TOWNSHIP OF UNION PUBLIC SCHOOLS

Grade 7 Honors Pre-Algebra
Curriculum Guide 2017

Mission Statement

The mission of the Township of Union Public Schools is to build on the foundations of honesty, excellence, integrity, strong family, and community partnerships. We promote a supportive learning environment where every student is challenged, inspired, empowered, and respected as diverse learners. Through cultivation of students' intellectual curiosity, skills and knowledge, our students can achieve academically and socially, and contribute as responsible and productive citizens of our global community.

Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is to formulate a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Course Description

Honors Pre-Algebra is a seventh grade course suggested for students who have a strong background in mathematics. The purpose of this course is to introduce and prepare students for higher level mathematics classes offered in the honors and advanced placement program. The course is designed specifically for students who have demonstrated a desire to learn and appreciate mathematics.

Major units of study include:

Exponents, Operations on Rational Numbers and Expressions - applying and extending previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers; work with integer exponents; know that there are numbers that are not rational, and approximate them by rational numbers;

Expressions, Equations and Ratios and Proportions - analyzing proportional relationships and use them to solve real-world and mathematical problems;

Functions, Equations, and Solutions - define, evaluate, and compare functions; understand the connections between proportional relationships, lines, and linear equations; analyze and solve linear equations and simultaneous linear equations;

Geometry: Pythagorean Theorem, Congruence and Similarity, and Transformations - solve real-life and mathematical problems involving angle measure, area, surface area, and volume; understand and apply the Pythagorean Theorem;

Statistics and Probability - investigate chance processes and develop, use, and evaluate probability models;

In depth knowledge of skills will be taught through the Eureka Math Program. The New Jersey Student Learning Standards are incorporated throughout the course. Students will be exposed to careers which emphasize the application of math skills in real life work, and they will be challenged to understand and model the mathematical concepts delivered throughout the curriculum. Assessments will include: projects, content related reading, tests, quizzes, homework, classwork, portfolios, and group work.

Recommended Textbooks:

Eureka Math – EngageNY Grade 7 Mathematics

Eureka Math – EngageNY Grade 8 Mathematics

Curriculum Units

Unit 1: **Operations with Rational Numbers, Expressions & Equations, Geometry**

Unit 2: **Percent, Ratios, and Proportional Relationships**

Unit 3: **Drawing Inferences about Population & Probability Models**

Unit 4: **Factors and Exponents**

Unit 5: **Functions, Equations and Solutions**

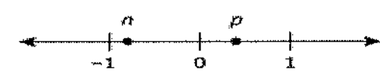
Unit 6: **Geometry: Pythagorean Theorem, Congruence and Similarity Transformations**

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 1 **Operations with Rational Numbers. Expressions and Equations. Geometry**	■ 7.NS.A.1 ■ 7.NS.A.2 ■ 7.NS.A.3 ■ 7.EE.A.1 ■ 7.EE.A.2 ■ 7.EE.B.3 ■ 7.EE.B.4 ◎ 7.G.B.4 ◎ 7.G.B.5 ◎ 7.G.B.6 ◎ 7.G.A.2 ◎ 7.G.A3 ◎ 8.G.C.9.	• Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers • Use properties of operations to generate equivalent expressions • Solve real-life and mathematical problems using numerical and algebraic expressions and equations • Solve real-life and mathematical problems involving angle measure, area, surface area, and volume including cylinders, cones, and spheres	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 1: Suggested Educational Resources	7.NS.A.1 Comparing Freezing Points 7.NS.A.1b-c Differences of Integers 7.NS.A.2 Why is a Negative Times a Negative Always Positive 7.NS.A.2d Equivalent fractions approach to non-repeating decimals 7.NS.A.2d Repeating decimal as approximation 7.EE.A.1 Writing Expressions 7.EE.A.2 Ticket to Ride 7.EE.B.3 Discounted Books 7.EE.B.3 Shrinking 7.EE.B.4 Fishing Adventures 2 7.NS.A.1 Bookstore Account 7.EE.B.4b Sports Equipment Set 7.G.B.4 Wedges of a Circle 7.G.B.4 Eight Circles 7.G.B.6, 7.RP.A.3 Sand under the Swing Set 8.G.C.9 A Canister of Tennis Balls		
Unit 2 **Percent, Ratios, and Proportional Relationships**	■ 7.RP.A.1 ■ 7.RP.A.2 ■ 7.RP.A.3 ◎ 7.G.A.1	• Analyze proportional relationships and use them to solve real-world and mathematical problems • Draw, construct, and describe geometrical figures and describe the relationships between them • Solve multi-step ratio and percent problems using proportional relationships	

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 2: Suggested Educational Resources	7.RP.A.1 Cooking with the Whole Cup 7.RP.A.2 Sore Throats, Variation 1 7.RP.A.2 Buying Coffee 7.RP.A.2c Gym Membership Plans 7.G.A.1 Floor Plan 7.G.A.1 Map distance		
Unit 3 **Drawing Inferences about Populations & Probability Models**	☐ 7.SP.A.1 ☐ 7.SP.A.2 ◎ 7.SP.B.3 ◎ 7.SP.B.4 ☐ 7.SP.C.5 ☐ 7.SP.C.6 ☐ 7.SP.C.7 ☐ 7.SP.C.8	• Use random sampling to draw inferences about a population • Draw informal comparative inferences about two populations • Find Measures of Central Tendency & Measures of Variation • Investigate chance processes and develop, use, and evaluate probability models	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure. MP.8 Look for and express regularity in repeated reasoning.
Unit 3: Suggested Educational Resources	7.SP.A.1 Mr. Briggs Class Likes Math 7.SP.A.2 Valentine Marbles 7.SP.B.3,4 College Athletes 7.SP.B.3,4 Offensive Linemen 7.SP.C.6 Heads or Tails 7.SP.C.7, 6 Rolling Dice 7.SP.C.7a How Many Buttons 7.SP.C.8 Tetrahedral Dice 7.SP.C.8 Waiting Times		
Unit 4 **Factors and Exponents**	■ 8.EE.A.1 ■ 8.EE.A.3 ■ 8.EE.A.4 ■ 7.EE.A.1	• Rules of exponents including negative integers • GCF and LCM of a monomial • Very large and very small quantities can be approximated with numbers expressed in the form of a single digit times an integer power of 10.	
Unit 4: Suggested Educational Resources	8.EE.A.1 Extending the Definitions of Exponents 8.EE.A.3 Ant and Elephant 8.EE.A.4 Giantburgers		

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 5 **Functions, Equations, and Solutions**	■ 8.F.A.1 ■ 8.F.A.2 ■ 8.F.A.3 ■ 8.F.B.4 ■ 8.F.B.5 ■ 8.EE.C.7 ■ 8.EE.C.8	• Define, evaluate, and compare functions • Use functions to model relationships between quantities • Analyze and solve linear equations and simultaneous linear equations	MP.1 Make sense of problems and persevere in solving them.
Unit 5: Suggested Educational Resources	8.F.A.1 Function Rules 8.F.A.2 Battery Charging 8.F.A.3 Introduction to Linear Functions 8.F.B.4 Chicken and Steak, Variation 1 8.F.B.4 Baseball Cards 8.EE.C.7 The Sign of Solutions 8.EE.C.7 Coupon versus discount 8.EE.C.8a Intersection of Two Lines 8.EE.C.8 How Many Solutions		MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments & critique the reasoning of others. MP.4 Model with mathematics.
Unit 6 **Geometry: Pythagorean Theorem, Congruence and Similarity Transformations**	■ 8.EE.A.2 ■ 8.G.B.6 ■ 8.G.B.7 ■ 8.G.B.8 ■ 8.G.A.1 ■ 8.G.A.2 ■ 8.G.A.3 ■ 8.G.A.4	• Work with radicals and integer exponents • Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres • Understand and apply the Pythagorean Theorem • Understand Distance and Midpoint Formula Understand congruence and similarity using physical models, transparencies, or geometry software	MP.5 Use appropriate tools strategically. MP.6 Attend to precision. MP.7 Look for and make use of structure.
Unit 6: Suggested Educational Resources	8.G.B.6 Converse of the Pythagorean Theorem 8.G.B.7 Running on the Football Field 8.G.B.8 Finding isosceles triangles 8.G.A.1 Reflections, Rotations, and Translations 8.G.A.2 Congruent Triangles 8.G.A.3 Effects of Dilations on Length, Area, and Angles 8.G.A.4 Are They Similar		MP.8 Look for and express regularity in repeated reasoning.

