

7th Grade Mathematics – Scope and Sequence – MSD of Pike Township

Purpose Statement					
The purpose of this scope and sequence document is to ensure that MSD of Pike Township has a viable and guaranteed Mathematics curriculum. It is meant to provide the foundational skills, strategies, and concepts necessary for our students to leave Pike Township college and career ready. Please remember that this scope and sequence is based on the Indiana Academic Standards and the typical progress of students. Use your professional judgment when addressing the individual needs of your students. If you need to shorten or lengthen a unit, then do so based on mastery of standards, evidence from your classroom assessments and professional observations. Always consider the students’ need and interest as well as other content area topics to guide your units of study. Collaborate with your instructional coach and school librarian to plan and implement the units of study, mini-lesson ideas, and instructional resources.					
Components Included in the Scope and Sequence					
<u>Mathematics Content</u> As you work with your students, please remember the following: - Students are expected to apply the math they previously learned as they progress through the year and to the next level. - Math content builds on previous lessons and years, but students learn in many different ways and take many different paths to learn concepts. Provide students with many opportunities throughout the year to tackle and master math content in their world. - All students are mathematicians. Find ways to allow our students to make true connections with math content. - Math instruction should incorporate reading and writing.			<u>Process Standards for Mathematics</u> As you work with your students, please remember the following: - The Process Standards for Mathematics are the “how” when delivering mathematics instruction. They rely on students communicating with each other about mathematics in order to learn mathematics. - The Process Standards for Mathematics are expected student behaviors. Make sense of problems and persevere in solving them. Reason abstractly and quantitatively. Construct viable arguments and critique the reasoning of others. Model with mathematics. Use appropriate tools strategically. Attend to precision. Look for and make use of structure. Look for and express regularity in repeated reasoning.		
Each Component Includes:					
Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
These goals define the necessary habits, skills, and dispositions we want students to know and be able to do when the unit is completed.	The Indiana Academic Standards listed represent the priority standards for the unit. Other standards may be taught explicitly or implicitly.	The strategy and skill focus gives guidance for lesson topics and ideas. It also gives ideas for teaching strategies you might rely upon for instruction. The goal is for students to understand these skills/strategies by the end of the unit.	Academic vocabulary includes the words that are needed to understand the content. Assessment vocabulary should be integrated throughout the year. They should be explicitly taught and used regularly.	This is where you will find your connection to possible instructional resources. Ask your school librarian and/or instructional coach for assistance in this area also!	Ideas for scaffolding support for striving mathematicians, English Learners and Exceptional Learners are provided. Please use your available resources to differentiate. Ask your building resource teachers for assistance if needed.
Testing Vocabulary to be Taught Throughout the Year					
Best: “Which statement BEST describes the two shapes?” Although more than one option might make sense, students will need to choose one that is better than all the others. Choose: “ Choose TWO fractions that are greater than 0.50.” Students will be asked to choose one or more items that fit the criteria. Complete: “ Complete the table by filling in the missing numbers.” Students may be asked to complete tables, graphs, and/or statements. Define the Variable: Students should be able to provide a precise description of a variable used in an equation. Enter: “ Enter the product. 214 x 12”. Students will be asked to enter items. This means they type the answer in the appropriate place. Greatest: “What is the GREATEST number of hats Sarah can buy?” Identify: “ Identify all errors in Jenna’s work.” Students will need to choose one or more items that fit the criteria. In ALL: “How much money does Amy spend IN ALL ?” Students will need to give a total. This does not mean to simply apply an operation, though. Students will need to read critically to determine the operation(s) that make(s) sense. More/Fewer: “How many MORE stickers does Jimmy need to complete his collection?” Students will need to compare two quantities and determine how much more or less one quantity is than another. Plot: “ Plot an X on the line plot to represent Eric’s data.” Students will need to place data points on a coordinate grid, data display, or number line. Represent: “ Represent 0.20 as a fraction.” Students will need to be able to translate between different forms of the same concept (i.e. fractions and decimals, equivalent fractions, equivalent expressions). Select: “ Select the shape(s) that match the given attributes.” Students will need to choose one or more items that fit the criteria. Shade: “ Shade squares in the grid that represent the given fraction.” Students will need to fill in the appropriate amount Show All Work: Students will need to show all work needed to solve problems in order to receive full credit. Solve/Evaluate: “ Solve. 145 + 82” or “ Evaluate. 145 + 82” Students will need to give an answer for the test item. Use Word, Numbers and/or Symbols: “ Use words, numbers, and/or symbols to support your answer. ” Students will need to explain their ideas clearly using math words, numbers or symbols. It should include evidence from the problem and student work.					

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Quarter 1 Weeks 1 – 6	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 1: <u>Introducing Mathematics</u> <u>The Number System</u>	- Mathematicians write and talk about their thinking. - Mathematicians show their work. - Mathematicians ask questions of themselves, others and the world around them. - Mathematicians find math ideas in their world. - Mathematicians compute with integers and rational numbers using a variety of models and strategies. - Mathematicians solve problems that require the use of one or more of the arithmetic operations with fractions, decimals and integers.	7.NS.3 7.C.8 Support Standards 7.NS.1 7.NS.2 7.C.1 7.C.2 7.C.3 7.C.4	- Introduce procedures and routines. - Help students to see they are mathematicians. - Reinforce there are multiple strategies and solution pathways when solving problems. - Add, subtract, multiply and divide integers and other rational numbers using number lines, counters and other strategies. - Represent rational numbers in different forms. - Use the order of operations to solve multistep problems involving integers. - Find the prime factorization of whole numbers and write the results as exponents. - Find the square root of a perfect square integer. - Understand the relationship between squaring a number and find the square root of a number. - Compare rational and common irrational numbers. - Solve problems involving square roots. - Solve real world problems involving rational numbers.	absolute value additive inverse difference divide dividend divisor exponent expression factor integers irrational number model multiply negative numbers operation opposites pattern positive numbers prime factorization product quotient rational number repeating decimal square number square root sum terminating decimal whole number	Curriculum Support Document Find helpful information about the critical standards here. Go Math: - Unit 1: Modules 1, 2 and 3 - IN Success Lessons: A1, A2 & A3 Connected Mathematics: - Accentuate the Negative (G7) - Additional Practice and Skills (G7) (pg.58 – 82) - Bits and Pieces I (G6) - Additional Practice and Skills (G6) (pg. 17 – 30) - Comparing and Scaling (G7) - Additional Practice and Skills (G7) (pg. 39 – 57) Weeks of Inspirational Math https://www.youcubed.org/week-inspirational-math/ Inside Mathematics: Cat Food (7.C.4, 7.C.5, PS.2, PS.6) http://www.insidemathematics.org/assets/common-core-math-tasks/cat%20food.pdf Illustrative Mathematics Tasks: http://www.illustrativemathematics.org	*Spiral review: use critical standards from previous units Prerequisite Skills: - Operations with whole numbers - Equivalent forms of rational numbers - Operations with positive fractions and decimals - Classify whole numbers, integers and rational numbers Scaffolding Support: (ELL; SPED; Striving Learners): - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
Process Standards for Mathematics Problem Solving:	- Mathematicians choose appropriate tools to help them solve problems. - Mathematicians use familiar structures to make connections to current material. - Mathematicians look for patterns. - Mathematicians use repeated reasoning to create conjectures and discover rules.	PS. 5 PS. 7 PS. 8	- Use manipulatives (such as colored counters or algebra tiles) and other tools (such as number lines or thermometers) to represent and solve problems. - Solve problems using more than one representation. - Use the structure of the number system (by using numbers lines, number charts, etc.) to discover patterns and create generalized rules for working with rational numbers.			

