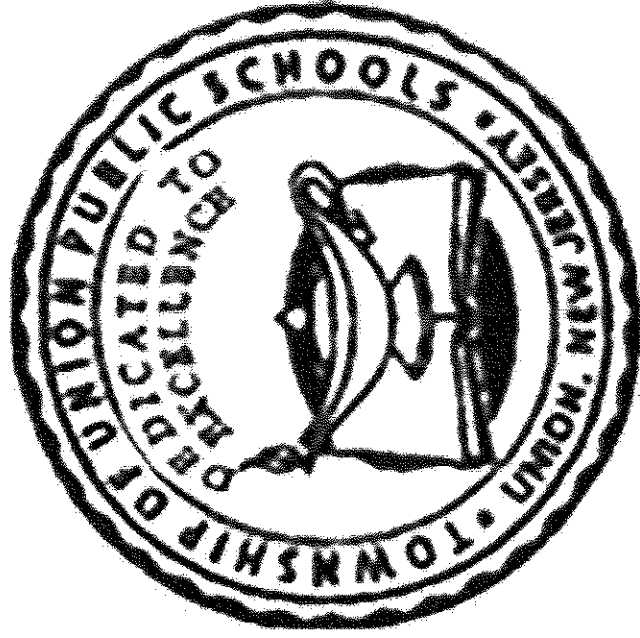


TOWNSHIP OF UNION PUBLIC SCHOOLS



**Grade 6 Mathematics
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

This course is designed to cover all 6th grade New Jersey State Learning Standards as well as introduce skill sets needed to be successful in the 7th grade course. The sixth grade math curriculum is currently aligned with the NJSL. All skills required for mastery are a part of the sixth grade learning goals. All lessons are created to address differentiated learning styles to ensure each lesson's objective is obtained by each student. The sixth grade curriculum focuses on sixth critical areas: (1) Ratios; (2) Arithmetic: Decimals, Fractions, and Number Theory; (3) Rational Numbers – representing, comparing and ordering, absolute value, - all operations; (4) Expressions and Equations – translating, substitution, solve one and two step equations; (5) Area, Surface Area and Volume of Prism and Pyramids; and (6) Statistics – Measures of Central Tendency and Measures of Variations.

Recommended Textbooks:

Eureka Math – EngageNY Grade 6 Mathematics

Curriculum Units

Unit 1: Representing and Reasoning about Ratios

Unit 2: Arithmetic

Unit 3: Rational Numbers

Unit 4: Expressions & Equations

Unit 5: Area, Surface Area and Volume

Unit 6: Statistics

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 1 Representing & Reasoning About Ratios	<ul style="list-style-type: none"> ■ 6.RP.A.1 ■ 6.RP.A.2 ■ 6.RP.A.3a ■ 6.RP.A.3b ■ 6.RP.A.3c ■ 6.RP.A.3d 	<ul style="list-style-type: none"> • Understand ratio concepts and use ratio reasoning to solve problems • Be able create and apply Ratio Tables as well as model application problems using Ratio Tables • Calculate Unit Rate • Convert between Units of Measure using Units • Find the Percent of a quantity as a rate per 100 	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.
Unit 1: Suggested Educational Resources	<ul style="list-style-type: none"> 6.RP.A.1 Games at Recess 6.RP.A.2 Price per pound and pounds per dollar 6.RP.A.3 Voting for Three, Variation 1 6.RP.A.3c Shirt Sale 		
Unit 2 Arithmetic	<ul style="list-style-type: none"> ■ 6.NS.A.1 ◎ 6.NS.B.2 ◎ 6.NS.B.3 ◎ 6.NS.B.4 	<ul style="list-style-type: none"> • Apply and extend previous understandings of multiplication and division to divide fractions by fractions • Compute fluently with Decimal Values (all operations) • Fluently divide multi-digit numbers • Identify Least Common Multiple & Greatest Common Factor 	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 2: Suggested Educational Resources	<ul style="list-style-type: none"> 6.NS.A.1 Traffic Jam 6.NS.B.3 Reasoning about Multiplication and Division and Place Value, Part 1 6.NS.B.4 Factors and Common Factors 6.NS.B.4 Multiples and Common Multiples 		

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
<p>Unit 3 Rational Numbers</p>	<ul style="list-style-type: none"> ■ 6.NS.C.5 ■ 6.NS.C.6a ■ 6.NS.C.6b ■ 6.NS.C.6c ■ 6.NS.C.7 ■ 6.NS.C.8 □ 6.G.A.1 	<ul style="list-style-type: none"> • Understand Positive & Negative Numbers on the Number Line • Be able to order and understand Absolute Value • Use the Coordinate Plane to plot ordered pairs • Identify Symmetry in the Coordinate Plane 	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.3 Construct viable arguments & critique the reasoning of others.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p>
<p>Unit 3: Suggested Educational Resources</p>	<p>6.NS.C.5 <u>Warmer in Miami</u> 6.NS.C.6 <u>Mile High</u> 6.NS.C.7 <u>Jumping Flea</u> 6.NS.C.7a <u>Fractions on the Number Line</u> 6.NS.C.7b <u>Comparing Temperatures</u> 6.NS.C.8 <u>Nome, Alaska</u> 6.G.A.1, 6.G.A.3 <u>Polygons in the Coordinate Plane</u></p>		
<p>Unit 4 Expressions & Equations</p>	<ul style="list-style-type: none"> ■ 6.EE.A.1 ■ 6.EE.A.2a ■ 6.EE.A.2b ■ 6.EE.A.2c ■ 6.EE.A.3 ■ 6.EE.A.4 ■ 6.EE.B.5 ■ 6.EE.B.6 ■ 6.EE.B.7 ■ 6.EE.B.8 ■ 6.EE.C.9 	<ul style="list-style-type: none"> • Distinguish relationships between Inverse Operations • Compute exponents & understand the Order of Operations • Understand the concept of substitution • Apply and extend previous understanding of arithmetic to algebraic expressions. • Be able to identify parts of an algebraic expression • Use algebraic properties to write equivalent expressions (distributive property) • Be able to expand, factor, and distribute algebraic expressions • Write and evaluate expressions including the use of Formulas • Reason about and solve one variable equations • Reason about and solve one variable inequalities • Apply and solve one step equation problems in the real world 	<p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning.</p>

Overview	Standards for Mathematical Content	Unit Focus	Standards for Mathematical Practice
Unit 4: Suggested Educational Resources	<u>6.EE.A.1 The Djinni's Offer</u> <u>6.EE.A.2 Rectangle Perimeter 1</u> <u>6.EE.A.4 Rectangle Perimeter 2</u> <u>6.EE.A.4 Equivalent Expressions</u> <u>6.EE.B.5 Make Use of Structure</u> <u>6.EE.B.7 Morning Walk</u> <u>6.EE.B.8 Fishing Adventures 1</u> <u>6.EE.C.9 Families of Triangles</u>		
Unit 5: Area, Surface Area, and Volume	<input checked="" type="checkbox"/> 6.G.A.1 <input checked="" type="checkbox"/> 6.G.A.2 <input checked="" type="checkbox"/> 6.G.A.3 <input checked="" type="checkbox"/> 6.G.A.4	<ul style="list-style-type: none"> Find the area of triangles and special quadrilaterals Use the known formulas to find the area of composite figures Draw polygons on the Coordinate Plane and be able to determine the perimeter and area of the figure Find the volume of a right rectangular prism Be able to find the surface area of a 3 dimensional figures using nets and formula. 	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.3 Construct viable arguments & critique the reasoning of others.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning.</p>
Unit 5: Suggested Educational Resources	<u>6.G.A.2 Volumes with Fractional Edge Lengths</u> <u>6.G.A.4 Nets for Pyramids and Prisms</u>		
Unit 6: Statistics	<input checked="" type="checkbox"/> 6.SP.A.1 <input checked="" type="checkbox"/> 6.SP.A.2 <input checked="" type="checkbox"/> 6.SP.A.3 <input checked="" type="checkbox"/> 6.SP.B.4 <input checked="" type="checkbox"/> 6.SP.B.5 <input checked="" type="checkbox"/> 6.SP.B.5b	<ul style="list-style-type: none"> Be able to understand and describe distributions of numerical data Summarize a normal distribution using mean and mean absolute deviation Summarize a skewed distribution using median and interquartile range 	
Unit 6: Suggested Educational Resources	<u>6.SP.A.1 Identifying Statistical Questions</u> <u>6.SP.A.2. 6.SP.B.4 Puppy Weights</u> <u>6.SP.A.3 Is It Center or Is It Variability?</u> <u>6.SP.B.5c Number of Siblings</u> <u>6.SP.B.5d Mean or Median?</u>		