Unit 1 - Operations with Rational Numbers, Expressions & Equations, Geometry	

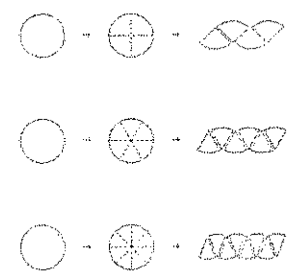
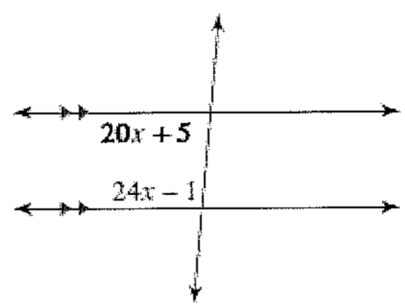
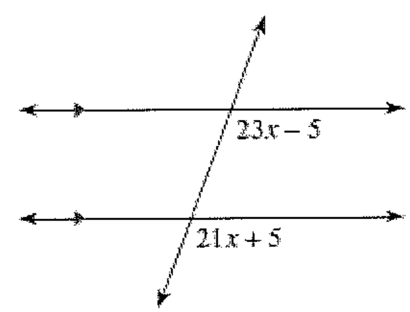
Content & Practice Standards	Standards for Mathematical Practice	Critical Knowledge & Skills	Examples
<u>Topic A</u> **7.NS.A.1**. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line. **7.NS.A.1a**. Describe situations in which opposite quantities combine to make 0. For example, In the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round? **7.NS.A.1b**. 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.NS.A.1c.** Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$.	MP.2 MP.3 MP.5 MP.7	Concept(s): • Opposite quantities combine to make 0 (additive inverses). • $p + q$ is the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. • Subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$ • The product of two whole numbers is the total number of objects in a number of equal groups. Students are able to: • represent addition and subtraction on a horizontal number line. • represent addition and subtraction on a vertical number line. • interpret sums of rational numbers in real-world situations. • show that the distance between two rational numbers on the number line is the absolute value of their difference.	Solving what absolute value will give you an answer of 6? **SELECT ALL THAT APPLY!** A. $\|-6\|$ B. $\|6\|$ C. $\|9\| + \|-6\|$ D. $\|-6\| + \|13\|$ E. $\|-2\| + \|4\|$ Two numbers, n and p are plotted on the number line shown.  The numbers $n - p$, $n + p$, and $p - n$ will be plotted on the number line. Select an expression from each drop-down menu to make this statement true. The number with the least value is [Choose...], and the number with the greatest value is [Choose...].

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.A.1d.** Apply properties of operations as strategies to add and subtract rational numbers.		<u>**Learning Goal 1**</u>**:** Describe real-world situations in which (positive and negative) rational numbers are combined, emphasizing rational numbers that combine to make 0. Represent sums of rational numbers ($p + q$) on horizontal and vertical number lines, showing that the distance along the number line is $\|q\|$ and including situations in which q is negative and positive, <u>**Learning Goal 2**</u>**:** Add and subtract (positive and negative) rational numbers, showing that the distance between two points on a number line is the absolute value of their difference and representing subtraction using an additive inverse.	
<u>**Topic B**</u> **7.NS.A.2.** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **7.NS.A.2a**. 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. Interpret products of rational numbers by describing real-world contexts. **7.NS.A.2b.** Understand that integers can be divided, provided that the divisor is not zero, and every	MP.2 MP.4 MP.7	Concept(s): • Integers can be divided, provided that the divisor is not zero. • If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Students are able to: • multiply and divide signed numbers. <u>**Learning Goal 3**</u>**:** Multiply and divide signed numbers, including rational numbers, and interpret the products and quotients using real-world contexts.	A ship lowered a device into the ocean to test for the amount of salt in the water. Each time the captain pressed a button, the device was lowered 10 feet. If the button was pressed six times, which integer represents the location of the device under the water?

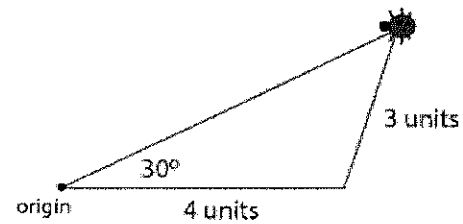
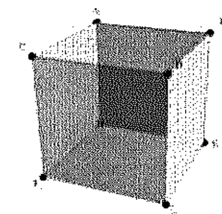
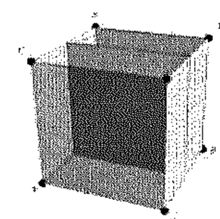
quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. 2c. Interpret quotients of rational numbers by describing real world contexts. **7.NS.A.2d.** Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.			
<u>Topic C</u> **7.NS.A.3**. Solve real-world and mathematical problems involving the four operations with rational numbers. **7.NS.A.2.** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **7.NS.A.2c.** Apply properties of operations as strategies to multiply and divide rational numbers.	MP.1 MP.2 MP.4 MP.5 MP.6	Concept(s): • The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers. Students are able to: • add and subtract rational numbers. • multiply and divide rational numbers using the properties of operations. • apply the convention of order of operations to add, subtract, multiply and divide rational numbers. • solve real world problems involving the four operations with rational numbers. **<u>Learning Goal 4</u>:** Apply properties of operations as strategies to add, subtract, multiply, and divide rational numbers.	The following is an example of the properties and how they are used in this lesson. $-13\frac{5}{7} + 6 - \frac{2}{7}$ $= -13\frac{5}{7} + 6 + \left(-\frac{2}{7}\right)$ *Subtracting a number is the same as adding its inverse.* $= -13 + \left(-\frac{5}{7}\right) + 6 + \left(-\frac{2}{7}\right)$ *The opposite of a sum is the sum of its opposite.* $= -13 + \left(-\frac{5}{7}\right) + \left(-\frac{2}{7}\right) + 6$ *Commutative property of addition* $= -13 + (-1) + 6$ *Associative property of addition* $= -14 + 6$ $= -8$

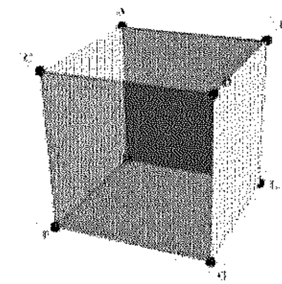
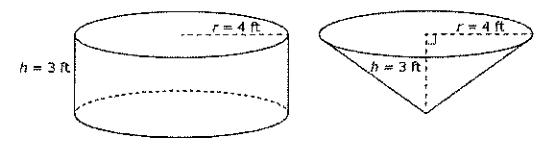
<u>Topic D</u> **7.NS.A.3.** Solve real-world and mathematical problems involving the four operations with rational numbers. **7.NS.A.2.** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **7.NS.A.2c.** Apply properties of operations as strategies to multiply and divide rational numbers.	MP.1 MP.2 MP.4 MP.5 MP.6	Concept(s): • The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers. Students are able to: • add and subtract rational numbers. • multiply and divide rational numbers using the properties of operations. • apply the convention of order of operations to add, subtract, multiply and divide rational numbers. • solve real world problems involving the four operations with rational numbers. **<u>Learning Goal 5</u>:** Solve mathematical and real-world problems involving addition, subtraction, multiplication, and division of signed rational numbers.	Which expressions are equivalent to $3\frac{1}{4} - \left(-\frac{5}{8}\right)$? Select **all** that apply. ☐ A. $3\frac{1}{4} - \left(\frac{5}{8}\right)$ ☐ B. $3\frac{1}{4} + \left(\frac{5}{8}\right)$ ☐ C. $3\frac{1}{4} + \left(-\frac{5}{8}\right)$ ☐ D. $3\frac{1}{4} + \left(+\frac{5}{8}\right)$ ☐ E. $-3\frac{1}{4} + \left(-\frac{5}{8}\right)$ ☐ F. $-3\frac{1}{4} + \left(+\frac{5}{8}\right)$
<u>Topic E</u> **7.EE.A.1.** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **7.EE.A.2.** Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.	MP.2 MP.7	Concept(s): • Rewriting an expression in different forms in a problem context can shed light on the problem. Students are able to: • add and subtract linear expressions having rational coefficients, using properties of operations. • factor and expand linear expressions having rational coefficients, using properties of operations.	Using the Distributive Property **SELECT ALL THE POSSIBLE ANSWERS** that the following expression can be rewritten: 3(n - 5) A) 3n - 5 B) 3n - 15 C) 3n + 15 D) 3n + (-15) E) n – 15 Simplify $3(4k + 5h) + 12k^2 + 5h - 4k$

		• write expressions in equivalent forms to shed light on the problem and interpret the relationship between the quantities in the context of the problem. **<u>Learning Goal 6</u>:** Apply the properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. **<u>Learning Goal 7</u>:** Rewrite algebraic expressions in equivalent forms to highlight how the quantities in it are related.	A garden is 15-feet long by 5-feet wide. The length and width of the garden will eacl increased by the same number of feet. This expression represents the perimeter of larger garden: $(x+15)+(x+5)+(x+15)+(x+5)$ Which expression is equivalent to the expression for the perimeter of the larger garden? Select **all** that apply. ☐ A. $4x+40$ ☐ B. $2(2x+20)$ ☐ C. $2(x+15)(x+5)$ ☐ D. $4(x+15)(x+5)$ ☐ E. $2(x+15)+2(x+5)$
<u>Topic F</u> **7.EE.B.3**. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6	Concept(s): • Rational numbers can take different forms. Students are able to: • solve multi-step real-life problems using rational numbers in any form. • solve multi-step mathematical problems using rational numbers in any form. **<u>Learning Goal 8</u>:** Solve multi-step real life and mathematical problems with rational numbers in any form (fractions, decimals) by applying properties of operations and converting rational	Please rewrite the following equation without fractions using the algebraic properties: 5/8x + 4 = 3/4 Please rewrite the following equation without decimals using the algebraic properties: 4.5x + 3.25 = 10.5

		numbers between forms as needed. Assess the reasonableness of answers using mental computation and estimation strategies.	
Topic G **7.G.B.4:** Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6 MP.7 MP.8	Concept(s): • Circumference Students are able to: • solve problems by finding the area and circumference of circles. • show that the area of a circle can be derived from the circumference. **Learning Goal 9**: Know the formulas for the area and circumference of a circle and use them to solve problems. Give an informal derivation of the relationship between the circumference and area of a circle.	Martin and Muriel finished a project for class showing one way to see why the area of a circle is given by $A=\pi r^2$, if r is the radius of the circle. Muriel is not in class today and Martin is trying to understand the following page of pictures from their project. Help Martin by writing up an explanation of how these pictures could be used to derive the formula for the area of a circle. 
Topic H **7.G.B.5.** Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	MP.3 MP.4 MP.5 MP.6 MP.7	Concept(s): No new concept(s) introduced Students are able to: • use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations. • solve mathematical problems by writing and solving simple algebraic equations based on the relationships between and properties of angles (supplementary, complementary, vertical, and adjacent.	