- 7.NS.3: Know there are rational and irrational numbers. Identify, compare, and order rational and irrational numbers (e.g. $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, π) and plot them on a number line.**
- 7.C.8: Solve real-world problems with rational numbers by using one or two operations.**

- 7.NS.1: Find the prime factorization of whole numbers and write the results using exponents.
- 7.NS.2: Understand the inverse relationship between squaring and finding the square root of a perfect square whole number. Find square roots of perfect square integers.
- 7.C.1: Understand $p + q$ 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). Find and interpret sums of rational numbers in real-world contexts.
- 7.C.2: Understand 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.C.3: Understand that multiplication is extended 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.
- 7.C.4: Understand that integers can be divided, provided that the divisor is not zero. Understand that if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$.

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Quarter 1 Weeks 7 – 9	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 2: <u>Rates and Proportionality</u>	- Mathematicians use rates and proportional reasoning to solve real-world problems. - Mathematicians represent and solve word problems using equations. - Mathematicians represent proportional and non-proportional relationships with equations and graphs.	7.C.5 7.C.8 7.AF.9 Support Standards 7.C.7 7.AF.4 7.AF.5 7.AF.6 7.AF.7 7.AF.8	- Use tables to show proportional relationships. - Connect proportional relationships to equation. - Identify the unit rate or constant of proportionality in tables, graphs, equations and verbal descriptions of proportional relationships. - Decide whether two quantities are in a proportional relationship. - Explain what the coordinates of a point on the graph of a proportional relationship mean in terms of the situation. Pay special attention to (0,0) and (1,r) where r is the unit rate. - Compute with rational numbers fluently. - Solve real world problems involving rational numbers. - Solve problems involving slope.	change in y change in x complex fraction constant constant of proportionality equivalent ratios factor ordered pair origin percent proportion proportional relationship rate rate of change ratio rise run slope unit rates vary	<u>Curriculum Support Document</u> Find helpful information about the critical standards here. <u>Go Math:</u> - Unit 2: Module 4 - IN Success Lessons: A4, A5 & A6 SKIP: Lesson 4.3 <u>Connected Mathematics:</u> - Comparing and Scaling (G7) - Additional Practice and Skills (G7) (pg. 39 – 57) - CC Additional Investigations (G7) (pg. 1 – 6) <u>Good Questions for Math Teaching</u> Pg. 31 – 45 <u>Illustrative Mathematics Tasks:</u> http://www.illustrativemathematics.org <u>Inside Mathematics:</u> Cereal (7.AF.6, 7.AF.7, 7.AF.9, 7.C.3, 7.C.4, PS.2, PS.4) http://www.insidemathematics.org/assets/common-core-math-tasks/cereal.pdf	*Spiral review: use critical standards from previous units <u>Prerequisite Skills:</u> - Understand the concept of ratio, rate and unit rate - Operations with rational numbers - Graphing ordered pairs <u>Scaffolding Support: (ELL, SPED, Striving Learners):</u> - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
Process Standards for Mathematics Problem Solving:	- Mathematicians create and use representations to organize, record and communicate ideas. - Mathematicians apply math they know to problems arising in everyday life, society and the workplace.	PS. 2 PS. 4	- Use bar diagrams to model the relationship between a rate and a unit rate. - Use tables to model relationships between corresponding real-world proportional values. - Write equations to explain proportional relationships - Use rates, unit rates and conversions to describe and solve situations occurring in everyday life. - Use graphs and equations to represent real-world proportional relationships.			

- 7.C.5: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- 7.C.8: Solve real-world problems with rational numbers by using one or two operations.
- 7.AF.9: Represent real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent these proportional relationships. Recognize that these situations are described by a linear function in the form $y = mx$, where the unit rate, m , is the slope of the line.
- 7.C.7: Compute fluently with rational numbers using an algorithmic approach.
- 7.AF.4: Define slope as vertical change for each unit of horizontal change and recognize that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change.
- 7.AF.5: Graph a line given its slope and a point on the line. Find the slope of a line given its graph.
- 7.AF.6: 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.AF.7: Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships.
- 7.AF.8: Explain what the coordinates of a point on the graph of a proportional relationship mean in terms of the situation, with special attention to the points (0, 0) and (1,r), where r is the unit rate.

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Quarter 2 Weeks 10 – 12	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 3: <u>Proportions and Percent</u>	- Mathematicians understand and apply ratios, rates, and proportions. - Mathematicians understand and apply the relationship among factors in rate problems. - Mathematicians use rates and proportional reasoning to solve real-world problems. - Mathematicians apply knowledge of percents to consumer situations such as markups, discounts, tips, fees, commissions, and sales tax situations.	7.C.5 7.C.6 7.C.8 Support Standards 7.C.7	- Solve problems involving percent increase, percent decrease, and percent of change. - Solve markup and markdown problems. - Use percents to find sales tax, tips, total cost, simple interest, profit and commission. - Use proportions to assist in conversions between fractions, decimals and percents - Solve problems involving ratios and percents. - Compute with rational numbers fluently. - Solve real world problems involving rational numbers.	commission conversion markdown markup part percent percent decrease percent increase principal profit proportion rate ratio sales simple interest tax tips total cost unit rate whole	<u>Curriculum Support Document</u> Find helpful information about the critical standards here. <u>Go Math:</u> - Unit 2: Module 5 - IN Success Lessons: A7, A8 & A9 <u>Connected Mathematics:</u> - Comparing and Scaling (G7) - Additional Practice and Skills (G7) (pg. 39 – 57) - CC Additional Investigations (G7) (pg. 1 – 6) - Bits and Pieces III (G6) - Additional Practice and Skills (G6) (pg. 92 – 99) <u>Good Questions for Math Teaching</u> Pg. 31 – 45 <u>Illustrative Mathematics Tasks:</u> http://www.illustrativemathematics.org <u>Inside Mathematics:</u> Photographs (7.C.5, 7.C.6, PS.1) http://www.insidemathematics.org/assets/common-core-math-tasks/photographs.pdf	*Spiral review: use critical standards from previous units <u>Prerequisite Skills:</u> - Rewrite numbers as fractions, decimals and percents - Finds the percent of numbers - Uses proportions to understand percents <u>Scaffolding Support: (ELL; SPED; Striving Learners):</u> - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
Process Standards for Mathematics Problem Solving:	- Mathematicians create and use representations to organize, record and communicate ideas. - Mathematicians defend their solutions with mathematics. - Mathematicians listen to and critique others' reasoning using mathematics. - Mathematicians apply math they know to problems arising in everyday life, society and the workplace.	PS. 2 PS. 3 PS. 4	- Use bar diagrams to model the relationship between total price, prices and tax. - Use tables to help write equations. - Write equations to explain percent relationships. - Explain reasoning using math arguments. - Justify others' reasoning using math arguments. - Use mathematics to describe and solve situations involving sales, discounts, profits, etc. - Use graphs and equations to represent real-world relationships.			