Unit 1 Ratios & Unit Rates												
Content & Practice Standards	Standards for Mathematical Practice	Critical Knowledge & Skills										
<p>Topic A: Representing and Reasoning About Ratios</p> <p>6.RP.A.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p>	<p>MP.2 Reason abstractly and quantitatively.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> A ratio shows relative sizes or values of two quantities. <p>Students are able to:</p> <ul style="list-style-type: none"> describe a ratio relationship between two quantities using ratio language. Express ratios in simplest form. <p>Learning Goal 1: Explain the relationship of two quantities in given ratio using ratio language.</p>										
<p>Topic A: Representing and Reasoning About Ratios</p> <p>6.RP.A.1. Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p>	<p>MP.2 Reason abstractly and quantitatively.</p>	<p>Examples</p> <ul style="list-style-type: none"> The students in Mr. Hill's class played games at recess. <ul style="list-style-type: none"> 6 boys played soccer 4 girls played soccer 2 boys jumped rope 8 girls jumped rope <p>Afterward, Mr. Hill asked the students to compare the boys and girls playing different games.</p> <p>Mika said, "Four more girls jumped rope than played soccer." Chaska said, "For every girl that played soccer, two girls jumped rope." Mr. Hill said, "Mika compared the girls by looking at the difference and Chaska compared the girls using a ratio."</p> <ol style="list-style-type: none"> Compare the number of boys who played soccer and jumped rope using the difference. Write your answer as a sentence as Mika did. Compare the number of boys who played soccer and jumped rope using a ratio. Write your answer as a sentence as Chaska did. Compare the number of girls who played soccer to the number of boys who played soccer using a ratio. Write your answer as a sentence as Chaska did <p>This table shows the numbers of books, by type, checked out from the school library on Monday.</p> <table border="1"> <thead> <tr> <th>Book Type</th> <th>Number of Books</th> </tr> </thead> <tbody> <tr> <td>mystery</td> <td>24</td> </tr> <tr> <td>nonfiction</td> <td>18</td> </tr> <tr> <td>adventure</td> <td>12</td> </tr> <tr> <td>humor</td> <td>16</td> </tr> </tbody> </table> <p>Use the drop-down menus to complete the statement. For every <input type="text"/> checked out, <input type="text"/> mystery books checked out. <input type="text"/> nonfiction books were</p>	Book Type	Number of Books	mystery	24	nonfiction	18	adventure	12	humor	16
Book Type	Number of Books											
mystery	24											
nonfiction	18											
adventure	12											
humor	16											

<p>Topic B: Collections of Equivalent Ratios</p> <p>6.RP.A.3. Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations. *(benchmark)</p> <p>6.RP.A.3a. Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> • use ratio reasoning to create tables of equivalent ratios relating quantities with <i>whole number</i> measurements, find missing values in tables. • compare ratios using tables of equivalent ratios. <p>Learning Goal 2: Create and complete tables of equivalent ratios to solve real world and mathematical problems using ratio and rate reasoning that include making tables of equivalent ratios, solving unit rate problems, finding percent of a quantity as a rate per 100</p>	<ul style="list-style-type: none"> • John, Marie, and Will all ran for 6th grade class president. Of the 36 students, 16 voted for John, 12 for Marie, and 8 for Will. - What was the ratio of votes for John to votes for Will? What was the ratio of votes for Marie to votes for Will? What was the ratio of votes for Marie to votes for John? - Because no one got half the votes, they had to have a run-off election. Marie dropped out and convinced all her voters to vote for Will. What is the new ratio of Will's votes to John's? - John and Will also ran for Middle School Council President. There are 90 students voting in middle school. If the ratio of Will's votes to John's votes remains the same as it was in part (b), how many more votes will Will get than John? Use a table. • Sam's two new aquariums each hold exactly 200 gallons of water. One aquarium will hold small fish and the other will hold large fish. Now he needs fish for his aquariums. <ul style="list-style-type: none"> - He will buy 5 small fish for every 10 gallons of water in the aquarium. - He will buy 8 large fish for every 40 gallons of water in the aquarium. <p>What is the total number of fish Sam will have? What will the ratio of Sam's small fish to large fish? Show and explain the ratios in a table.</p>
<p>Topic C: Unit Rates</p> <p>6.RP.A.2. Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.</p> <p>6.RP.A.3b. Solve unit rate problems including those involving unit pricing and</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> • A rate is a ratio comparing two different types of quantities. <p>Students will be able to:</p> <ul style="list-style-type: none"> • determine the unit rate given a ratio relationship. • describe a unit rate relationship between two quantities using rate 	<ul style="list-style-type: none"> • We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger. The grocery store sells beans in bulk. The grocer's sign above the beans says, 5 pounds for \$4. At this store, you can buy any number of pounds of beans at this same rate, and all prices include tax. • Alberto said, "The ratio of the number of dollars to the number of pounds is 4:5. That's \$0.80 per pound." • Beth said, "The sign says the ratio of the number of pounds to the number of dollars is 5:4. That's 1.25 pounds per dollar." <p>1. Are Alberto and Beth both correct? Explain.</p>

<p>constant speed.</p> <p>6.RP.A.3d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p>	<p>strategically</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning</p>	<p>language.</p> <ul style="list-style-type: none"> • convert measurement units using ratio reasoning and proportions. • transform units appropriately when multiplying and dividing quantities. <p>Learning Goal 3: Use rate language, in the context of the ratio relationship, to describe a unit rate.</p> <p>Learning Goal 4: Use ratio and rate reasoning to convert measurement units and to transform units appropriately when multiplying or dividing quantities</p> <p>Learning Goal 5: Students will be able to set up and solve proportions.</p>	<p>2. Claude needs two pounds of beans to make soup. Show Claude how much money he will need.</p> <p>3. Dora has \$10 and wants to stock up on beans. Show Dora how many pounds of beans she can buy.</p> <p>4. Do you prefer to answer parts (b) and (c) using Alberto's rate of \$0.80 per pound, using Betty's rate of 1.25 pounds per dollar, or using another strategy? Explain.</p> <ul style="list-style-type: none"> • Chad drove 168 miles in 3 hours. Part A – How many miles per hour did Chad drive? • Part B – Chad will drive 672 more miles. He continues to drive at the same rate. How many hours will it take Chad to drive the 672 miles? • Part C – Chad stopped and filled the car with 11 gallons of gas. He had driven 308 miles using the previous 11 gallons of gas. How many miles per gallon did Chad's car get? • If it took 7 hours to mow 4 lawns, then at that rate, how many lawns could be mowed in 35 hours? At what rate were lawns being mowed? • Jessica sees the following speed limit sign while visiting Australia where the units for speed are kilometers per hour:  <ul style="list-style-type: none"> Part a. A conversion table indicates that 1 mile is 1.6 km. With this conversion rate, is the speed limit greater than or less than 65 mph? Explain. Part b. Jessica finds out that 1 mile is not exactly 1.6 km. This number has been rounded to the nearest tenth. Does this influence the answer to part (a)
<p>Topic D: Percent</p> <p>6.RP.A.3c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> • Use the percent proportion to solve percent problems • calculate a percent of a quantity and solve problems by finding the whole 	<ul style="list-style-type: none"> • John, Marie, and Will all ran for 6th grade class president. Of the 36 students, 16 voted for John, 12 for Marie, and 8 for Will. <ul style="list-style-type: none"> - What was the ratio of votes for John to votes for Will? What was the ratio of votes for Marie to votes for Will? What was the ratio of votes for Marie to votes for John? - Because no one got half the votes, they had to have a run-off election. Marie dropped out and convinced all her voters to vote for Will. What is the new ratio of Will's votes to John's?