		Learning Goal 10: Write and solve *simple* multi-step algebraic equations involving supplementary, complementary, vertical, and adjacent angles.	
Topic I **7.G.B.6.** Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	MP.1 MP.2 MP.3 MP.4. MP.5 MP.6 MP.7	Concept(s): No new concept(s) introduced Students are able to: • solve real-world and mathematical problems involving area of two dimensional objects composed of triangles, quadrilaterals, and polygons. • solve real-world and mathematical problems involving volume of three dimensional objects composed of cubes and right prisms. • solve real-world and mathematical problems involving surface area of three-dimensional objects composed of cubes and right prisms. **Learning Goal 11**: Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	The 7th graders at Sunview Middle School were helping to renovate a playground for the kindergartners at a nearby elementary school. City regulations require that the sand underneath the swings be at least 15 inches deep. The sand under both swing sets was only 12 inches deep when they started. The rectangular area under the small swing set measures 9 feet by 12 feet and required 40 bags of sand to increase the depth by 3 inches. How many bags of sand will the students need to cover the rectangular area under the large swing set if it is 1.5 times as long and 1.5 times as wide as the area under the small swing set?
Topic J **7.G.A.2.** Draw (with technology, with ruler and protractor as well as freehand) geometric shapes with	MP.3 MP.5	Concept(s): • Conditions for unique triangles, more than one triangle, and no triangle.	**Starting at the origin, a ladybug walked 4 units east. Then she walked a distance of 3 units in an unknown direction. At that time she was 30 degrees to the north of her original walking direction.** The diagram shows one possibility for the ladybug's final location.

given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle	MP.6 MP.7	Students are able to: • draw geometric shapes with given conditions, including constructing triangles from three measures of angles or sides. • recognize conditions determining a unique triangle, more than one triangle, or no triangle. **Learning Goal 12**: Use freehand, mechanical (i.e. ruler, protractor) and technological tools to draw geometric shapes with given conditions (e.g. scale factor), focusing on constructing triangles.	Find a different final location that is also consistent with the given information, and draw the ladybug there. 
Topic K **7.G.A.3.** Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	MP.5 MP.6 MP.7.	Concept(s): • Cross-sections of three-dimensional objects Students are able to: • analyze three dimensional shapes (right rectangular pyramids and prisms) by examining and describing all of the 2-dimensional figures that result from slicing it at various angles. **Learning Goal 13**: Describe all of the 2-dimensional figures that result when a 3-dimemsional figures are sliced from multiple angles.	Imagine you are a ninja that can slice solid objects straight through. You have a solid cube in front of you. You are curious about what 2-dimensional shapes are formed when you slice the cube. For example, if you make a slice through the center of the cube that is parallel to one of the faces, the cross section is a square:  

			For each of the following slices, (i) describe using precise mathematical language the shape of the cross section. (ii) draw a diagram showing the cross section of the cube.  a. A slice containing edge AC and edge EG b. A slice containing the vertices C, B, and G. C. A slice containing the vertex A, the midpoint of edge EG, and the midpoint of edge FG.
<u>Topic L</u> **8.G.C.9**. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6 MP.7	Students are able to: • find volume of cones, cylinders and spheres using to solve real world problems. **<u>Learning Goal 14:</u>** Apply the formula for the volume of a cone, a cylinder, or a sphere to find a single unknown dimension when solving real-world and mathematical problems.	The figure shows a right-circular cylinder and a right-circular cone. The cylinder and the cone have the same base and the same height.  Part A What is the volume, in cubic feet, of the cone? ○ A. 12π ○ B. 16π ○ C. 36π ○ D. 48π **Part B** What is the ratio of the cone's volume to the cylinder's volume? Enter your answer in the box. Enter **only** your fraction.
<u>Topic M</u> **7.EE.B.4**. Use variables to represent	MP.1	Concept(s): No new concept(s) introduced	Fishing Adventures rents small fishing boats to tourists for day-long fishing trips. Each boat can only carry 1200 pounds of people and gear for safety reasons. Assume the average weight of a person is 150 pounds. Each group will require 200 lbs. of gear for the

quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities . **7.EE.B.4a.** 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.B.4b**. 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.	MP.2 MP.3 MP.4 MP.5 MP.6 MP.7	Students are able to: • compare an arithmetic solution to a word problem to the algebraic solution of the word problem, identifying the sequence of operations in each solution. • write an equation of the form $px + q = r$ or $p(x + q)=r$ in order to solve a word problem. • fluently solve equations of the form $px + q = r$ and $p(x + q)= r$. • write an inequality of the form $px + q > r$, $px + q < r$, $px + q \geq r$ or $px + q \leq r$ to solve a word problem. • graph the solution set of the inequality. • interpret the solution to an inequality in the context of the problem. **<u>Learning Goal 15</u>:** Use variables to represent quantities in a real-world or mathematical problem by constructing simple equations and inequalities to represent problems. **<u>Learning Goal 16</u>:** Fluently solve equations; solve inequalities, graph the solution set of the inequality and interpret the solutions in the context of the problem (Equations of the form $px + q = r$ and $p(x + q) = r$ and inequalities of the form $px + q > r$, $px + q \geq r$, $px+ q \leq r$, or $px + q < r$, where p, q, and r are specific rational numbers).	boat plus 10 lbs. of gear for each person. Create an inequality describing the restrictions on the number of people possible in a rented boat. Graph the solution set. Several groups of people wish to rent a boat. Group 1 has 4 people. Group 2 has 5 people. Group 3 has 8 people. Which of the groups, if any, can safely rent a boat? What is the maximum number of people that may rent a boat? a. At the beginning of the month, Evan had $24 in his account at the school bookstore. Use a variable to represent the unknown quantity in each transaction below and write an equation to represent it. Then represent each transaction on a number line. What is the unknown quantity in each case? i. First he bought some notebooks and pens that cost $16. ii. Then he deposited some more money and his account balance was $28. iii. Then he bought a book for English class that cost $34. iv. Then he deposited exactly enough money so that he paid off his debt to the bookstore. b. Explain why it makes sense to use a negative number to represent Evan's account balance when he owes money.

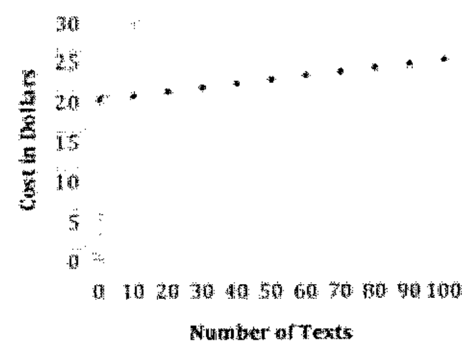
Unit 1 Vocabulary

Additive Inverse
Break-Even Point (The break-even point is the point at which there is neither a profit nor loss.)
Distance
Loss
Profit
Terminating Decimal
Repeating Decimal (The decimal form of a rational number, for example, 3 = 0. 3.)
Absolute Value
Associative Property (of Multiplication and Addition)
Commutative Property (of Multiplication and Addition)
Credit
Debit
Deposit
Distributive Property (of Multiplication Over Addition)
Expression
Equation
Integer
Inverse
Multiplicative Inverse
Opposites
Overdraft
Positives
Negatives
Like Terms
Terms
Equation
Expression
Inequality
Inverse operations
Algebraic inequality
Algebraic expression
Compound inequality
Inequality
Solution set
Rational number
Inverse
Reciprocal
Mixed number
Improper fraction
Decimal
Circumference
Area
Circle
Cross section

Three dimensional
Supplementary angles
Complementary angles
Vertical angles
Adjacent angles
Triangle
Polygon
Quadrilateral
Composite Shape
Cube
Right Prism
Volume
Surface Area
Rectangular Pyramid

Unit 2 Percent, Ratios, and Proportional Relationships			
Content & Practice Standards	**Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Examples**
<u>Topic A</u> **7.RP.A.1.** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.	MP.2 MP.4 MP.6	Concept(s): No new concept(s) introduced Students are able to: • compute unit rates with ratios of fractions. • compute unit rates with ratios of fractions representing measurement quantities. in both like and different units of measure. **<u>Learning Goal 1</u>:** Calculate and interpret unit rates of various quantities involving ratios of fractions that contain like and different units.	Travis was attempting to make muffins to take to a neighbor that had just moved in down the street. The recipe that he was working with required 3/4 cup of sugar and 1/8 cup of butter. Travis accidentally put a whole cup of butter in the mix. What is the ratio of sugar to butter in the original recipe? What amount of sugar does Travis need to put into the mix to have the same ratio of sugar to butter that the original recipe calls for? If Travis wants to keep the ratios the same as they are in the original recipe, how will the amounts of all the other ingredients for this new mixture compare to the amounts for a single batch of muffins? The original recipe called for 38 cup of blueberries. What is the ratio of blueberries to butter in the recipe? How many cups of blueberries are needed in the new enlarged mixture?

