

***Pike County School District  
Standards Mastery Document***

6<sup>th</sup> Grade Mathematics  
Revised 2019



Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

The Standards Mastery Document is designed for educators by educators as a resource and tool to help educators increase their depth of understanding of the Common Core Standards. This document will enable teachers to plan College & Career Ready curriculum and classroom instruction that promotes inquiry and higher levels of cognitive demand.

The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important “processes and proficiencies” with longstanding importance in mathematics education.

8 Mathematical Practices (MP):

- MP 1. Make sense of problems and persevere in solving them.
- MP 2. Reason abstractly and quantitatively.
- MP 3. Construct viable arguments and 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.

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**Grade 6 Overview**

**Ratios and Proportions and Proportional Relationships (RP)**

- **Understand ratio concepts and use ratio reasoning.**

**The Number System (NS)**

- **Apply and extend previous understandings of multiplication and division to divide fractions by fractions.**
- **Multiply and divide multi-digit numbers and find common factors and multiples.**
- **Apply and extend previous understanding of numbers to the system of rational numbers.**

**Expressions and Equations (EE)**

- **Apply and extend previous understandings of arithmetic to algebraic expressions.**
- **Reason about and solve one-variable equations and inequalities.**
- **Represent and analyze quantitative relationships between dependent and independent variables.**

**Geometry: (G)**

- **Solve real-world and mathematical problems involving area, surface area, and volume.**

**Statistics and Probability (SP)**

- **Develop understanding of the process of statistical variability.**
- **Develop understanding of statistical variability.**
- **Summarize and describe distributions.**

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**Grade 6 Overview**

**In Grade 6, instructional time should focus on four critical areas:**

**1. In the Ratios and Proportional Relationships domain, students will:**

- use reasoning about multiplication and division to solve ratio and rate problems about quantities;
- connect understanding of multiplication and division with ratios and rates by viewing equivalent ratios and rates as deriving from and extending, pairs of rows (or columns) in the multiplication table and by analyzing simple drawings that indicate the relative size quantities; and
- expand the scope of problems for which they can use multiplication and division to solve problems and they connect ratios and rates.

**2. In the Number System domain, students will:**

- use the meaning of fractions and relationships between multiplication and division to understand and explain why the procedures for dividing fractions make sense;
- extend their previous understandings of number and the ordering of numbers to the full system of rational numbers, which includes negative rational numbers, particularly negative integers; and
- reason about the order and absolute value of rational numbers and about the location of points on a coordinate plane.

**3. In the Expressions, Equations and Inequalities domain, students will:**

- write expressions and equations that correspond to give situations, using variables to represent an unknown and describe relationships between quantities;
- understand that expressions in different forms can be equivalent and use the properties of operations to rewrite and evaluate expression in equivalent forms; and
- use properties of operations and the idea of maintaining the equality of both sides of an equation to solve simple one-step equations.

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**4. In the Geometry domain, students will:**

- reason about relationships among shapes to determine area, surface area and volume. They find areas of right triangles, other triangles and special quadrilaterals by decomposing these shapes, rearranging or moving pieces and relating the shapes to rectangles.
- discuss, develop and justify formulas for areas of triangles and parallelograms. Students find areas of polygons and surface areas of prisms and pyramids by decomposing them into whose area they can determine. They reason about right rectangular prisms with fractional side lengths to extend formulas for the volume of a right rectangular prism to fractional side lengths.

**5. In the Statistics and Probability domain, students will:**

- develop their ability to think statistically;
- recognize that a data distribution may not have a definite center and that different ways to measure center yield different values. The median measures center in the sense that it is roughly the middle value. The mean measures center in the sense that it is the value that each data point would take on if the total of the data values were redistributed equally and also in the sense that it is a balance point.
- recognize that a measure of variability (interquartile range or mean absolute deviation) can also be useful for summarizing data because two very different sets of data can have the same mean and median yet be distinguished by their variability.
- learn to describe and summarize numerical data sets, identifying clusters, peaks, gaps, and symmetry, considering the context in which the data were collected.

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**Table 1**  
**Common Addition and Subtraction Situations<sup>1</sup>**

	Result Unknown	Change Unknown	Start Unknown
<b>Add To</b>	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now?  $2 + 3 = ?$	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two?  $2 + ? = 5$	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before?  $? + 3 = 5$
<b>Take From</b>	Five apples were on the table. I ate two apples. How many apples are on the table now?  $5 - 2 = ?$	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat?  $5 - ? = 3$	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before?  $? - 2 = 3$
	Total Unknown	Addend Unknown	Both Addends Unknown <sup>3</sup>
<b>Put Together/ Take Apart<sup>2</sup></b>	Three red apples and two green apples are on the table. How many apples are on the table?  $3 + 2 = ?$	Five apples are on the table. Three are red and the rest are green. How many apples are green?  $3 + ? = 5, 5 - 3 = ?$	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase?  $5 = 0 + 5, 5 = 5 + 0$ $5 = 1 + 4, 5 = 4 + 1$ $5 = 2 + 3, 5 = 3 + 2$
	Difference Unknown	Bigger Unknown	Smaller Unknown
<b>Compare</b>	<b>(“How many more?” version):</b>  Lucy has two apples. Julie has five apples. How many more apples does Lucy have than Julie?	<b>(Version with “more”):</b>  Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?	<b>(Version with “more”):</b>  Julie has three more apples than Lucy. Julie has five apples. How many apples does Lucy have?
	<b>(“How many fewer?” version):</b>  Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?  $2 + ? = 5, 5 - 2 = ?$	<b>(Version with “fewer”):</b>  Lucy has three fewer apples than Julie. Lucy has two apples. How many apples does Julie have?  $2 + 3 = ?, 3 + 2 = ?$	<b>(Version with “fewer”):</b>  Lucy has three fewer apples than Julie. Julie has five apples. How many apples does Lucy have?  $5 - 3 = ?, ? + 3 = 5$

Blue shading indicates the four Kindergarten problem subtypes. Students in grades 1 and 2 work with all subtypes and variants (blue and green).

Yellow indicates problems that are the difficult four problem subtypes students in grade 1 work with but do not need to master until grade 2.

<sup>1</sup> Adapted from Box 2-4 of National Research Council (2009, op. cit., pp. 32, 33).

<sup>2</sup> These *take apart* situations can be used to show all the decompositions of a given number. The associated equations, which have the total on the left of the equal sign, help

children understand that the = sign does not always mean *makes* or *results in* but always does mean *is the same number as*.