- 7.C.5: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- 7.C.6: Use proportional relationships to solve ratio and percent problems with multiple operations (e.g. simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease).
- 7.C.8: Solve real-world problems with rational numbers by using one or two operations.
- 7.C.7: Compute fluently with rational numbers using an algorithmic approach.

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Quarter 2 Weeks 13 – 18	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 4: <u>Expressions and Equations</u>	- Mathematicians analyze situations involving linear relationships and formulate linear equations and inequalities to solve problems. - Mathematicians investigate methods for solving linear equations and inequalities using concrete models, tables, graphs, and the properties of equality, select a method, and solve the equations or inequalities. - Mathematicians interpret and determine the reasonableness of solutions to linear equations and inequalities for given contexts. - Mathematicians represent the solution to linear inequalities on a number line.	7.AF.2 7.AF.3 7.AF.9 7.C.8 Support Standards 7.AF.1 7.C.7	- Use tables, graphs, balances and algebra tiles as tools to solve equations. - Use patterns to create algebraic expressions, equations and inequalities. - Make connections between algebraic steps and the models for solving equations and inequalities - Use all representations: verbal, numerical (table), graphical, concrete and algebraic. - Relate algebraic equations and inequalities to real world situations. - Write real-world situations that could be represented by given equations or inequalities. - Create equivalent linear expressions using the properties of operations: factoring, identity, inverse, commutative, associative, and distributive. - Apply the properties of operations to create equivalent linear expressions. - Represent and solve real-world problems using linear equations. - Solve 2-step linear equations fluently. - Compute with rational numbers fluently. - Solve real world problems involving rational numbers.	algebraic expression coefficient constant distributive property equation factor greater than inequality integers less than operations solution variable	Curriculum Support Document Find helpful information about the critical standards here. Go Math: - Unit 3: Modules 6 and 7 - IN Success Lessons: A10 Connected Mathematics: - Variables and Patterns (G7) - Additional Practices and Skills (G7) (pg. 1 – 20) - CC Additional Investigations (G7) (pg. 7 – 18) Good Questions for Math Teaching Pg. 91 – 114 Illustrative Mathematics Tasks: http://www.illustrativemathematics.org Inside Mathematics: Toy Trains (7.AF.2, PS.4, PS.8) http://www.insidemathematics.org/assets/common-core-math-tasks/toy%20trains.pdf	*Spiral review: use critical standards from previous units Prerequisite Skills: - Operations with rational numbers - Solve one-step, one-variable equations. - Evaluates expressions for a given value - Understands the concept of each operation - Graph points on a number line Scaffolding Support: (ELL; SPED; Striving Learners): - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
Process Standards for Mathematics Problem Solving:	- Mathematicians make sense of problems and persevere in solving them. - Mathematicians create and use representations to organize, record and communicate ideas. - Mathematicians apply math they know to problems arising in everyday life, society and the workplace.	PS. 1 PS. 2 PS. 4	- Solve problems with EASE by exploring given information, formulating an attack plan, solving, and explaining your solution. - Ask questions during the problem-solving process such as “Does this make sense?” and “Is the solution reasonable?” - Create expressions, equations and inequalities from real-world contexts. - Solve equations and inequalities and relate the solutions back to real-world contexts.			
7.AF.2: Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p, q, and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems. 7.AF.3: Solve inequalities of the form $px + q (> \text{ or } \geq) r$ or $px + q (< \text{ or } \leq) r$, where p, q, and r are specific rational numbers. Represent real-world problems using inequalities of these forms and solve such problems. Graph the solution set of the inequality and interpret it in the context of the problem. 7.AF.9: Represent real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent these proportional relationships. Recognize that these situations are described by a linear function in the form $y = mx$, where the unit rate, m, is the slope of the line. 7.C.8: Solve real-world problems with rational numbers by using one or two operations. 7.AF.1: Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process. 7.C.7: Compute fluently with rational numbers using an algorithmic approach.						