Topic B **7.RP.A.2**. Recognize and represent proportional relationships between quantities. **7.RP.A.2a.** 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.A.2b**. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. **7.RP.A.2c.** Represent proportional relationships by equations. **7.RP.A.2d.** 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.	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6 MP.7 MP.8	Concept(s): • Proportions represent equality between two ratios. • Constant of proportionality Students are able to: • use tables and graphs to determine if two quantities are in a proportional relationship. • identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. • write equations representing proportional relationships. • Interpret the origin and (1, r) on the graph of a proportional relationship in context. • interpret a point on the graph of a proportional relationship in context. **<u>Learning Goal 2</u>:**Determine if a proportional relationship exists between two quantities (e.g. by testing for equivalent ratios in a table or graph on the coordinate plane and observing whether the graph is a straight line through the origin). **<u>Learning Goal 3</u>:**Identify the constant of proportionality (unit rate) from tables, graphs, equations, diagrams, and verbal descriptions **<u>Learning Goal 4</u>:**Write equations to model proportional relationships in real world problems **<u>Learning Goal 5</u>:**Use the graph of a proportional relationship to interpret the	**1)** Nia and Trey both had a sore throat so their mom told them to gargle with warm salt water. Nia mixed 1 teaspoon salt with 3 cups water. Trey mixed 12 teaspoon salt with 112 cups of water. Nia tasted Trey's salt water. She said, "I added more salt so I expected that mine would be more salty, but they taste the same." Explain why the salt water mixtures taste the same. Which of the following equations relates s, the number of teaspoons of salt, with w, the number of cups of water, for both of these mixtures? Choose all that apply. s=1/3w s=3w s=1 1/2w w=3s w=1/3s w=1/2s **2)** Coffee costs $18.96 for 3 pounds. What is the cost for one pound of coffee? At this store, the price for a pound of coffee is the same no matter how many pounds you buy. Let x be the number of pounds of coffee and y be the total cost of x pounds. Draw a graph of the relationship between the number of pounds of coffee and the total cost. Where can you see the cost per pound of coffee in the graph? What is it? **3)** In January, Georgia signed up for a membership at Anytime Fitness. The plan

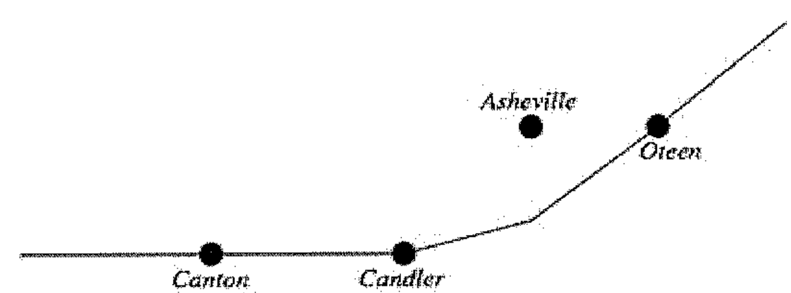
		meaning of any point (x, y) on the graph in terms of the situation - including the points (0, 0) and (1, r), recognizing that r is the unit rate.	she chose cost $95 in start-up fees and then $20 per month starting in February. Edwin also signed up at Anytime Fitness in January. His plan cost $35 per month starting in February, and his start-up fees were waived. Create tables for both Georgia and Edwin that compare the number of months since January to the total cost of their gym memberships. Continue this table for one year. Decide if either or both gym memberships are described by a proportional relationship, and write an equation representing any such relationship. Explain how parts (a) and (b) could be used to support your answer. **4)** The monthly cost of Jazmine's cell phone plan is graphed on the grid below. Her friend Kiara selected a plan that charges $0.25 per text, with no monthly fee, because she only uses her phone for texting.  a. Write an equation to represent the monthly cost of Kiara's plan for any number of texts. b. Graph the monthly cost of Kiara's plan on the grid above.

			c. Using the graphs above, explain the meaning of the following coordinate pairs: (0, 20): (0, 0): (10, 2.5): (100, 25): d. When one of the girls doubles the number of texts she sends, the cost doubles as well. Who is it? Explain in writing how you know
Topic C **7.NS.A.2**. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. **7.NS.A.2a**. 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. Interpret products of rational numbers by describing real-world contexts. **7.NS.A.2b**. Understand that integers can be divided, provided that the divisor is not zero, and every quotient	MP.2 MP.4 MP.7	Concept(s): • Every quotient of integers (with non-zero divisor) is a rational number. • Decimal form of a rational number terminates in 0s or eventually repeats. • Integers can be divided, provided that the divisor is not zero. Students are able to: • use long division to convert a rational number to a decimal. **Learning Goal 6:**Convert a rational number to a decimal using long division and explain why the decimal is either a terminating or repeating decimal. Convert decimals and fractions to percent's.	Which of the following is not a terminating or repeating decimal? $\frac{3}{8}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{7}{11}$ $\frac{7}{17}$ Kevin Durant made $\frac{9}{11}$ shots in the first quarter of the NBA finals, how is that written as a decimal?

<table>
<tr><td>of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. 2c. Interpret quotients of rational numbers by describing real world contexts.

7.NS.A.2d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.</td><td></td><td></td><td></td></tr>
<tr><td><u>Topic D</u>

7.EE.B.3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.</td><td>MP.1
MP.2
MP.3
MP.4
MP.5
MP.6</td><td>Concept(s):
Rational numbers can take different forms.
Students are able to:
solve multi-step real-life problems using rational numbers in any form.
solve multi-step mathematical problems using rational numbers in any form.
convert between decimals and fractions and apply properties of operations when calculating with rational numbers.
estimate to determine the reasonableness of answers.
<u>Learning Goal 7</u>: Solve multi-step real life and mathematical problems with rational numbers in any form (fractions, decimals) by applying properties of operations and converting rational numbers between forms as needed. Assess the reasonableness of</td><td>Katie and Margarita have $20.00 each to spend at Students' Choice book store, where all students receive a 20% discount. They both want to purchase a copy of the same book which normally sells for $22.50 plus 10% sales tax.
To check if she has enough to purchase the book, Katie takes 20% of$22.50 and subtracts that amount from the normal price. She takes 10% of the discounted selling price and adds it back to find the purchase amount.
Margarita takes 80% of the normal purchase price and then computes 110% of the reduced price.
Is Katie correct? Is Margarita correct? Do they have enough money to purchase the book?</td></tr>
</table>

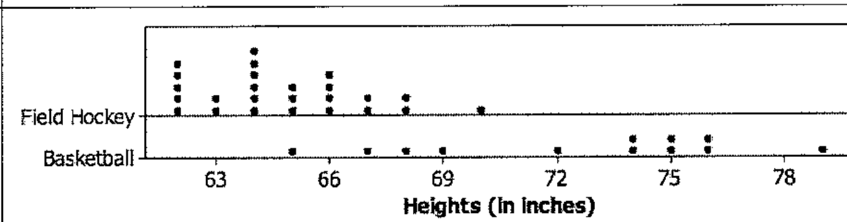
		answers using mental computation and estimation strategies.	
Topic E **7.RP.A.3.** Use proportional relationships to solve multistep ratio and percent problems. Such as simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.	MP.1 MP.2 MP.4 MP.5 MP.6 MP.7	Concept(s): • Recognize percent as a ratio indicating the quantity *per one hundred.* Students are able to: • use proportions to solve multistep percent problems including simple interest, tax, markups, discounts, gratuities, commissions, fees, percent increase, percent decrease, percent error. • use proportions to solve multistep ratio problems. **Learning Goal 8:**Solve multi-step ratio and percent problems using proportional relationships (simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error)	There were 24 boys and 20 girls in a chess club last year. This year the number of boys increased by 25% but the number of girls decreased by 10%. Was there an increase or decrease in overall membership? Find the overall percent change in membership of the club.
Topic F **7.RP.A.3:** Use proportional relationships to solve multistep ratio and percent problems. **7.G.A.1**: 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	MP.1 MP.2 MP.4 MP.5 MP.6 MP.7	Concept(s): • Scale and proportion Students are able to: • use ratios and proportions to create scale drawings. • reproduce a scale drawing at a different scale. • computing actual lengths and areas from a scale drawing. • solve problems involving scale drawings using proportions. **Learning Goal 9:**Use ratio and proportion	On the map below, 1/4 inch represents one mile. Candler, Canton, and Oteen are three cities on the map. 

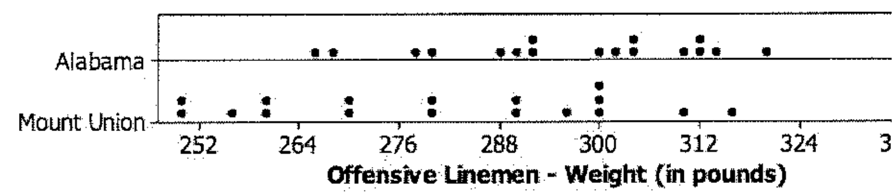
scale.		to solve problems involving scale drawings of geometric figures.	If the distance between the real towns of Candler and Canton is 9 miles, how far apart are Candler and Canton on the map? If Candler and Oteen are 312 inches apart on the map, what is the actual distance between Candler and Oteen in miles?