	<p>appropriate tools strategically</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p> <p>MP.8 Look for and express regularity in repeated reasoning</p>	<p>when given the part and the percent.</p> <p>Learning Goal 6: Create and complete tables of equivalent ratios to solve real world and mathematical problems using ratio and rate reasoning that include making tables of equivalent ratios, solving unit rate problems, finding percent of a quantity as a rate per 100.</p>	<p>- John and Will also ran for Middle School Council President. There are 90 students voting in middle school. If the ratio of Will's votes to John's votes remains the same as it was in part (b), how many more votes will Will get than John? Use a table.</p> <ul style="list-style-type: none"> Selina bought a shirt on sale that was 20% less than the original price. The original price was \$5 more than the sale price. What was the original price? Explain or show work. <p>Anita brings 6 dolls to her grandma's house. These dolls represent 20% of Anita's doll collection, as shown in the diagram.</p> <div data-bbox="553 331 669 766" data-label="Figure"> </div> <p>What is the total number of dolls in Anita's doll collection?</p>
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Unit 1 Vocabulary

- Simplest Form
- Ratio
- Ratio Table
- Equivalent Ratios
- Rate
- Unit Rate
- Proportion
- Percent

Unit 2 Arithmetic

Content & Practice Standards

Standards for Mathematical Practice

MP.4 Model with mathematics.

Topic A: Multiplying & Dividing Fractions

6.NS.A.1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.

Critical Knowledge & Skills

Concept(s): No new concept(s) introduced

Students are able to:

- Convert mixed numbers to improper fractions and improper fractions to mixed numbers
- Find the reciprocal of a fraction and mixed number
- multiply and divide a fraction by a fraction.
- represent division of fractions using visual models.
- interpret quotients of fractions in the context of the problem.
- compute quotients of fractions in order to solve word problems.
- write equations to solve word problems involving division of fraction by a fraction.
- use the relationship between multiplication and division to explain division of fractions.

Learning Goal 1: Compute products of fractions and mixed numbers.

Learning Goal 2: Compute quotients of fractions and mixed numbers.

Learning Goal 3: Construct visual fraction models to represent quotients of fractions and use the relationship between multiplication and division to explain

Examples

- Dan observes that

$$\frac{6}{10} \div \frac{2}{10} = 6 \div 2$$

He says,

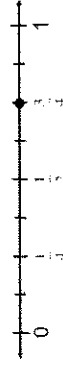
I think that if we are dividing a fraction by a fraction with the same denominator, then we can just divide the numerators.

Is Dan's conjecture true for all fractions? Explain how you know.

- You are stuck in a big traffic jam on the freeway and you are wondering how long it will take to get to the next exit, which is $1\frac{1}{2}$ miles away. You are timing your progress and find that you can travel $\frac{2}{3}$ of a mile in one hour. If you continue to make progress at this rate, how long will it be until you reach the exit? Solve the problem with a diagram and explain your answer.

- James has a board that is $\frac{3}{4}$ foot long. He wants to cut the board into pieces that are each $\frac{1}{8}$ foot long. How many pieces can James cut from the board? Explain how James can use the number line diagram to determine the number of pieces he can cut from the board.

This diagram shows a number line.



- Every student was given a magnet in Science class today. Each magnet

		<p>division of fractions.</p> <p>Learning Goal 4: Solve real-world problems involving quotients of fractions and interpret the solutions in the context given.</p>	<p>weighed $\frac{5}{16}$ of a pound. If there were 28 students in your class, how much did all of the magnets weigh together?</p>
<p>Topic B & C: Multi-Digit Decimal Operations & Dividing Whole Numbers and Decimals</p> <p>6.NS.B.2. Fluently divide multi-digit numbers using the standard algorithm.</p> <p>6.NS.B.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p>		<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> • use the standard algorithm to divide multi-digit numbers with speed and accuracy. • add and subtract multi-digit decimals with accuracy and efficiency. • multiply and divide multi-digit decimals with accuracy and efficiency. <p>Learning Goal 5: Fluently divide multi-digit numbers using the standard algorithms.</p> <p>Learning Goal 6: Fluently add, subtract, multiply and divide multi-digit decimals.</p>	<ul style="list-style-type: none"> • Use the computation shown below to find the products. $\begin{array}{r} 189 \\ 16 \overline{)3024} \\ \underline{16} \\ 142 \\ \underline{128} \\ 144 \\ \underline{144} \\ 0 \end{array}$ a) 189×16 b) 80×16 c) 9×16 • Use the fact that $13 \times 17 = 221$ to find the following. <ol style="list-style-type: none"> 13×1.7 130×17 13×1700 1.3×1.7


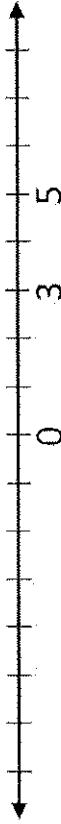
<p>Topic D: Number Theory</p> <p>6.NS.B.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.</p>	<p>MP.7 Look for and make use of structure.</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> determine whether a number is prime or composite. use divisibility rules. find the prime factorization of a number. create lists of factors for two whole numbers less than or equal to 100; find the largest factor common to both lists. create lists of multiples for two whole numbers less than or equal to 12; find the smallest multiple common to both lists. <p>Learning Goal 7: Use divisibility rules to 2,3,4,5,6,9, and 10 to find factors and determine whether a number is prime or composite.</p> <p>Learning Goal 8: Find the prime factorization of a number written in</p>	<p>e. $2210 \div 13$</p> <p>f. $22100 \div 17$</p> <p>g. $221 \div 1.3$</p> <ul style="list-style-type: none"> Thomas buys a case of bottled water. A case contains 36 bottles of water and \$4.69. Thomas will sell each bottle of water for \$0.75 at a school event. How much profit, in dollars, will Thomas earn if he sells all the bottles of water?
			<p>Part A - List all the factors of 48. List all the factors of 64. What are the common factors of 48 and 64? What is the greatest common factor of 48 and 64?</p> <p>Part B - List all the multiples of 8 that are less than or equal to 100. List all the multiples of 12 that are less than or equal to 100. What are the common multiples of 8 and 12 from the two lists? What is the least common multiple of 8 and 12?</p> <p>Part C - Lyle noticed that the list of common multiples has a pattern. Describe a pattern in the list of numbers that Lyle might have seen.</p> <ul style="list-style-type: none"> The United States wants to adopt another state into our country. If another state joins the United States would it be possible to arrange the stars of the new flag in rows, where each row has the same number of stars? Explain why or why not using your divisibility rules The wing span of a red robin is $2x^3$ cm long. The wing span of a blue jay is 2^2x^2 cm long. Which bird has the larger wing span? Compare the prime factorization of the wing spans.


exponential form.