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Quarter 3 Weeks 19 – 24	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 5: <u>Geometry and Measurement</u>	- Mathematicians use proportions to solve real world geometry problems. - Mathematicians determine scale factor, scale drawings, and enlargements using proportional relationships. - Mathematicians use known figures to find the area, surface area or volume of composite figures. - Mathematicians solve real world, multistep problems involving geometric concepts. *Geometric figures include: triangles, rectangles, squares, parallelograms, circles, trapezoids, 2D composite figures, cylinders, rectangular prisms, and 3D figures made from rectangular prisms.	7.GM.3 7.GM.4 7.GM.5 7.GM.6 7.C.8 Support Standards 7.GM.1 7.GM.2 7.GM.7 7.C.5 7.C.7	- Write and solve equations using formulas and geometric concepts to find the circumference and area of a circle. - Find the area of composite figures in multiple ways. - Use proportions and ratios to solve problems involving similarity of figures. - Solve problems using the different types of angle pairs (vertical, adjacent, supplementary and complementary). - Investigate basic properties of triangles, including conditions that create no triangle, a unique triangle, or more than one triangle. - Create nets for cylinders and right rectangular prisms and use them to calculate surface area. - Use rational numbers and percents in real-world problems involving geometric concepts. - Solve problems involving similarity, ratios and percents. - Solve problems involving vertical, adjacent, complementary and supplementary angles. - Solve problems involving area and circumference of circles. - Solve problems involving volume and surface area of cylinders and 3D objects composed of right rectangular prisms. - Compute with rational numbers fluently. - Solve real world problems involving rational numbers.	adjacent angles angle area circumference complementary angles composite figure congruent angles cross section degree diameter dimension intersection length parallelogram perimeter polygon prism proportion radius ratio rectangle scale scale drawing square supplementary angles trapezoid triangle vertical angles volume width	<u>Curriculum Support Document</u> Find helpful information about the critical standards here. <u>Go Math:</u> - Unit 4: Modules 8 and 9 - IN Success Lessons: A11, A12, A13, A14, & A15 SKIP: Lessons 8.4, 9.4, and 9.5 <u>Connected Mathematics:</u> - Shapes and Designs (G6) - Additional Practice and Skills (G6) (pg. 31 – 42) - Filling and Wrapping (G7) - Additional Practice and Skills (G7) (pg. 21 – 38, 114 – 138) - CC Additional Investigations (G7) (pg. 25 – 26) - CC Additional Investigations (G8) (pg. 23 – 26, 28 – 34) - Stretching and Shrinking (G7) <u>Good Questions for Math Teaching</u> Pg. 31 – 45, 77 – 89, 133 - 155 <u>Illustrative Mathematics Tasks:</u> http://www.illustrativemathematics.org	*Spiral review: use critical standards from previous units <u>Prerequisite Skills:</u> - Operations with fractions and decimals - Solves two-step equations - Solves proportions - Understands how to find the area of squares, rectangles and triangles using equations and models <u>Scaffolding Support:</u> <u>(ELL; SPED; Striving Learners):</u> - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
Process Standards for Mathematics Problem Solving:	- Mathematicians make sense of problems and persevere in solving them. - Mathematicians look for and make use of structure. - Mathematicians look for patterns in reasoning and create generalizations.	PS. 1 PS. 7 PS. 8	- Solve problems with EASE by exploring given information, formulating an attack plan, solving, and explaining your solution. - Ask questions during the problem-solving process such as “Does this make sense?” and “Is the solution reasonable?” - Examine the measurements of several circular objects, reaching the conclusion that the relationship between the circumference and the diameter is a constant ratio, pi. - Use repeated reasoning to develop formulas and solve problems involving the radius, diameter, and circumference of a circle.			

- 7.GM.3:** Solve real-world and other mathematical problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing. Create a scale drawing by using proportional reasoning.
- 7.GM.4:** Solve real-world and other mathematical problems using facts about vertical, adjacent, complementary, and supplementary angles.
- 7.GM.5:** Understand the formulas for area and circumference of a circle and use them to solve real-world and other mathematical problems; give an informal derivation of the relationship between circumference and area of a circle.
- 7.GM.6:** Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.
- 7.C.8:** Solve real-world problems with rational numbers by using one or two operations.

- 7.GM.1: Explore triangles with given conditions from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
- 7.GM.2: Identify and describe similarity relationships of polygons including the angle-angle criterion for similar triangles, and solve problems involving similarity.
- 7.GM.7: Construct nets for right rectangular prisms and cylinders and use the nets to compute the surface area; apply this technique to solve real-world and other mathematical problems.
- 7.C.5: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
- 7.C.7: Compute fluently with rational numbers using an algorithmic approach.

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Quarter 3/4 Weeks 25 – 28	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 6: <u>Statistics</u>	- Mathematicians recognize and discuss misleading representations of data. - Mathematicians describe numerical data in terms of its center and spread from a variety of representations. - Mathematicians use samples to make generalizations about larger populations. - Mathematicians understand bias and evaluate bias when collecting and interpreting data.	7.DSP.3 7.C.6 Support Standards 7.DSP.1 7.DSP.2 7.DSP.4	- Analyze a sample to gain information about a population using random and nonrandom sampling. - Make inferences from dot plots and box plots. - Use data about a sample and proportional reasoning to make inference or predictions about a population. - Compare two sets of data displayed numerically, in dot plots, in box plots and other representations. - Summarize numerical data in terms of its center and spread. - Determine how data added to a set of data changes affects measures of center and spread. - Make inferences about data from random samples. - Summarize and interpret data sets using measures of center and spread. - Solve problems involving ratios and percents.	biased sample box plot data dot plot interquartile range lower quartile mean mean absolute deviation (MAD) measure of center measure of spread median population random sample sample spread survey upper quartile	<u>Curriculum Support Document</u> Find helpful information about the critical standards here. <u>Go Math:</u> - Unit 5: Modules 10 and 11 - IN Success Lessons: A16 SKIP: Lesson 11.1 <u>Connected Mathematics:</u> - Data Distributions (G7) - Additional Practice and Skills (G7) (pg. 156 – 173) - CC Additional Investigations (G7) (pg. 27 – 34) - Samples and Populations (G8) - Additional Practice and Skills (G8) (pg. 171 – 194) <u>Good Questions for Math Teaching</u> Pg. 17 – 29 <u>Illustrative Mathematics Tasks:</u> http://www.illustrativemathematics.org <u>Inside Mathematics:</u> Ducklings (7.DSP.1, 7.DSP.3, PS.3, PS.5) http://www.insidemathematics.org/assets/common-core-math-tasks/ducklings.pdf	*Spiral review: use critical standards from previous units <u>Prerequisite Skills:</u> - Operations with fractions - Converting between fractions, decimals and percents - Solves proportions - Finds the range and mean of a set of data - How to read dot plots <u>Scaffolding Support: (ELL; SPED; Striving Learners):</u> - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
Process Standards for Mathematics Problem Solving:	- Mathematicians can justify their conclusions, communicate them with others and respond to the arguments of others. - Mathematicians apply math they know to problems arising in everyday life, society and the workplace. - Mathematicians use correct vocabulary to express ideas. - Mathematicians check their work and are careful with calculations and units or labels.	PS. 3 PS. 4 PS. 6	- Analyze data to create summaries and conjectures. - Share conjectures and summaries with others using mathematical arguments. - Justify others' reasoning using mathematical arguments. - Use a variety of data displays to examine and represent real-world situations. - Use precise calculations with data. - Use precise mathematical vocabulary to describe data.			

- 7.DSP.3: Find, use, and interpret measures of center (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.
- 7.C.6: Use proportional relationships to solve ratio and percent problems with multiple operations (e.g. simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease).
- 7.DSP.4: Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.
- 7.DSP.1: Understand that statistics can be used to gain information about a population by examining a sample of the population. Understand that conclusions and generalizations about a population from a sample are valid only if the sample is representative of that population and that random sampling tends to produce representative samples and support valid inferences.
- 7.DSP.2: Use data from a random sample to draw inferences about a population. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.

