A.4 (major)

Learning Target Code
M3.1.4 = *Subject area (Math)*
M***3***.1.4 = *Grade/course level*
M3.***1***.4 = *Benchmark*
M3.1.***4*** = *Learning target*

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

"Major, additional, or supplemental" *identifies standards that are emphasized on state tests for grades 3-8.*

CCSS Math Standard Reference
3.OA.A.4 = *Grade*
3.***OA***.A.4 = *Domain*
3.OA.***A***.4 = *Cluster*
3.OA.A.***4*** = *Standard*

Mathematics Curriculum at a Glance

Grade Level or Course	Purpose Statement
Math - Kindergarten	Students will write, build, or draw, and compare whole numbers within 20. Students will compose and decompose numbers within 10 and be fluent within 5. Students will use numbers to represent quantities, and also identify basic two-dimensional and three-dimensional shapes to describe their environment using spatial reasoning.
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, and measuring using non-standard measurement.
Math - 2nd Grade	Students will show their understanding of the base-ten system, properties of operation of addition and subtraction, build fluency with addition and subtraction, use standard units of measurement, as well as describe and analyze two-dimensional and three-dimensional shapes. *By the end of grade 2, know from memory all sums of two 1-digit numbers.
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 3x1) using place value strategies; use fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers to solve word problems; and analyze two-dimensional geometric figures and classify them based on their properties, such as having parallel sides, perpendicular sides, angle measurement, and symmetry.
Math - 5th Grade	Students will fluently add and subtract fractions with like and unlike denominators and establish an ability to multiply and divide. Students extend division to two-digit divisors and will demonstrate fluency with whole numbers. 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 and linear equations. 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, solve and apply linear relationships using graphs, equations and tables, and describe quantitative relationships using function notation. Students will analyze two and three dimensional space and figures using geometric attributes and apply the Pythagorean Theorem to solve realistic life 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.
Algebra I	Students will solve linear equations and inequalities, graph linear functions, apply operations with algebraic expressions, solve systems of linear equations, simplify expressions using laws of exponents, classify polynomials and factor polynomial expressions to solve real life and mathematical problems.
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 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 and solve radical, rational, and polynomial equations within the real and complex number system. Students will also graph and analyze quadratic, exponential and logarithmic functions to broaden their mathematical understanding and problem-solving techniques.
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

Advanced Algebra/Trigonometry	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.
Integrated Math	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.
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 calculators.
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="2"></td><td colspan="4">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

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

Math -Kindergarten

Purpose Statement:	Students will write, build, or draw, and compare whole numbers within 20. Students will compose and decompose numbers within 10 and be fluent within 5. Students will use numbers to represent quantities, and also identify basic two-dimensional and three-dimensional shapes to describe their environment using spatial 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).

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

Quarter 1 Benchmarks:

MK.1		Students will write, build, and draw the relationship of numbers up to 5 and count to 5.	Standard Reference
	MK.1.1	Identify numbers 1-5.	K.CC.A.1
	MK.1.2	Orally count numbers 1-5.	K.CC.A.1
	MK.1.3	Count objects 1-5 (1-1 correspondence).	K.CC.B.4a
	MK.1.4	Write numbers 1-5.	K.CC.A.3
	MK.1.5	Write the numeral for a given number of objects and create a set of objects based on a given numeral 1-5 *(e.g., a line, rectangular array, circle, or scattered configuration).*	K.CC.A.3
	MK.1.6	Use counting strategies to tell how many 1-5 *(e.g., a line, rectangular array, circle, or scattered configuration).*	K.CC.B.4b K.CC.B.5
Vocabulary		how many, number story, number	

Quarter 2 Benchmarks:

MK.2		Students will write, build, and draw the relationship of numbers up to 10 and count to 10.	Standard Reference
	MK.2.1	Identify numbers 0-10.	K.CC.A.1
	MK.2.2	Orally count numbers 0-10.	K.CC.A.1
	MK.2.3	Count objects 0-10 (1-1 correspondence).	K.CC.B.4a
	MK.2.4	Write numbers 0-10.	K.CC.A.3
	MK.2.5	Write, build, or draw, numbers 0-10 in a variety of ways.	K.CC.A.3
	MK.2.6	Write the numeral for a given number of objects and create a set of objects based on a given numeral 0-10 *(e.g., a line, rectangular array, circle, or scattered configuration)*.	K.CC.A.3
	MK.2.7	Count on from a given number other than 1 (0-10).	K.CC.A.2
	MK.2.8	State the number that is one more or one less of a given number 0-10.	K.CC.B.4c
	MK.2.9	Use counting strategies to tell how many 0-10 *(e.g., a line, rectangular array, circle, or scattered configuration)*.	K.CC.B.4b K.CC.B.5
	MK.2.10	Use counting strategies to identify greater than, less than, or equal to the number of objects in another group 0-10.	K.CC.C.6
	MK.2.11	Compare written numbers 0-10.	K.CC.C.7
Vocabulary		greater than, less than, equal to, composing, decomposing, compare, how many, number story, one more, one less, number, zero	

MK.3		Students will describe two-dimensional and three-dimensional shapes in their environment. Students will be able to create patterns using objects. Students will describe, compare, and classify measurable attributes of objects.	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.A.1
	MK.3.2	Describe and compare two-dimensional shapes including square, circle, rectangle, triangle, and hexagon.	K.G.A.2 K.G.A.3 K.G.B.4
	MK.3.3	Describe and compare three-dimensional shapes including cube, cone, cylinder, and sphere.	K.G.A.2 K.G.A.3

			K.G.B.4
	MK.3.4	Analyze and compare the attributes of two-dimensional and three-dimensional shapes *(e.g., number of sides, vertices and sides of equal length).*	K.G.B.4
	MK.3.5	Create patterns using objects.	K.D
	MK.3.6	Describe measurable attributes of objects	K.MD.A.1
	MK.3.7	Compare two objects using measurable attributes.	K.MD.A.2
	MK.3.8	Sort into categories, objects using measurable attributes, and sort categories by count (most, least, alike, different).	K.MD.B.3
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	

Quarter 3 Benchmarks:

MK.4		Students will build, draw, decompose, and solve addition and subtraction problems within 10.	Standard Reference
	MK.4.1	Build or draw addition and subtraction models within 10.	K.OA.A.1
	MK.4.2	Solve addition and subtraction word problems within 10 using objects or drawings.	K.OA.A.2
	MK.4.3	Decompose numbers within 10 into pairs in more than one way.	K.OA.A.3
	MK.4.4	Produce all combinations that make 10.	K.OA.A.4
	MK.4.5	Add and subtract problems within 5 fluently.	K.OA.A.5
Vocabulary		add, subtract, addition, subtraction, minus, number bond, part, whole, number sentence, plus, equal, compose, decompose	

Quarter 4 Benchmarks:

MK.5		Students will write and build the relationship of numbers up to 20 and count to 100.	Standard Reference
	MK.5.1	Identify numbers 0-20.	K.CC.A.1
	MK.5.2	Orally count numbers 1-100.	K.CC.A.1
	MK.5.3	Orally count numbers 10-100 by tens.	K.CC.A.1
	MK.5.4	Count objects 0-20 (1-1 correspondence).	K.CC.B.4a
	MK.5.5	Write numbers 0-20.	K.CC.A.3

	MK.5.6	Write the numeral and count to answer how many for a given number of objects and create a set of objects based on a given numeral 0-20 *(e.g., a line, rectangular array, circle, or scattered configuration).*	K.CC.A.3 K.CC.B.4b K.CC.B.5
	MK.5.7	State the number that is one more or one less of a given number 0-20.	K.CC.B.4c
	MK.5.8	Count on from a given number other than 1 (1-100).	K.CC.A.2
	MK.5.9	Compose and decompose numbers 0-20 as ten ones and some more ones.	K.NBT.A.1
Vocabulary		greater than, less than, equal to, composing, decomposing, compare, how many, number story, one more, one less, teen number	

MK.6		Students will describe, draw, build, or compare two-dimensional and three-dimensional shapes in their environment.	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	Draw or build several simple shapes to make bigger shapes *(e.g., two triangles to make a rectangle).*	K.G.B.6
Vocabulary		flat, solid, vertices, attributes, ordinal numbers	

1st Grade Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
MD	Measurement & Data
G	Geometry
D	District

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, and measuring using non-standard measurement.

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.

Quarter 1 Benchmarks:

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.	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 apart, and comparing with unknowns in all positions.	1.OA.1
	M1.1.2	Solve word problems with answers less than or equal to ten.	1.OA.2
	M1.1.3	Apply properties of operations as strategies to add and subtract (students do not need to use the formal terms for properties).	1.OA.3

	M1.1.4	Understand subtraction as an unknown-addend problem.	1.OA.4
	M1.1.5	Relate counting to addition and subtraction *(e.g., counting on 2 is adding 2)*.	1.OA.5
	M1.1.6	Add and subtract within ten fluently using a variety of strategies.	1.OA.6
	M1.1.7	Understand equal to and the meaning of the equal sign.	1.OA.7
	M1.1.8	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. 8 + ? = 11, 5 = ? -3.	1.OA.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	

Quarter 2 Benchmarks:

M1.2		Students will understand place value using a variety of strategies to add and subtract within 20, including word problems.	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.	1.OA.1
	M1.2.2	Solve word problems with answers less than or equal to 20.	1.OA.2
	M1.2.3	Apply properties of operations as strategies to add and subtract (students do not need to use the formal terms for properties).	1.OA.3
	M1.2.4	Understand subtraction as an unknown-addend problem.	1.OA.4
	M1.2.5	Relate counting to addition and subtraction *(e.g., counting on 2 is adding 2)*.	1.OA.5
	M1.2.6	Add and subtract within ten fluently using a variety of strategies.	1.OA.6
	M1.2.7	Understand equal to and the meaning of the equal sign.	1.OA.7
	M1.2.8	Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. 8 + ? = 11, 5 = ? -3.	1.OA.8
	M1.2.9	Understand that the two digits of a two-digit number represent amounts of tens and ones.	1.NBT.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	

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.	Standard Reference
	M1.3.1	Use addition and subtraction to solve word problems within 40.	1.OA.1
	M1.3.2	Order three objects by length and compare lengths.	1.MD.1
	M1.3.3	Express the length of an object as a whole number of length units, understanding that the length measurement is the number of same size units that span it with no gaps or overlaps.	1.MD.2
	M1.3.4	Organize, represent and interpret data with up to three categories.	1.MD.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	

Quarter 3 Benchmarks:

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.	Standard Reference
	M1.4.1	Use addition and subtraction to solve word problems within 40.	1.OA.1
	M1.4.2	Count, order, and write numbers to 40 starting from any number and represent a number of objects with a written numeral.	1.NBT.1
	M1.4.3	Determine place value for tens and ones. Understand that a 10 is a bundle of ten ones, and that the numbers from 11 to 19 are composed of a ten and some ones.	1.NBT.2
	M1.4.4	Compare 2-digit numbers using >,<, and =.	1.NBT.3
	M1.4.5	Add and subtract within 40 using concrete models, drawings or strategies based on place value, properties of operations, and/or relationships between addition and subtraction. Relate strategies to written methods and explain reasoning used.	1.NBT.4
	M1.4.6	Mentally find 10 more or 10 less than a given two-digit number without having to count and be able to explain reasoning.	1.NBT.5

	M1.4.7	Subtract multiples of 10 from decade numbers in the range 10 to 90, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.	1.NBT.6
Vocabulary		arrow notation, comparison symbols:<,>,=, dime, hide zero cards, hundreds chart, number bond, penny, place value chart, quick ten, rekenrek, tape diagram	

Quarter 4 Benchmarks:

M1.5		Students will reason with shapes and their attributes. Students will organize, represent, and interpret data with up to three categories.	Standard Reference
	M1.5.1	Distinguish defining attributes and use to describe, build, or draw shapes *(e.g., two-dimensional: sides, number of corners, three dimensional: faces, corners, edges)*.	1.G.1
	M1.5.2	Compose and decompose shapes *(e.g., use triangles to compose a square, decompose a rectangle into squares)*.	1.G.2
	M1.5.3	Partition shapes into 2 and 4 equal parts.	1.G.3
Vocabulary		attributes, composite shapes, three dimensional shapes: cone, rectangular prism, Two-dimensional shapes: half-circle, quarter –circle, rhombus, trapezoid, clock, circle, cube, cylinder, hexagon, rectangle, sphere, square, triangle	

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.	Standard Reference
	M1.6.1	Use addition and subtraction to solve word problems within 100.	1.OA.1
	M1.6.2	Count, order, and write numbers to 120 starting from any number and represent a number of objects with a written numeral.	1.NBT.1
	M1.6.3	Determine place value for tens and ones. Understand that a 10 is a bundle of ten ones, and that the numbers from 11 to 19 are composed of a ten and some ones.	1.NBT.2
	M1.6.4	Compare 2-digit numbers using >,<, and =.	1.NBT.3
	M1.6.5	Add within 100, including a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or	1.NBT.4

		drawings, and strategies based on place value properties of operations, and/or the relationship between addition and subtraction Relate strategies to written methods and explain reasoning used.	
	M1.6.6	Mentally find 10 more or 10 less than a two-digit given number without having to count and be able to explain reasoning.	1.NBT.C.5
	M1.6.7	Subtract multiples of 10 from decade numbers in the range 10-90 using concrete models, drawings, and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction Relate strategies to written methods and explain reasoning used.	1.NBT.C.6
Vocabulary		<,>,= signs, tape diagram, place value chart, compare, represent	

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.*	Standard Reference
	M1.7.1	Identify hour and minute hand	1.MD.3
	M1.7.2	Tell time to the hour	1.MD.3
	M1.7.3	Tell time to the half-hour	1.MD.3
	M1.7.4	Use tools to tell and write time	1.MD.3
	M1.7.5	Identify the penny, nickel, dime and quarter	
	M1.7.6	State the value of the penny, nickel, dime and quarter	
Vocabulary		dime, nickel, penny, quarter, compare, identify, digital clock, face, fourth of, fourths, half-hour, half of, half past, hour, hour hand, minute, minute hand, O'clock, quarter of	

2nd Grade Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
MD	Measurement & Data
G	Geometry
D	District

Math - 2nd Grade

Purpose Statement:	Students will show their understanding of the base-ten system, properties of operation of addition and subtraction, build fluency with addition and subtraction, use standard units of measurement, as well as describe and analyze two-dimensional and three-dimensional shapes. *By the end of grade 2, know from memory all sums of two 1-digit 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).