Learning Goal 9: Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two numbers less than or equal to 12.

Unit 2 Vocabulary

Mixed Number
Improper Fractions
Equivalent Fractions
Reciprocal
Product
Quotient
Divisible
Prime Numbers
Composite Numbers
Prime Factorization
Greatest Common Factor
Least Common Multiple

Unit 3 Rational Numbers		Examples
Content & Practice Standards	Standards for Mathematical Practice	Critical Knowledge & Skills
<p>Topic A & B : Positive and Negative Numbers on a Number Line & Absolute Value</p> <p>6.NS.C.5. Understand that positive and negative numbers are used together to describe quantities having opposite directions or use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p> <p>6.NS.C.6a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., $-(-3) = 3$, and that 0 is its own opposite.</p> <p>6.NS.C.6c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.</p> <p>6.NS.C.7. Understand ordering and absolute value of rational numbers.</p> <p>6.NS.C.7a. Interpret statements of inequality as statements about</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.3 Construct viable arguments and critique the reasoning of others.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.8 Look for and express regularity in repeated reasoning.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Positive and negative numbers, used together, describe quantities having opposite directions or opposite values. Opposite signs of numbers indicate locations on opposite sides of 0 on the number line. The opposite of the opposite of a number is the number itself (e.g. the opposite of three is -3. The opposite of the opposite of three, $-(-3)$, is equal to the original number, 3). The absolute value of a rational number is its distance from 0 on the number line. <p>Students are able to:</p> <ul style="list-style-type: none"> represent quantities with positive and negative numbers in real-world contexts. interpret positive and negative numbers in real-world contexts. explain the meaning of zero, in context, in each real-world situation position rational numbers on horizontal and vertical number
		<p>Examples</p> <ul style="list-style-type: none"> Denver, Colorado is called “The Mile High City” because its elevation is 5280 feet above sea level. Someone tells you that the elevation of Death Valley, California is -282 feet. <ol style="list-style-type: none"> Is Death Valley located above or below sea level? Explain. How many feet higher is Denver than Death Valley? Below is a number line with 0 and 1 labeled:  <ol style="list-style-type: none"> Find and label the numbers -2 and -4 on the number line. Explain. Find and label the numbers $-(-2)$ and $-(-4)$ on the number line. Explain Find and label the number -0 on the number line. Explain.  <ol style="list-style-type: none"> Find and label the numbers -3 and -5 on the number line. For each of the following, state whether the inequality is true or false. Use the number line diagram to help explain your answers. <ol style="list-style-type: none"> $-3 > -5$ $-5 > -3$ $-5 < -3$ The table below shows the lowest elevation above sea

<p>the relative position of two numbers on a number line diagram.</p> <p>6.NS.C.7b. Write, interpret, and explain statements of order for rational numbers in real-world contexts.</p> <p>6.NS.C.7c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.</p> <p>6.NS.C.7d. Distinguish comparisons of absolute value from statements about order.</p>		<p>lines.</p> <ul style="list-style-type: none"> locate numbers and their opposites on the number line and explain their relation to 0. given an inequality, determine the position of one rational number relative to another. Be able to add, subtract, multiply, and divide rational numbers. <p>Learning Goal 1: Use positive and negative numbers to represent quantities in real-world situations, explaining the meaning of zero in the context of the real-world situation.</p> <p>Learning Goal 2: Locate rational numbers and their opposites on horizontal and vertical number line; explain their relation of the opposites to zero.</p> <p>Learning Goal 3: Use statements of inequality to determine relative positions of two rational numbers on a number line; write and explain statements of order for rational numbers in real-world contexts.</p> <p>Learning Goal 4: Explain the meaning of absolute value of a rational number as distance from zero on the number line and as magnitude for a positive or negative quantity in a real-world situation</p>	<p>level in three American cities.</p> <table border="1" data-bbox="162 29 487 907"> <thead> <tr> <th>City</th> <th>State</th> <th>Elevation above sea level</th> <th>Elevation below sea level</th> </tr> </thead> <tbody> <tr> <td>Denver</td> <td>Colorado</td> <td>5130</td> <td></td> </tr> <tr> <td>New Orleans</td> <td>Louisiana</td> <td></td> <td>-8</td> </tr> <tr> <td>Seattle</td> <td>Washington</td> <td>0</td> <td></td> </tr> </tbody> </table> <p>Finish filling in the table as you think about the following statements. Decide whether each of the following statements is true or false. Explain your answer for each one.</p> <ol style="list-style-type: none"> New Orleans is -8 feet below sea level. New Orleans is -8 feet below sea level. New Orleans is 8 feet below sea level. Seattle is 0 feet above sea level. Seattle is 0 feet below sea level. Denver is -5130 feet below sea level. Denver is -5130 feet below sea level. Denver is $- 5130$ feet below sea level. 	City	State	Elevation above sea level	Elevation below sea level	Denver	Colorado	5130		New Orleans	Louisiana		-8	Seattle	Washington	0	
City	State	Elevation above sea level	Elevation below sea level																
Denver	Colorado	5130																	
New Orleans	Louisiana		-8																
Seattle	Washington	0																	
<p>Topic C: The Coordinate Plane</p> <p>6.NS.C.6b. Understand signs of numbers in ordered pairs as</p>	<p>MP.5 Use appropriate tools strategically.</p> <p>MP.8 Look for</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Signs of numbers in ordered pairs indicate their locations in quadrants 	<ul style="list-style-type: none"> Below is a number line with 0 and 1 labeled: 																

indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

6.NS.C.6c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

and express regularity in repeated reasoning.

of the coordinate plane.

- When two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.

Students are able to:

- position pairs of rational numbers on a coordinate plane.
- explain the conditions for which pairs of points are reflections across an axis in the coordinate plane.

Learning Goal 5: Locate rational numbers and their opposites on horizontal and vertical number line; explain their relation of the opposites to zero.

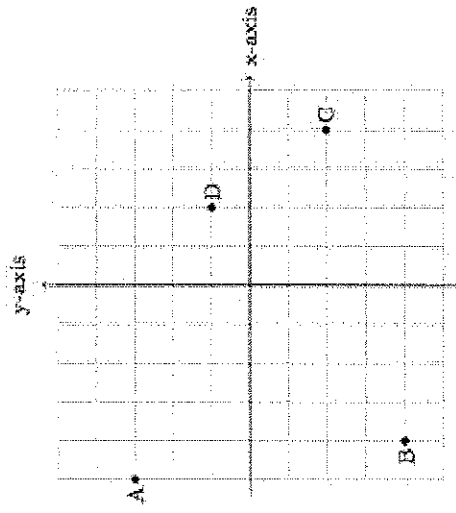
Learning Goal 6: Plot pairs of positive and negative rational numbers in the coordinate plane; describe two ordered pairs that differ only by signs as reflections across one or both axes.

a. Find and label the numbers -2 and -4 on the number line. Explain.

b. Find and label the numbers $-(-2)$ and $-(-4)$ on the number line. Explain

C. Find and label the number -0 on the number line. Explain.

- Below are some points in the coordinate plane:



Find the coordinates of the points.

- Reflect the points over the x -axis and find the coordinates of the new points: label the reflection of point A as A' , the reflection of B as B' , the reflection of C as C' , and the reflection of D as D' .
- Reflect the points from (b) over the y -axis: label the reflection of point A' as A'' , the reflection of B' as B'' , the reflection of C' as C'' , and the reflection of D' as D'' .
- How do the points A'' , B'' , C'' , D'' from (c) relate to the points A , B , C , and D ?