7th Grade Mathematics – Scope and Sequence – MSD of Pike Township

Quarter 4 Weeks 29 – 32	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 7: <u>Probability</u>	- Mathematicians use probability and experiments to make predictions about the likelihood of an event. - Mathematicians apply probability and probability models to real-world contexts.	7.DSP.5 7.C.8 Support Standards 7.DSP.6 7.DSP.7	- Find the probability of a simple event and its complement. - Find experimental probabilities of simple events. - Use experimental probability to make a prediction. - Develop and use probability models that represent simple events with equally likely outcomes. - Explain possible sources of discrepancies between probability models and observed frequencies of simple events. - Create sample spaces for simple events. - Determine if an event is certain, probable, unlikely, equally likely or impossible - Understand and apply probability of 1, $\frac{1}{2}$ and 0. - Solve problems involving probability. - Solve real-world problems involving rational numbers	complement compound probability data event experiment experimental probability observation outcome percent probability ratio simple event simulation theoretical probability trial	<u>Curriculum Support Document</u> Find helpful information about the critical standards here. <u>Go Math:</u> - Unit 6: Modules 12 and 13 - SKIP 12.3 and 13.2 - Compound events are not in the standards for 7th grade <u>Connected Mathematics:</u> - How Likely is it? (G6) - Additional Practice and Skills (G6) (pg. 100 – 111) - What Do You Expect? (G7) - Additional Practice and Skills (G7) (pg. 139 – 155) <u>Good Questions for Math Teaching</u> Pg. 120 – 124, 128 – 131 <u>Illustrative Mathematics Tasks:</u> http://www.illustrativemathematics.org <u>Inside Mathematics:</u> Counters (7.DSP.5, 7.DSP.7, PS.3, PS.4) Fair Game? (7.DSP.5, 7.DSP.6, 7.DSP.7, PS.3, PS.4) http://www.insidemathematics.org/performance-assessment-tasks	*Spiral review: use critical standards from previous units <u>Prerequisite Skills:</u> - Operations with fractions - Converting between fractions, decimals and percents - Simplifying fractions - Write ratios <u>Scaffolding Support:</u> <u>(ELL; SPED; Striving Learners):</u> - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
Process Standards for Mathematics Problem Solving:	- Mathematicians create and use representations to organize, record and communicate ideas. - Mathematicians defend their solutions with mathematics. - Mathematicians listen to and critique others' reasoning using mathematics. - Mathematicians apply math they know to problems arising in everyday life, society and the workplace.	PS. 2 PS. 3 PS. 4	- Create simulations, tables, lists and ratios of probability to represent and solve everyday problems. Relate the solutions back to the problem situation. - Analyze data from experiments to create summaries and conjectures. - Share conjectures and summaries with others using mathematical arguments. - Justify others' reasoning using mathematical arguments. - Explain possible errors between simulations and expected probabilities. - Use a variety of simulations to examine and represent real-world situations.			

- 7.DSP.5: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Understand that a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Understand that a probability of 1 indicates an event certain to occur and a probability of 0 indicates an event impossible to occur. Identify probabilities of events as impossible, unlikely, equally likely, likely or certain.
- 7.C.8: Solve real-world problems with rational numbers by using one or two operations.
- 7.DSP.6: Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its relative frequency from a large sample.
- 7.DSP.7: Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to observed frequencies; evaluate the level of agreement and explain possible sources of discrepancy.

7th Grade Mathematics – Scope and Sequence – MSD of Pike Township

Quarter 4 Weeks 33 – 36	Essential Goals	Priority Standards	Strategies/Skills	Academic Vocabulary	Instructional Resources	Differentiation
Math Content: Unit 8: <u>Reinforce and Extend Mathematical Understandings</u>	- Mathematicians practice critical grade level skills, in a variety of formats, to prepare them for more complex mathematical understandings. - Mathematicians make sense of a variety of problems and persevere in solving them. - Mathematicians reason abstractly and quantitatively to solve problems. - Mathematicians construct viable arguments and critique the reasoning of others. - Mathematicians apply math skills and understandings to solve real-world problems. - Mathematicians use a variety of tools to aid them in solving mathematical and real-world problems. - Mathematicians use structures and patterns to solve problems efficiently.	7.C.6 7.C.7 7.C.8 7.AF.2 7.GM.5 7.GM.6	- Use pre and post assessments to determine reinforcement or extension of skills and understandings. - Use multiple representations to solve problems. - Connect mathematics to students' daily lives. - Use correct mathematical vocabulary. - Use accurate labels, symbols and calculations. - Work in teams to solve problems and justify solutions. - Select an appropriate tool to solve a problem and explain why the tool makes sense to use. - Explain whether or not a solution or process is reasonable for the problem situation.	abstract reasoning argument construct critique efficient mathematical models persevere precision proficient quantitative reasoning reasonable reasoning repeated reasoning strategically structure	<u>Curriculum Support Document</u> Find helpful information about the critical standards here. <u>Go Math:</u> - Unit 7 – Review Projects - Unit 7 GR Modules 1, 2, 3 and 4 <u>Good Questions for Math Teaching</u> <u>Connected Mathematics</u> <u>Laying The Foundation (NMSI)</u> <u>Illustrative Mathematics Tasks:</u> http://www.illustrativemathematics.org/ <u>Inside Mathematics:</u> Lawn Mowing (7.C.6, 7.C.7) Mixing Paints (7.C.6, 7.C.8) Parallelogram (7.GM.6) Pizza Crusts (7.GM.5, 7.GM.6) Which Is Bigger (7.GM.5, 7.GM.6) http://www.insidemathematics.org/performance-assessment-tasks	*Spiral review: use critical standards from previous units <u>Scaffolding Support:</u> <u>(ELL; SPED; Striving Learners):</u> - Go Math: differentiation materials - Open ended problems with multiple entry points - Written instructions - Small group instruction - Graphic Organizers - Manipulatives - Concrete models - Encourage multiple ways to solve problems - Models of finished products - Picture Support - Ask all students to show their strategies while explaining - Games for practicing at home
7.C.6: Use proportional relationships to solve ratio and percent problems with multiple operations (e.g. simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease). 7.C.7: Compute fluently with rational numbers using an algorithmic approach. 7.C.8: Solve real-world problems with rational numbers by using one or two operations. 7.AF.2: Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p, q, and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems. 7.GM.5: Understand the formulas for area and circumference of a circle and use them to solve real-world and other mathematical problems; give an informal derivation of the relationship between circumference and area of a circle. 7.GM.6: Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.						