<sup>3</sup> Either addend can be unknown, so there are three variations of these problem situations. Both Addends Unknown is a productive extension of this basic situation especially for small numbers less than or equal to 10.

<sup>4</sup> For the Bigger Unknown or Smaller Unknown situations, one version directs the correct operation (the version using *more* for the bigger unknown and using *less* for the smaller unknown). The other versions are more difficult.

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**Table 2**  
**Common Multiplication and Division Situations<sup>1</sup>**

	<b>Unknown Product</b>	<b>Group Size Unknown</b>	<b>Number of Groups Unknown</b>
	$3 \times 6 = ?$	$3 \times ? = 18$ and $18 \div 3 = ?$	$? \times 6 = 18$ and $18 \div 6 = ?$
<b>Equal Groups</b>	<p>There are 3 bags with 6 plums in each bag. How many plums are there in all?</p> <p>Measurement example: you need 3 lengths of string, each 6 inches long. How much string will you need all together?</p>	<p>If 18 plums are shared equally into 3 bags, then how many plums will be in each bag?</p> <p>Measurement example: you have 18 inches of string which you will cut into 3 equal pieces. How long will each piece of string be?</p>	<p>If 18 plums are to be packed 6 to a bag, then how many bags are needed?</p> <p>Measurement example: you have 18 inches of string which you will cut into pieces that are 6 inches long. How many pieces of string will you have?</p>
<b>Arrays<sup>2</sup> Area<sup>3</sup></b>	<p>There are three rows of apples with 6 apples in each row. How many apples are there?</p> <p>Area example: what is the area of a 3 cm by 6 cm triangle?</p>	<p>If 18 apples are arranged into 3 equal rows, how many apples will be in each row?</p> <p>Area example: a rectangle has area of 18 square centimeters. If one side is 3 cm long, how long is a side next to it?</p>	<p>If 18 apples are arranged into equal rows of 6 apples, how many rows will there be?</p> <p>Area example: a rectangle has area of 18 square centimeters. If one side is 6 cm long, how long is the side next to it?</p>
<b>Compare</b>	<p>A blue hat costs \$6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost?</p> <p>Measurement example: a rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?</p>	<p>A red hat costs \$18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost?</p> <p>Measurement example: a rubber band is stretched to be 18 cm long and is 3 times as long as it was at first. How long was the rubber band at first?</p>	<p>A red hat costs \$18 and a blue hat costs \$6. How many times as much does the red hat cost as the blue?</p> <p>Measurement example: a rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?</p>
<b>General</b>	$a \times b = ?$	$a \times ? = p$ and $p \div a = ?$	$? \times b = p$ and $p \div b = ?$

<sup>1</sup> The first examples in each cell are examples of discrete things. These are easier for students and should be given before the measurement examples.

<sup>2</sup> The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: the apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.

<sup>3</sup> Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.



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**Table 3**  
**Properties of Operations**

The variables  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in a given number system. The properties of operations apply to the rational number system, the real number system and the complex number system.

Associative property of addition	$(a + b) + c = a + (b + c)$
Commutative property of addition	$a + b = b + a$
Additive identity property of 0	$a + 0 = 0 + a = a$
Existence of additive inverses	For every $a$ there exists $-a$ so that $a + (-a) = (-a) + a = 0$
Associative property of multiplication	$(a \times b) \times c = a \times (b \times c)$
Commutative property of multiplication	$a \times b = b \times a$
Multiplicative identity property of 1	$a \times 1 = 1 \times a = a$
Existence of multiplicative inverses	For every $a \neq 0$ there exists $1/a$ so that $a \times 1/a = 1/a \times a = 1$
Distributive property of multiplication over addition	$a \times (b + c) = a \times b + a \times c$

**Table 4**  
**Properties of Equality**

The variables  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in the rational, real or complex number systems.

Reflexive property of equality	$a = a$
Symmetric property of equality	If $a = b$ , then $b = a$
Transitive property of equality	If $a = b$ and $b = c$ , then $a = c$
Addition property of equality	If $a = b$ , then $a + c = b + c$
Subtraction property of equality	If $a = b$ , then $a - c = b - c$
Multiplication property of equality	If $a = b$ , then $a \times c = b \times c$
Division property of equality	If $a = b$ and $c \neq 0$ , then $a \div c = b \div c$
Substitution property of equality	If $a = b$ , then $b$ may be substituted for $a$ in any expression containing $a$ .

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**Table 5**  
**Properties of Inequality**

The variables  $a$ ,  $b$  and  $c$  stand for arbitrary numbers in the rational or real number systems.

Exactly one of the following is true: $a < b$ , $a = b$ , $a > b$
If $a > b$ and $b > c$ then $a > c$
If $a > b$ , then $b < a$
If $a > b$ , then $-a < -b$
If $a > b$ , then $a \pm c > b \pm c$
If $a > b$ and $c > 0$ , then $a \times c > b \times c$
If $a > b$ and $c < 0$ , then $a \times c < b \times c$
If $a > b$ and $c > 0$ , then $a \div c > b \div c$
If $a > b$ and $c < 0$ , then $a \div c < b \div c$

**Table 6**  
**Fluency Standards across All Grade Levels**

Grade	Coding	Fluency Standards
K	<b>KY.K.OA.5</b>	Fluently add and subtract within 5.
1	<b>KY.1.OA.6</b>	Fluently add and subtract within 10.
2	<b>KY.2.OA.2 KY.2.NBT.5</b>	Fluently add and subtract within 20. Fluently add and subtract within 100.
3	<b>KY.3.OA.7 KY.3.NBT.2</b>	Fluently multiply and divide within 100. Fluently add and subtract within 1000.
4	<b>KY.4.NBT.</b>	Fluently add and subtract multi-digit whole numbers using an algorithm.
5	<b>KY.5.NBT.5</b>	Fluently multiply multi-digit whole numbers (not to exceed four-digit by two-digit multiplication) using an algorithm.
6	<b>KY.6.NS.2 KY.6.NS.3 KY.6.EE.2</b>	Fluently divide multi-digit numbers using an algorithm. Fluently add, subtract, multiply and divide multi-digit decimals using an algorithm for each operation. Write, read and evaluate expressions in which letters stand for numbers.