Unit 2 Vocabulary

- Equivalent ratios
- Indirect measurement
- Proportion
- Rate
- Scale
- Scale drawing
- Scale model
- Similar
- Corresponding sides
- Corresponding angles
- Percent change
- Interest
- Percent of decrease
- Percent of increase
- Principal
- Simple interest
- Isolate variable
- Proportion
- Gratuity
- Commission
- Fee
- Tax

Unit 3 Drawing Inferences about Population & Probability Models			
Content & Practice Standards	**Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Examples**
Topic A **7.SP.A.1.** Understand that statistics can be used to gain information about a population by examining a sample of the population; 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.	MP.3 MP.6	Concept(s) • Statistics can be used to gain information about a population by examining a sample of the population. • Generalizations about a population from a sample are valid only if the sample is representative of that population. • Random sampling tends to produce representative samples. Students are able to: • analyze and distinguish between representative and non-representative samples of a population. **Learning Goal 1**: Distinguish between representative and non-representative samples of a population (*e.g. if the class had 50% girls and the sample had 10% girls, then that sample was not representative of the population*).	Your teacher is conducting a survey to determine the average age of students in your class. Which of the following would most likely not result in a representative sample? A. ◯ Your teacher writes everyone's name down on a piece of paper and draws 10 names from a hat to survey. B. ◯ Your teacher chooses only students wearing a red or blue shirt to survey. C. ◯ Neither of these would result in a representative sample D. ◯ Both of these would result in a representative sample

<u>Topic B</u> **7.SP.A.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. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*	MP.1 MP.2 MP.3 MP.4 MP.6	Concept(s): • Inferences can be drawn from random sampling. Students are able to: • analyze data from a sample to draw inferences about the population. • generate multiple random samples of the same size. • analyze the variation in multiple random samples of the same size. **<u>Learning Goal 2</u>:** Use random sampling to produce a representative sample. **<u>Learning Goal 3</u>:** Develop inferences about a population using data from a random sample and assess the variation in estimates after generating multiple samples of the same size.	What is the average amount of time BMS students spend watching TV each week? *the surveying student will randomly ask one student at each cafe. table, during each grade level lunch, how many hours he/she watches TV each week. Based on the average of the data collected we can assume how many hours of TV the entire student body at BMS watches.
<u>Topic C</u> **7.SP.B.3**. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6 MP.7	Concept(s): No new concepts introduced Students are able to: • locate, approximately, the measure of center (mean or median) of a distribution • visually assess, given a distribution, the measure of spread (mean absolute deviation or inter-quartile range). • visually compare two numerical data distributions and describe the degree of overlap. • measure or approximate the difference between the measures centers and express it as a multiple of a measure of variability.	 Based on visual inspection of the dotplots, which group appears to have the larger average height? Which group appears to have the greater variability in the heights? • Compute the mean and mean absolute deviation (MAD) for each group. Do these values support your answers in part (a)? • How many of the 12 basketball players are shorter than the tallest field hockey player?

		Learning Goal 4: Visually compare the means of two distributions that have similar variability; express the difference between the centers as a multiple of a measure of variability. **Learning Goal 5:** Compute and describe Measures of Central Tendency (Mean, Median & Mode) & Measures of Variation (Mean Absolute Deviation & Interquartile Range)	• Imagine that an athlete from one of the two teams told you she needs to go to practice. You estimate that she is about 65 inches tall. If you had to pick, would you think that she was a field hockey player or that she was a basketball player? Explain your reasoning. • The women on the Maryland field hockey team are not a random sample of all female college field hockey players. Similarly, the women on the Maryland basketball team are not a random sample of all female college basketball players. However, for purposes of this task, suppose that these two groups can be regarded as random samples of all female college field hockey players and all female college basketball players, respectively. If these were random samples, would you think that female college basketball players are typically taller than female college field hockey players? Explain your decision using answers to the previous questions and/or additional analysis.
Topic D **7.SP.B.4**. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6	Concept(s): No new concept(s) introduced Students are able to: • using measures of center, draw informal inferences about two populations and compare the inferences. • using measures of variability, draw informal inferences about two populations and compare the inferences. **Learning Goal 6:** Draw informal comparative inferences about two populations using their measures of center and measures of variability.	 **A.** Based on visual inspection of the dot plots, which group appears to have the larger average weight? Does one group seem to have greater variability in its weights than the other, or do the two groups look similar in that regard? **B.** Compute the mean and mean absolute deviation (MAD) for each group. Do your measures support your answers in part (a)? **C.** Choose from the following to fill in the blank: "The average Alabama offensive lineman's weight is about _________ than the average Mount Union offensive lineman's weight." 1. 20 pounds lighter 2. 15 pounds lighter 3. 15 pounds heavier 4. 20 pounds heavier **D.** "This difference in average weights is approximately __________ of

			either team." 5. About half of the MAD 6. Slightly more than 1 MAD 7. Twice the MAD E. The offensive linemen on the Alabama team are not a random sample from all FBS offensive linemen. Similarly, the offensive linemen on the Mount Union Team are not a random sample from all Division III offensive linemen. However, for purposes of this task, suppose that these two groups can be regarded as random samples of offensive linemen from their respective divisions/subdivisions. If these were random samples, would you think that offensive linemen from FBS schools are typically heavier than offensive linemen from Division III schools? Explain your decision using answers to the previous questions and/or additional analysis.
Topic E **7.SP.C.5.** Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. 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.	MP.4 MP.5 MP.6 MP.7	Concept(s): • Probability of a chance event is a number between 0 and 1. • Probability expresses the likelihood of the event occurring. • Larger probability indicates greater likelihood. Students are able to: • draw conclusions about the likelihood of events given their probability. Learning Goal 7: Interpret and express the likelihood of a chance event as a number between 0 and 1, relating that the probability of an unlikely event happening is near 0, a likely event is near 1, and 1/2 is neither likely nor unlikely.	Decide where each event would be located on the scale from between 0 and 1. Place the letter for each event in the appropriate place on the probability scale. Event: A. You will see a live dinosaur on the way home from school today. B. A solid rock dropped in the water will sink. C. A round disk with one side red and the other side yellow will land yellow side up when flipped. D. A spinner with four equal parts numbered 1–4 will land on the 4 on the next spin. E. Your full name will be drawn when a full name is selected randomly from a bag containing the full names of all of the students in your class. F. A red cube will be drawn when a cube is selected from a bag that has five blue cubes and five red cubes. G. Tomorrow the temperature outside will be −250 degrees.
Topic F **7.SP.C.6.** Approximate the	MP.1	Concept(s): • Relative frequency • Experimental probability	relative frequency = # of times an event has occurred /# of trials

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<td>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.</td>
<td>MP.2

MP.3

MP.4

MP.5</td>
<td>Theoretical probability
Students are able to:
collect data on chance processes, noting the long-run relative frequency.
predict the approximate relative frequency given the theoretical probability

<u>Learning Goal 8</u>: Approximate the probability of a chance event by collecting data and observing long-run relative frequency; predict the approximate relative frequency given the probability</td>
<td>Probability: will it snow Christmas week?

Process: the students will check previous years of weather records during Christmas week, then use formula for relative frequency to determine the probability. Then convert fraction into decimal form then into a percentage. To reverse the prob. to relative frequency is to change percentage to a decimal and then to a fraction.</td>
</tr>
<tr>
<td><u>Topic G</u>

7.SP.C.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.

7.SP.C.7a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.

7.SP.C.7b. . Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.</td>
<td>MP.1

MP.2
MP.4

MP.6</td>
<td>Concept(s):
Uniform (equally likely) and non-uniform probability models
Students are able to:
develop a uniform probability model.
use a uniform probability model to determine the probabilities of events.
develop (non-uniform) probability models by observing frequencies in data that has been generated from a chance process.
<u>Learning Goal 9</u>: Develop a uniform probability model by assigning equal probability to all outcomes; develop probability models by observing frequencies and use the models to determine probabilities of events; compare probabilities from a model to observed frequencies and explain sources of discrepancy when agreement is not good</td>
<td>Problem Set

Jerry and Michael played a game similar to Picking Blue! The following results are from their research using the same two bags:

Jerry's Research:

Number of Red Chips Picked Bag A 2
Bag B 3

Number of Blue Chips Picked Bag A 8
Bag B 7

Michael's Research:

Number of Red Chips Picked Bag A 28
Bag B 22</td>
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			Number of Blue Chips Picked: Bag A 12 **Bag B 18** **1. If all you knew about the bags were the results of Jerry's research, which bag would you select for the game?** **2. If all you knew about the bags were the results of Michael's research, which bag would you select for the game? Explain your answer.** **3. Does Jerry's research or Michael's research give you a better indication of the makeup of the blue and red chips in each bag? Explain why you selected this research.** **4. Assume there are 12 chips in each bag. Use either Jerry's or Michael's research to estimate the number of red and blue chips in each bag. Then, explain how you made your estimates.** **Bag A Bag B** **Number of red chips: Number of red chips:** **Number of blue chips: Number of blue chips:** **5. In a different game of Picking Blue!, two bags each contain red, blue, green, and yellow chips. One bag contains the same number of red, blue, green, and yellow chips. In the second bag, half of the chips are blue. Describe a plan for determining which bag has more blue chips than any of the other colors.**
<u>Topic H</u> **7.SP.C.8.** Find probabilities of compound events using organized lists, tables, tree	MP.1 MP.2 MP.4 MP.5	Concept(s): • Just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space. Students are able to:	A drawer contains 5 brown socks, 6 black socks, and 9 navy blue socks. The power is out. What is the probability that Sam chooses two socks that are both black?

diagrams, and simulation. **7.SP.C.8a.** 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. **7.SP.C.8b.** Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event. **7.SP.C.8c.** Design and use a simulation to generate frequencies for compound events.	MP.7 MP.8	• use organized lists, tables, and tree diagrams to represent sample spaces. • given a description of an event using everyday language, identify the outcomes in a sample space that make up the described event. • design simulations. use designed simulations to generate frequencies for compound events. **<u>Learning Goal 10</u>:** Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams, identifying the outcomes in the sample space which compose the event. Use the sample space to find the probability of a compound event. **<u>Learning Goal 11</u>:** Design and use a simulation to generate frequencies for compound events.	The probability that it will snow on Sunday is . The probability that it will snow on both Sunday and Monday is . What is the probability that it will snow on Monday, if it snowed on Sunday?