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

Foundational skills can be found at the beginning of each module. These are skills that need to be refreshed throughout the year.

Quarter 1 Benchmarks:

M2.1		Students will add and subtract within 20 using mental strategies.	Standard Reference
	M2.1.1	Use mental math strategies to solve math facts within 20 fluently *(e.g., counting on, making ten, etc.)*.	2.OA.B.2
	M2.1.2	Demonstrate composing and decomposing numbers within 20.	2.OA.B.2
	M2.1.3	Fluently add and subtract numbers to 20 using mental strategies.	2.OA.B.2
	M2.1.4	Solve problems with an unknown number in all positions. A+B=___, ___+B=A, B+___=A, A=___+B	2.OA.B.2
Vocabulary		addend, compose, decompose, equals, equation, minuend, number	

M2.2		Students will create a number line to show whole numbers and compare it to measuring tools. Students will measure, compare, and estimate the length of objects and solve word problems involving length. Students will compare units of metric measurement to ones, tens, and hundreds in place value. *Note: Benchmark 2 is a foundation for teaching Benchmark 3. This benchmark gives students a concrete bases of the relationship between centimeters and meters, and ones, tens, and hundreds in place value.*	Standard Reference
	M2.2.1	Create a number line to show whole numbers and compare it to measuring tools.	
	M2.2.2	Measure the length of an object by selecting and using appropriate tools such as rulers, meter sticks, and measuring tapes.	2.MD.1
	M2.2.3	Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.	2.MD.2
	M2.2.4	Estimate lengths using units of centimeters, and meters.	2.MD.3
	M2.2.5	Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard metric length unit.	2.MD.4
	M2.2.6	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, *(e.g., using drawings such as drawings of rulers)* and equations with a symbol for the unknown number to represent the problem.	2.MD.5
	M2.2.7	Compare units of metric measurement to ones, tens, and hundreds, in place value.	
Vocabulary		centimeter, equal length, height, length, measure, meter,	

Quarter 2 Benchmarks:

M2.3		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.	Standard Reference
	M2.3.1	Count within 1,000; skip count by 5s, 10s, and 100s.	2.NBT.A.1
	M2.3.2	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)*.	2.NBT.A.2
	M2.3.3	Read and write numbers to 1,000 using base ten numerals, number names, and expanded form.	2.NBT.A.3
	M2.3.4	Compare two three-digit numbers using <, >, and = to record the results of comparisons.	2.NBT.A.4
Vocabulary		expanded form, skip counting, standard form, word form	

M2.4		Students will solve addition and subtraction problems using place value, including word problems, within 100 using multiple strategies.	Standard Reference
	M2.4.1	Add and subtract fluently within 100 using place value, properties of operations, and/or the relationship between addition and subtraction.	2.NBT.B.5
	M2.4.2	Solve problems, including word problems, with an unknown number in all positions. A+B=___, ___+B=A, B+___=A, A=___+B	2.OA.A.1 2.OA.B.2
	M2.4.3	Solve one step word problems within 100.	2.OA.A.1 2.NBT.B.5
	M2.4.4	Solve two step word problems within 100.	2.OA.A.1 2.NBT.B.5
Vocabulary		hundreds place, place value, strategies, unknown	

Quarter 3 Benchmarks:

M2.5		Students will add and subtract within 1,000 using multiple strategies and explain why they work.	Standard Reference
	M2.5.1	Add and subtract 10 and 100 from any given number mentally within 100-900.	2.NBT.B.8

	M2.5.2	Add and subtract within 1,000 using concrete models or drawings, and strategies based on place value.	2.NBT.B.7
	M2.5.3	Add up to four two-digit numbers, using strategies based on place value and properties of operations.	2.NBT.B.6
	M2.5.4	Explain why addition and subtraction strategies work, using concrete objects, pictures or words (orally or written).	2NBT.B.9
Vocabulary		thousands place	

M2.6		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.	Standard Reference
	M2.6.1	Determine whether a group of objects (up to 20) has an odd or even number of members.	2.OA.C.3
	M2.6.2	Build arrays using rows and columns (up to 5x5).	2.OA.C.4
	M2.6.3	Use repeated addition to find the total sum of objects in the array and write an equation to solve.	2.OA.C.4
	M2.6.4	Partition a rectangle, without manipulatives, into rows and columns of same-size squares and count to find the total number of them.	2.G.A.2
Vocabulary		array, column, equal groups, even, odd, repeated addition, row	

M2.7		Students will create a number line to show whole numbers and compare it to measuring tools. Students will measure, compare, and estimate the length of objects; solve word problems involving length and create line plots. Students will tell time to the nearest 5 minutes.	Standard Reference
	M2.7.1	Create a number line to show whole numbers and compare it to measuring tools.	2.MD.B.6
	M2.7.2	Measure the length of an object by selecting appropriate tools.	2.MD.A.1
	M2.7.3	Measure the length of an object twice, using different units of measure and compare them.	2.MD.A.2
	M2.7.4	Estimate lengths using inches, feet, centimeters and meters.	2.MD.A.3

	M2.7.5	Measure to determine how much longer one object is than another.	2.MD.A.4
	M2.7.6	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units.	2.MD.B.5
	M2.7.7	Measure lengths using whole units to create a line plot labeling x and y-axis (horizontal and vertical), title and key.	2.MD.9
	M2.7.8	Tell and write time from analog and digital clocks to the nearest five minutes using a.m. and p.m.	2.MD.C.7
Vocabulary		a.m., centimeter, equal length, foot, height, inch, length, measure, meter, minute to, p.m., quarter past, width, yard	

Quarter 4 Benchmarks:

M2.8		Students will solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using appropriate dollar and cents symbols.	Standard Reference
	M2.8.1	Identify names and values of half dollar, dollar coin, and dollar bills.	2.D
	M2.8.2	Count different combinations of coins and bills.	2.D
	M2.8.3	Solve word problems involving money using addition and subtraction.	2.MD.C.8
Vocabulary		cent, coins, dollar, half dollar	

M2.9		Students will generate data to read and create picture graphs and bar graphs with up to four categories.	Standard Reference
	M2.9.1	Read and interpret picture graphs.	2.MD.D.10
	M2.9.2	Collect data and create a picture graph, labeling x and y-axis (horizontal and vertical), title, and key.	2.MD.D.10
	M2.9.3	Read and interpret bar graphs.	2.MD.D.10
	M2.9.4	Collect data and create a bar graph, labeling x and y-axis (horizontal and vertical), title, and key.	2.MD.D.10
Vocabulary		bar graph, data, horizontal, key, least, line plot, most, picture graph, vertical	

M2.10		Students will identify and draw two-dimensional and three-dimensional shapes.	Standard Reference
	M2.10.1	Identify and describe the attributes of two-dimensional shapes *(e.g. angles, sides etc.).*	2.G.A.1
	M2.10.2	Draw two-dimensional shapes with given attributes.	2.G.A.1
	M2.10.3	Identify and describe the attributes of three-dimensional shapes *(e.g., faces, edges, vertices etc.).*	2.G.A.1
	M2.10.4	Draw three-dimensional shapes with given attributes.	2.G.A.1
Vocabulary		angle, attributes, base, face, edge, parallel, parallelogram, quadrilateral, symmetrical, vertices	

M2.11		Students will partition rectangles and circles into two, three, or four equal shares.	Standard Reference
	M2.11.1	Identify rectangles and circles that are divided into equal shares.	2.G.A.3
	M2.11.2	Determine whether rectangles and circles are divided into halves, thirds and fourths.	2.G.A.3
	M2.11.3	Recognize that equal shares of identical wholes do not need to be the same shape.	2.G.A.3
	M2.11.4	Draw and partition rectangles and circles into halves, thirds, and fourths.	2.G.A.3
Vocabulary		divide, equal shares, fourths, halves, identical, thirds, whole	

3rd Grade Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
MD	Measurement & Data
G	Geometry
D	District

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.

Quarter 1 Benchmarks:

M3.1		Students will solve problems using multiplication and division strategies with 2, 3, 4, 5, and 10 within 100.	Standard Reference
	M3.1.1	Model and explain the concept of "groups of" *(e.g., 5 x 7 is the total number of objects in 5 groups of 7 objects)*.	3.0A.A.1 (major)
	M3.1.2	Model and explain the concept of whole number quotients as number being divided into equal groups *(e.g., 56 as a number of objects and shared equally in 8 groups, 7 times)*.	3.0A.A.2 (major)
	M3.1.3	Solve 1 and 2-step word problems with multiplication and division.	3.0A.A.3 (major)
	M3.1.4	Determine the unknown whole number in a multiplication and/or division equation *(e.g., emphasize the inverse relationship)*.	3.0A.A.4 (major)
	M3.1.5	Build multiplication and division equations with manipulatives and draw pictures with 2, 3, 4, 5 and	3.0A.B.5 3.OA.B.6

		10 understanding division as an unknown-factor problem, and emphasizing the commutative, associative, and distributive properties.	
	M3.1.6	Fluently (meaning using strategies) multiply and divide within 100 using strategies such as the relationship between multiplication and division or properties of operations.	3.OA.C.7 (major)
	M3.1.7	Solve two-step word problems with addition, subtraction, multiplication, and division.	3.OA.D.8 (major)
Vocabulary		addend, algorithm, area, array, associative property of multiplication, commutative property of multiplication, compare, decompose, digit, distributive property, division, equation, estimate, expression, factor, fair share model, equal groups, unit, quotient, product	

M3.2		Students will use place value understanding to round numbers to the nearest 10 and 100, and add and subtract within 1,000 including two-step word problems. Students will estimate intervals of time and tell time to the minute. Students will determine elapsed time in word problems. Students will estimate, measure and solve one-step word problems using the four operations, with liquid volumes and masses of objects using correct units.	Standard Reference
	M3.2.1	Use place value understanding to round to the nearest 10 and 100 *(e.g., number line, hundreds chart, etc.)*.	3.NBT.A.1 (additional)
	M3.2.2	Solve addition and subtraction equations within 1,000 using strategies and algorithms.	3.NBT.A.2 (additional)
	M3.2.3	Tell and write time to the minute and measure intervals of time to the nearest minute.	3.MD.A.1 (major)
	M3.2.4	Determine elapsed time in word problems.	3.MD.A.1 (major)
	M3.2.5	Estimate intervals of time *(e.g., What unit of time would you use to measure brushing your teeth, driving to another town, etc.?)*.	3.MD.A.1 (major)
	M3.2.6	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 paperclip is approximately 1 gram)*.	3.MD.A.2 (major)

	M3.2.7	Measure liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).	3.MD.A.2 (major)
	M3.2.8	Solve one-step word problems, using the four operations, involving volume or masses that are given in the same unit.	3.MD.A.2 (major)
Vocabulary		A.M./P.M., elapsed time, estimate, half hour, half past, interval, minute, quarter, standard, time interval, arithmetic patterns, compare, difference, equation, expanded form, midpoint (halfway), reasonableness, related facts, round, standard form, sum, word form, benchmarks, grams, kilograms, liters, mass, measure, volume	

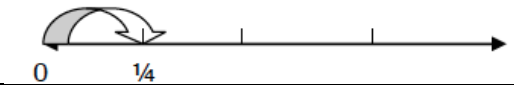
Quarter 2 Benchmarks:

M3.3		Students will solve problems using multiplication and division strategies using 0, 1, 6-9 and 10 within 100, and identify arithmetic patterns and multiply one-digit whole numbers by multiples of 10. *Note: By the end of grade 3, know from memory all products of two one-digit numbers.*	Standard Reference
	M3.3.1	Solve 1 and 2-step problems with multiplication and division.	3.0A.A.3 (major)
	M3.3.2	Determine the unknown whole number in a multiplication and/or division equation *(e.g., emphasize the inverse relationship)*.	3.0A.A.4 (major)
	M3.3.3	Build multiplication and division facts with manipulatives and draw pictures within 0, 1, 6-9 and 10.	3.0A.B.5 (major)
	M3.3.4	Fluently multiply and divide within 100 using strategies such as the relationship between multiplication and division or properties of operations.	3.OA.C.7 (major)
	M3.3.5	Solve two-step word problems with addition, subtraction, multiplication, and division.	3.OA.D.8 (major)
	M3.3.6	Identify arithmetic patterns (*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)
	M3.3.7	Multiply one-digit whole numbers by multiples of 10 using strategies based on place value and properties of operations.	3.NBT.A.3 (additional)