Process Standards for Mathematics

The Process Standards demonstrate the ways in which students should develop conceptual understanding of mathematical content, and the ways in which students should synthesize and apply mathematical skills.	
PS.1: 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. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, “Does this make sense?” and “Is my answer reasonable?” They understand the approaches of others to solving complex problems and identify correspondences between different approaches. Mathematically proficient students understand how mathematical ideas interconnect and build on one another to produce a coherent whole.
PS.2: 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.
PS.3: 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 analyze situations by breaking them into cases and recognize and use counterexamples. They organize their mathematical thinking, justify their conclusions and 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. They justify whether a given statement is true always, sometimes, or never. Mathematically proficient students participate and collaborate in a mathematics community. They listen to or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
PS.4: Model with mathematics.	Mathematically proficient students apply the mathematics they know to solve problems arising in everyday life, society, and the workplace using a variety of appropriate strategies. They create and use a variety of representations to solve problems and to organize and communicate mathematical ideas. Mathematically proficient students apply what they know and 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 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.
PS.5: Use appropriate tools strategically.	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Mathematically 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. Mathematically proficient students identify relevant external mathematical resources, such as digital content, and use them to pose or solve problems. They use technological tools to explore and deepen their understanding of concepts and to support the development of learning mathematics. They use technology to contribute to concept development, simulation, representation, reasoning, communication and problem solving.
PS.6: Attend to precision.	Mathematically proficient students communicate precisely to others. They use clear definitions, including correct mathematical language, 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 express solutions clearly and logically by using the appropriate mathematical terms and notation. They specify units of measure and label axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently and check the validity of their results in the context of the problem. They express numerical answers with a degree of precision appropriate for the problem context.
PS.7: Look for and make use of structure.	Mathematically proficient students look closely to discern a pattern or structure. They step back for an overview and shift perspective. They recognize and use properties of operations and equality. They organize and classify geometric shapes based on their attributes. They see expressions, equations, and geometric figures as single objects or as being composed of several objects.
PS.8: Look for and express regularity in repeated reasoning.	Mathematically proficient students notice if calculations are repeated and look for general methods and shortcuts. They notice regularity in mathematical problems and their work to create a rule or formula. Mathematically proficient students maintain oversight of the process, while attending to the details as they solve a problem. They continually evaluate the reasonableness of their intermediate results.

NUMBER SENSE

7.NS.1	Find the prime factorization of whole numbers and write the results using exponents.
7.NS.2	Understand the inverse relationship between squaring and finding the square root of a perfect square whole number. Find square roots of perfect square whole numbers.
7.NS.3	Know there are rational and irrational numbers. Identify, compare, and order rational and irrational numbers (e.g. $\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, π) and plot them on a number line.

COMPUTATION

7.C.1	Understand $p + q$ as the number located a distance $ q $ from p , in the positive or negative direction, depending on whether q is positive or negative. Show on a number line that a number and its opposite have a sum of 0 (are additive inverses). Find and interpret sums of rational numbers in real-world contexts.
7.C.2	Understand 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.C.3	Understand that multiplication is extended 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.
7.C.4	Understand that integers can be divided, provided that the divisor is not zero. Understand that if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$.
7.C.5	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
7.C.6	Use proportional relationships to solve ratio and percent problems with multiple operations (e.g. simple interest, tax, markups, markdowns, gratuities, conversions within and across measurement systems, and percent increase and decrease).
7.C.7	Compute fluently with rational numbers using an algorithmic approach.
7.C.8	Solve real-world problems with rational numbers by using one or two operations.

ALGEBRA AND FUNCTIONS

7.AF.1	Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring out a common number (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process.
7.AF.2	Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p , q , and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.
7.AF.3	Solve inequalities of the form $px + q (> \text{ or } \geq) r$ or $px + q (< \text{ or } \leq) r$, where p , q , and r are specific rational numbers. Represent real-world problems using inequalities of these forms and solve such problems. Graph the solution set of the inequality and interpret it in the context of the problem.
7.AF.4	Define slope as vertical change for each unit of horizontal change and recognize that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change.
7.AF.5	Graph a line given its slope and a point on the line. Find the slope of a line given its graph.
7.AF.6	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.AF.7	Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships.
7.AF.8	Explain what the coordinates of a point on the graph of a proportional relationship mean in terms of the situation, with special attention to the points $(0, 0)$ and $(1, r)$, where r is the unit rate.
7.AF.9	Represent real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent these proportional relationships. Recognize that these situations are described by a linear function in the form $y = mx$, where the unit rate, m , is the slope of the line.

GEOMETRY AND MEASUREMENT

7.GM.1	Explore triangles with given conditions from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
7.GM.2	Identify and describe similarity relationships of polygons including the angle-angle criterion for similar triangles, and solve problems involving similarity.
7.GM.3	Solve real-world and other mathematical problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing. Create a scale drawing by using proportional reasoning.

7.GM.4	Solve real-world and other mathematical problems using facts about vertical, adjacent, complementary, and supplementary angles.
7.GM.5	Understand the formulas for area and circumference of a circle and use them to solve real-world and other mathematical problems; give an informal derivation of the relationship between circumference and area of a circle.
7.GM.6	Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.
7.GM.7	Construct nets for right rectangular prisms and cylinders and use the nets to compute the surface area; apply this technique to solve real-world and other mathematical problems.

DATA ANALYSIS, STATISTICS, AND PROBABILITY

7.DSP.1	Understand that statistics can be used to gain information about a population by examining a sample of the population. Understand that conclusions and generalizations about a population from a sample are valid only if the sample is representative of that population and that random sampling tends to produce representative samples and support valid inferences.
7.DSP.2	Use data from a random sample to draw inferences about a population. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
7.DSP.3	Find, use, and interpret measures of center (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.
7.DSP.4	Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.
7.DSP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Understand that a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Understand that a probability of 1 indicates an event certain to occur and a probability of 0 indicates an event impossible to occur. Identify probabilities of events as impossible, unlikely, equally likely, likely, or certain.
7.DSP.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its relative frequency from a large sample.
7.DSP.7	Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to observed frequencies; evaluate the level of agreement and explain possible sources of discrepancy.