Unit 3 Vocabulary

Chance Experiment (description) (A chance experiment consists of observing a single outcome of a chance process.)

Chance Process (description) (A chance process is any process that is repeatable and results in one of two or more well-defined outcomes each time it is repeated. The act of performing the process and producing a result is called a trial. In a chance process, trials are independent from each other in that the result of one trial does not influence the result of any other trial. In the context of probability, observing a single outcome of a chance process is sometimes called a chance experiment.)

Event (An event is a subset of outcomes of the sample space.
A simple event is an event with a single outcome. A compound event is an event that is the union of two or more simple events.)

Frequency of an Event (The frequency of an event is the number of trials for which the event occurred in performing a fixed number of trials of a chance process.)

Long-Run Relative Frequency (description) (The long-run relative frequency is the number that the relative frequencies get closer and closer to as more and more trials are performed. The long-run relative frequency for a large number of trials provides an estimate of the probability of that event occurring that can be used when the probability of that event is hard to calculate from the probability model.)

Population (description) (A population is any entire collection of people, animals, plants, or things that someone is interested in learning about. Each person or object in the population is called a member.)

Probability (description) (The probability of an event is a number between 0 and 1 that measures the chance that the event will occur.)

Probability Model (description) (A probability model is a mathematical representation of a chance process defined by its sample space, events within the sample space, and the assignment of a probability for each and every event.)

Probability Simulation (illustration) (A probability simulation is the use of a random number generator (e.g., spinners, coin toss, computers) to generate outcomes that are consistent with a given probability model.
For example, to estimate the probability that a family with children will include or more boys, the children in a family might be represented by a sequence of four random digits with even digits representing a girl and odd digits representing a boy. This would generate "families" using a model that is consistent with a family having children and each child being equally likely to be male or female. A large number of simulated "families" could be generated using technology, and then the relative frequency of those with or more boys provides an estimate of the probability that a family with children will include or more boys.)

Random Sample (A random sample of size is a sample that is selected using a process that ensures that every different possible sample of size had the same chance of being selected as the sample.
This selection process implies that every individual member of the population has the same chance of being included in the sample.)

Relative Frequency of an Event (The relative frequency of an event is the value given by the frequency of the event divided by the total number of trials.)

Sample (A sample is any subset of a population.)

Sample Space (The sample space of a chance process is the set of all possible outcomes.
For example, the sample space for the experiment of rolling a die is the set .)

Sample Statistic (description) (A sample statistic or statistic is a number (e.g., mean, standard deviation) that is calculated from a sample.
Statistics are used to estimate, predict, or make decisions about population parameters.)

Statistical Inference (Statistical inference is the process of drawing conclusions about population parameters using sample statistics.
In Grade 7, this can be described as "the process of drawing conclusions about populations using information from a sample of the population." The words in the definition above are described in this section.)

Uniform Probability Model (A uniform probability model is a probability model that assigns the same probability for all simple events of the sample space

Mean Absolute Deviation (MAD)

Unit 4 Factors and Exponents			
Content & Practice Standards	**Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Examples**
<u>Topic A</u> **8.EE.A.1.** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.	MP.1 MP.2 MP.4 MP.5 MP.6 MP.7 MP.8	Concept(s): • Exponents as simplified representation of repeated multiplication. Students are able to: • apply properties of exponents to numerical expressions. • generate equivalent numerical expressions using positive and negative integer exponents. **<u>Learning Goal 1:</u>** Apply the properties of integer exponents to write equivalent numerical expressions.	Which expressions are equivalent to $\frac{3^{-8}}{3^{-4}}$? Select **all** that apply. ☐ A. 3^{-12} ☐ B. 3^{-4} ☐ C. 3^2 ☐ D. $\frac{1}{3^2}$ ☐ E. $\frac{1}{3^4}$ ☐ F. $\frac{1}{3^{12}}$
<u>Topic B</u> 8.EE.A.3. 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.	MP.2. MP.4 MP.5 MP.6 MP.7 MP.8	Concept(s): • Very large and very small quantities can be approximated with numbers expressed in the form of a single digit times an integer power of 10. Students are able to: • estimate very large and very small quantities with numbers expressed in the form of a single digit times an integer power of 10.	You and your friend thinks that 4×10^3 is twice as great as 2×10^2. What error is your friend making? Explain your reasoning. How many times bigger is the distance from Earth to the sun of 9.3×10^6 miles than the furthest distance from Earth to the moon of 3×10^{25} miles? Order from least to greatest 2.6×10^4; 3500; 9.2×10^4. Let n be any positive integer. Consider the expressions $n \times 10^{n+1}$ and $(n+1) \times 10^n$. a. Make a table of values for each expression n = 1, 2, 3, and 4.

		• compare numbers written in the form of a single digit times an integer power of 10 and express how many times as much one is than the other. **Learning Goal 2**: Estimate and express the values of very large or very small numbers with numbers expressed in the form of a single digit times an integer power of 10. Compare numbers expressed in this form, expressing how many times larger or smaller one is than the other.	b. Is the value $n \times 10^{n+1}$ always, sometimes, or never greater than the value of $(n + 1) \times 10^{n}$ The body of a 154-pound person contains approximately 2×10^{-1} milligrams of gold and 6×10^{1} milligrams of aluminum. Based on this information, the number of milligrams of aluminum in the body is how many times the number of milligrams of gold in the body?
Topic C **8.EE.A.4.** Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. 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.	MP. 2 MP.4 MP.5 MP.6 MP.7 MP.8	Concept(s): No new concept(s) introduced Students are able to: • multiply and divide numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. • add and subtract numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. • use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. • interpret scientific notation that has been generated by technology (e.g. recognize 4.1E-2 and 4.1e-2 as 4.1×10^{-2}). **Learning Goal 3:** Perform operations using numbers expressed in scientific notation, including problems where both decimals and scientific notation are used. In real-world	Each shrimp weighs approximately 0.00027 g and a shrimp company can bring in over 3,100,000,000 shrimp per year. Approximately how much would that many shrimp weigh? McDonald's has about 210,000 managers and each makes on average of 39,000 dollars per year. How much does McDonald's spend on managers per year? The average distance from the sun to the earth is 1.488×10^{11} meters. If the length of the average paperclip is 3×10^{-2} meters, how many paperclips would need to be connected together to reach the sun?

		problem-solving situations, choose units of appropriate size for measurement of very small and very large quantities and interpret scientific notation generated when technology has been used for calculations.	
Topic D **7.EE.A.1.** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	MP.2 MP.7	Concept(s): No new concept(s) introduced Students are able to: • factor and expand linear expressions having rational coefficients, using properties of operations. • Find the gcf and lcm of a monomial **Learning Goal 4:** Apply properties of operations as strategies to add, subtract, multiply, and divide rational numbers.	Find the greatest common factor of the monomials: $16a^4b^2$, 40ab Find the LCM of the monomials: 15cd, $25cd^3$
Topic E **7.NS.A.2**. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. MP.6 Attend to precision.	Concept(s): • The process for multiplying and dividing fractions extends to multiplying and dividing to simplify algebraic expressions Students are able to: • multiply and divide to simplify and algebraic expressions **Learning Goal 5:** Apply properties of operations as strategies to add, subtract, multiply, and divide rational numbers.	$\frac{3xy}{8} \bullet \frac{4xy}{7}$

Unit 4 Vocabulary

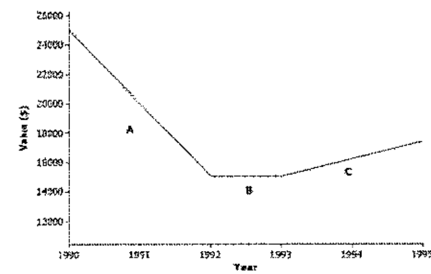
Exponent
scientific notation
Least Common Multiple
Greatest Common Factor
Monomial
Prime factorization
Factors
Multiples
Power
Exponent
Base
Factor tree

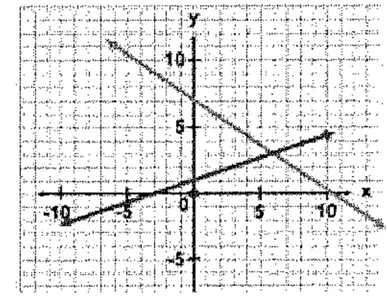
Unit 5 Functions, Equations, and Solutions	