Vocabulary	addend, algorithm, area, array, associative property of multiplication, commutative property of multiplication, compare, decompose, digit, distributive property, dividend, divisor, division, equation, estimate, expression, factor, fair share model

M3.4		Students will demonstrate concepts of area and relate area to multiplication and addition including real world problems.	Standard Reference
	M3.4.1	Identify attributes of a plane figure *(e.g., length of sides will determine coverage without over lapping).*	3.MD.C.5a 3.MD.C.5b (major)
	M3.4.2	Measure area by counting unit squares.	3.MD.C.6 (major)
	M3.4.3	Determine area of rectangles using tiles and show area as a multiplication equation.	3.MD.C.7a (major)
	M3.4.4	Multiply length X width of rectangles to find area-using models in real world problems.	3.MD.C.7b (major)
	M3.4.5	Use area models concretely to represent the distributive property in mathematical reasoning.	3.MD.C.7c (major)
	M3.4.6	Determine areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. 	3.MD.C.7d (major)
	M3.4.7	Determine the unknown side (whole number) length of a rectangle.	3.MD.8 (major)
	M3.4.8	Determine the area of rectilinear figure (figure whose edges meet at right angles) by recognizing area as additive and adding the non-overlapping parts.	3.MD.C.7d (major)
Vocabulary		length, overlapping and non-overlapping, plane figure, rectangle, right angle, square unit, tiling, unit square, width	

Quarter 3 Benchmarks:

M3.5		Students will partition shapes into equal parts, and decompose whole numbers, as well as compare and justify two fractions. Students will represent a fraction on a number line, generate simple equivalent fractions, and express whole numbers as fractions. *Note: Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.*	Standard Reference
	M3.5.1	Partition shapes into equal parts with an equal area, recording each part as a unit fraction.	3.G.A.2 (support)
	M3.5.2	Understand a fraction as 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.	3.NF.A.1 (major)
	M3.5.3	Represent a fraction as a number on a number line.  	3.NF.A.2a-b (major)
	M3.5.4	Explain why two fractions are 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 (major)
	M3.5.5	Identify 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 (major)
	M3.5.6	Show 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 (major)
	M3.5.7	Compare and justify why 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 (major)
Vocabulary		copies, eighths, equivalent, fraction, fourths, fraction partition, half, justify, like denominator, numerator, quarters, sixths, thirds, unit fraction, unit form, whole numbers	

M3.6		Students will use measuring tools to solve problems involving measurement. Students will generate data, create graphs and interpret graphs.	Standard Reference
	M3.6.1	Generate measurement data by measuring lengths using rulers marked with whole numbers, halves and quarters of an inch.	3.MD.B.4 (support)
	M3.6.2	Show the data by making a line plot, where the horizontal scale is marked off in appropriate units (whole numbers, halves, or quarters).	3.MD.B.4 (support)
	M3.6.3	Generate measurement data and construct a scaled picture graph, a scaled bar graph, and scaled line plot from the data.	3.MD.B.3, 3.MD.B.4 (support)
	M3.6.4	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.B.3 (support)
Vocabulary		analyze, intervals, key, picture graph, quarter inch, reasonableness, scaled bar graph, scaled line plot, scaled picture graph, title, x-axis (horizontal), y-axis (vertical)	

Quarter 4 Benchmarks:

M3.7		Students will categorize shapes that share attributes and solve real world word problems, involving perimeters of polygons *(e.g., rhombus, rectangles, etc.)*.	Standard Reference
	M3.7.1	Compare and contrast attributes of shapes in different categories of polygons *(e.g., four sides, four angles are shared attributes and therefore both shapes are quadrilaterals)*.	3.G.A.1 (support)
	M3.7.2	Generate measurement data and construct a scaled picture graph, a scaled bar graph, and scaled line plot from the data.	3.MD.B.4 (support)
	M3.7.3	Use objects and pictures to find lengths of sides.	3.MD.D.8 (additional)
	M3.7.4	Use objects and pictures to find missing lengths of sides of polygons and rectilinear shapes.	3.MD.D.8 (additional)
	M3.7.5	Solve real world word problems involving the perimeters of polygons.	3.OA.D.8 (major) 3.MD.D.8 (additional)

Vocabulary	angle, attribute, closed figure, edge, figure, hexagon, open figure, perimeter, polygon, quadrilaterals, rectilinear figure, rhombus, sides, two-dimensional, vertex

4th Grade Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
NF	Number & Operations – Fractions
MD	Measurement & Data
G	Geometry
D	District

Math - 4th Grade

Purpose Statement:	Students will demonstrate an understanding and fluency with multi-digit multiplication (up to 2x2) and division (up to 3x1) using place value strategies; use fraction equivalence, addition and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers to solve word problems; and analyze two-dimensional geometric figures and classify them based on their properties, such as having parallel sides, perpendicular sides, angle measurement, and symmetry.

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.

Foundational skills can be found at the beginning of each module. These are skills that need to be refreshed throughout the year.

Quarter 1 Benchmarks:

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.	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 *(e.g., 354x10=3,540, the four in the product is ten times more than the four in the first number)*.	4.NBT.A.1 (major)
	M4.1.3	Use strategies for powers of 10 to multiply and divide multiples of 10.	4.NBT.A.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.A.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.	Standard Reference
	Foundational	*Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.*	*4.NBT.A.1*
	M4.2.1	Read and write multi-digit whole numbers in standard, expanded, written, and unit form.	4.NBT.A.2 (major)
	M4.2.2	Compare two multi-digit numbers using >, < and = symbols and explain with place value reasoning.	4.NBT.A.2 (major)
	M4.2.3	Use place value to round multi-digit whole numbers to the millions place.	4.NBT.A.3 (major)
	M4.2.4	Explain why a number is rounded to a given place.	4.NBT.A.3 (major)
	M4.2.5	Show place value understanding through drawings, charts, tables, diagrams and more.	4.NBT.A.3 (major)
Vocabulary		compare, expanded form, number form, unit form, word form	

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.	Standard Reference
	Foundational	*Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.*	*4.NBT.A.1*
	Foundational	*Read, write, analyze, round, and illustrate their understanding of place value up to 1,000,000.*	*4.NBT.A.2*
	M4.3.1	Demonstrate regrouping with drawings, charts, or tables and explain why it works.	4.NBT.B.4 (major)
	M4.3.2	Fluently add and subtract multi-digit whole numbers using the standard algorithm up to 1,000,000.	4.NBT.B.4 (major)
	M4.3.3	Use variables to represent unknown quantities in addition and subtraction word problems.	4.OA.A.3 (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.B.4 (major)
Vocabulary		algorithm	

Quarter 2 Benchmarks:

M4.4		Students will identify and count factors and multiples for whole numbers in the range of 1-100 and determine if they are prime or composite with justification.	Standard Reference
	M4.4.1	Identify all factor pairs for a whole number up to 100.	4.OA.B.4 (support)
	M4.4.2	Count the multiples of a factor up to 100.	4.OA.B.4 (support)
	M4.4.3	Demonstrate that a whole number is a multiple of a 1-digit number.	4.OA.B.4 (support)
	M4.4.4	Identify a prime or composite number up to 100.	4.OA.B.4 (support)
	M4.4.5	Explain why numbers are prime or composite.	4.OA.B.4 (support)
	M4.4.6	Explain what a multiple is and give an example.	4.OA.B.4 (support)
Vocabulary		composite, prime, factor, factor pair, multiple	

M4.5		Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money.	Standard Reference
	Foundational	*Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.*	*4.NBT.A.1*
	Foundational	*Fluently add and subtract multi-digit whole numbers using the standard algorithm.*	*4.NBT.B.4*
	M4.5.1	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.A.1 (support)
	M4.5.2	Record measurement equivalents in a two-column table.	4.MD.A.1 (support)
	M4.5.3	Use appropriate tools for measuring.	4.MD.A.1 (support)

	M4.5.4	Solve multi-step word problems involving measurement unit conversions with distance.	4.MD.A.2 (support)
	M4.5.5	Solve multi-step word problems involving elapsed time.	4.MD.A.2 (support)
	M4.5.6	Solve multi-step word problems involving money.	4.MD.A.2 (support)
	M4.5.7	Solve multi-step word problems involving capacity.	4.MD.A.2 (support)
Vocabulary		convert, customary, equivalent, metric, standard, unit, diagram, elapsed time, capacity, volume	

M4.6		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.	Standard Reference
	Foundational	*Identify and count factors and multiples for whole numbers in the range of 1-100 and determine if they are prime or composite.*	*4.OA.B.4*
	M4.6.1	Build multiplication equations to show a comparison of two numbers *(e.g., interpret 35= 5 x 7 as a statement that 35 is 5 times as many as 7).*	4.OA.A.1 (major)
	M4.6.2	Write a verbal statement as multiplication equations to show a comparison of two numbers *(e.g., hear or read 35 is 5 times as many as 7 or 35 is 7 times as many as 5 and record).*	4.OA.A.1 (major)
	M4.6.3	Write and solve a multiplication equation for multi-digit by one-digit products.	4.OA.A.1 (major)
	M4.6.4	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.B.5 4.OA.A.2 (major)
	M4.6.5	Illustrate and explain a multiplication problem using rectangular arrays, area models, and properties of operations or equations, including word problems.	4.NBT.B.5 A.OA.A.2 (major)

	M4.6.6	Solve multi-step word problems using a variety of multiplication strategies, including multiplicative comparison.	4.OA.B.4 (support)
	M4.6.7	Use the area formula *A=lw* to solve problems, including word problems.	4.MD.A.3 4.OA.A.2 (support)
	M4.6.8	Use the perimeter formula *P=2l + 2w* to solve problems, including word problems.	4.MD.A.3 4.OA.A.2 (support)
	M4.6.9	Apply the area and perimeter formulas for rectangles in real world mathematical problems.	4.MD.A.3 (support)
	M4.6.10	Generate a number pattern that follows a given rule, using multiplication.	4.OA.B.5 (additional)
Vocabulary		area model, operations, formula, area, perimeter, length, width	

Quarter 3 Benchmarks:

M4.7		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.	Standard Reference
	Foundational	*Identify and count factors and multiples for whole numbers in the range of 1-100 and determine if they are prime or composite.*	*4.OA.B.4*
	M4.7.1	Use and explain area model to divide numbers; progressing from one-digit divisors with double-digit dividends up through four-digit dividends with and without remainders, including word problems.	4.NBT.B.6 4.OA.A.2 (major)
	M4.7.2	Use and explain partial quotient to divide numbers; progressing from one-digit divisors with double-digit dividends up through four-digit dividends with and without remainders, including word problems.	4.NBT.B.6 4.OA.A.3 (major)
	M4.7.3	Apply both equations and illustrations to divide numbers; progressing from one-digit divisors with double-digit dividends up through four-digit dividends with and without remainders, including word problems.	4.NBT.B.6 4.OA.A.3 (major)

	M4.7.4	Use the area formula A=lw to find unknown variables, including word problems.	4.MD.A.3 4.OA.A.3 (support)
	M4.7.5	Use the perimeter formula P=2l + 2w to find unknown variables, including word problems.	4.MD.A.3 4.OA.A.3 (support)
	M4.7.6	Apply the area and perimeter formulas for rectangles to find the unknown variable in real world mathematical problems.	4.MD.A.3 (support)
	M4.7.7	Generate a number pattern that follows a given rule, using multiplication or division.	4.OA.B.5 (additional)
Vocabulary		dividend, divisor, quotient, remainder, growing pattern, repeating pattern, rule, features	

M4.8		Students will analyze fraction equivalence and compare fractions.	Standard Reference
	Foundational	*Identify and count factors and multiples for whole numbers in the range of 1-100 and determine if they are prime or composite.*	*4.OA.B.4*
	M4.8.1	Explain why fraction a/b is equivalent to a fraction (n x a)/(n x b) using visual fraction models.	4.NF.A.1 (major)
	M4.8.2	Recognize and generate equivalent fractions.	4.NF.A.1 (major)
	M4.8.3	Find common denominators for two fractions.	4.NF.A.2 (major)
	M4.8.4	Compare two fractions with different numerators and different denominators using the symbols <, >, or =.	4.NF.A.2 (major)
Vocabulary		numerator, denominator, equivalent, benchmark fraction, common denominator, thirds, fifths, sixths, eighths, tenths, twelfths, hundredths	

M4.9		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 word 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.*	Standard Reference
	Foundational	*Identify and count factors and multiples for whole numbers in the range of 1-100 and determine if they are prime or composite.*	*4.OA.B.4*
	Foundational	*Analyze fraction equivalence and compare fractions.*	*4.NF.A.1*
	M4.9.1	Use number bonds to show addition and subtraction of fractions as joining and separating parts referring to the same whole.	4.NF.B.3a (major)
	M4.9.2	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.B.3b (major)
	M4.9.3	Convert mixed numbers into fractions greater than one *(e.g., 5/2)*.	4.NF.B.3c (major)
	M4.9.4	Add and subtract mixed numbers with like denominators.	4.NF.B.3c (major)
	M4.9.5	Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.	4.NF.B.3d (major)
	M4.9.6	Identify fraction a/b as a multiple of 1/b *(e.g., 5/4 is the product of 5 x (1/4))*.	4.NF.B.4a (major)
	M4.9.7	Identify a multiple of a/b as a multiple of 1/b, and multiply a fraction by a whole number (*e.g., use a visual fraction model to express 3 x (2/5) as 6 x (1/5))*.	4.NF.B.4b (major)
	M4.9.8	Solve word problems involving multiplication of a fraction by a whole number by using visual fraction models and equations.	4.NF.B.4c (major)
	M4.9.9	Use the four operations to solve word problems involving measurement using simple fractions.	4.MD.A.2 (support)