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**Ratio and Proportional Relationships (6.RP)**

**Standard: 6.RP.1** Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. For example, “The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was one beak.” “For every vote candidate A received, candidate C received nearly three votes.”

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively.

MP.6: Attend to precision.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What are the three ways to write a ratio?</p> <p>Can ratios be simplified?</p> <p>Ratios compare two quantities. Do they have to have the same unit of measure?</p> <p>What are the contexts that ratios can appear? (part-to-whole, whole-to-part, part-to-part, and rates)</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Write ratios based on a relationship between two quantities.</p> <p>Write equivalent ratios that are simplified or higher using the multiplicative relationship.</p> <p>Write ratios as fractions</p> <p>Write ratios as decimals.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students <b>use</b> the concept of a ratio and use ratio language to describe a ratio relationship between two quantities <b>to make comparisons.</b></p> <p>Students will express these relationships in equivalent ratios in lowest terms, where appropriate.</p>
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Coherence KY.5.NF.5→KY.6.RP.1

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**Standard: 6.RP.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. For example, “This recipe has a ratio of 3 cups of flour to 4 cups of sugar, so there is  $3/4$  cup of flour for each cup of sugar.” “We paid \$75 for 15 hamburgers, which is a rate of \$5 per hamburger.”

**Enduring Skills:**

- MP.2: Reason abstractly and quantitatively.
- MP.6: Attend to precision.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>Can you write a ratio based on a given situation?</p> <p>Can you identify and calculate the unit rate?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Write a rate as a ratio.</p> <p>Simplify the ratio to find the unit rate.</p> <p>Interpret rate language using per or each to solve unit rate problems.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students understand the concept of a unit rate <math>a/b</math> associated with a ratio <math>a:b</math> with <math>b \neq 0</math>.</p> <p>Students use rate language in the context of a ratio relationship.</p>
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Coherence [KY.5.NF.3](#)→[KY.6.RP.2](#)→[KY.7.RP.1](#)

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**Standard: 6.RP.3** Use ratio and rate reasoning to solve real-world and mathematical problems.

a. 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.

**Enduring Skills:**

MP.1: Make sense of problems and persevere in solving them.

MP.4: Model with mathematics.

MP.7: Look for and make use of structure.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are the missing values in a table of equivalent ratios?	Use tables to find equivalent ratios with whole-numbers and to compare proportional quantities.	Students <b>create and interpret</b> tables of equivalent ratios relating quantities as whole-number measurements and
What is the equivalent ratios using the coordinate plane?	Plot pairs of values on the coordinate plane. To be proportional, it must pass through (0,0) and be on the line.	Students find missing values in the tables.
Does this equation represent a proportional relationship?	Use the equation $y = mx$ to represent a proportional relationship.	Students plot the pairs of values on the coordinate plane.
		Students use tables to compare ratios <b>to determine greater or lesser rates.</b>

Coherence KY.6.RP.3→KY.7.RP.2

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**Standard: 6.RP.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.

b. Solve unit rate problems including those involving unit pricing and constant speed. For example, 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?

**Enduring Skills:**

MP.1: Make sense of problems and persevere in solving them.

MP.4: Model with mathematics.

**MP.7: Look for and make use of structure.**

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are the missing values in a table of equivalent ratios.	Find the unit price of each item.	Students <b>solve and apply</b> unit rate problems including those involving unit pricing and constant speed <b>relating to future scenarios</b> .
What is the equivalent ratios using the coordinate plane?	Find the rate/constant speed.	<b>Students solve and reason to determine the best buy.</b>
Does this equation represent a proportional relationship?	Order from the least to greatest or greatest to least to find the better buy.	
What is the distance formula?	Using $d = rt$ solve for distance, rate, or time.	

**Coherence KY.6.RP.3→KY.7.RP.2**

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**Number System (6.NS)**

**Standard: 6.NS.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. For example, create a story context for  $(2/3) \div (3/4)$  and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that  $(2/3) \div (3/4) = 8/9$  because  $3/4$  of  $8/9$  is  $2/3$ . (In general,  $(a/b) \div (c/d) = ad/bc$ .) How much chocolate will each person get if 3 people share  $1/2$  lb of chocolate equally? How many  $3/4$ -cup servings are in  $2/3$  of a cup of yogurt? How wide is a rectangular strip of land with length  $3/4$  mi and area  $1/2$  square mi?

**Enduring Skills:**

MP.1: Make sense of problems and persevere in solving them.

MP.2: Reason abstractly and quantitatively.

MP.3: Construct viable arguments and critique the reasoning of others.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What does reciprocal mean?	Model and solve problems with whole numbers divided by fractions.	Students <b>use concrete representations</b> to interpret and compute quotients of fractions.
Which number do you find the reciprocal of when solving a division problem?	Model and solve problems with fractions divided by whole numbers.	Students solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem.
What is the inverse of division?	Model and solve problems with fractions divided by fractions.	
In a division problem, which number is the quotient, dividend, and divisor?	Create story problems for dividing unit fractions.	
	Solve division problems with mixed numbers.	

Coherence [KY.5.NF.7](#)→[KY.6.NS.1](#)→[KY.7.NS.2](#)

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**Standard: 6.NS.2** Fluently divide multi-digit numbers using an algorithm.

a. Convert a rational number to a decimal using long division.

**Enduring Skills:**

MP.7: Look for and make use of structure.

MP.8: Look for and express regularity in repeated reasoning.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are compatible numbers?	Multiplication and division family facts.	Students recognize that division and multiplication are inverse operations.
What does the word algorithm mean?	Convert fraction into a decimal.	Student fluently divide multi-digit numbers with accuracy.
How do you convert a fraction into a decimal?	Convert fraction into a repeating decimal.	Students apply division to determine repeating and terminating decimals.
	Convert fraction into a terminating decimal.	

Coherence KY.5.NBT.6→KY.6.NS.2



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**Standard: 6.NS.2** Fluently divide multi-digit numbers using an algorithm.

- b. Know that the decimal form of a rational number terminates in “0s” or eventually repeats.

**Enduring Skills:**

MP.7: Look for and make use of structure.

MP.8: Look for and express regularity in repeated reasoning.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>How to divide fractions.</p> <p>How to divide until the remainder is zero.</p> <p>What do you do when you have a remainder and you want to know if it terminates or repeat.</p> <p>What are rational numbers?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Convert a fraction into a decimal.</p> <p>Know what steps and rules to convert a terminating or repeating decimal.</p> <p>Multiplications and division facts.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students fluently divide fractions into decimals and know if it terminates or repeats.</p>
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Coherence KY.5.NBT.6→KY.6.NS.2

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**Standards: 6.NS.3** Fluently add, subtract, multiply, and divide multi-digit decimals using an algorithm for each operation.