Content & Practice Standards	Standards for Mathematical Practice	Critical Knowledge & Skills	Examples
Topic A **8.F.A.1.** Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.	MP.2 MP.5	Concept(s): • A function is a rule. • If a rule is a function, then for each input there is exactly one output. Students are able to: • use function language. • describe a function as providing a single output for each input. • determine whether non-numerical relationships are functions. • describe a function as a set of ordered pairs. • read inputs and outputs from a graph. describe the ordered pairs as containing an input, and the corresponding output. **Learning Goal 1:** Define a function as a rule that assigns one output to each input and determine if data represented as a graph or in a table is a function.	A relationship between *x* and *y* is defined by the equation $y = -\frac{4}{3}x + \frac{1}{3}$, where *x* is the input and *y* is the output. Which statements about the relationship are true? Select each correct statement. A *y* is a function of x. B The graph of the relationship is a line. C When the input is -3, the output is 4. D When the input is -2, the output is 3. E The *y*-intercept of the relationship is (0,1).
Topic B **8.F.A.2.** Compare properties (e.g. rate of change, intercepts, domain and range) of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).	MP.5 MP.8	Concept(s): • Functions (quantitative relationships) can be represented in different ways. • Functions have properties; properties of linear functions. Students are able to: • analyze functions represented algebraically, as a table of values, and as a graph. • interpret functions represented by a	You have $20 in savings at the bank. Each week, you add $4 to your savings. Your friend has $30 in a savings at the bank. Each week she adds $2 to her savings. Let y represent the total amount of money you have saved at the end of x weeks. Write an equation to represent each situation and identify the slopes. Create a table and graph the linear equations. What do the slopes represent? Who has the greater rate of savings?

		verbal description. • given two functions, each represented in a different way, compare their properties. **<u>Learning Goal 2</u>:** Compare two functions each represented in a different way (numerically, verbally, graphically, and algebraically) and draw conclusions about their properties (rate of change and intercepts).	
<u>Topic C</u> **8.F.A.3** Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear..	MP.2 MP.3 MP.5	Concept(s): • A linear function is defined by the equation $y = mx + b$. • The graph of a linear function is a straight line. Students are able to: • analyze tables of values, graphs, and equations in order to classify a function as linear or non-linear. • determine if equations presented in forms other than $y = mx + b$ (for example $3y - 2x = 7$) define a linear function. • give examples of equations that are non-linear functions. • show that a function is not linear using pairs of points. **<u>Learning Goal 3</u>:** Classify functions as linear or non-linear by analyzing equations, graphs, and tables of values; interpret the equation $y = mx + b$ as defining a linear function.	A cinder cone is a type of volcano. To describe the steepness of a cinder cone from one point on the cone to another, you can find the gradient between the two points. Graph A(0,0), B(0.1,400), and C(0.2,500). Graph the function and determine whether the graph is linear. How would you find the gradient between any two points?

Topic D **8.F.B.4.** 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.	MP.2 MP.6 MP.7	Concept(s): • As with equations, two (x,y) values can be used to construct a function. Students are able to: • determine the rate of change and initial value of a function from a description of a relationship. • determine the rate of change and initial value of a function from two (x, y) values by reading from a table of values. • determine the rate of change and initial value of a function from two (x, y) values by reading these from a graph. • construct a function in order to model a linear relationship. interpret the rate of change and initial value of a linear function in context. **Learning Goal 4:** Model a linear relationship by constructing a function from two (x,y) values. Interpret the rate of change and initial value of the linear function in terms of the situation it models, and in terms of its graph or a table of values.	The table of values below represents the number of pages that Anne can type, y, in a few selected x minutes. Assume she types at a constant rate. Use the table below to determine the slope or Anne's constant rate of typing. **Minutes (x)** | **Pages Typed (y)** 3 | 2 5 | 10/3 8 | 16/3 10 | 20/3

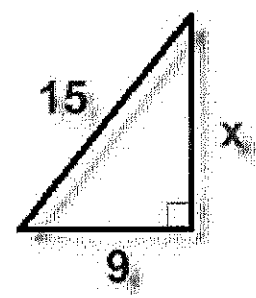
<u>Topic E</u> **8.F.B.5.** Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.	MP.1 MP.2 MP.4 MP.5	Concept(s): No new concept(s) introduced Students are able to: • analyze a graph. • provide qualitative descriptions of graphs (e.g. where increasing or decreasing, linear or non-linear). • given a verbal description, sketch a graph of a function based on the qualitative features described. **<u>Learning Goal 5</u>:** Sketch a graph of a function from a qualitative description and give a qualitative description of a graph of a function.	1. The graph below shows the relationship between a car's value and time.  Match each part of the graph (A, B, and C) to its verbal description. Explain the reasoning behind your choice. i. The value of the car holds steady due to a positive consumer report on the same model. ii. There is a shortage of used cars on the market, and the value of the car rises at a constant rate. iii. The value of the car depreciates at a constant rate.
<u>Topic F</u> **8.EE.C.7.** Solve linear equations in one variable.	MP.5 MP.6	Concept(s): • Linear equations may have an infinite number of solutions. • Linear equations may have no solution or a single solution. Students are able to: • give examples of linear equations in one variable with one solution *(x = a),* infinitely many solutions *(a = a),* or no solutions *(a = b.)* • transform a given equation, using the properties of equality, into simpler forms. • transform a given equation until an equivalent equation of the form *x = a, a = a,* or *a = b* results *(a and b are different numbers).* • solve linear equations that have fractional coefficients; include equations requiring use of the distributive property and collecting	$.84 - .09x = .3(.25x - 1.6)$

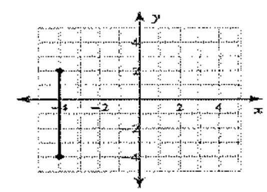
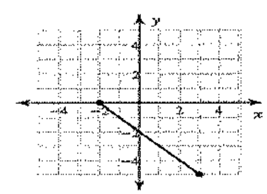
		like terms. **<u>Learning Goal 6</u>:** Apply the distributive property and collect like terms to solve linear	
<u>Topic G</u> **8.EE.C.8**. Analyze and solve pairs of simultaneous linear equations.	MP.1 MP.2 MP.6 MP.7	Concept(s): • Simultaneous linear equations may have an infinite number of solutions. • Simultaneous linear equations may have no solution or a single solution. • Solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs. Students will be able to: • solve systems of two linear equations in two variables algebraically. • estimate solutions of a linear system of two equations by graphing. • solve simple cases of a linear system of two equations by inspection. • solve real-world and mathematical problems leading to two linear equations in two variables. **<u>Learning Goal 7:</u>** Solve systems of linear equations in two variables algebraically and by inspection. Estimate solutions by graphing, explain that points of intersection satisfy both equations simultaneously, and interpret solutions in context	What is the solution of the system of linear equations provided on the graph? A (0, 1) B (1, 0) C (6, 3) D (3, 6)  Consider the system of equations. $y = 2x + 2$ $y = 6x + 2$ Select from the drop-down menus to correctly complete each statement. The graph of the system consists of lines that have __________ of intersection. Therefore, A no points B exactly one point C more than one point the system has __________ solution. D no E exactly one F more than one

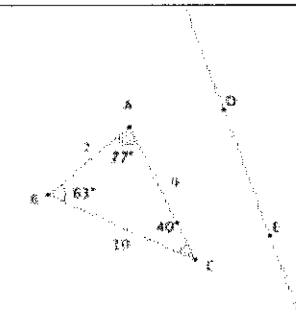
Unit 5 Vocabulary

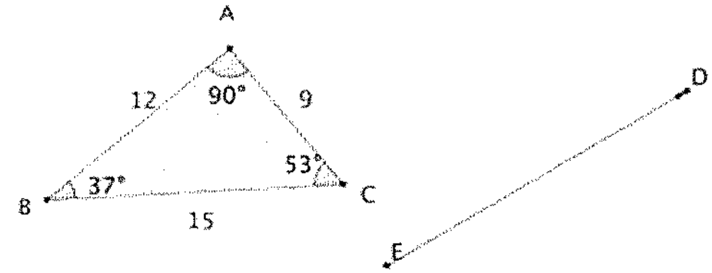
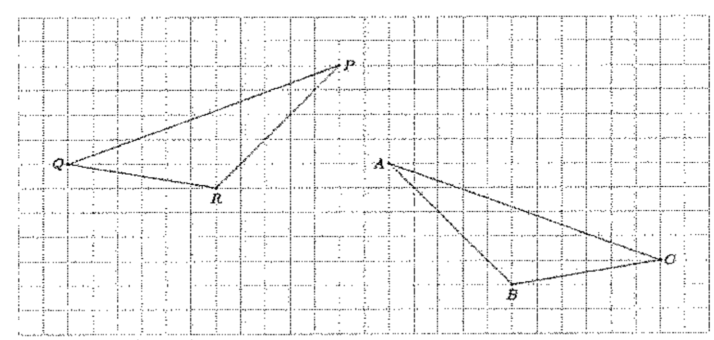
function
input
output
domain
range
ordered pair
non-linear function
linear function
y = mx + b
systems of linear equations
point of intersection and one solution
no solution
infinite solutions

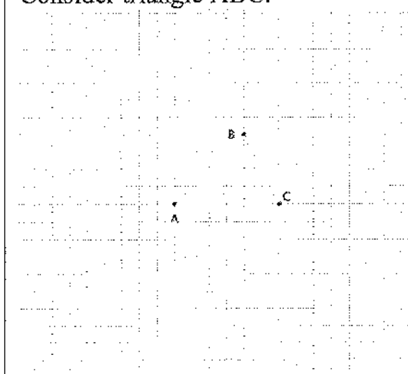
Unit 6 Geometry: Pythagorean Theorem, Congruence and Similarity Transformations			
Content & Practice Standards	**Standards for Mathematical Practice**	**Critical Knowledge & Skills**	**Examples**
Topic A **8.EE.A.2**. Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ 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.	MP.2 MP.4 MP.5 MP.6 MP.7 MP.8.	Concept(s): • Square root and cube roots; perfect squares and perfect cubes • Inverse relationship between powers and square roots Students are able to: • give the value of square roots of small perfect squares. • solve equations of the form $x^2 = p$, where p is a positive rational number. • use the square root symbol to represent solutions to equations of the form $x^2 = p$.	If the area of a square is 144 ft^2 then how long is each side? $X^2 = 64$ If the volume of a cube is 64 ft^3 then how long is each dimension?