Number Sense		
Grade 6	Grade 7	Grade 8
6.NS.1: Understand that positive and negative numbers are used to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge). Use positive and negative numbers to represent and compare quantities in real-world contexts, explaining the meaning of 0 in each situation.	7.NS.3: Know there are rational and irrational numbers. Identify, compare, and order rational and common irrational numbers ($\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, π) and plot them on a number line.	8.NS.1: Give examples of rational and irrational numbers and explain the difference between them. Understand that every number has a decimal expansion; for rational numbers, show that the decimal expansion terminates or repeats, and convert a decimal expansion that repeats into a rational number.
6.NS.2: Understand the integer number system. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself (e.g., $-(-3) = 3$), and that 0 is its own opposite.		
6.NS.3: Compare and order rational numbers and plot them on a number line. Write, interpret, and explain statements of order for rational numbers in real-world contexts.		8.NS.2: Use rational approximations of irrational numbers to compare the size of irrational numbers, plot them approximately on a number line, and estimate the value of expressions involving irrational numbers.
6.NS.4: Understand that the absolute value of a number is the distance from zero on a number line. Find the absolute value of real numbers and know that the distance between two numbers on the number line is the absolute value of their difference. Interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.		
6.NS.5: Know commonly used fractions (halves, thirds, fourths, fifths, eighths, tenths) and their decimal and percent equivalents. Convert between any two representations (fractions, decimals, percents) of positive rational numbers without the use of a calculator.		
6.NS.6: Identify and explain prime and composite numbers.		
6.NS.7: Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers from 1 to 100, with a common factor as a multiple of a sum of two whole numbers with no common factor.	7.NS.1: Find the prime factorization of whole numbers and write the results using exponents.	8.NS.3: Given a numeric expression with common rational number bases and integer exponents, apply the properties of exponents to generate equivalent expressions.
6.NS.8: Interpret, model, and use ratios to show the relative sizes of two quantities. Describe how a ratio shows the relationship between two quantities. Use the following notations: a/b , a to b , $a:b$.		
6.NS.9: Understand the concept of a unit rate and use terms related to rate in the context of a ratio relationship.		
6.NS.10: Use reasoning involving rates and ratios to model real-world and other mathematical problems (e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations).		
	7.NS.2: Understand the inverse relationship between squaring and finding the square root of a perfect square integer. Find square roots of perfect square integers.	8.NS.4: Use square root symbols to represent solutions to equations of the form $x^2 = p$, where p is a positive rational number.

Computation		
Grade 6	Grade 7	Grade 8
6.C.1: Divide multi-digit whole numbers fluently using a standard algorithmic approach.		
6.C.2: Compute with positive fractions and positive decimals fluently using a standard algorithmic approach.	7.C.1: Understand $p + q$ 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.C.2: Understand 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.C.3: Understand that multiplication is extended 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.	
	7.C.4: Understand that integers can be divided, provided that the divisor is not zero, and that every quotient of integers (with non-zero divisor) is a rational number. Understand that if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$.	
6.C.3: Solve real-world problems with positive fractions and decimals by using one or two operations.	7.C.7: Compute with rational numbers fluently using a standard algorithmic approach.	8.C.1: Solve real-world problems with rational numbers by using multiple operations.
	7.C.6: Use proportional relationships to solve ratio and percent problems with multiple operations, such as the following: simple interest, tax, markups, markdowns, gratuities, commissions, fees, conversions within and across measurement systems, percent increase and decrease, and percent error. 7.C.8: Solve real-world problems with rational numbers by using one or two operations.	
6.C.4: Compute quotients of positive fractions and solve real-world problems involving division of fractions by fractions. Use a visual fraction model and/or equation to represent these calculations.	7.C.5: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.	
6.C.5: Evaluate positive rational numbers with whole number exponents.		8.C.2: Solve real-world and other mathematical problems involving numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Interpret scientific notation that has been generated by technology, such as a scientific calculator, graphing calculator, or excel spreadsheet.
6.C.6: Apply the order of operations and properties of operations (identity, inverse, commutative properties of addition and multiplication, associative properties of addition and multiplication, and distributive property) to evaluate numerical expressions with nonnegative rational numbers, including those using grouping symbols, such as parentheses, and involving whole number exponents. Justify each step in the process.		

Algebra and Functions		
Grade 6	Grade 7	Grade 8
6.AF.1: Evaluate expressions for specific values of their variables, including expressions with whole-number exponents and those that arise from formulas used in real-world problems.		
6.AF.2: Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions and to justify whether two linear expressions are equivalent when the two expressions name the same number regardless of which value is substituted into them.	7.AF.1: Apply the properties of operations (e.g., identity, inverse, commutative, associative, distributive properties) to create equivalent linear expressions, including situations that involve factoring (e.g., given $2x - 10$, create an equivalent expression $2(x - 5)$). Justify each step in the process.	
6.AF.3: Define and use multiple variables when writing expressions to represent real-world and other mathematical problems, and evaluate them for given values.		
6.AF.4: Understand that solving an equation or inequality is the process of answering the following question: Which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.		8.AF.2: Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by transforming a given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).
6.AF.5: Solve equations of the form $x + p = q$, $x - p = q$, $px = q$, and $x/p = q$ fluently for cases in which p , q and x are all nonnegative rational numbers. Represent real world problems using equations of these forms and solve such problems.	7.AF.2: Solve equations of the form $px + q = r$ and $p(x + q) = r$ fluently, where p , q , and r are specific rational numbers. Represent real-world problems using equations of these forms and solve such problems.	8.AF.1: Solve linear equations with rational number coefficients fluently, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. Represent real-world problems using linear equations and inequalities in one variable and solve such problems.
6.AF.6: Write an inequality of the form $x > c$, $x \geq c$, $x < c$, or $x \leq c$, where c is a rational number, to represent a constraint or condition in a real-world or other mathematical problem. Recognize inequalities have infinitely many solutions and represent solutions on a number line diagram.	7.AF.3: Solve inequalities of the form $px + q (> \text{ or } \geq) r$ or $px + q (< \text{ or } \leq) r$, where p , q , and r are specific rational numbers. Represent real-world problems using inequalities of these forms and solve such problems. Graph the solution set of the inequality and interpret it in the context of the problem.	
6.AF.7: Understand that signs of numbers in ordered pairs indicate the quadrant containing the point; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes. Graph points with rational number coordinates on a coordinate plane.		
6.AF.8: Solve real-world and other mathematical problems by graphing points with rational number coordinates on a coordinate plane. Include the use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.		