Unit 3 Vocabulary

- Integers
- Opposites
- Absolute Value
- Coordinate Plane
- Quadrants
- Ordered Pairs
- Perimeter
- Symmetry
- Reflection

Unit 4 Expressions and Equations		Critical Knowledge & Skills	Examples
Content & Practice Standards	Standards for Mathematical Practice	Concept(s):	
<p>Topics A & D: Relationships of the Operations & Expanding, Factoring, and Distributing Expressions</p> <p>6.EE.A.3. Apply the properties of operations to generate equivalent expressions. <i>For example, apply the distributive property to the expression $3(2 + x)$ to produce the equivalent expression $6 + 3x$; apply the distributive property to the expression $24x + 18y$ to produce the equivalent expression $6(4x + 3y)$; apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$</i></p> <p>6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers</p> <p>6.EE.A.2a. Write expressions that record operations with numbers and with letters standing for numbers. <i>For example, express the calculation "Subtract y from 5" as $5 - y$.</i></p> <p>6.EE.A.2b. Identify parts of an expression using mathematical terms (sum, term, product, factor,</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.7 Look for and make use of structure.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Properties of operations: distributive property, combining like terms Solving multi-step problems according to the order of operations <p>Students are able to:</p> <ul style="list-style-type: none"> Write algebraic expressions from verbal descriptions. Use mathematical terms (sum, term, product, factor, quotient, coefficient) to identify the parts of an expression. Evaluate algebraic expressions and formulas, including those involving exponents. Combine like terms to generate an equivalent expression. Factor to generate an equivalent expression. Multiply (apply the distributive property) to generate an equivalent expression. <p>Learning Goal 1: Apply Commutative, Associative, and Distributive Properties to numerical and algebraic expressions to create equivalent expressions.</p> <p>Learning Goal 2: Apply properties of operations (factor, distribute, and combine like terms) to generate equivalent expressions and to identify when two expressions are equivalent.</p>	<p>Examples</p> <ul style="list-style-type: none"> <p>Bianna's teacher asks her which of these three expressions are equivalent to each other:</p> <p>Expression A: $9x - 3x - 4$</p> <p>Expression B: $12x - 4$</p> <p>Expression C: $5x + x - 4$</p> <p>Bianna says Select each expression that is equivalent to $3(n + 6)$.</p> <p>Bianna's thil Select all that apply:</p> <ul style="list-style-type: none"> Identify it! Determine Explain o <p>A. $3n + 6$</p> <p>B. $3n + 18$</p> <p>C. $2n + 2 + n + 4$</p> <p>D. $2(n + 6) + (n + 6)$</p> <p>E. $2(n + 6) + n$</p> <p>Identify which properties state the following:</p> <ul style="list-style-type: none"> <input type="radio"/> $ca = ac$ <input type="radio"/> $a + (b + c) = (a + b) + c$ <input type="radio"/> $m(n + k) = mn + nk$

<p>quotient, coefficient); view one or more parts of an expression as a single entity. <i>For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms</i></p> <p>6.EE.A.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). <i>For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for</i></p>			<p>The ideal cooking time, in minutes, for a turkey that weighs p pounds is given by the expression $15 + 20p$. Which of the following shows the expression written as the product of the GCF and a sum?</p> <p>F $15p + 20$ G $15(1 + 20p)$ H $5(3 + 20p)$ J $5(3 + 4p)$</p>
<p>Topic B: Special Notations of Operations</p> <p>6.EE.A.1. Write and evaluate numerical expressions involving whole-number exponents</p> <p>6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers</p> <p>6.EE.A.2c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems.</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.7 Look for and make use of structure.</p>	<p>Concept(s): No new concept(s) introduced</p> <p>Students are able to:</p> <ul style="list-style-type: none"> Evaluate algebraic expressions and formulas, including those involving exponents. Write numerical expressions (involving whole number exponents) from verbal descriptions. Evaluate numerical expressions involving whole number exponents. <p>Learning Goal 3: Write and evaluate numerical expressions involving whole number exponents.</p>	<p>After opening an ancient bottle you find on the beach, a Djinni appears. In payment for his freedom, he gives you a choice of either 50,000 gold coins or one magical gold coin. The magic coin will turn into two gold coins on the first day. The two coins will turn into four coins total at the end of two days. By the end of the third day there will be eight gold coins total. The Djinni explains that the magic coins will continue this pattern of doubling each day for one moon cycle, 28 days. Which prize do you choose?</p> <p>When you have made your choice, answer these questions:</p> <p>The number of coins on the third day will be $2 \times 2 \times 2$. Can</p>

<p>Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). <i>For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume and surface area of a cube with sides of length $s = \frac{1}{2}$</i></p>			<p>you write another expression using exponents for the number of coins there will be on the third day? Write an expression for the number of coins there will be on the 28th day. Is this more or less than a million coins?</p> <ul style="list-style-type: none"> Jake tells a joke to 3 people and each of those people tells the joke to 3 more people, and so on. How many people will hear the joke in the 4th round of jokes told? How many people will hear the joke in total after the fourth round? Apply the formula $A = s^2$ to determine the area of a square that has a side length of 8.5 inches. Gina won a contest and was given the option of receiving \$1,000 or \$100². If she wants to take home the most money, which option should she pick? 														
<p>Topics C, E, & F: Replacing Letters and Numbers, Expressing Operations in Algebraic Form, and Writing/Evaluating Expressions and Formulas</p> <p>6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers</p> <p>6.EE.A.2c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). <i>For example, use the formulas $V = s^3$ and $A = 6s^2$ to find the volume</i></p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> A variable can represent an unknown number or any number in a set of numbers. Using substitution to replace variables with numbers <p>Students are able to:</p> <ul style="list-style-type: none"> Write expressions for solving real-world problems. Translate between word phrases and algebraic expressions Complete sequence tables and write algebraic expressions based on sequence tables. <p>Learning Goal 4: Write and evaluate algebraic expressions involving exponents (include evaluating formulas).</p>	<ul style="list-style-type: none"> To compute the perimeter of a rectangle you add the length, l and width, w and double this sum. Write an expression for the perimeter of a rectangle. Use the expression to find the perimeter of a rectangle with length 30 and width 75. Determine the value of... <p>$a^2 + 3b$</p> <table border="1" data-bbox="982 178 1096 640"> <thead> <tr> <th colspan="4">Clear Lake Kayak Rentals</th> </tr> </thead> <tbody> <tr> <td>Number of Hours</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>Total Cost (\$)</td> <td>15</td> <td>20</td> <td>25</td> <td>30</td> </tr> </tbody> </table> <p>ticket cost x dollars. Write an expression that represents the amount of money, in dollars, that Casey had after she bought the tickets.</p> <ul style="list-style-type: none"> The table below shows the cost of renting a kayak. 	Clear Lake Kayak Rentals				Number of Hours	1	2	3	4	Total Cost (\$)	15	20	25	30
Clear Lake Kayak Rentals																	
Number of Hours	1	2	3	4													
Total Cost (\$)	15	20	25	30													

and surface area of a cube with sides of length $s = \frac{1}{2}$

6.EE.A.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).

For example, the expressions $y + y + y$ and $3y$ are equivalent because they name the same number regardless of which number y stands for

6.EE.A.2. Write, read, and evaluate expressions in which letters stand for numbers

6.EE.A.2a. Write

expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract y from 5" as $5 - y$.*

6.EE.A.2b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression $2(8 + 7)$ as a product of two factors; view $(8 + 7)$ as both a single entity and a sum of two terms*

Learning Goal 5: Use variables to represent numbers and write expressions when solving real world or mathematical problems.

Learning Goal 6: Use mathematical language to identify parts of an expression.