**Enduring Skills:**

**MP.2: Reason abstractly and quantitatively.**

**MP.6: Attend to precision.**

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What are the rules for adding, subtracting, multiplying, and dividing with decimals?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Find the sum and differences of decimals.</p> <p>Find the product and put decimal in the correct place.</p> <p>Find the quotient with the divisor as a whole number and with it as a decimal.</p> <p>Find the quotient with decimal in the dividend.</p> <p>Solve for the quotient with a decimal in both the divisor and dividend.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.</p> <p><b>Students will accurately place the decimal point while adding, subtracting, multiplying, and dividing.</b></p>
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**KY.5.NBT.5**

Coherence **KY.5.NBT.7**→**KY.6.NS.3**→**KY.7.NS.3**

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**Standards: 6.NS.4** Use the distributive property to express a sum of two whole numbers 1 – 100 with a common factor as a multiple of a sum of two whole numbers with no common factor. Example:  $6 + 21 = 3(2+7)$ . Understand there may be multiple equivalent expressions, but only one will have been completely factored (the greatest common factor removed using the distributive property)

**Enduring Skills:**

MP.8: Look for and express regularity in repeated reasoning.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What are factors?</p> <p>What are multiples?</p> <p>What is the distributive property?</p> <p>What are prime numbers?</p> <p>What are composite numbers?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Identify the factors of two whole numbers.</p> <p>Identify the (GCF) Greatest Common Factor of two whole numbers.</p> <p>Determine whether two statements are equivalent by the Distributive property.</p> <p>Apply the Distributive Property to rewrite addition and subtraction problems by factoring out the GCF.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students find the greatest common factor of two whole numbers less than or equal to 1</p> <p>Students use the distributive property to write two equivalent expressions.</p> <p>Students use the greatest common factor of two numbers to write an equivalent expression.</p>
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Coherence KY.4.OA.4→KY.6.NS.4

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standards: 6.NS.5** Understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above /below zero, elevation above/below sea level, credits/debits, positive/negative electric charge); use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.

**Enduring Skills:**

**MP.1: Make sense of problems and persevere in solving them.**

**MP.2: Reason abstractly and quantitatively.**

**MP.4: Model with mathematics.**

<b>Know</b> – What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What is an integer?</p> <p>What does opposite mean in math?</p> <p>What is a rational number?</p> <p>What is the difference in an integer and a rational number?</p>	<p>Name integers and rational numbers with their opposites.</p> <p>Represent situations with integers and rational numbers using number lines.</p> <p>Describe 0 in each situation.</p>	<p>Students understand that positive and negative numbers are used together to describe quantities having opposite directions or values (e.g., temperature above /below zero, elevation above/below sea level, credits/debits, positive/negative electric charge).</p> <p>Students use positive and negative numbers to represent quantities in real-world contexts, explaining the meaning of 0 in each situation.</p>

**Coherence KY.6.NS.5→KY.7.NS.1**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.NS.6a** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

a. 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.

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively  
MP.4: Model with mathematics.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What does opposite mean in math? Relate it to the number line.</p> <p>What is the opposite of the opposite of a number?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Identify the location of zero on a number line in relation to positive and negative numbers.</p> <p>Recognize opposite signs of numbers as locations on opposite sides of 0 on the number line.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students recognize opposite signs of numbers on a number line.</p> <p>Students recognize the opposite of the opposite of a number is the number itself.</p>
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KY.6.EE.6

Coherence KY.5.G.1→KY.6.NS.6→KY.7.NS.1

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.NS.6b** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes using appropriate range and intervals, to represent points on the line and in the plane, that include negative numbers and coordinates.

b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; **recognize the similarity between whole numbers, their negative opposites and their positions on a number line, ordered pairs differ only by signs and their locations on one or both axes.**

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively

MP.4: Model with mathematics

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
Can you label the origin, x-axis and y-axis on a coordinate plane?	Plot points in all four quadrants.	Students understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane.
Can you label the quadrants in a coordinate plane?	Identify what quadrant a point lies in.	
Do you know the signs of x and y for points in each quadrant?	Find the reflection of points across the x and y axis.	Students recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
Can you plot a point on the coordinate plane?	Recognize that when only the x value in a set of ordered pairs are opposites, it creates a reflection over the y axis, e.g., (x,y) and (-x,y)	
What is reflection?	Recognize that when only the y value in a set of ordered pairs are opposites, it creates a reflection over the x axis, e.g., (x,y) and (x,-y)	
<b>What is counterclockwise?</b>	Recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across both axes, e.g., (-x, -y) and (x,y).	

**KY.6.EE.6**

Coherence **KY.5.G.1**→**KY.6.NS.6**→**KY.7.NS.1**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.NS.6c** Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates.

c. 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.

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively.

MP.4: Model with mathematics.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are integers and rational numbers?	Write ordered pairs with integers and rational numbers.	Students understand a rational number as a point on a number line with positive and negative numbers.
What is a horizontal and vertical number line?	Plot points with integers and rational numbers.	Students find and position integers and other rational numbers on a horizontal or vertical number line diagram.
Can you find and position integers and rational numbers on a coordinate plane?	Identify reflections of points with integers and rational numbers.	Students find and position pairs of integers and other rational numbers on a coordinate plane.

**KY.6.EE.6**

Coherence **KY.5.G.1**→**KY.6.NS.6**→**KY.7.NS.1**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standards: 6.NS.7a** Understand ordering and absolute value of rational numbers.

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram. For example, interpret  $-3 > -7$  as a statement that  $-3$  is located to the right of  $-7$  on a number line oriented from left to right.

**Enduring Skills:**

**MP.1 Make sense of problems and persevere in solving them**

MP.2: Reason abstractly and quantitatively

MP.4: Model with mathematics

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What is an inequality?</p> <p>What symbols are used in an inequality?</p>	<p>Use a number line to relate position of two numbers.</p> <p>Compare integers and rational numbers.</p> <p>Write inequalities with integers and rational numbers.</p> <p>Order integers and rational numbers on a number line.</p>	<p>Students interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.</p>

Coherence [KY.5.NBT.3](#)→[KY.6.NS.6.NS.7](#)→[KY.7.NS.1](#)  
[KY.6.EE.8](#)



Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standards: 6.NS.7b** Understand ordering and absolute value of rational numbers.  
b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write  $-3^{\circ}\text{C} > -7^{\circ}\text{C}$  to express the fact that  $-3^{\circ}\text{C}$  is warmer than  $-7^{\circ}\text{C}$ .