	M4.9.10	Create a line plot to display a data set of measurements in fractions of a unit (1/2, 1/4 and 1/8).	4.MD.B.4 (support)
	M4.9.11	Solve problems involving addition and subtraction of fractions by using information presented in line plots.	4.MD.B.4 (support)
Vocabulary		joining parts, separating parts, whole, sub, fraction greater than one, mixed number, line plot, data	

Quarter 4 Benchmarks:

M4.10		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.	Standard Reference
	Foundational	*Build fractions from unit fractions by applying and extending previous understanding of operations on whole numbers.*	*4.NF.3* *4.NF.4*
	Foundational	*Students will recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.*	*4.NBT.A.1*
	M4.10.1	Identify the tenths and hundredths place.	4.NF.C.7 (major)
	M4.10.2	Write fractions with denominator 10 as an equivalent fraction with denominator 100 *(e.g., 3/10 = 30/100)*.	4.NF.C.5 (major)
	M4.10.3	Add two fractions with respective denominators 10 and 100 *(e.g., 3/10 + 4/100= 34/100)*.	4.NF.C.5 (major)
	M4.10.4	Use decimal notation for fractions with denominators 10 or 100 *(e.g., 0.62=62/100)*.	4.NF.C.6 (major)
	M4.10.5	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.C.7 (major)
	M4.10.6	Justify comparing decimals by using a visual model.	4.NF.C.7 (major)
	M4.10.7	Use the four operations to solve word problems involving measurement using simple fractions and decimals.	4.MD.A.2 (major)
Vocabulary		tenths, hundredths, decimals	

M4.11		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.	Standard Reference
	M4.11.1	Draw and identify points, lines, line segments, rays.	4.G.A.1 (additional)
	M4.11.2	Draw and identify right, acute, obtuse, straight angles.	4.D 4.G.A.1 (additional)
	M4.11.3	Draw and identify parallel, perpendicular, and intersecting lines.	4.D 4.G.A.1 (additional)
	M4.11.4	Identify types of lines and angles within a two-dimensional figure.	4.G.A.1 (additional)
	M4.11.5	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.A.2 (additional)
	M4.11.6	Identify and categorize right triangles by property.	4.G.A.2 (additional)
	M4.11.7	Identify line-symmetric figures and draw lines of symmetry.	4.G.A.3 (additional)
	M4.11.8	Generate a shape pattern that follows a given rule.	4.OA.B.5 (additional)
Vocabulary		acute, obtuse, right angle, parallel, perpendicular, ray, line segment, two-dimensional shapes, classify, right triangle, symmetry, polygons	

M4.12		Students will use concepts of angles and angle measurement to sketch and find unknown angles in real world and math problems.	Standard Reference
	Foundational	*Draw and identify lines and angles, and classify two-dimensional figures by properties of their lines and angles.*	*4.G.A.1* *4.G.A.2*
	M4.12.1	Recognize and identify angles as geometric shapes that are formed where two rays share a common endpoint.	4.MD.C.5 (additional)
	M4.12.2	Measure angles to show what a degree is within a circle.	4.MD.C.5a (additional)

	M4.12.3	Measure angles in whole-number degrees using a protractor.	4.MD.C.6 (additional)
	M4.12.4	Sketch angles to a specified measure.	4.MD.C.6 (additional)
	M4.12.5	Compose and decompose angles.	4.MD.C.7 (additional)
	M4.12.6	Solve real world problems to find the unknown angle measurement.	4.MD.C.7 (additional)
Vocabulary		arc, endpoint, intersect, protractor, degrees, decompose	

5th Grade Standard Reference Code	
OA	Operations & Algebraic Thinking
NBT	Number & Operations in Base Ten
NF	Number & Operations – Fractions
MD	Measurement & Data
G	Geometry
D	District

Math - 5th Grade

Purpose Statement:	Students will fluently add and subtract fractions with like and unlike denominators and establish an ability to multiply and divide. Students extend division to two-digit divisors and will demonstrate fluency with whole numbers. 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.

Quarter 1 Benchmarks:

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.	Standard Reference
	M5.1.1	Build and represent whole numbers.	5.NBT.A.3 (major)
	M5.1.2	Build and represent decimals to the thousandths.	5.NBT.A.3 (major)
	M5.1.3	Represent decimals on a number line to the thousandths.	5.NBT.A.3 (major)
	M5.1.4	Find a number before and after a decimal on a number line to the thousandths.	5.NBT.A.3 5.NBT.A.4 (major)
	M5.1.5	Read and write decimals in a variety of ways *(e.g., base-ten numerals, number names, and expanded form)*.	5.NBT.A.3a (major)

	M5.1.6	Show the next nearest number to the designated decimal to the thousandths.	5.NBT.A.3 5.NBT.A.4 (major)
	M5.1.7	Compare decimals using the inequality symbols to demonstrate >, < or = to the thousandths.	5.NBT.A.3 (major)
	M5.1.8	Round decimals to the nearest required place value to the thousandths.	5.NBT.A.3 (major)
Vocabulary		decimal, digit, inequality	

M5.2		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.	Standard Reference
	M5.2.1	Use concrete or pictorial representation to add decimals to the hundredths using a variety of strategies.	5.NBT.B.7 (major)
	M5.2.2	Use concrete or pictorial representation to subtract decimals to the hundredths using a variety of strategies.	5.NBT.B.7 (major)
	M5.2.3	Relate the strategies to a written method and explain the reasoning used.	5.NBT.B.7 (major)
Vocabulary		n/a	

M5.3		Students will construct multi-digit numbers to include decimals representing patterns and the power of 10.	Standard Reference
	M5.3.1	Demonstrate what the digits represent in a multi-digit number.	5.NBT.A.1 (major)
	M5.3.2	Identify and explain patterns when multiplying numbers of power of 10.	5.NBT.A.2 (major)
	M5.3.3	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 (major)
	M5.3.4	Use whole number exponents to denote powers of 10.	5.NBT.A.2 (major)
Vocabulary		factors, multiple, product	

Quarter 2 Benchmarks:

M5.4		Students will fluently multiply multi-digit whole numbers and decimals using the standard algorithm to include real world application.	Standard Reference
	5.4.1	Apply a variety of methods and tools interchangeably to compute multi-digit multiplication problems.	5.NBT.B.5 (major)
	5.4.2	Fluently use the standard algorithm to solve multi-digit multiplication problems.	5.NBT.B.5 (major)
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.	Standard Reference
	M5.5.1	Identify the relationship between multiplication and division.	5.NBT.B.6 (major)
	M5.5.2	Illustrate and explain the calculation by using equations, rectangular arrays, concrete models, drawings and or area models.	5.NBT.B.6 (major)
	M5.5.3	Relate strategy to a written method and explain the reasoning used within a real world problem.	5.NBT.B.6 (major)
	M5.5.4	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.	5.OA.A.1 (additional)
	M5.5.5	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.	5.OA.A.2 (additional)
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	

Quarter 3 Benchmarks:

M5.6		Students will add and subtract fractions with unlike denominators including mixed numbers using a variety of strategies, additionally solving real world problem.	Standard Reference
	M5.6.1	Demonstrate equivalent fractions.	5.NF.A.1 (major)
	M5.6.2	Add fractions with unlike denominators (with mixed numbers).	5.NF.A.1 (major)
	M5.6.3	Subtract fractions with unlike denominators (with mixed numbers).	5.NF.A.1 (major)
	M5.6.4	Subtract fractions with unlike denominators to include regrouping.	5.NF.A.1 (major)
	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 (major)
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.	Standard Reference
	M5.7.1	Multiply fractions or whole number by a fraction.	5.NF.B.4 (major)
	M5.7.2	Prove that the product is parts of a whole *(e.g., (2/3 x 4 = 8/3) or (2/3 x 4/5=8/15))*.	5.NF.B.4 (major)
	M5.7.3	Find the area of a rectangle using fractional sides, tiling it with squares of appropriate length.	5.NF.B.4b (major)
	M5.7.4	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 (major)
	M5.7.5	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 (major)

	M5.7.6	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.6 (major)
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.	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 (major)
	M5.8.2	Explain the relationship between multiplication and division *(e.g., 1/3 ÷4 =1/12 because 1/12 × 4=1/3)*.	5.NF.B.7b (major)
	M5.8.3	Explain the relationship between multiplication and division *(e.g., 4 ÷ 1/5=20 because 20 × 1/5=4)*.	5.NF.B.7b (major)
	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 ½ pound of chocolate equally? Or How many 1/3 cup servings are in 2 cups of raisins?)*.	5.NFB.7c (major)
Vocabulary		n/a	

Quarter 4 Benchmarks:

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.	Standard Reference
	M5.9.1	Identify volume as an attribute of 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 (major)
	M5.9.2	Measure volume by counting unit cubes (cubic cm., cubic in., cubic ft., and improvised units).	5.MD.C.4 (major)
	M5.9.3	Relate the concept of volume to the operations of multiplication and addition to solve real world problems involving volume.	5.MD.C.5 (major)

	M5.9.4	Build a rectangular prism with unit cubes and show that the volume is the same as multiplying the length, base and height *(e.g. to represent the associative property)*.	5.MD.C.5a (major)
	M5.9.5	Apply the formulas V=l × w × h and V=b × h to find the volume of right rectangular prisms using real world and mathematical problems.	5.MD.C.5b 5.NBT.B.5 (major)
	M5.9.6	Show volume as additive using two shapes while applying it to real world application.	5.MD.C.5c (major)
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.	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 (support)
	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 (support)
	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 (support)
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.	Standard Reference
	M5.11.1	Generate two numerical patterns using two given rules.	5.OA.B.3 (additional)
	M5.11.2	Identify the pattern and understand the relationship of given coordinates points.	5.OA.B.3 (additional)
	M5.11.3	Plot points on a coordinate grid, using x- and y-axis.	5.G.A.1 (additional)

	M5.11.4	Represent and interpret real world problems by graphing points in the first quadrant on the coordinate plane.	5.G.A.2 (additional)
Vocabulary		axis, coordinate plane, quadrant, ordered pair	

M5.12		Students will identify and classify two-dimensional figures.	Standard Reference
	M5.12.1	Identify the attributes of two-dimensional figures.	5.G.B.3 (additional)
	M5.12.2	Identify the sub-categories of two-dimensional figures.	5.G.B.3 (additional)
	M5.12.3	Classify two-dimensional figures 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 (additional)
Vocabulary		congruent, perpendicular, isosceles, scalene, parallel	

6th Grade Standard Reference Code	
RP	Ratios & Proportional Relationships
NS	Number System
EE	Expressions & Equations
G	Geometry
SP	Statistics & Probability
D	District

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.

Benchmarks:

M6.1		Students will use ratio and rate reasoning to solve real-world and mathematical problems by interpreting tables of equivalent ratios, or equations.	Standard Reference
	M6.1.1	Analyze the relationship of unit rates to ratios.	6.RP.1 6.RP.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 (major)
	M6.1.3	Create table of equivalent ratios and rates.	6.RP.3a 6.RP.3b 6.RP.3c

			6.RP.3d (major)
	M6.1.4	Solve unit rate problems.	6.RP.3a 6.RP.3b 6.RP.3c 6.RP.3d (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 (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.	Standard Reference
	M6.2.1	Interpret and compute quotients of fractions and solve word problems.	6.NS.1 (major)
	M6.2.2	All operations multi-digit integers and decimals using the standard algorithm.	6.NS.2 6.NS.3 (additional)
	M6.2.3	Use greatest common factor and least common multiple of two whole numbers to identify common denominators.	6.NS.4 (additional)
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.	Standard Reference
	M6.3.1	Add and subtract integers and produce on a number line to represent real world situations	6.NS.5 (major)
	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 (major)
	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 (major)
	M6.3.4	Interpret statement of inequalities on a number line.	6.NS.7a (major)
	M6.3.5	Display x, y coordinates on a coordinate plane.	6.NS.8 (major)
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.	Standard Reference
	M6.4.1	Write and evaluate numerical expressions involving whole-number exponents.	6.EE.1 (major)
	M6.4.2	Write, read, and evaluate expressions in which letters stand for numbers.	6.EE.2a (major)
	M6.4.3	Identify parts of an expression using mathematical terms including sum, term, product, factor, quotient, and coefficient.	6.EE.2b (major)
	M6.4.4	Evaluate expressions at specific values of variables.	6.EE.2c (major)
	M6.4.5	Apply the properties of operations to generate equivalent expressions including distributive, commutative, and associative properties.	6.EE.3 (major)
	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)
	M6.4.7	Determine if a value is a solution to a given equation or inequality.	6.EE.5 (major)

	M6.4.8	Use variables to represent numbers when writing expressions.	6.EE.6 (major)
	M6.4.9	Solve real-world and mathematical problems by writing and solving equations.	6.EE.7 (major)
	M6.4.10	Write an inequality *(e.g., 5>4)*.	6.EE.8 (major)
	M6.4.11	Use variables to represent two quantities (independent and dependent variables).	6.EE.9 (major)
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.	Standard Reference
	M6.5.1	Construct polygons in a coordinate plane.	6.G.3 (supporting)
	M6.5.2	Find area of right triangles, other triangles, special quadrilaterals, and polygons.	6.G.1 (supporting)
	M6.5.3	Represent 3-D figures using nets and use them to find the surface area.	6.G.4 (supporting)
	M6.5.4	Calculate the volume of a rectangular prism including fractional edge lengths.	6.G.2 (supporting)
Vocabulary		polygons, parallelogram, trapezoid, quadrilateral, surface area, net, volume, prism, rectangular prism, three-dimensional, two-dimensional polygons, parallelogram, trapezoid, quadrilateral, surface area, net, volume, prism, rectangular prism, three-dimensional, two-dimensional	

M.6.6		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.	Standard Reference
	M.6.6.1	Recognize a statistical question.	6.SP.1 (additional)
	M.6.6.2	Analyze a set of data.	6.SP.2 (additional)

	M.6.6.3	Recognize that a measure of center for a numerical data set.	6.SP.3 (additional)
	M.6.6.4	Display numerical real- world data.	6.SP.4 (additional)
	M.6.6.5	Summarize, record, and describe the data.	6.SP.5a-b (additional)
	M.6.6.6	Interpret the mean, median, mode, and range of data.	6.SP.5c-d (additional)
Vocabulary		Statistical question, validity, variability, data set, stats, box plots, mean deviation (MAD), mean, median, mode, range, probability, unlikely, likely, certainty	

7th Grade Standard Reference Code	
RP	Ratios & Proportional Relationships
NS	Number System
EE	Expressions & Equations
G	Geometry
SP	Statistics & Probability
D	District

Math - 7th Grade

Purpose Statement:	Students will apply proportional relationships; manipulate and analyze rational numbers including expressions and linear equations. 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).