Learning Goal 7: Create and complete sequence tables given algebraic expression or determine algebraic expression based on given sequence table.

- Write 2 difference expressions that can be used for renting the kayak for h hours.
- How much does it cost to rent the kayak for 6 hours?
- Given the following table, write 2 possible expressions that could be used in this table. (6 points)

Position	3	n
Value of Term	10	?

Rule 1: _____ Rule 2: _____

- Write an algebraic expression for the following sequence table and use this expression to determine what the 9th term would be.

Position	1	2	3	4	n
Value of Term	2	6	10	14	?

- What is an expression that can represent the expression "18 - y "? Select all that apply.
 - subtract 18 from y
 - y less than 18
 - the difference between 18 and y
 - take away 18 from y
 - 18 minus y

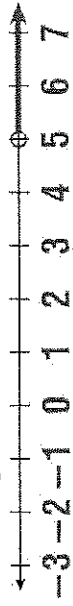
<p>6.EE.B.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p>			
<p>Topic G: Solving Equations</p> <p>6.EE.B.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p> <p>6.EE.B.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>6.EE.B.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Solving an equation is a process of answering the question: determine which values from a specified set, if any, make the equation or true. An equation is defined by two expressions that are equivalent to one another. Two quantities that change in relationship to one another may be represented with an equation in two variables, with a graph, and with a table of values. <p>Students are able to:</p> <ul style="list-style-type: none"> Substitute a number into an equation to determine whether it makes an equation true. Solve real world problems by writing and solving equations of the form $x + p = q$ (p, q, and x are non-negative and rational). Solve real world problems by writing and solving equations of the form $px = q$ (p, q, and x are non-negative and rational). Represent two quantities that related to one another, with variables. Write an equation in two variables. Distinguish the dependent variable from the independent variable. 	<ul style="list-style-type: none"> A town's total allocation for firefighter's wages and benefits in a new budget is \$600,000. If wages are calculated at \$40,000 per firefighter and benefits at \$20,000 per firefighter, write an equation whose solution is the number of firefighters the town can employ if they spend their whole budget. Solve the equation. The White House is 246 feet tall. A capital fact sheet states that it is 2,552 inches tall. Determine if these two measurements are equal. Explain. Determine whether the given value of the variable is a solution. <ul style="list-style-type: none"> $94 \div s = 26$ for $s = 3$ $v + 79 = 167$ for $v = 88$ Scott has 3 times as many cards in his hand then Jim. Scott has 54 cards. How many does Jim have? Write and solve an algebraic equation. Let $j = \#$ of Jim's cards. Jamie rented a canoe while she was on a camping trip with her family. She paid a flat rental fee of \$85 plus \$9 per day of her trip. In total, she paid \$130 for the canoe. Write AND solve a two-step equation using d for days to see how long she rented the canoe for. Chris is ordering art supplies. Each canvas costs \$16 and the shipping and handling charges are \$6 for the whole order. The total cost y depends on the number of canvases x. This function is described by the equation $y = 16x + 6$. To find the solution of the equation with 2

<p>Topic H: Relationships of the Operations & Expanding, Factoring, and Distributing Expressions</p> <p>6.EE.B.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p> <p>6.EE.B.6. Use variables to</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p>	<ul style="list-style-type: none"> Analyze a given graph and table of values, and relate them to the equation. <p>Learning Goal 8: Use substitution to determine whether a given number makes an equation or true.</p> <p>Learning Goal 9: Solve real world problems by writing and solving equations of the form $x + p = q$ and $px = q$ (p, q, and x are non-negative rational numbers).</p> <p>Learning Goal 10: Use knowledge of inverse operations to solve two-step equations and write two-step equations based off real-life situations.</p> <p>Learning Goal 11: Write an equation using two variables (independent and dependent) to represent two quantities that change in relationship to one another in a real world problem.</p> <p>Learning Goal 12: Analyze the relationship between the dependent and independent variables and relate the equation to a given graph and to its table of values.</p>	<p>variables, first choose a replacement value for one variable and then find the value of the other variable.</p> <ul style="list-style-type: none"> Use the given x/ values to write solutions of the equation $y=16x -6$ as ordered pairs. $X = 1, 2, 3, 4$. Show the ordered pairs. <ul style="list-style-type: none"> Karen buys 4 bouquets of flowers. How many flowers does she buy if each bouquet contains 10, 12, 14, or 16 flowers? Write an equation letting e equal the amount of flowers in each bouquet and f represent the total number of flowers.
<p>6.EE.B.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.</p> <p>6.EE.B.6. Use variables to</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Solving an inequality is a process of answering the question: determine which values from a specified set, if any, make the equation or inequality true. An inequality may represent a constraint (or a condition) in a real-world problem. Infinity ($x > c$ and $x < c$ have an infinite number of solutions). A variable can represent an unknown number or any number in a set of numbers. Two quantities that change in relationship to one another may be represented with an equation in two variables, with a graph, and 	<ul style="list-style-type: none"> A theme park has a log ride that can hold 12 people. They also have a weight limit of 1500 lbs per log for safety reasons. If the average adult weighs 150 lbs, the average child weighs 100 lbs and the log itself weighs 200, the ride can operate safely if the inequality $150A + 100C + 200 \leq 1500$ is satisfied (A is the number of adults and C is the number of children in the log ride together). There are several groups of children of differing numbers waiting to ride. Group one has 4 children, group two has 3 children, group three has 9 children, group four 6 children while group five has 5 children. If 4 adults are already seated in the log, which groups of children can safely ride with them? Fishing Adventures rents small fishing boats to tourists

<p>represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>6.EE.B.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.</p> <p>6.EE.B.8. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams</p> <p>6.EE.C.9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. <i>For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation $d = 65t$ to</i></p>	<p>MP.6 Attend to precision.</p> <p>MP.7 Look for and make use of structure.</p>	<p>with a table of values.</p> <p>Students are able to:</p> <ul style="list-style-type: none"> • Write inequality statements to represent real-life situations • Substitute a number into an inequality to determine whether it makes the inequality true. • Represent real-world constraint or condition by writing an inequality of the form $x > c$ or $x < c$. • Graph inequalities of the form $x > c$ or $x < c$ on number lines. <p>Learning Goal 13: Use substitution to determine whether a given number makes an equation or inequality true.</p> <p>Learning Goal 14: Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real world or mathematical problem and represent them on a number line.</p> <p>Learning Goal 15: Write, interpret, and graph simple inequalities as presented in real-life situations.</p> <p>Learning Goal 16: Write, interpret, and graph simple inequalities as presented in real-life situations.</p>	<p>for day-long fishing trips. Each boat can hold at most eight people. Additionally, each boat can only carry 900 pounds of weight for safety reasons.</p> <p>A) Let p represent the total number of people. Write an inequality to describe the number of people that a boat can hold. Draw a number line diagram that shows all possible solutions.</p> <p>B) Let w represent the total weight of a group of people wishing to rent a boat. Write an inequality that describes all total weights allowed in a boat. Draw a number line diagram that shows all possible solutions.</p> <ul style="list-style-type: none"> • Water freezes at 32°F and boils at 212°F. Write 3 inequalities to show the ranges of temperatures for which water is a solid (frozen), liquid (neither frozen nor boiling), and gas (boiling). • Translate and graph the following simple inequalities. <ul style="list-style-type: none"> ○ No more than 18 students got first honor roll. ○ Fewer than 85 members attended the meeting. ○ There were at least 41 parents in attendance. ○ The height of the tree is above 18 feet.
<p>Circle which of the following values satisfy each inequality.</p> $\frac{m}{-16} < 8$ <p style="text-align: center;">-120 -100 -110 -115</p>			

represent the relationship between distance and time.