**Enduring Skills:**

**MP: 1** Make sense of problems and persevere in solving them

MP.2: Reason abstractly and quantitatively

MP.4: Model with mathematics

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What is an inequality?</p> <p>What symbols are used in an inequality?</p>	<p>Use a number line to relate position of two numbers.</p> <p>Compare integers and rational numbers.</p> <p>Write inequalities with integers and rational numbers.</p> <p>Explain what the inequality means in a real-world situation.</p>	<p>Students write, interpret, and explain statements of order for rational numbers in real-world contexts.</p>

Coherence [KY.5.NBT.3](#)→[KY.6.NS.6.NS.7](#)→[KY.7.NS.1](#)  
[KY.6.EE.8](#)

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standards: 6.NS.7c** Understand ordering and absolute value of rational numbers.

c. 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. For example, for an account balance of -30 dollars, write  $|-30| = 30$  to describe the size of the debt in dollars.

**Enduring Skills:**

**MP.1** Make sense of problems and persevere in solving them

**MP.2:** Reason abstractly and quantitatively

**MP.4:** Model with mathematics

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What is the absolute value of a number?	Identify absolute values of a number.	Students understand the absolute value of a rational number as its distance from 0 on the number line.
Why do we use the absolute value of a number when referring to distance?	Using absolute values in real-world problems.	Students interpret absolute value as magnitude for a positive or negative quantity in a real-world situation.

Coherence [KY.5.NBT.3](#)→[KY.6.NS.6.NS.7](#)→[KY.7.NS.1](#)  
[KY.6.EE.8](#)

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standards: 6.NS.7d** Understand ordering and absolute value of rational numbers.

d. Distinguish comparisons of absolute value from statements about order. For example, recognize that an account balance less than -30 dollars represents a debt greater than 30 dollars.

**Enduring Skills:**

**MP.1 Make sense of problems and persevere in solving them**

**MP.2: Reason abstractly and quantitatively**

**MP.4: Model with mathematics**

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What is the absolute value of a number?	Ordering absolute values in least to greatest or greatest to least.	Students understand ordering and absolute value of rational numbers.
Why do we use the absolute value of a number when referring to distance?	Comparing absolute values as inequalities.	Students distinguish comparisons of absolute value from statements about order.
	Using absolute values in real-world problems.	

Coherence **KY.5.NBT.3**→**KY.6.NS.6.NS.7**→**KY.7.NS.1**  
**KY.6.EE.8**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standards: 6.NS.8** Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.

For example, represent the vertices of a rectangle in the coordinate plane and find distances between horizontal and vertical vertices accurately.

**Enduring Skills:**

MP: 5 Use appropriate tools strategically.

MP: 7 Look for and make use of structure.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
How do you find the distance between points in the same quadrant?	Find vertical and horizontal distance between points by graphing points in all four quadrants of a coordinate plane.	Students solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane.
How do you find the distance between points in different quadrants?	Find distances when only given the coordinates	Students use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
How do you find the x-coordinates and the y coordinates?		

Coherence →KY.5.G.2→KY.6.NS.8

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Expressions and Equations (6.EE)**

**Standards: 6.EE.1** Write and evaluate numerical expressions involving whole-number exponents.

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively.

MP.6: Attend to precision.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What is the base of an exponent?</p> <p>What does the exponent represent in relationship to the base?</p> <p>How do you read an exponent?</p>	<p>Write a numerical expression involving a whole number and exponents.</p> <p>Evaluate a numerical expression involving whole number exponents.</p> <p>Solve order of operation problems that contain exponents.</p>	<p>Students write and evaluate numerical expressions involving whole-number exponents.</p> <p style="color: red;">Students interpret an exponent of size <math>n</math> as a repetitive multiplication expression of the base multiplied by itself <math>n</math> times.</p> <p style="color: red;">Students use the standard order of operations using exponents to evaluate numerical expressions.</p>

Coherence KY.5.NBT.2→KY.6.EE.1→KY.8.EE.1

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.2.a** Write, read and evaluate expressions in which letters stand for numbers.

- a. Write expressions that record operations with numbers and with letters standing for numbers. For example, express the calculation “y less than 5” as  $5 - y$ .

**Enduring Skills:**

**MP.1: Make sense of problems and persevere in solving them.**

**MP.3: Construct viable arguments and critique the reasoning of others.**

**MP.4: Model with mathematics.**

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What are numerical expressions?</p> <p>What is an algebraic expression?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Translating written phrases into algebraic expressions.</p> <p>Translating algebraic expressions into written phrases.</p> <p>Represent real-world situations using algebraic expressions with one operation</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students write, read and evaluate expressions in which letters stand for numbers.</p> <p>Students write expressions that record operations with numbers and with letters standing for numbers.</p>
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**KY.5.OA.2**

Coherence KY.5.OA.2 → KY.6.EE.2

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.2.b** Write, read and evaluate expressions in which letters stand for numbers.

- b. 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.

**Enduring Skills:**

- MP.1: Make sense of problems and persevere in solving them.**  
**MP.3: Construct viable arguments and critique the reasoning of others.**  
**MP.4: Mode with mathematics.**

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What do the following mathematical terms mean: sum, term, product, factor, quotient, coefficient, variable, constant?</p> <p>Can you identify the coefficient, constant, and variable in an expression?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Identify parts of an expression.</p> <p>Identify parts of an expression as a single entity.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students write, read and evaluate expressions in which letters stand for numbers.</p> <p>Students identify parts of an expression using mathematical terms.</p> <p>Students view one or more parts of an expression as a single entity.</p> <p>Students describe expressions as a product of two factors.</p>
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Coherence [KY.5.OA.2](#)→[KY.6.EE.2](#)



Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.2.c** Write, read and evaluate expressions in which letters stand for numbers.

- c. Evaluate expressions at specific values of their variables, **including values that are non-negative rational numbers**. 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). 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  $s = 1/2$ .