		• give the value of cube roots of small perfect cubes. • show or explain that √2 is an irrational number. **Learning Goal 1:** Evaluate square roots and cubic roots of small perfect squares and cubes respectively and use square 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; identify √2 as irrational.	
Topic B 8.G.B.6. Explain a proof of the Pythagorean Theorem and its converse.	MP.2	Concept(s): • Pythagorean Theorem • If the square of one side of a triangle is equal to the sum of the squares of the other two sides, then the triangle is a right triangle (Pythagorean theorem converse). Students are able to: • given a proof of the Pythagorean theorem, explain the proof. • given a proof of the converse of the Pythagorean theorem, explain the proof. **Learning Goal 2**: Explain a proof of the Pythagorean Theorem and its converse.	
Topic C 8.G.B.7. Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three	MP.2 MP.7	Concept(s): No new concept(s) introduced Students are able to: • determine side lengths of right triangles by applying the Pythagorean Theorem to solve	The foot of s ladder is placed 6 feet from a wall. If the top of the ladder rests 8 feet up on the wall, how long is the ladder? In baseball it is 90 feet between bases. If the catcher throws the ball

dimensions.		real world and mathematical problems involving two dimensional spaces. • determine side lengths of right triangles by applying the Pythagorean Theorem to solve real world and mathematical problems involving three dimensional spaces. **Learning Goal 3:** Apply the Pythagorean Theorem to determine unknown side lengths of right triangles in two and three dimensional cases when solving real-world and mathematical problems.	from home to second then how many feet is that?
Topic D **8.G.B.8.** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system	MP.2 Reason abstractly and quantitatively. MP.7 Look for and make use of structure.	Concept(s): No new concept(s) introduced Students are able to: • determine the distance between two points in a coordinate plane by drawing a right triangle and applying the Pythagorean Theorem. **Learning Goal 4**: Use the Pythagorean Theorem to determine the distance between two points in the coordinate plane. **Learning Goal 5**: Use the Midpoint Formula to calculate the midpoint of a line on the coordinate plane.	Find the distance between each pair of points.  
Topic E **8.G.A.1**. Verify experimentally the properties of rotations,	MP.3. MP.5	Concept(s): • A property of rigid motion transformations (rotation, reflection, and translation) is that	a. Below is a triangle ABC and a line DE←→:

reflections, and translations: **8.G.A.1a**. Lines are transformed to lines, and line segments to line segments of the same length. **8.G.A.1b.** Angles are transformed to angles of the same measure. **8.G.A.1c**. Parallel lines are transformed to parallel lines.	MP.8	the measure of a two-dimensional object under the transformation remains unchanged. Students are able to: • show and explain that performing rotations, reflections, and translations on lines results in a line. • show and explain that performing rotations, reflections, and translations on line segments results in a line segment and does not alter the length of the line segment. • show and explain that performing rotations, reflections, and translations on angles results in an angle and does not alter the measure of the angle. • show and explain that performing rotations, reflections, and translations on parallel lines results in parallel lines. • explain that a property of rigid motion transformations (rotation, reflection, and translation) is that the measure of a two-dimensional object under the transformation remains unchanged. **<u>Learning Goal 6:</u>** Explain and model the properties of rotations, reflections, and translations with physical representations and/or geometry software using pre-images and resultant images of lines, line segments, and angles.	 rReflect △ABC over DE←→. Label the reflected triangle A′B′C′. What are the side lengths and angle measures of triangle A′B′C′? What happens when you change the location of one of the vertices of △ABC? What happens when you change the location of line DE←→? b. Below is a triangle ABC and a point E. Draw the rotation of △ABCabout E through an angle of 85 degrees in the counterclockwise direction.  Label the image of △ABC as △A′B′C′. What happens to the side lengths and angle measures of △A′B′C′ when you change the measure of the angle of rotation? What happens when you move the center of rotation E? c. Below is a triangle ABC and a directed line

			segment $\overline{ED}$.  Draw the translation of $\triangle ABC$ by $\overline{ED}$ and label it $\triangle A'B'C'$. What happens to the side lengths and angle measures of triangle $A'B'C'$ when you change one of the vertices, A, B, or C? What if you change the position, length, or direction of the directed line segment $\overline{ED}$?
<u>Topic F</u> **8.G.A.2.** 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; given two congruent figures, describe a sequence that exhibits the congruence between them.	MP.2 MP.7	Concept(s): • 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. Students are able to: • given two congruent figures, describe a transformation or sequence of transformations that shows the congruence between them. **<u>Learning Goal 7</u>:** Describe and perform a sequence of rotations, reflections, and/or translations on a two dimensional figure in	The two triangles in the picture below are congruent:  a. Give a sequence of rotations, translations, and/or reflections which take $\triangle PRQ$ to $\triangle ABC$.

		order to prove that two figures are congruent.	Is it possible to show the congruence in part (a) using only translations and rotations? Explain.
Topic G **8.G.A.3**. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	MP.2 MP.3 MP.5	Concept(s): No new concept(s) introduced Students are able to: • describe, using coordinates, the resulting two-dimensional figure after applying dilations with scale factor greater than, less than, and equal to 1. • describe, using coordinates, the resulting two-dimensional figure after applying translation, rotation, and reflection. **Learning Goal 8**: Use the coordinate plane to locate images or pre-images of two-dimensional figures and determine the coordinates of a resultant image after applying dilations, rotations, reflections, and translations.	Consider triangle ABC.  a. Draw a dilation of ABC with: Center A and scale factor 2. ii. Center B and scale factor 3. iii. Center C and scale factor 12. b. For each dilation, answer the following questions: . By what factor do the base and height of the triangle change? Explain. i. By what factor does the area of the triangle change? Explain. ii. How do the angles of the scaled triangle compare to the original? Explain.

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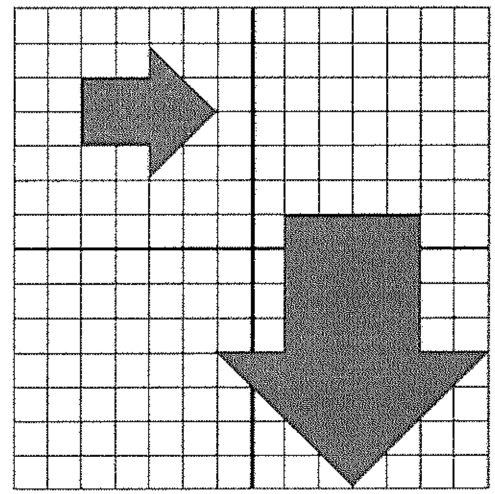
<td><u>Topic H</u>

8.G.A.4. 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; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.</td>
<td>MP.2

MP.7</td>
<td>Concept(s):
• 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.
• Congruent figures are also similar.
Students are able to:
• describe a transformation or sequence of transformations that show the similarity between them given two similar two-dimensional figures.

<u>Learning Goal 9</u>: Apply an effective sequence of transformations to determine that figures are similar when corresponding angles are congruent and corresponding sides are proportional. Write similarity statements based on such transformations.</td>
<td>Determine, using rotations, translations, reflections, and/or dilations, whether the two polygons below are similar.



The intersection of the dark lines on the coordinate plane represents the origin (0,0) in the coordinate plane.</td>
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Unit 6 Vocabulary
Square root
Perfect Square
Cube root
Perfect Cube
Leg
Hypotenuse
Pythagorean Theorem
Transformation
Reflection
Rotation
Dilation
Translation

Research-Based Effective Teaching Strategies	21st Century Learning Skills
Task/Activities that solidifies mathematical concepts Use questioning techniques to facilitate learning Reinforcing Effort, Providing Recognition Practice , reinforce and connect to other ideas within mathematics Promotes linguistic and nonlinguistic representations Cooperative Learning Setting Objectives, Providing Feedback Varied opportunities for students to communicate mathematically Use technological and /or physical tools	Teamwork and Collaboration Initiative and Leadership Curiosity and Imagination Innovation and Creativity Critical thinking and Problem Solving Flexibility and Adaptability Effective Oral and Written Communication Accessing and Analyzing Information

Formative Assessment	Summative Assessment	Technology
Short constructed responses Extended responses Checks for understanding Exit tickets Teacher observation Projects Timed Practice Test – Multiple Choice & Open-Ended Questions	End of Unit Assessment	NJ CORE Annenberg Learning : Insight into Algebra 1 Mathematics Assessment Projects Get the Math Achieve the Core Webmath.com sosmath.com Mathplanet.com Interactive Mathematics.com Illustrative Mathematics Inside Mathmatics.org Asia Pacific Economic Cooperation : :Lesson Study Videos Genderchip.org Interactive Geometry Mathematical Association of America National Council of Teachers of