- Write a real-life situation to represent this simple inequality:



Unit 4 Vocabulary

- Distribute
- Distributive Property
- Commutative Property
- Associative Property
- Factor
- Coefficient
- Term
- Equivalent
- Equivalent Expressions
- Exponent
- Base
- Power
- Exponential Form
- Variable
- Expression
- Equation
- Substitute
- Evaluate
- Inverse Operations
- Solution
- Solution Set
- Inequality
- Simple Inequality
- Compound Inequality
- Translate

Unit 5 Area, Surface Area, and Volume		Examples	
Content & Practice Standards	Standards for Mathematical Practice	Critical Knowledge & Skills	Examples
<p>Topic A: Area of Triangles, Quadrilaterals, and Polygons</p> <p>6.G.A.1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or other shapes; apply these techniques in the context of solving real-world and mathematical problems.</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.7 Look for and make use of structure.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> Apply area formulas for quadrilaterals and triangles Use knowledge of area formulas to break down composite figures into smaller polygons and determine area <p>Students are able to:</p> <ul style="list-style-type: none"> Compose rectangles in order to find the area of triangles, special quadrilaterals and polygons. Decompose triangles, special quadrilaterals, and polygons into triangles and other shapes in order to find their area. Compose rectangles and decompose into triangles in order to solve real-world problems. <p>Learning Goal 1: Find the area of right triangles, other triangles, special quadrilaterals and polygons by composing into rectangles or decomposing into triangles</p>	<ul style="list-style-type: none"> Jamie is planning to cover a wall with red wallpaper. The dimensions of the wall are shown below: <div style="text-align: center;"> </div> 1) How many square feet of wallpaper are required to cover the wall? 2) Wallpaper comes in long rectangular strips which are 24 inches wide. If Jamie lays the strips of wallpaper vertically, can she cover the wall without wasting any wallpaper? Explain. 3) If Jamie lays the strips of wallpaper horizontally, can she cover the wall without wasting any wallpaper? Explain
<p>Topics B & C: Volume of Right Rectangular Prisms & Nets and Surface Area</p> <p>6.G.A.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by</p>	<p>MP.1 Make sense of problems and persevere in solving them.</p> <p>MP. 2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> No new concept(s) introduced <p>Students are able to:</p> <ul style="list-style-type: none"> Pack a right rectangular prism with fractional edge lengths with unit fraction cubes. Show that the volume found by packing is the same as would be found by multiplying 	<ul style="list-style-type: none"> To compute the perimeter of a rectangle you add the length, l and width, w and double this sum. <ol style="list-style-type: none"> Write an expression for the perimeter of a rectangle. Use the expression to find the perimeter of a rectangle with length 30 and width 75.

multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

6.G.A.4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

mathematics.
MP.5 Use appropriate tools strategically

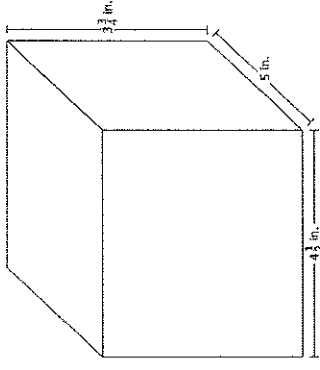
- the edge lengths of the prism.
- Apply volume formulas, $V = lwh$ and $V = Bh$ to right rectangular prisms with fractional edge lengths.
- Represent three dimensional objects with nets made up of rectangles and triangles.
- Find surface area of three-dimensional objects using nets.
- Solve real world and mathematical problems involving surface area using nets.

Learning Goal 2: Write and evaluate algebraic expressions involving exponents (include evaluating formulas).

Learning Goal 3: Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes and show that the volume is the same as it would be if found by multiplying the edge lengths; apply volume formulas to right rectangular prisms with fractional edge lengths.

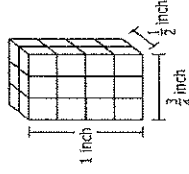
Learning Goal 4: Represent three dimensional figures objects with nets made of rectangles and triangles, and use the nets to find the surface area of the figures in order to solve real world and mathematical problems.

Small cubes with edge lengths of $\frac{1}{4}$ inch will be packed into the right rectangular prism shown.

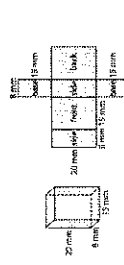


How many small cubes are needed to completely fill this right rectangular prism?

This right rectangular prism is built with small cubes.

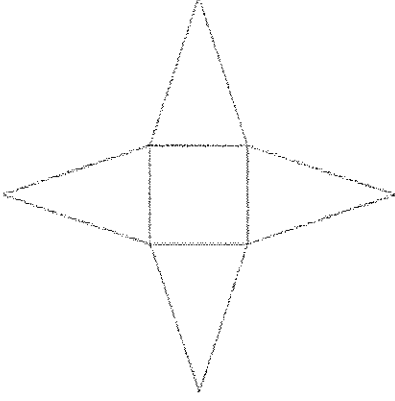


Part A
 What is the volume, in cubic inches, of the right rectangular prism?



- A. The lateral area L of a prism is the area of all faces except the bases. $L = 2(\dots) + 2(\dots)$
- B. The area B of each base is \dots
- C. The surface area S of the prism is the sum of the lateral area L and the total area of the bases, or \dots

- Below is the net for a three-dimensional shape.



The inner quadrilateral is a square and the four triangles all have the same size and shape.

- 1) What three dimensional shape does this net make? Explain.
- 2) If the side length of the square is 2 units and the height of the triangles is 3 units, what is the surface area of this shape?

Unit 5 Vocabulary

- Polygon
- Quadrilateral
- Square
- Rectangle
- Parallelogram
- Trapezoid
- Triangle
- Congruent
- Parallel
- Perpendicular

Right Angle

Base

Height

Surface Area

Volume

Cubic units

Squared units

Prism

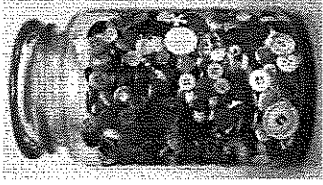
Pyramid

2-Dimensional Shape

3-Dimensional Shape

Composite Figure

Unit 6 Statistics

Content & Practice Standards	Standards for Mathematical Practice	Critical Knowledge & Skills	Examples
<p>Topic A: Understanding Distributions</p> <p>6.SP.A.1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.</p> <p>6.SP.A.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>6.SP.B.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.</p> <p>6.SP.B.5. Summarize numerical data sets in relation to their context, such as by:</p> <p>6.SP.B.5b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p> <p>MP.6 Attend to precision</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> A statistical question is one that anticipates variability in the data that is related to the question A data set has a distribution which can be described by its center, spread, and overall shape. <p>Students are able to:</p> <ul style="list-style-type: none"> Display categorical and numerical data in a frequency table Display numerical data in dot plots on a number line. Display numerical data in histograms on a number line. Display numerical data in box plots on a number line. Distinguish questions that are statistical (anticipate variability in data) from those that are not. <p>Learning Goal 1: Distinguish questions that are statistical (anticipate variability in data) from those that are not.</p> <p>Learning Goal 2: Display numerical data in plots on the number line (including dot plots, histograms, and box plots) and summarize in relation to their context.</p>	<ul style="list-style-type: none"> Zeke likes to collect buttons and he keeps them in a jar. Zeke can empty the buttons out of the jar, so he can see all of his buttons at once.  <p>Which of the following are statistical questions that someone could ask Zeke about his buttons? (A statistical question is one that anticipates an answer based on data that vary.) For each question, explain why it is or is not a statistical question.</p> <ol style="list-style-type: none"> What is a typical number of holes for the buttons in the jar? How many buttons are in the jar? How large is the largest button in the jar? If Zeke grabbed a handful of buttons, what are the chances that all of the buttons in his hand are round? What is a typical size for the buttons in the jar? How are these buttons distributed according to color? Write another statistical question related to Zeke's button collection. <ul style="list-style-type: none"> The number of siblings for a group of sixth grade students is shown below: 1, 0, 2, 1, 6, 0, 2, 0, 1, 10. <ul style="list-style-type: none"> Make a dot plot of the data. Find the mean and median of the data. What does the mean tell you about the data?