**Enduring Skills:**

- MP.1 Make sense of problems and persevere in solving them.**  
**MP.3 Construct viable arguments and critique the reasoning of others.**  
**MP.4 Model with mathematics.**

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What is the order of operations?</p> <p>Why is it important that we use order of operations when solving multi-operational problems?</p>	<p>Solve expressions by substituting specific values for variables.</p> <p>Evaluate algebraic expressions including those that arise from real-world problems.</p> <p>Apply order of operations when there are no parentheses for expressions that include whole number exponents.</p>	<p>Students evaluate expressions at specific values of their variables.</p> <p>Students include expressions that arise from formulas used in real-world problems.</p> <p>Students perform arithmetic operations.</p> <p><b>Students use formulas to find the volume and surface area of a cube.</b></p>

**KY.5.OA.2**

Coherence **KY.5.OA.2**→**KY.6.EE.2**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.3** Apply the properties of operations to generate equivalent expressions. 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  $3y$ .

**Enduring Skills:**

MP.7: Look for and make use of structure.

MP.8: Look for and express regularity in repeated reasoning.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are the properties used to write equivalent expressions?	Identify properties shown by numerical and algebraic statements.	Students apply the properties of operations to generate equivalent expressions using the distributive property.
What does equivalent mean?	Use properties to simplify expressions.	Students apply properties of operations to $y + y + y$ to produce the equivalent expression $3y$ .
What operations can you use the Commutative and Associative properties with?	Identify and apply the Identity and Zero properties, the Commutative property, the Associative property, and the Distributive property	Students use Associative, Commutative, and Distributive Properties to generate equivalent expressions.
	Apply the properties of operations to generate equivalent expressions.	

Coherence [KY.5.OA.2](#)→[KY.6.EE.3](#)→[KY.7.EE.1](#)

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.4** Identify when two expressions are equivalent 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.

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively.

MP.3: Construct viable arguments and critique the reasoning of others.

MP.7: Look for and make use of structure.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What does equivalent mean?</p> <p>How can we prove two equations are equivalent?</p>	<p>Recognize when two expressions are equivalent.</p>	<p>Students identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them).</p> <p>Students recognize the variable represents <i>any</i> number.</p>

Coherence [KY.5.OA.2](#)→[KY.6.EE.4](#)→[KY.7.EE.1](#)

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE. 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.

**Enduring Skills:**

**MP.1: Make sense of problems and persevere in solving them.**

**MP.2: Reason abstractly and quantitatively.**

**MP.7: Look for and make use of structure.**

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What is the difference in an equation and an inequality?	Recognize solving an equation or inequality as a process of answering “which values from a specified set, if any, make the equation or inequality true?”	Students solves 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?
How many possible answers are there in an equation?	Understand the solutions are the value(s) that make the equation or inequality true.	Students use substitution to determine whether a given number in a specified set makes an equation or inequality true.
How many possible answers are there in an inequality?	Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	<b>Students describe an equation or inequality with no solution as having no solutions or an empty set of solutions.</b>
What is a true equation?		
What is a false equation?		
What is an open sentence?		
What is the solution of an equation?		

**Coherence KY.6.EE.5→KY.8.EE.8**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.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.

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively.

MP.6: Attend to precision.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What are variables and why would we use them in math?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Identify variable quantities.</p> <p>Relate variables to a context.</p> <p>Write expressions when solving real-world or mathematical problems.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.</p> <p>Students represent an unknown quantity in real-world context appropriately with a variable and write an expression to show this.</p>
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Coherence KY.6.EE.6→KY.7.EE.4

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.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.

**Enduring Skills:**

MP.1: Make sense of problems and persevere in solving them.

MP.2: Reason abstractly and quantitatively.

MP.3: Construct viable arguments and critique the reasoning of others.

MP.4: Model with mathematics.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What are inverse operations?</p> <p>What is the goal when solving an equation with a variable?</p>	<p>Identify and use inverse operations to solve equations.</p> <p>Solve addition, subtraction, multiplication, and division equations.</p> <p>Solve and write equations for real-world mathematical problems containing one unknown.</p>	<p>Students solve real-world and mathematical problems by writing and solving equations of the form <math>x + p = q</math> and <math>px = q</math> for cases in which <math>p</math>, <math>q</math> and <math>x</math> are all nonnegative rational numbers.</p> <p>Students understand equations can be solved by using the inverse operations to keep an equation balanced.</p>

Coherence KY.6.EE.7→KY.7.EE.4

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.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 vertical and horizontal number lines.**

**Enduring Skills:**

**MP.3: Construct viable arguments and critique the reasoning of others.**

**MP.7: Look for and make use of structure.**

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>Does an inequality have just one answer that will make it true?</p> <p>When do you use an open or closed circle on a number line?</p> <p>What inequality symbol would you use for “at most” and “at least”?</p>	<p>Use an inequality to describe real-world situations.</p> <p>Graph inequalities to represent situations.</p> <p><b>Graph inequalities on a horizontal and vertical number line.</b></p>	<p>Students write an inequality of the form <math>x &gt; c</math> or <math>x &lt; c</math> to represent a constraint or condition in a real-world or mathematical problem.</p> <p>Students recognize that inequalities of the form <math>x &gt; c</math> or <math>x &lt; c</math> have infinitely many solutions.</p> <p>Students represent solutions of such inequalities <b>on a horizontal and vertical</b> number line diagram.</p>

**Coherence KY.6.EE.8→KY.7.EE.4**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.EE.9** Use variables to represent two quantities in a real-world problem that changes in relationship to one another.

- a. Appropriately recognize one quantity as the dependent variable and the other as the independent variable.
- b. 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.
- c. Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the question.

**Enduring Skills:**

MP.3: Construct viable arguments and critique the reasoning of others

MP. 4: Model with mathematics

MP.7: Look for and make use of structure

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>Can you identify related and unknown quantities?</p> <p>Can you classify quantities as dependent or independent variables?</p> <p>Can you use variables to represent two quantities in a real-world problem that change in relations to one another?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Write an equation to express one quantity (dependent) in terms of the other quantity (independent).</p> <p>Recognize that quantities given may not have a clear independent/dependent relationship.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students use variables to represent two quantities in a real-world problem that change in relationship to one another.</p> <p>Students 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.</p>
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**Coherence** KY.5.OA.3→KY.6.EE.9→KY.8.EE.5



Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Geometry (G)**

**Standard: 6.G.1** Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and quadrilaterals; apply these techniques in the context of solving real-world and mathematical problems.