Benchmarks:

M7.1		Students will analyze proportional relationships and use them to solve real-world and mathematical problems. Students will recognize and represent proportional relationships between quantities using tables, graphs, equations, and scale drawings.	Standard Reference
	M7.1.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.	7.RP.1 (major)
	M7.1.2	Decide whether two quantities are in a proportional relationship *(e.g., test for equivalent ratios in a table or graph on a coordinate plane and observe whether the graph is a straight line through the origin).*	7.RP.2a (major)
	M7.1.3	Identify the constant of proportionality (k, unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.	7.RP.2b (major)
	M7.1.4	Represent proportional relationships by equations (y = kx).	7.RP.2c (major)
	M7.1.5	Explain what a point *(x, y)* on the graph of a	7.RP.2d

		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.	(major)
	M7.1.6	Use proportional relationships to solve multistep ratio and percent problems.	7.RP.3 (major)
	M7.1.7	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities. • Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where *p*, *q*, and *r* are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.	7.EE.4 7.EE.4a (major)
	M7.1.8	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.1 (additional)
Vocabulary		proportional to, proportional relationship, constant of proportionality, one-to-one correspondence, scale drawing, scale factor	

M7.2		Students will apply operations with rational numbers including mathematical expressions, equations, inequalities and real world situations. Students will represent addition and subtraction on a horizontal or vertical number line diagram.	Standard Reference
	M7.2.1	Describe situations in which opposite quantities combine to make 0 *(e.g., a hydrogen atom has 0 charge because its two constituents are oppositely charged)*.	7.NS.1a (major)
	M7.2.2	Describe $p + q$ as the number located a distance $\|q\|$ from *p*, in the positive or negative direction depending on whether *q* is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.	7.NS.1b (major)
	M7.2.3	Show subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.	7.NS.1c (major)
	M7.2.4	Apply properties of operations as strategies to add and subtract rational numbers.	7.NS.1d (major)

	M7.2.5	Extend the properties of multiplication from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.	7.NS.2a (major)
	M7.2.6	Demonstrate that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. *(e.g., if p and q are integers, then –(p/q) = (–p)/q = p/(–q))*. Interpret quotients of rational numbers by describing real-world contexts.	7.NS.2b (major)
	M7.2.7	Apply properties of operations as strategies to multiply and divide rational numbers.	7.NS.2c (major)
	M7.2.8	Convert a rational number to a decimal using long division; show that the decimal form of a rational number terminates in 0s or eventually repeats.	7.NS.2d (major)
	M7.2.9	Solve real-world and mathematical problems involving the four operations with rational numbers.	7.NS.3 (major)
	M7.2.10	Rewrite an expression in different forms in a problem context to show how the quantities are related.	7.EE.2 (major)
	M7.2.11	Use variables to represent quantities in a real-world or mathematical problem, and build simple equations and inequalities to solve problems by reasoning about the quantities. • Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.	7.EE.4 7.EE.4a (major)
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. Students will use variables to represent quantities in a real-world or mathematical problem, and build simple equations and inequalities to solve problems by reasoning about the quantities.	Standard Reference
	M7.3.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	7.EE.1 (major)

	M7.3.2	Rewrite an expression in different forms showing how the quantities are related.	7.EE.2 (major)
	M7.3.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form. Apply properties of operations to calculate and convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	7.EE.3 (major)
	M7.3.4	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *(e.g., the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?).*	7.EE.4a (major)
	M7.3.5	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem *(e.g., As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions).*	7.EE.4b (major)
Vocabulary		an expression in expanded form, an expression in factored form, an expression in standard form, coefficient of the term, circle, diameter of a circle, circumference, pi, circular region or disk	

M7.4		Students will solve real life and mathematical problems involving angle relationships and using geometric formulas.	Standard Reference
	M7.4.1	Use the formulas for the area and circumference of a circle to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	7.G.4 (additional)
	M7.4.2	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.5 (additional)
	M7.4.3	Solve real world and mathematical problems involving area, of two-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	7.G.6 (additional)
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, commissions, 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 forms.	Standard Reference
	M7.5.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.	7.RP.1 (major)
	M7.5.2	Decide whether two quantities are in a proportional relationship *(e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin)*.	7.RP.2a (major)
	M7.5.3	Identify the constant of proportionality (unit rate) in tables, graphs, equations, and verbal descriptions of proportional relationships.	7.RP.2b (major)
	M7.5.4	Represent proportional relationships by equations ($y = kx$).	7.RP.2c (major)
	M7.5.5	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.2d (major)
	M7.5.6	Use proportional relationships to solve multistep ratio and percent problems. Use real-world application (i.e. mark up, mark down, simple interest, sales tax, commissions, fees, and percent error).	7.RP.3 (major)
	M7.5.7	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form. Apply properties of operations to calculate and convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	7.EE.3 (major)
	M7.5.8	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.1 (additional)
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 draw, construct, and describe geometric figures and describe the relationships. Students will solve real-life and mathematical problems involving angle measure, surface area, and volume.	Standard Reference
	M7.6.1	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Construct triangles from three measures of angles or sides, noting when the conditions determine a unique triangle, more than one triangle, or no triangle.	7.G.2 (additional)
	M7.6.2	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	7.G.3 (additional)
	M7.6.3	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.5 (additional)
	M7.6.4	Solve real world and mathematical problems involving volume and surface area of three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	7.G.6 (additional)
Vocabulary		Correspondence, Identical (Congruent) Triangles, Right Rectangular Pyramid, Surface of a Pyramid, Three Sides Condition, Two Angles and the Included Side Condition, Two Angles and the Side Opposite a Given Angle, Two Sides and a Non-Included Angle Condition, Two Sides and the Included Angle Condition, Unique Triangle	

M7.7		Students will use random sampling to draw inferences about a population by developing a probability model. Models include organized lists, tables, tree diagrams and simulation.	Standard Reference
	M7.7.1	Demonstrate that statistics can be used to gain information about a population by examining a valid sample, representative of that population. Explain that random sampling tends to produce representative samples and support valid inferences.	7.SP.1 (supporting)
	M7.7.2	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.	7.SP.2 (supporting)
	M7.7.3	Assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring	7.SP.3 (additional)

		the difference between the centers by expressing it as a multiple of a measure of variability *(e.g., the mean height of players on the basketball is 10 cm greater than the mean height of the players on the soccer team, about twice the variability on either team).*	
	M7.7.4	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	7.SP.4 (additional)
	M7.7.5	Demonstrate that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring.	7.SP.5 (supporting)
	M7.7.6	Determine 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 (supporting)
	M7.7.7	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events *(e.g., if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected).*	7.SP.7a (supporting)
	M7.7.8	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.	7.SP.7b (supporting)
	M7.7.9	Demonstrate 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.	7.SP.8a (supporting)
	M7.7.10	Explain 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.8b (supporting)
	M7.7.11	Design and use a simulation to generate frequencies for compound events.	7.SP.8c (supporting)
Vocabulary		Compound event, Inference, Long-Run Relative Frequency, Probability, Probability Model, Random Sample, Simulation, Tree Diagram, Uniform Probability Model	

8th Grade Standard Reference Code	
NS	Number System
EE	Expressions & Equations
F	Functions
G	Geometry
SP	Statistics & Probability
D	District

Math - 8th Grade

Purpose Statement:	Students will formulate, solve and apply linear relationships using graphs, equations and tables, and describe quantitative relationships using function notation. Students will analyze two and three dimensional space and figures using geometric attributes and apply the Pythagorean Theorem to solve realistic life 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).

Benchmarks:

M8.1		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.	Standard Reference
	M8.1.1	Apply the properties of integer exponents to generate equivalent numerical expressions.	8.EE.1 (major)
	M8.1.2	Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other.	8.EE.3 (major)
	M8.1.3	Perform operations with numbers expressed in scientific and decimal notation. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities *(e.g., use millimeters per year for seafloor spreading)*. Interpret scientific notation that has been generated by technology.	8.EE.4 (major)

Vocabulary	scientific notation, order of magnitude

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); calculate the length of a missing leg of a right triangle using the Pythagorean Theorem.	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.1 (major)
	M8.2.2	Transform a two-dimensional figure congruent to an original by a sequence of rotations, reflections, and/or translations; given two congruent figures, describe a sequence that exhibits the congruence between them.	8.G.2 (major)
	M8.2.3	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal.	8.G.5 (major)
	M8.2.4	Explain a proof of the Pythagorean Theorem and its converse.	8.G.6 (major)
	M8.2.5	Apply the Pythagorean Theorem to determine unknown hypotenuse in right triangles in real- world and mathematical problems in two dimensions.	8.G.7 (major)
Vocabulary		transformation, basic rigid motion, translation, rotation, reflection, image, sequence, vector, congruence, transversal	

M8.3		Students will describe the effect of dilations on two-dimensional figures in general and on the coordinate plane; demonstrate that a two-dimensional figure is similar to another through a dilation and transformation (i.e. angle pair relationships can be explained through transformations), calculate the length of a missing leg of a right triangle using the Pythagorean Theorem.	Standard Reference
	M8.3.1	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	8.G.3 (major)
	M8.3.2	Model a two-dimensional figure as 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.4 (major)
	M8.3.3	Use informal arguments to establish facts about the angle sum and exterior angle 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.5 (major)
	M8.3.4	Defend a proof of the Pythagorean Theorem or its converse.	8.G.6 (major)
	M8.3.5	Apply the Pythagorean Theorem to determine unknown legs in right triangles in real- world and mathematical problems in two dimensions.	8.G.7 (major)
Vocabulary		dilation, congruence, similar, similarity transformation	

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 by examining similar triangles; generate graphs of linear equations in two variables; write equations of lines given slope and a point, write an equation given two points.	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 (verbally, graphically, tabular, or algebraically).	8.EE.5 (major)
	M8.4.2	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane.	8.EE.6 (major)
	M8.4.3	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 b.	8.EE.6 (major)
	M8.4.4	Give examples of linear equations in two variables with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a ≠ b.	8.EE.7a (major)
	M8.4.5	Solve linear equations in two variables with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.	8.EE.7b (major)
Vocabulary		slope	

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.	Standard Reference
	M8.5.1	Explain solutions of a system of two linear equations in two variables as it corresponds to a unique solution (one intersection), no solution (parallel), or infinitely many solutions (coinciding); verify that points of intersection satisfy both equations simultaneously.	8.EE.8a (major)
	M8.5.2	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection graphically.	8.EE.8b (major)
	M8.5.3	Solve real-world and mathematical problems leading to two linear equations in two variables.	8.EE.8c (major)
Vocabulary		slope, system of linear equations, solution to a system of linear equations	

M8.6		Students will use the defining qualities of functions to classify and graph functions; explain correlation between slope and rate of change in functions; differentiate between discrete and continuous data; solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	Standard Reference
	M8.6.1	Explain that a function is a rule that assigns to each input exactly one output, and the graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	8.F.1 (major)
	M8.6.2	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	8.F.2 (major)
	M8.6.3	Interpret the equation y = mx + b as defining a linear function, whose graph is a straight line; determine if the function is discrete or continuous; give examples of functions that are not linear.	8.F.3 (major)

	M8.6.4	Use the formulas for volumes of cones, cylinders, and spheres to solve real- world and mathematical problems.	8.G.9 (additional)
Vocabulary		function, input, output	

M8.7		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 scatterplots 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 function and its graph to make predictions; calculate and use the relative frequencies calculated from tables to informally assess possible associations between two categorical variables.	Standard Reference
	M8.7.1	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.	8.F.4 (supporting)
	M8.7.2	Describe qualitatively the functional relationship between two quantities by analyzing a graph *(e.g., where the function is increasing or decreasing, linear or nonlinear).* Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	8.F.5 (supporting)
	M8.7.3	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.	8.SP.1 (supporting)
	M8.7.4	Fit a straight line, and informally assess the model fit by judging the closeness of the bivariate data points to the line.	8.SP.2 (supporting)
	M8.7.5	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	8.SP.3 (supporting)

	M8.7.6	Display frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables.	8.SP.4 (supporting)
Vocabulary		association, relative frequency, two-way table	

M8.8		Students will find positive square roots and cube roots of expressions. Students will demonstrate that decimal expansions for rational numbers will repeat eventually and write repeating decimals as fractions. Students will apply the Pythagorean theorem to solve the distance between two points on the coordinate plane and apply the Pythagorean theorem to three-dimensional figures to solve real world situations.	Standard Reference
	M8.8.1	Differentiate between rational and irrational numbers explaining defining attributes of each. Show informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion that repeats eventually into a rational number.	8.NS.1 (supporting)
	M8.8.2	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 *(e.g., π^2)*.	8.NS.2 (supporting)
	M8.8.3	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.	8.EE.2 (major)
	M8.8.4	Explain a proof of the Pythagorean Theorem and its converse.	8.G.6 (major)
	M8.8.5	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real- world and mathematical problems in two and three dimensions.	8.G.7 (major)
	M8.8.6	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	8.G.8 (major)

	M8.8.7	Use the formulas for volumes of cones, cylinders, and spheres to solve real- world and mathematical problems.	8.G.9 (additional)
Vocabulary		chord, cube root, infinite decimal, irrational number, perfect square, rational approximation, truncated cone, square root of a number, principle square root	

HS 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
SP	Statistics & Probability					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.