Algebra and Functions		
Grade 6	Grade 7	Grade 8
6.AF.9: Make tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane.	7.AF.4: Define slope as vertical change for each unit of horizontal change and recognize that a constant rate of change or constant slope describes a linear function. Identify and describe situations with constant or varying rates of change.	
	7.AF.5: Graph a line given its slope and a point on the line. Find the slope of a line given its graph.	
	7.AF.6: 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.AF.7: Identify the unit rate or constant of proportionality in tables, graphs, equations, and verbal descriptions of proportional relationships.	
	7.AF.8: Explain what the coordinates of a point on the graph of a proportional relationship mean in terms of the situation, with special attention to the points (0, 0) and (1, r), where r is the unit rate.	
6.AF.10: Use variables to represent two quantities in a proportional relationship in a real-world problem; write an equation to express one quantity, the dependent variable, in terms of the other quantity, the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.	7.AF.9: Identify real-world and other mathematical situations that involve proportional relationships. Write equations and draw graphs to represent proportional relationships and recognize that these situations are described by a linear function in the form $y = mx$, where the unit rate, m, is the slope of the line.	8.AF.6: Construct a function to model a linear relationship between two quantities given a verbal description, table of values, or graph. Recognize in $y = mx + b$ that m is the slope (rate of change) and b is the y-intercept of the graph, and describe the meaning of each in the context of a problem.
		8.AF.7: Compare properties of two linear functions given in different forms, such as a table of values, equation, verbal description, and graph (e.g., compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed).
		8.AF.3: Understand that a function assigns to each x-value (independent variable) exactly one y-value (dependent variable), and that the graph of a function is the set of ordered pairs (x, y).
		8.AF.4: Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear, has a maximum or minimum value). Sketch a graph that exhibits the qualitative features of a function that has been verbally described.
		8.AF.5: Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. Describe similarities and differences between linear and nonlinear functions from tables, graphs, verbal descriptions, and equations.
		8.AF.8: Understand that solutions to a system of two linear equations correspond to points of intersection of their graphs because points of intersection satisfy both equations simultaneously. Approximate the solution of a system of equations by graphing and interpreting the reasonableness of the approximation.

Geometry and Measurement		
Grade 6	Grade 7	Grade 8
6.GM.1: Convert between measurement systems (English to metric and metric to English) given conversion factors, and use these conversions in solving real-world problems.	7.GM.1: Draw triangles (freehand, with ruler and protractor, and using technology) with given conditions from three measures of angles or sides, and notice when the conditions determine a unique triangle, more than one triangle, or no triangle.	
6.GM.2: Know that the sum of the interior angles of any triangle is 180° and that the sum of the interior angles of any quadrilateral is 360°. Use this information to solve real-world and mathematical problems.		
6.GM.3: Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate; apply these techniques to solve real-world and other mathematical problems.		
6.GM.4: Find the area of complex shapes composed of polygons by composing or decomposing into simple shapes; apply this technique to solve real-world and other mathematical problems.	7.GM.5: Understand the formulas for area and circumference of a circle and use them to solve real-world and other mathematical problems; give an informal derivation of the relationship between circumference and area of a circle.	8.GM.2: Solve real-world and other mathematical problems involving volume of cones, spheres, and pyramids and surface area of spheres.
6.GM.5: Find the volume of a right rectangular prism with fractional edge lengths using unit cubes of the appropriate unit fraction edge lengths (e.g., using technology or concrete materials), and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths to solve real-world and other mathematical problems.	7.GM.6: Solve real-world and other mathematical problems involving volume of cylinders and three-dimensional objects composed of right rectangular prisms.	
6.GM.6: Construct right rectangular prisms from nets and use the nets to compute the surface area of prisms; apply this technique to solve real-world and other mathematical problems.	7.GM.7: Construct nets for right rectangular prisms and cylinders and use the nets to compute the surface area; apply this technique to solve real-world and other mathematical problems.	
	7.GM.3: Solve real-world and other mathematical problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing. Create a scale drawing by using proportional reasoning.	
	7.GM.4: Solve real-world and other mathematical problems that involve vertical, adjacent, complementary, and supplementary angles.	
	7.GM.2: Identify and describe similarity relationships of polygons including the angle-angle criterion for similar triangles, and solve problems involving similarity.	8.GM.3: Verify experimentally the properties of rotations, reflections, and translations, including: lines are mapped to lines, and line segments to line segments of the same length; angles are mapped to angles of the same measure; and parallel lines are mapped to parallel lines.
		8.GM.4: Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. Describe a sequence that exhibits the congruence between two given congruent figures.
		8.GM.5: Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations. Describe a sequence that exhibits the similarity between two given similar figures.
		8.GM.6: Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.
		8.GM.7: Use inductive reasoning to explain the Pythagorean relationship.
		8.GM.8: Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and other mathematical problems in two dimensions.
		8.GM.9: Apply the Pythagorean Theorem to find the distance between two points in a coordinate plane.

Data Analysis, Statistics (and Probability for Gr.7-8)		
Grade 6	Grade 7	Grade 8
6.DS.1: Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for the variability in the answers. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.	7.DSP.1: Understand that statistics can be used to gain information about a population by examining a sample of the population and generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences. 7.DSP.2: Use data from a random sample to draw inferences about a population. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.	
6.DS.2: Select, create, and interpret graphical representations of numerical data, including line plots, histograms, and box plots.	7.DSP.4: Make observations about the degree of visual overlap of two numerical data distributions represented in line plots or box plots. Describe how data, particularly outliers, added to a data set may affect the mean and/or median.	
6.DS.3: Formulate statistical questions; collect and organize the data (e.g., using technology); display and interpret the data with graphical representations (e.g., using technology).		
6.DS.4: Summarize numerical data sets in relation to their context in multiple ways, such as: report the number of observations; describe the nature of the attribute under investigation, including how it was measured and its units of measurement; determine quantitative measures of center (mean and/or median) and spread (range and interquartile range), as well as describe any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered; and relate the choice of measures of center and spread to the shape of the data distribution and the context in which the data were gathered.	7.DSP.3: Find, use, and interpret measures of center (mean and median) and measures of spread (range, interquartile range, and mean absolute deviation) for numerical data from random samples to draw comparative inferences about two populations.	
	7.DSP.5: Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Understand that a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event. Understand that a probability of 1 indicates an event certain to occur and a probability of 0 indicates an event impossible to occur.	8.DSP.4: Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. Understand and use appropriate terminology to describe independent, dependent, complementary, and mutually exclusive events.
	7.DSP.6: Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its relative frequency from a large sample.	8.DSP.5: Represent sample spaces and find probabilities of compound events (independent and dependent) using methods, such as organized lists, tables, and tree diagrams.
	7.DSP.7: Develop probability models that include the sample space and probabilities of outcomes to represent simple events with equally likely outcomes. Predict the approximate relative frequency of the event based on the model. Compare probabilities from the model to observed frequencies; evaluate the level of agreement and explain possible sources of discrepancy.	8.DSP.6: For events with a large number of outcomes, understand the use of the multiplication counting principle. Develop the multiplication counting principle and apply it to situations with a large number of outcomes.
		8.DSP.1: Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantitative variables. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
		8.DSP.2: Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and describe the model fit by judging the closeness of the data points to the line.
		8.DSP.3: Write and use equations that model linear relationships to make predictions, including interpolation and extrapolation, in real-world situations involving bivariate measurement data; interpret the slope and y-intercept.