**Enduring Skills:**

MP.1: Make sense of problems and persevere in solving them

MP.6: Attend to precision

MP.8: Look for and express regularity in repeated reasoning

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are the basic properties of shapes?	Find the area of different polygons.	Students identify shapes and use the correct formula to find the area.
What are the formulas to find the area of right triangles, and other triangles, special quadrilaterals?	Compose or decompose shapes into other shapes to find the area.	Students compose or decompose shapes into other shapes they can use to find the area.
What does compose and decompose mean?	Apply these techniques in the context of solving real-world and mathematical problems.	Students apply these techniques in the context of solving real-world and mathematical problems.

Coherence KY.5.NF.4→KY.6.G.1→KY.7.G.6

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.G.2** Find the volume of a right rectangular prism with rational number edge lengths. Apply the formulas  $V=lwh$  and  $V= Bh$  to find the volumes of right rectangular prisms with rational number edge lengths in the context of solving real-world and mathematical problems.

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively

MP.5: Use appropriate tools strategically

MP.6: Attend to precision

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What is volume and give examples of how we can use in real-world situations?	Multiply using whole numbers, mixed numbers, and fractions.	Students multiply using whole numbers, mixed numbers, and fractions and get the correct answer.
What is the formula for solving volume questions?	Find the volume of a right rectangular prism.	Students use the net or a three-dimensional figure to find the volume.
Which numbers do I use to find the volume of a three-dimensional figure?	Apply the formulas for volume to solve real-world and mathematical problems.	Students apply the formulas for volume to solve real-world and mathematical problems.
Do I know how to multiply with fractions?		

Coherence [KY.5.MD.5](#)→[KY.6.G.2](#)→[KY.7.G.6](#)

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.G.3** Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems. *For example, a gardener draws a map of his garden on a coordinate plane with vertices (-2, 7), (-2, -1), (4, 7). What is the base and height of this triangle? What is the area of his garden, assuming each unit on the coordinate plane is one meter?*

**Enduring Skills:**

- MP.4: Model with mathematics
- MP.5: Use appropriate tools strategically
- MP.6: Attend to precision

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are the criteria for polygons?	Identify different polygons so they know how many sides and vertices each should have so they can draw polygons on the coordinate plane.	Students draw polygons on the coordinate plane.
How many sides do they have and the correct name for them?	Find the reflection of vertices across the x and y axis to find missing vertices.	Students find the missing vertices.
What is a vertex?	Find the distance between two points to know the side length of a polygon.	Students apply these techniques in the context of solving real-world and mathematical problems.
What is the distance formula?		
How do you find the distance of points that are in and are not in the same quadrant?		<i>Students plot points on a coordinate plane finding the base and the height.</i>

**Coherence KY.5.G.2→KY.6.G.3**

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.G.4** Classify three-dimensional figures including cubes, prisms, pyramids, cones, and spheres. Specify the attributes of each shape that makes unique to its classification.

**Enduring Skills:**

MP.2: Reason abstractly and quantitatively

MP.3: Construct viable arguments and critique the reasoning of others

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What are the characteristics of cubes, prisms, pyramids, cones, and spheres?</p> <p>What are attributes such as edges, vertex, and sides?</p> <p>How are two-dimensional and three-dimensional figures alike and how different?</p>	<p>Know edges, vertices, and sides of three-dimensional figures.</p> <p>Use nets of cubes, prisms, pyramids, cones, and spheres to find edges, Vertices, and sides of three-dimensional figures.</p>	<p>Students draw the net of three-dimensional figures and classify them by attributes then determine what makes them unique.</p>

Coherence KY.6.G.4→KY.7.G.6

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Statistics and Probability (SP)**

**Standard: 6.SP.0** Apply the four–step investigation process for statistical reasoning.

- a. **Formulate Questions:** Formulate a statistical question as one that anticipates variability and can be answered with data.
- b. **Collect Data:** Design and use a plan to collect appropriate data to answer a statistical question.
- c. **Analyze Data:** Select appropriate graphical methods and numerical measures to analyze data by displaying variability within a group, comparing individual to individual and comparing individual to group.

**Enduring Skills:**

- MP.1 Make sense of problems and persevere in solving them.
- MP.4 Model with mathematics.

<p><u>Know:</u> What content does the students need to know to demonstrate this standard?</p> <p>What are statistical question?</p> <p>What is the difference between biased and fair question?</p> <p>What is data?</p> <p>How do you collect data?</p> <p>What type of graphs can be used to represent data?</p>	<p><u>DO:</u> What skill must the student demonstrate?</p> <p>Use the four step investigation process to a real-world problem.</p> <ul style="list-style-type: none"> <li>A. Question</li> <li>B. Collect</li> <li>C. Analyze</li> <li>D. Interpret</li> </ul>	<p><u>Mastery:</u> How does the student demonstrate the learning of the standard?</p> <p>Students apply the four-step process for statistical question real world problem.</p>
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**Coherence** KY.5.MD.2→KY.6.SP.0→KY.7.SP.1

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

**Standard: 6.SP.1** Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. For example, “How old am I?” is not a statistical question, but “How old are the students in my school?” is a statistical question because one anticipates variability in students’ ages.

**Enduring Skills:**

MP.1: Make sense of problems and persevere in solving them.

MP.3: Construct viable arguments and critique the reasoning of others.

**MP.6: Attend to precision.**

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What are statistical questions?</p> <p>What are non-statistical questions?</p> <p>What is the difference between a statistical and non-statistical question?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Give students questions and let them decide if they are statistical or non-statistical.</p> <p>Let students write both types of questions.</p> <p><b>Statistical questions will give more than one answer for your data.</b></p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.</p>
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**Coherence** [KY.5.MD.2](#)→[KY.6.SP.1](#)→[KY.7.SP.1](#)

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**6<sup>th</sup> Grade Math Standards**

**Standard: 6.SP.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.

**Enduring Skills:**

**MP.2: Reason abstractly and quantitatively.**

MP.6: Attend to precision.