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).

Benchmarks:

PALG.1		Students will solve examples involving exponents, number lines, and scientific notation in various scenarios.	Standard Reference
	PALG.1.1	Arrange multiple values based on the number line.	6.NS.C.6.C
	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 basses and integer exponents.	RN.A.1
	PALG.1.4	Calculate the square root or cube root of a value.	8.EE.A.2
	PALG.1.5	Convert between standard notation and scientific notation and perform operations with scientific notation.	8.EE.A.4
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 with calculate angle measures with parallel lines and triangles.	Standard Reference
	PALG.2.1	Interpret translations.	8.G.A.2 8.G.A.3
	PALG.2.2	Interpret reflections and rotations.	8.G.A.2 8.G.A.3
	PALG.2.3	Identify rigid translations of congruent figures.	8.G.A.2 8.G.A.3
	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.A.5
	PALG.2.6	Calculate missing angle measures for triangles both interior and exterior.	8.G.A.5
Vocabulary		translation, reflection, rotation, congruent, scale factor, similar figures, corresponding, alternate interior, alternate exterior, consecutive interior, dilation	

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

PALG.4		Students will identify and interpret components of functions and their graphs.	Standard Reference
	PALG.4.1	Identify functions using graphs, coordinate pairs, or data.	8.F.A.1
	PALG.4.2	Interpret graphs of linear functions.	8.F.A.3
	PALG.4.3	Interpret graphs of non-linear functions.	8.F.B.5
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.	Standard Reference
	PALG.5.1	Calculate unit rates and slopes.	8.EE.B.5
	PALG.5.2	Identify slope or y-intercept from the slope-intercept form.	8.EE.B.6
	PALG.5.3	Identify slope-intercept form when given initial value and rate of change.	8.EE.B.6
	PALG.5.4	Find initial value or rate of change when given slope-intercept form.	8.EE.B.6
	PALG.5.5	Analyze data from non-linear functions.	IC.B.6
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.	Standard Reference
	PALG.6.1	Identify correlation on scatter plots.	8.SP.A.1
	PALG.6.2	Identify lines of best fit for scatter plots.	8.SP.A.2
	PALG.6.3	Interpret lines of best fit.	8.SP.A.2
	PALG.6.4	Calculate missing values on frequency tables.	ID.B.5
Vocabulary		correlation, scatter plots	

PALG.7		Students will solve equations that are one-step, multi-step, linear, and have variables on both sides.	Standard Reference
	PALG.7.1	Solve one-step equations.	6.EE.B.7
	PALG.7.2	Solve multi-step equations.	7.EE.B.4
	PALG.7.3	Solve linear equations.	8.EE.C.7.A
	PALG.7.4	Solve equations with variables on both sides.	8.EE.C.7.B
	PALG.7.5	Solve equations with rational coefficients.	8.EE.C.7.B
Vocabulary		variable, equation, coefficient	

PALG.8		Students will solve and create systems of equations utilizing various methods.	Standard Reference
	PALG.8.1	Identify systems of equations.	8.EE.C.8.A
	PALG.8.2	Solve systems of equations by graphing.	HSA.REI.C.6

	PALG.8.3	Solve systems of equations by substitution.	REI.C.6
	PALG.8.4	Solve systems of equations by elimination.	REI.C.6
	PALG.8.5	Create systems of equations.	REI.C.6
Vocabulary		system of equations, graphing, substitution, elimination	

HS 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
SP	Statistics & Probability					G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Algebra I

Purpose Statement:	Students will solve linear equations and inequalities, graph linear functions, apply operations with algebraic expressions, solve systems of linear equations, simplify expressions using laws of exponents, classify polynomials and factor polynomial expressions 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).

Benchmarks:

ALG1.1		Students will use cross products and inverse operations to solve algebraic equations, which may include percent problems.	Standard Reference
	ALG1.1.1	Solve simple equations and proportions which may include percents.	A.CED.A.1 A.REO.A.1 A.REI.B.3
	ALG1.1.2	Solve linear equations using multiple steps.	N.Q.A.1 A.REI.B.3 A.CED.A.1
	ALG1.1.3	Solve linear equations with variables on both sides.	A.REI.B.1 A.CED.A.1
	ALG1.1.4	Solve absolute value equations.	A.REI.B.3 A.CED.A.1

	ALG1.1.5	Solve literal equations.	A.CED.A.4
Vocabulary		equation, solution of an equation, inverse operations, identity, contradiction, formula, literal equation, proportion, similar, corresponding sides, corresponding angles	

ALG1.2		Students will use inverse operations to solve inequalities and will solve simple compound inequalities.	Standard Reference
	ALG1.2.1	Solve and graph inequalities on a number line.	A.REI.B.3 A.CED.A.1 F.LE.5
	ALG1.2.2	Solve simple compound inequalities.	A.REI.B.3 A.CED.A.1
Vocabulary		inequality, solution of an inequality, compound inequality, intersection, union	

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.	Standard Reference
	ALG1.3.1	Determine if a relation is a function and identify the domain, range, independent and dependent variables.	A.IF.A.1
	ALG1.3.2	Identify functions and linear functions.	A.CED.A.2 A.REI.D.10 A.IF.B.5 A.IFC.7a A.LE.A.1b
	ALG1.3.3	Use function notation to evaluate, interpret, solve and graph functions.	A.CED.A.2 A.IF.A.1 A.IF.A.2 A.IF.C.7a A.IF.C.9
	ALG1.3.4	Graph linear equations in standard form and in slope-intercept form.	A.CED.A.2 A.IF.C.7a A.LE.B.5 A.IF.B.4
	ALG1.3.5	Graph and transform linear functions,	A.IF.C.7a A.BF.B.3

Vocabulary	linear function, linear equation, y-intercept, x-intercept, rate of change, rise, run, slope, direct variation, constant of variation, parallel lines, perpendicular lines, coinciding lines

ALG1.4		Students will write equations, fit a function to a scatter plot and analyze the function, use arithmetic sequences and use function notation.	Standard Reference
	ALG1.4.1	Write equations in slope-intercept form.	A.CED.A.2 F.BF.A.1a F.LE.A.1b F.LE.A.2
	ALG1.4.2	Write equations in point-slope form.	A.CED.A.2 F.BF.A.1a F.LE.A.1b F.LE.A.2
	ALG1.4.3	Write equations of parallel and perpendicular lines.	A.CED.A.2 F.LE.A.2
	ALG1.4.4	Plot scatter plots and use lines of best fit.	F.LE.B.5 S.ID.B.6a S.ID.B.6c S.ID.C.7
	ALG1.4.5	Analyze and interpret lines of best fit.	F.LE.B.5 S.ID.B.6a S.ID.B.6b S.ID.B.6c S.ID.C.7 S.ID.C.8 S.ID.C.9
	ALG1.4.6	Write arithmetic sequences.	F.IF.A.3 F.BF.A.1a F.BF.A.2 F.LE.A.2
Vocabulary		continuous graph, discrete graph, relation, domain, range, function, independent variable, dependent variable, function notation, function rule, scatter plot, positive correlation, negative correlation, no correlation, trend line, sequence, term, arithmetic sequence, common difference	

ALG1.5	Students will solve systems of two linear equations and inequalities and relate them to real world situations.	Standard Reference

	ALG1.5.1	Solve system of equations by graphing and relate them to real world situations.	A.REI.C.6 A.CED.A.3
	ALG1.5.2	Solve systems of equations by substitution and elimination relate them to real world situations.	A.REI.C.5 A.REI.C.6 A.CED.A.3
	ALG1.5.3	Solve specials systems of equations and relate them to real world situations.	A.REI.C.6 A.CED.A.3
	ALG1.5.4	Graph systems of linear inequalities.	A.CED.A.3 A.REI.D.12
Vocabulary		system of linear of equations, system of linear inequalities solution of a system of linear equations, inconsistent system, consistent system, dependent system, independent system	

ALG1.6		Students will use properties of exponents, including radicals, rational, exponential, growth and decay.	Standard Reference
	ALG1.6.1	Re-write expressions using properties of exponents.	A.RN.A.2
	ALG1.6.2	Evaluate and solve problems with radicals and rational exponents	A.RN.A.1 A.RN.A.2
	ALG.6.3	Graph and solve problems using exponential functions.	A.IF.C.7.e A.IF.C.9 A.BF.A.1a A.LE.A.2
	ALG.6.4	Graph and solve problems using exponential growth and decay.	A.IF.C.7e A.IF.C.8b A.LE.A.1c A.LE.A.2
Vocabulary		n/a	

ALG1.7		Students will simplify polynomials by using the addition, subtraction and multiplication properties of exponents.	Standard Reference
	ALG1.7.1	Add and subtract polynomials.	A.APR.A.1
	ALG1.7.2	Multiply polynomials and special products of polynomials.	A.APR.A.1
	ALG1.7.3	Solve polynomial equations in factored form.	A.APR.B.3 A.REI.B.4b
	ALG1.7.4	Factor with lead coefficient equal to 1.	A.SSE.A.2 A.SSE.B.3a

	ALG1.7.5	Factor with lead coefficient not equal to 1.	A.SSE.A.2 A.SSE.B.3a
	ALG1.7.6	Factor special products.	A.SSE.A.2 A.SSE.B.3a
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 organize data in tables, graphs, histograms and scatter plots. Students will also calculate the central tendencies and standard deviation of data.	Standard Reference
	ALG1.8.1	Compare and find measures of center and variation.	S.ID.A.3
	ALG1.8.2	Create and interpret box and whisker plots.	S.ID.A.1 S.ID.A.3
	ALG1.8.3	Describe, use and compare shapes of distributions.	S.ID.A.1 S.ID.A.2 S.ID.A.3
	ALG1.8.4	Make and use two-way tables.	S.ID.B.5
	ALG1.8.5	Choose a table, graph, histogram or scatter plot to display data.	S.ID.A.1
Vocabulary		mean, median, range, outlier, quartile, outer quartile range, box and whisker plots, standard deviation, linear, quadratic and exponential, scatter plot	

HS 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
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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
SP	Statistics & Probability					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 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).

Benchmarks:

GEO.1		Students will identify basic geometric elements and calculate the midpoints and distances of segments.	Standard Reference
	GEO.1.1	Name, sketch, and define the basic elements of geometry *(e.g., point, line, plane, angle, etc.)*.	G.CO.1
	GEO.1.2	Use coordinate locations to find midpoints and calculate distances with the distance formula.	G.CO.1 G.GPE.6 G.GPE.7
	GEO.1.3	Calculate the area and perimeters of polygons in a coordinate plane.	G.GPE.6 G.GPE.7
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.	Standard Reference
	GEO.2.1	Use inductive reasoning, deductive reasoning, and conditional statements to establish logical arguments.	G.CO.9
	GEO.2.2	Support an argument using logical reasoning (postulates, diagrams, proofs – segment, angle pairs, angles).	A.REI.1 G.CO.9
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.	Standard Reference
	GEO.3.1	Measure and classify angles (interior, exterior, and relationships).	G.CO.1 G.CO.9
	GEO.3.2	Prove theorems involving parallel lines and their transversals and apply to triangles.	G.CO.1 G.CO.9 G.CO.10 G.CO.11
	GEO.3.3	Use criteria of parallel and perpendicular lines to solve geometric problems.	G.GPE.5 G.CO.1
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.	Standard Reference
	GEO.4.1	Draw and describe transformed figures using rotation, reflection, and translation.	G.CO.2 G.CO.3 G.CO.4 G.CO.5
	GEO.4.2	Use transformations to prove that when a transversal crosses parallel lines, corresponding angles are congruent.	G.CO.9

Vocabulary	congruent, rotation, transformation, reflection, translation

GEO.5		Students will compare triangles and prove and apply relationships between and within triangles.	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.7 G.CO.8 G.CO.10 G.C.O.11
	GEO.5.2	Prove and apply theorems for isosceles and equilateral triangles.	G.CO.10
	GEO.5.3	Show that two triangles are congruent after rigid motion ASA, SAS, SSS.	G.CO.6 G.CO.7 G.CO.8
	GEO.5.4	Prove theorems about triangles (medians, angle and perpendicular bisectors).	G.CO.9 G.CO.10
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.	Standard Reference
	GEO.6.1	Decide if triangles are similar (AA, SSS, SAS).	G.SRT.2 G.SRT.3
	GEO.6.2	Prove criteria of parallel and perpendicular lines (slopes and graphing).	G.GPE.5 G.CO.1
	GEO.6.3	Apply and verify the properties of similar figures including dilations (ratios, proportions).	G.SRT.1 G.SRT.4
	GEO.6.4	Compare transformations that preserve distance and angle to those that do not.	G.CO.2
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.	Standard Reference
	GEO.7.1	Write expressions in simplest radical form.	N.RN.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.8 A.APR.4
	GEO.7.3	Solve right triangles through the use of tangent, sine, and cosine.	G.SRT.6 G.SRT.7 G.SRT. 8
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.	Standard Reference
	GEO.8.1	Identify and describe relationships of circles and their tangents, secants, chords, and radii.	G.C.2 G.C.3
	GEO.8.2	Calculate arc lengths.	G.C.5
	GEO.8.3	Prove that all circles are similar.	G.C.1
	GEO.8.4	Make formal constructions with a variety of tools.	G.C.3 G.CO.12 G.CO.13
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.	Standard Reference
	GEO.9.1	Choose appropriate units of measurement and levels of accuracy as indicated for areas, volumes, and density.	G.MG.2 N.Q.1 N.Q.2 N.Q.3
	GEO.9.2	Solve problems involving surface area and volume of solids.	G.GMD.1 G.GMD.3
	GEO.9.3	Calculate areas of sectors of circles.	G.C.5
	GEO.9.4	Describe two-dimensional cross-sections of three-dimensional objects.	G.GMD.4
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.