<p>Topics B and C: Summarizing a Distribution that is Approximately Symmetric Using the Mean and Mean Absolute Deviation and Summarizing a Distribution that is Skewed Using the Median and the Interquartile Range</p> <p>6.SP.A.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>6.SP.A.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p> <p>6.SP.B.4. Display numerical data in plots on a number line,</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> A measure of center summarizes, with a single number, the values of an entire data set. A measure of variation describes, with a single number, how the values of a data set vary. Variability/Variation in numerical data or presentations of data A data set has a distribution which can be described by its center, spread, and overall shape. <p>Students are able to:</p> <ul style="list-style-type: none"> Compute mean, median, mode, and range of data sets and be able to explain how outliers can affect measures of central tendency Determine the number of observations of a data set. Describe the data in context, including how it was measured and the units of measurement. Calculate measures of center, mean and median, as well as range 	<p>What about the median? Which measure of average (mean or median) do you think best describes the data? Why?</p> <p>Janet surveyed a class of students. She recorded the number of hours in the extra-credit volunteer work that the students had done. The data are summarized in the survey.</p> <p style="text-align: center;">Volunteer Time</p> <p>Part A Use each student's dot plot to find the mean and median. Enter your answer in the box.</p> <p>Part B What is the mean number of hours volunteered by the students in the survey? Enter your answer in the box.</p>
<p>Topics B and C: Summarizing a Distribution that is Approximately Symmetric Using the Mean and Mean Absolute Deviation and Summarizing a Distribution that is Skewed Using the Median and the Interquartile Range</p> <p>6.SP.A.2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.</p> <p>6.SP.A.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.</p> <p>6.SP.B.4. Display numerical data in plots on a number line,</p>	<p>MP.2 Reason abstractly and quantitatively.</p> <p>MP.4 Model with mathematics.</p> <p>MP.5 Use appropriate tools strategically.</p>	<p>Concept(s):</p> <ul style="list-style-type: none"> A measure of center summarizes, with a single number, the values of an entire data set. A measure of variation describes, with a single number, how the values of a data set vary. Variability/Variation in numerical data or presentations of data A data set has a distribution which can be described by its center, spread, and overall shape. <p>Students are able to:</p> <ul style="list-style-type: none"> Compute mean, median, mode, and range of data sets and be able to explain how outliers can affect measures of central tendency Determine the number of observations of a data set. Describe the data in context, including how it was measured and the units of measurement. Calculate measures of center, mean and median, as well as range 	<p>Janet surveyed a class of students. She recorded the number of hours in the extra-credit volunteer work that the students had done. The data are summarized in the survey.</p> <p style="text-align: center;">Volunteer Time</p> <p>Part A Use each student's dot plot to find the mean and median. Enter your answer in the box.</p> <p>Part B What is the mean number of hours volunteered by the students in the survey? Enter your answer in the box.</p>

including dot plots, histograms, and box plots.

6.SP.B.5. Summarize numerical data sets in relation to their context, such as by:

6.SP.B.5a. Reporting the number of observations.

6.SP.B.5b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

6.SP.B.5c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

6.SP.B.5d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

- Calculate measures of spread, interquartile range and mean absolute deviation.
- Create box and whisker plots given data sets and find interquartile range
- Describe the overall shape of a distribution (skewed left, skewed right, etc).
- Identify striking deviations (outliers).
- Choose measures of center and variability appropriate to the shape of the distribution and context.

Learning Goal 3: Calculate, and interpret measures of center (mean and median) and variability (interquartile range and mean absolute deviation); report measures of center and variability appropriate to the shape of the distribution and context.

Dennis wants to find out people's opinions on a new game system. He surveys 10 people to rate the new system from 1 to 10. In his survey, 1 means the system is extremely uncool and 10 means the system is the coolest. The survey shows the following ratings: 9, 7, 7, 8, 7, 9, 5, 10, and 8.

a. What is the interquartile range of the ratings?

b. What is the mean absolute deviation of the ratings?

c. What do these measures of variation indicate about the ratings for the game system?

Multiple Choice A box-and-whisker plot shows that the third quartile is the same as the median. Which data set could represent the data in the box-and-whisker plot?

- A) 0, 0, 0, 0, 1, 1, 1, 1
- B) 0, 10, 20, 30, 40, 50, 60, 70
- C) 1, 15, 15, 15, 15, 16, 16
- D) 8, 8, 8, 26, 26, 26, 55

Write About It Describe how dramatically increasing one number in a data set affects the IQR and the mean absolute deviation. Explain which measure would be most affected by unusually large or small numbers in a data set.

- In 1988, 77 year old John Glenn became the oldest person to travel into space. Other astronauts traveling on that same mission were 43, 37, 38, 46, 35, and 42 years old. Find the mean, median, and mode with and without Glenn's age. Explain how his age affected the measures of central tendency.

Topic D: Summarizing and Describing Distributions

6.SP.B.4. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.

6.SP.B.5. Summarize numerical data sets in relation to their context, such as by:

6.SP.B.5a. Reporting the number of observations.

6.SP.B.5b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

6.SP.B.5c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.

6.SP.B.5d. Relating the choice of measures of center and variability to the shape of the data distribution and the context

Concept(s): No new concept(s) introduced

Students are able to:

- Display and analyze data presented in a variety of ways
- Describe data distributions as either normal or skewed

Learning Goal 4: Summarize numerical data in relation to their context by identifying the number of observations and describing how the data was measured.

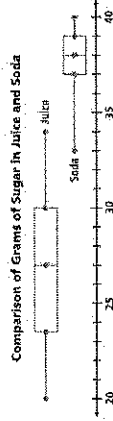
MP.2 Reason abstractly and quantitatively.

MP.4 Model with mathematics.

MP.5 Use appropriate tools strategically.

- **Short Response** A manager of a retirement home tracks the ages of each of the residents. She creates a dot plot with a number line from 0 to 100. Describe the most likely shape of the distribution of the manager's data, and explain why it will have that shape.

What conclusions can you make about the amount of sugar in each drink?

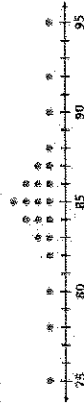


Think and Discuss

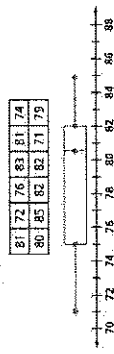
1. Explain how a box-and-whisker plot gives information that is hard to see by just looking at the numbers.
2. Describe the benefits of displaying data using a dot plot as opposed to a box-and-whisker plot.

The data set and dot plot display the grades of Ms. Lee's students. Describe the shape of the data distribution.

82	95	84	87	85	92	85	78	87	84	83
86	80	86	95	75	83	90	85	84	88	85



The data set and box-and-whisker plot display the heights in inches of players on a basketball team. Describe the shape of the data distribution.



in which the data were gathered.			
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Unit 6 Vocabulary
Data Statistics Frequency Table Tally Frequency Interval Scale Histogram Line Plot Variation Box-and-whisker plot Quartile Interquartile Range Measures of Central Tendency Mean Median Mode Outlier Mean Absolute Deviation Distribution



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

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