MP.7: Look for and make use of structure.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
<p>What is frequency?</p> <p>What are gaps?</p> <p>What are <b>outlier</b> values?</p> <p>What are clusters?</p> <p>What is mean, median, mode and range?</p>	<p>Use the data to create a dot plot or a histogram so they can visually see the center, spread, and overall shape.</p> <p>Use the distribution of data to describe its center, spread, and overall shape.</p>	<p>Students use the data to create a dot plot or a histogram so they can visually see the center, spread, and overall shape.</p> <p>Students use the distribution of data to describe its center, spread, and overall shape.</p> <p><b>Students analyze distribution and explain what it shows about the center, spread, and overall shape.</b></p>

Coherence [KY.5.MD.2](#)→[KY.6.SP.2](#)→[KY.7.SP.3](#)

Pike County School District  
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**6<sup>th</sup> Grade Math Standards**

**Standard: 6.SP.3** Recognize that a measure of center for a numerical data set summarizes all of its values with a single number **to describe a typical value** , while a measure of variation describes **how the values in the distribution vary**. Emphasis is on the sensitivity of measures of center to changes in the data, such as mean is generally much more likely to be pulled towards an extreme value than the median. Additionally, measures of variation (range, interquartile range) describe the data by giving a sense of the spread of data points.

**Enduring Skills:**

**MP.2: Reason abstractly and quantitatively.**

**MP.5: Use appropriate tools strategically.**

**MP.6: Attend to precision.**

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What is the measure of center?	Using mean and median find the measures of center of a data set.	Students recognize that a measure of center for a numerical data set summarizes all of its values vary.
What is the measure of variation/variability?	Using range, interquartile range, deviate, and mean absolute deviation to find the measure of variability of a data set.	Students recognize that the measure of variation describes how its values vary.
What is the first quartile, interquartile range, and third quartile using a box plot?		
What is the mean absolute deviation using a dot plot?		

**Coherence KY.6.SP.3→KY.7.SP.4**



Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

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

**Enduring Skills:**

MP.6: Attend to precision

MP.7: Look for and make use of structure

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What is a number line?</p> <p>What is a dot plot?</p> <p>What is a histogram?</p> <p>What is a box plot?</p> <p>Which one shows each data in the data set (frequency)?</p> <p>Which one shows groupings/intervals of data?</p> <p>Which is best for large data sets?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Draw dot plots, histograms, and box plots.</p> <p>Use the dot plot, histogram and box plot to answer questions regarding the data.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students draw dot plots, histograms, and box plots.</p> <p>Students use the dot plot, histogram and box plot to answer questions regarding the data.</p>
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**Coherence** [KY.5.MD.2](#)→[KY.6.SP.4](#)→[KY.7.SP.1](#)

Pike County School District  
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**6<sup>th</sup> Grade Math Standards**

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

- a. Reporting the number of observations.

**Enduring Skills:**

MP.3: Construct viable arguments and critique the reasoning of others

MP.7: Look for and make use of structure

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>How many observations were in the set of data?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Find the number of observations by adding the number of data or counting the data.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students report the number of observations in a data set.</p> <p>Students understand the larger numbers of observations creates a more accurate statistical representation than the smaller numbers of observations.</p>
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Coherence KY.6.SP.5→KY.7SP.1

Pike County School District  
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**6<sup>th</sup> Grade Math Standards**

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

- b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.

**Enduring Skills:**

MP.3: Construct viable arguments and critique the reasoning of others

MP.7: Look for and make use of structure

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What is being measured?	Analyze data.	Students describe the nature of the attribute under investigation, including how it is measured and its units of measurement.
How is it being measured?	Describe the data.	
What does the data mean?		

Coherence KY.6.SP.5→KY.7SP.1

Pike County School District  
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**6<sup>th</sup> Grade Math Standards**

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

- c. Determining quantitative measures of center (median and/or mean) to describe distribution of numerical data.

**Enduring Skills:**

MP.3: Construct viable arguments and critique the reasoning of others

MP.7: Look for and make use of structure.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What is the difference in measure of center and measure of variability?</p> <p>How to find mean and median?</p> <p>Finding the median in non-ordered sets of data and find the mean is a mathematical average.</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Use median and/or mean to find the measure of center.</p> <p>Use interquartile range and/or mean absolute to find the measure of variability.</p> <p>Choose the appropriate measure of central tendency to represent the data.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students give quantitative measures of center (median and/or mean) to describe distribution of numerical data.</p> <p>Students know methods of finding measures of center including finding the median of a non-ordered sets and a mean is a mathematical average.</p>
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Coherence KY.6.SP.5→KY.7SP.1

Pike County School District  
Standards Mastery Document -- Revised 2019  
**6<sup>th</sup> Grade Math Standards**

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

- d. Describing distributions of numerical data qualitatively relating to shape (using terms such as cluster, mode(s), gap, symmetric, uniform, skewed-right and the presence of outliers) and quantitatively relating to spread/variability (using terms such as range and interquartile range).

**Enduring Skills:**

MP.3 Construct viable arguments and critique the reasoning of others.

MP.7 Look for and make use of structure.

<b>Know:</b> What content does the student need to know to demonstrate this standard?	<b>Do:</b> What skill must the student demonstrate?	<b>Mastery:</b> How does the student demonstrate the learning of the standard?
What are clusters in numerical data?	Identify clustering, mode, gap, data symmetry, and outliers.	Students can describe distributions of numerical data using terms such as cluster, mode, gap, symmetric, skewed.
What are mode in data sets?	Find range and interquartile range.	Students can describe the spread or variability of data by calculating range and interquartile range.
What are range and interquartile range?		

Coherence KY.6.SP.5→KY.7SP.1

Pike County School District  
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**6<sup>th</sup> Grade Math Standards**

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

- e. Relating the choice of measures of center and variability to the shape of the data distribution.

**Enduring Skills:**

MP.3: Construct viable arguments and critique the reasoning of others

MP.7: Look for and make use of structure.

<p><b>Know:</b> What content does the student need to know to demonstrate this standard?</p> <p>What is the measure of center?</p> <p>What is the measure of variability?</p>	<p><b>Do:</b> What skill must the student demonstrate?</p> <p>Analyze the shape of the data distribution and the context in which the data were gathered to choose the appropriate measures of central tendency and variability and justify why this measure is appropriate in terms of the context.</p> <p>Make conclusions from mean absolute deviations.</p> <p>Make conclusions from ranges.</p>	<p><b>Mastery:</b> How does the student demonstrate the learning of the standard?</p> <p>Students make choices of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.</p> <p>Students make conclusion from the measure of center and the measure of variability by shapes of the distribution.</p>
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Coherence KY.6.SP.5→KY.7SP.1