HS 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
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SP	Statistics & Probability					G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Algebra II

Purpose Statement:	Students will create and solve radical, rational, and polynomial equations within the real and complex number system. Students will also graph and analyze quadratic, exponential and logarithmic functions to broaden their mathematical understanding and problem-solving techniques.

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).

Benchmarks:

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.	Standard Reference
	ALG2.1.1	Identify families of functions. Describe transformations of parent functions. Describe combinations of transformations.	F-BF.B.3
	ALG2.1.2	Write functions representing translations and reflections, stretches and shrinks, and combinations of transformations.	F-BF.B.3
	ALG2.1.3	Write equations of linear functions using points and slopes. Find line of fit and lines of best fit.	A-CED.A.2 F-IF.C.9 F-BF.A.1a F-LE.A.2

			S-ID.B.6a
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. Students will write equations of parabolas and write quadratic equations to model data sets.	Standard Reference
	ALG2.2.1	Describe transformations of quadratic equations.	F-IF.C.7c F-BF.B.3
	ALG2.2.2	Explore properties of parabolas. Find 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.7c F-IF.C.9 A-APR.B.3
	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.7c G-GPE.A.2
	ALG2.2.4	Write equations of quadratic functions using vertices, points, and *x*-intercepts. Write quadratic equations to model data sets.	A-CED.A.2 F-IF.B.6 F-BF.A.1a S-ID.B.6a
Vocabulary		s 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. Students will add, subtract, and multiply complex numbers, and solve systems of nonlinear equations. Students will solve and graph quadratic inequalities in two variables.	Standard Reference
	ALG2.3.1	Solve quadratic equations by graphing. Solve quadratic equations algebraically.	A.SSE.A.2 A-REI.B.4b F-IF.C.8a
	ALG2.3.2	Define and use the imaginary unit *i*. Add, subtract, and multiply complex numbers. Find complex solutions and zeros.	N-CN.A.1 N-CN.A.2 N-CN.C.7 A-REI.B.4b
	ALG2.3.3	Solve quadratic equations using square roots, and completing the square. Write quadratic functions in vertex form.	N-CN.C.7 A-REI.B.4b F-IF.C.8b

	ALG2.3.4	Solve quadratic equations using the Quadratic Formula. Analyze the discriminant to determine the number and type of solutions.	N-CN.C.7 A-REI.B.4b
	ALG2.3.5	Solve systems of nonlinear equations. Solve quadratic equations by graphing.	A-CED.A.3 A-REI.C.7 A-REI.D.11
	ALG2.3.6	Graph quadratic inequalities in two variables. Solve quadratic inequalities in one variable.	A-CED.A.1 A-CED.A.3
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. 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.	Standard Reference
	ALG2.4.1	Identify polynomial functions. Graph polynomial functions using tables and end behavior.	F-IF.B.4 F-IF.C.7C
	ALG2.4.2	Add, subtract, and multiply polynomials.	A-APR.A.1 A-APR.C.4 A-APR.C.5
	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.B.2 A-APR.D.6
	ALG2.4.4	Factor polynomials. Use the Factor Theorem.	A-SSE.A.2 A-APR.B.2 A-APR.B.3
	ALG2.4.5	Find solutions of polynomial equations and zeros of polynomial functions. (+) Use the Irrational Conjugates Theorem and Rational Root Theorem.	A-APR.B.3
	ALG2.4.6	(+) Use the Fundamental Theorem of Algebra. Find conjugate pairs of complex zeros of polynomial functions.	N-CN.C.8 N-CN.C.9 A-APR.B.3
	ALG2.4.7	Describe transformations of polynomial functions. Write transformations of polynomial functions.	F-IF.C.7c F-BF.B.3

	ALG2.4.8	Use *x*-intercepts to graph polynomial functions. Find turning points and identify maximums and minimums. Identify even and odd functions.	A-APR.B.3 F-IF.B.4 F-IF.C.7c F-BF.B.3
Vocabulary		polynomial, polynomial function, synthetic substitution, end behavior, factored completely, factor by grouping, quadratic form, polynomial long division, synthetic division, repeated solution, local maximum, and local minimum	

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.	Standard Reference
	ALG2.5.1	Find n^{th} root of numbers. Evaluate expressions with rational exponents. Solve equations using n^{th} root.	N.RN.A.1 N-RN.A.2
	ALG2.5.2	Use 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
	ALG2.5.3	Graph radical functions. Write transformations of radical functions. Graph parabolas and circles.	F-IF.C.7b F-BF.B.3
	ALG2.5.4	Solve equations containing radicals and rational exponents.	A-REI.A.1 A-REI-A.2
	ALG2.5.5	Add, subtract, multiply, and divide functions.	F-BF.A.1b
	ALG2.5.6	Explore inverses of functions. (+) Find and verify inverses of functions. Solve real-life problems using inverse functions.	A-CED.A.4 F-BF.B.4a
Vocabulary		n^{th} 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 solve logarithmic functions. Students will write logarithmic models for data sets.	Standard Reference
	ALG2.6.1	Graph exponential growth and decay functions. Use exponential models to solve real-life problems.	A.SSE.3c F-IF.C.7e F-IF.C.8b

			F-LE.A.2 F-LE.B.5
	ALG2.6.2	Define and use the natural base *e*. Graph natural base functions. Solve real-life situations.	F-IF.C7e
	ALG2.6.3	Define and evaluate logarithms. Use inverse properties of logarithmic and exponential functions. Graph logarithmic functions.	F.LE.4
	ALG2.6.4	Use the properties of logarithms to evaluate, expand and condense logarithmic expressions.	A.SSE.2
	ALG2.6.5	Solve exponential and logarithmic equations.	F.IF.8 A.SSE.3c
	ALG2.6.6	Write and apply exponential and power functions.	F.IF.8
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. Students will add, subtract, multiply, and divide rational expressions. Students will solve rational equations.	Standard Reference
	ALG2.7.1	Model inverse and joint variation.	F.BF.4 A.SSE.2
	ALG2.7.2	Multiply and divide rational expressions.	A.APR.7(+)
	ALG2.7.3	Add and subtract rational expressions.	A.APR.7(+)
	ALG2.7.4	Solve rational equations.	A.REI.2
Vocabulary		inverse variation, constant of variation, joint variation, rational function, simplified form of a rational expression, complex fraction, cross multiplying	

ALG2.8		Students will graph and write equations of segments, parabolas, circles, ellipses, and hyperbolas. Students will classify and translate conic sections.	Standard Reference
	ALG2.8.1	Graph and write equations of parabolas.	G.GPE.2
	ALG2.8.2	Graph and write equations of circles.	G.GPE.1 G.GPE.4
	ALG2.8.3	Graph and write equations of ellipses.	G.GPE.3 (+)
	ALG2.8.4	Graph and write equations of hyperbolas.	G.GPE.3 (+)

	ALG2.8.5	Classify and translate conic sections.	G.CO.2
	ALG2.8.6	Apply the distance and midpoint formulas.	G.GPE.5 G.GPE.6 G.GPE.7
Vocabulary		distance formula, foci, directrix, ellipse, vertices, co-vertices, major axis, minor axis, hyperbola, transverse axis, conic sections, general second degree equation, discriminant, quadratic system	

ALG2.9		Students will apply the fundamental counting principle and the formulas for permutations and combinations and apply those ideas to solve problems. Students will expand counting methods to theoretical, experimental and geometric probability and find probabilities of events and construct and interpret distributions. Students will make inferences and justify conclusions in experiments, samples, and studies.	Standard Reference
	ALG2.9.1	Apply the counting principle and permutations and use combinations and the binomial theorem.	Modeling
	ALG2.9.2	Define and use probability. Find probabilities of disjoint and overlapping events *(e.g., A or B)*. Find probabilities of independent and dependent events *(e.g., A and B, A given B)*.	S.CP.1 S.CP.2 S.CP.3 S.CP.5 S.CP.6 S.CP.7
	ALG2.9.3	Construct and interpret binomial distributions and interpret normal distributions.	S.CP.4 S.ID.4
	ALG2.9.4	Analyze hypotheses for sample data, identify various types of samples, determine bias and make inferences from sample surveys.	S.IC.1 S.IC.2 S.IC.3
	ALG2.9.5	Analyze experimental design and make inferences from experiments.	S.IC.1 S.IC.2 S.IC.3 S.IC.5 S.IC.6
Vocabulary		permutation, combination, binomial theorem, probability, compound event, overlapping events, disjoint events, independent events, dependent events, conditional probability, random variable, binomial distribution, normal distribution, normal curve, standard normal distribution, *z*-score, population, sample, parameter, statistic, hypothesis, random sample, self-selected sample, systematic sample, stratified sample, cluster sample,	

	convenience sample, bias, unbiased sample, biased sample, experiment, observational study, survey, simulation, biased question, controlled experiment, control group, treatment group, randomization, randomized comparative experiment, placebo, replication, descriptive statistics, inferential statistics, margin of error

HS 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
SP	Statistics & Probability					G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Algebra III Trigonometry
Advanced Algebra/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).

Benchmarks:

ALG3.1	Students will write and sketch graphs of equations and circles using symmetry. Students will use the order of operations to manipulate the imaginary unit *i* and its' conjugates in order to write the quotient of two complex numbers in standard form, and find complex solutions of quadratic equations. Students will solve polynomial equations of degree three or greater (using factoring and quadratic equation), radical equations, rational equations, and absolute value equations. Students will use properties of inequalities to write equivalent inequalities along with solving absolute value inequalities. Mathematical Models are used to solve real-world	Standard Reference

		examples of Compound Interest, Mixture Problems, Profits and Reduced Rates.	
	ALG3.1.1	Sketch graphs of equations and circles using symmetry, *x* and *y* intercepts, and solutions points.	F-IF.B.4 F-IF.C.7.a F-IF.C.7.b F-IF.C.7.c F-IF.C.8.a
	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 A-CED.A.1
	ALG3.1.3	Write and use Mathematical Models to solve real-life problems using common formulas.	A-REI.D.10 A-REI.D.11
	ALG3.1.4	Solve quadratic equations by factoring, extracting square roots, completing the square, and quadratic formula.	N-CN.C.7 A-REI.B.4a A-REI.B4b
	ALG3.1.5	Use operations and conjugates with complex numbers to find solutions of quadratic equations.	N-CN.A.1 N-CN.A.2 N-CN.A.3 (+)
	ALG3.1.6	Solve polynomial equations of degree three or higher, radical equations, rational equations, and absolute value equations.	N.RN.A.1 N.RN.A.2 A-APR.C.6
	ALG3.1.7	Use properties of inequalities to solve linear, and absolute value inequalities using interval notation.	A-CED.A.1 A-CED.A.3 A-REI.B.3
	ALG3.1.8	Use nonlinear inequalities to model and solve real-life problems using the algebraic "string method" and graphing, and providing the answers in interval notation.	A-CED.A.2 A-CED.A.3 A-REI.D.12
Vocabulary		solution point, symmetry with respect to the *x- and y-* axes, and the origin, radical and rational equations, interval notation, "string method"	

ALG3.2		Students will model equations and use slope as a rate of change in real-life examples. Students will find domains, use vertical and horizontal line tests, find zeros of functions, identify even and odd functions and recognize graphs of parent functions. Students will add, subtract, multiply, and divide functions, along with finding and using combinations and compositions of functions to model problems.	Standard Reference
	ALG3.2.1	Use slope to graph and write linear equations given two points and identify parallel and perpendicular lines.	F-IF.B.6 F-LE.A.1.a F-LE.A.1.b
	ALG3.2.2	Determine whether given relations are functions, determine domains of functions.	F-IF.A.1 F-IF.A.2 F-IF.B.5
	ALG3.2.3	Use the Vertical Line Test for functions, determine intervals of increasing and decreasing, determine relative maximum and minimum values, and identify odd and even functions.	F-IF.B.4
	ALG3.2.4	Recognize and identify linear, quadratic, cubic, square root, reciprocal, step, and other piecewise-defined functions.	F-IF.C.7.b F-LE.A.1
	ALG3.2.5	Use vertical shifts, horizontal shifts, and reflections to sketch graphs of functions.	G-CO.A.2 G-CO.A.4 G-CO.A.5 F-BF.B.3
	ALG3.2.6	Add, subtract, multiply, and divide functions. Find composition of one function with another function, and compositions of functions.	F-BF.B.3 F-BF.A.1.c
	ALG3.2.7	Find inverse functions informally, graphically, using the horizontal line test, and algebraically.	F-BF.B.4.a F-BF.B.4.b (+) F-BF.B.4.c (+)
Vocabulary		parent function, odd and even functions, step function, piecewise 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. Write equations for direct, inverse and joint variations, and work with the regression feature of a graphing calculator.	Standard Reference
	ALG3.3.1	Analyze graphs of quadratic functions, write the graphs equation in Standard Form, and determine the maximum and minimum values in real-life applications.	F-IF.B.4 F-IF.C.7c F-IF.C.9 A-APR.B.3
	ALG3.3.2	Use transformations, Leading Coefficient Test (to determine end behavior), and real zeros of polynomial functions to sketch their graphs.	A-APR.A.1 A-APR.A.3
	ALG3.3.3	Use long division, synthetic division, the Remainder Theorem, and the Factor Theorem to determine the factors of polynomials.	A-APR.A.1 A-APR.A.2
	ALG3.3.4	Find the rational zeros and complex zeros using factoring methods and conjugate pairs.	A-SSE.A.2 A-APR.B.2 A-APR.B.3
	ALG3.3.5	Write mathematical models for direct, inverse, joint, and combined variations. Use the regression feature of a graphing calculator to find equations.	F.BF.B.4 A-SSE.A.2 F-BF.A.1.a S-ID.B.6.b
Vocabulary		standard Form, maximum, minimum, leading coefficient, long division, synthetic division, rational and complex zeros, and conjugate pairs	

ALG3.4		Students will use the substitution and elimination methods to solve systems of equations algebraically in two variables. Students will use the graphical method to solve systems of equations by locating points of intersection. Students will sketch and solve systems of inequalities in two variables.	Standard Reference
	ALG3.4.1	Use the method of graphing and of substitution to solve systems of linear and nonlinear equations in two variables.	A-CED.A.1 A-REI.C.5 A-REI.C.6 A-REI.C.7

	ALG3.4.2	Use the method of graphing and of elimination to solve systems of linear equations in two variables.	A-CED.A.2 A-REI.C.5 A-REI.C.6
	Vocabulary	substitution method, two-solution case, no-real-solution case, point of intersection, elimination method, no-solution case, infinitely-many-solutions case	

ALG3.5		Students will recognize and evaluate exponential functions with base "*a*" and "*e*", graph exponential functions and use the One-to-One Property. Students will recognize, evaluate, and graph, and use the properties of logarithmic functions to model and solve equations and real-life problems.	Standard Reference
	ALG3.5.1	Recognize, evaluate, and graph exponential functions with base "*a*", and "*e*" to model and solve real-life problems (compound interest, radioactive decay, etc.)	A-SSE.3.c F-IF.C.7.e F-LE.A.1.a F-LE.A.1.c
	ALG3.5.2	Recognize, evaluate, and graph logarithmic functions with base "*a*" and the natural logarithmic function.	F-IF.C.7.e
	ALG3.5.3	Use the change-of-base formulas and the properties of logarithms to evaluate, rewrite, expand, condense, logarithmic expressions to model and solve real-life applications.	F-IF.C.8.b F-LE.A.4
	ALG3.5.4	Solve more complicated exponential and logarithmic equations.	F-IF.C.8.b F-LE.A.1.c
	ALG3.5.5	Recognize the graphs of exponential and logarithmic functions to solve and model real-life problems.	A-SSE.A.3.c F-IF.C.7.e F-LE.A.1.a F-LE.A.1.c
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.	

ALG3.6		Students will use degree and radian measure to describe angles, use fundamental trigonometric functions and reference angles, sketch the trigonometric functions using their periods, amplitudes and shifts. Apply real-life applications performing calculations with arc length along a circle, linear and angular speeds. Solve real-life application problems pertaining to altitude, distance, elevation and depression angles using right triangle trigonometric functions.	Standard Reference
	ALG3.6.1	Describe angles, use degree and radian measures, along with converting them. Calculate arc length, linear and angular speed.	F-TF.A.1 F-TF.A.2 G-C.A.5 G-GMD.A.1
	ALG3.6.2	Evaluate trigonometric functions of acute angle and perform fundamental trigonometric identities.	F-TF.A.2 F-TF.A.3 (+) G-SRT.C.6 G-SRT.C.8
	ALG3.6.3	Employ reference angles to evaluate trigonometric functions of any angle, or real number.	F-TF.A.4 (+) G-SRT.C.7 G-SRT.C.8
	ALG3.6.4	Sketch the graphs of basic sine and cosine functions involving period and amplitude.	F-TF.B.5 F-TF.B.6 (+) F-TF.B.7 (+)
	ALG3.6.5	Describe and solve real-life applications using right triangle trig.	F-TF.B.5 F-TF.B.7 (+)
Vocabulary		radian measure, initial and terminal side, coterminal angle, arc length, linear and angular speed, area of sector, cosecant, secant, cotangent reference angle, periodic function, even and odd functions, inverse trigonometric function, amplitude of sine and cosine curves.	

ALG3.7		Recognize, write and explain the fundamental trigonometric identities to evaluate, simplify, and rewrite trigonometric expressions.	Standard Reference
	ALG3.7.1	State the fundamental trigonometric identities and use them to evaluate and rewrite trigonometric expressions using factoring and adding expressions.	F-TF.C.1 F-TF.C.2 (+)

Vocabulary	reciprocal, quotient, pythagorean, cofunction and even/odd identities

HS 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
SP	Statistics & Probability					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).

Benchmarks:

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.	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.	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	

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.	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.	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.	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.5.1	Represent data with plots on the real number line (dot plots and histograms).	S.ID.1
	INT.5.1	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.	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	S.MD.2

		as the expected win/loss of buying raffle tickets, or playing the lottery.	
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.	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	

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.	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	

HS 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
SP	Statistics & Probability					G-GMD	Geometric Measurement & Dimension		
						G-MG	Modeling with Geometry		
# District Standards									

Pre-Calculus Trigonometry
Pre-Calculus

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 calculators.

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).

Benchmarks:

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.	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
	PCAL.1.2	Define a sequence, write the recursive form, graph, and apply sequences to real world situations.	F.IF.3 F.BF.1

	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
	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
	PCAL.1.5	Write Geometric Sequences recursively and explicitly. Graph a geometric sequence.	A.SSE.4 F.BF.3
Vocabulary		arithmetic sequence and series, geometric sequence, recursive and explicit form, sigma (summation notation)	

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.	Standard Reference
	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
	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
	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
	PCAL.2.6	Solve absolute value inequalities algebraically and graphically.	F.IF.7b
Vocabulary		interval notation, extraneous solutions	

PCAL.3		Students will study functions and their graphs, transformations, operations on functions, inverse functions, and rates of change.	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
	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 increasing or decreasing, and intervals where they are concave up and concave down. Graph parametric equations.	F.IF.4 F.IF.5
	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
	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
	PCAL.3.5	The functions: Build sum, difference, product, and quotient and their domains. Composite functions and their domain.	F.IF.7
	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
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.	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
	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
	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
	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.	Standard Reference
	PCAL.5.1	Define and apply rational and irrational exponents. Simplify expressions containing radicals or rational exponents.	N.RN.1 N.RN.S
	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.LF.3 F.LE.4

			Modeling
	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
	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
	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 A.SSE.3c Modeling
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.	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, conterminal 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.	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.	Standard Reference
	PCAL.8.1	Solve trigonometric equations graphically. Find solutions on a specific interval and complete solutions.	F.TF.9
	PCAL.8.2	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.	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, and 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 Cosines.	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	

Standard Reference Code	
RP	Ratios & Proportional Relationships
EE	Expressions & Equations
G	Geometry
HSN	High School Number and Quantity
RST	Science and Technical
SSE	Seeing Structures in Expressions and Equations
SP	Statistics & Probability

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).

Benchmarks:

CM.1		Students will calculate employee pay through hourly, yearly, individual production, and commission payroll scenarios. Scenarios include withholding taxes, insurance and voluntary deductions.	Standard Reference
	CM.1.1	Calculate fixed income.	HSN.Q.A.1, HSN.Q.A.2 HSA.SSE.A.1.A
	CM.1.2	Calculate variable income.	HSN.Q.A.1 HSN.Q.A.3
	CM.1.3	Calculate tax deductions.	HSA.SSE.A.1.A HSA.CED.A.2
	CM.1.4	Calculate health insurance, social security and other deductions.	HSA.REI.B.3 HSN.Q.A.1
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.	Standard Reference
	CM.2.1	Compute average monthly expenditure.	HSA.SSE.A.1.A
	CM.2.2	Prepare a budget sheet.	HSA.SSE.A.1.A
	CM.2.3	Compare budgeted amount to actual expenditures.	HSA.SSE.A.1.A
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.	Standard Reference
	CM.3.1	Manage a checking account.	RST.9-10.7
	CM.3.2	Balance a checking account with a monthly statement.	RST.9-10.7
	CM.3.3	Utilize online banking for bill pay and accessing information of the account.	WHST.11-12.7
	CM.3.4	Manage a savings account.	RST.9-10.7
	CM.3.5	Calculate simple and compound interest.	HSN.RN.A.1
	CM.3.6	Compare compound interest and continuous annuities.	HSA.CED.A.1 HSN.RN.A.1
Vocabulary		deposit, automatic teller machine – ATM, personal identification number – PIN, checking account, check register, balance, bank statement, service charge, reconcile, online banking, savings account, deposit, withdrawal, 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.	Standard Reference
	CM.4.1	Calculate and compare total purchase price and unit price including sales tax.	HSA.CED.A.1

	CM.4.2	Calculate sales prices using coupons, rebates and markdowns.	HSA.CED.A.1
	CM.4.3	Calculate balance and finance charges on a charge account.	HSA.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.	Standard Reference
	CM.5.1	Calculate APR, length of loan, total interest, monthly payment and loan payoff for student and personal loans	HSN.RN.A.1 HSA.CED.A.2
	CM.5.2	Calculate vehicle loans including licensing, taxes and insurance.	RST.11-12.7
	CM.5.3	Calculate home mortgages including closing costs, taxes and insurance.	SSE.B.4 RST.11-12.7 RST.9-10.7
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.	Standard Reference
	CM.6.1	Calculate health insurance premiums	RST.11-12.7
	CM.6.2	Calculate the amount the patient pays for health care	RST.11-12.7
	CM.6.3	Utilize tables to compute annual premiums for term life insurance	RST.9-10.7
	CM.6.4	Compare whole life insurance, universal life insurance, and limited payment policy	RST.11-12.7
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.	Standard Reference
	CM.7.1	Compute interest and effective annual yield on a certificate of deposit	RST.11-12.7
	CM.7.2	Calculate the cost, annual yield, annual dividend and profit or loss on stock and bond investments.	HSF.BF.A.1.A HSF.LE.A.1.B
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.	Standard Reference
	CM.8.1	Calculate the cost of hiring, maintaining and training employees.	RST.11-12.9 RST.11-12.7
	CM.8.2	Calculate employee benefits including insurance, disability, workers compensation and unemployment insurance.	RST.11-12.9 RST.11-12.7
	CM.8.3	Calculate the cost of manufacturing a product and determine profit, loss and break-even values.	CED.A.3 RST.9-10.7 RST.11-12.9
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.	Standard Reference
	CM.9.1	Calculate the selling price of products using trade discounts, chain discounts and the complement method.	CED.A.1
	CM.9.2	Calculate the net profit as a percent of the selling price.	CED.A.1

	CM.9.3	Calculate the mark-down of products as a percent of the selling price.	CED.A.1
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.	Standard Reference
	CM.10.1	Calculate the costs of advertising and the possible ways to advertise to increase projected sales.	HSS.IC.A.1
	CM.10.2	Calculate the costs of warehouse storage and utilities.	HSS.IC.B.6
	CM.10.3	Calculate the costs associated with inventory and shipping the products.	HSS.IC.A.1
Vocabulary		product test, opinion research firm, opinion survey, sales potential, sample, market, 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.	Standard Reference
	CM.11.1	Calculate business expenses using income statements.	RST.9-10.7
	CM.11.2	Calculate assets, liabilities and owners' equity using a balance sheet and MACRS.	CED.A.1 RST.9-10.7
	CM.11.3	Analyze and compare two or more income statements and balance sheets.	RST.9-10.7
	CM.11.4	Calculate the total cost of expanding a business.	RST.9-10.7
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 goods 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.	Standard Reference
	CM.12.1	Calculate the inflation rate, current price, and original price	RST.9-10.7
	CM.12.2	Explain and compute gross domestic product	RST.9-10.7
	CM.12.3	Calculate consumer price index, the current cost, and cost of commodity	RST.9-10.7
	CM.12.4	Allocate revenue and expenses and analyze a budget	RST.9-10.7
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 $7 \times 5 + 7 \times 3$, 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**