

6th Grade Mathematics
Units of Instruction
2022-2023



6th Grade Mathematics

UNIT 1: Area & Operations (with whole numbers and decimals) 5 Weeks	UNIT 2: Integers and numbers lines 6 Weeks	Unit 3: Rational Numbers 6 Weeks	UNIT 4 : Rates & Ratios 6 Weeks	UNIT 5: Expressions and Graphs 8 Weeks	UNIT 6: Distributions 5 Weeks
6.G.1 6.EE.2 6.NS.3 <i>6.G.3</i> <i>6.NS.4</i>	6.NS.6 6.NS.8 6.EE.8 <i>6.NS.7</i> <i>6.NS.2</i> <i>6.NS.4</i> <i>6.NS.5</i>	6.G.2 6.NS.6 6.NS.3 <i>6.G.4</i> <i>6.NS.1</i> <i>6.NS.2</i> <i>6.NS.4</i> <i>6.EE.8</i>	6.RP.1 6.RP.3 <i>6.RP.2</i>	6.EE.2 6.EE.3 6.EE.7 6.EE.9 <i>6.EE.1</i> <i>6.EE.4</i> <i>6.EE.5</i> <i>6.EE.6</i> <i>6.NS.4</i>	6.SP.3 6.SP.5 6.NS.3 <i>6.SP.0</i> <i>6.SP.2</i> <i>6.SP.4</i> <i>6.SP.1</i>
*Fluency Standards (taught all year long): 6.EE.2, 6.NS.3 (Supporting: 6.NS.2)					

Priority Standards: 6.RP.1, 6.RP.3, 6.NS.3, 6.NS.6, 6.NS.8, 6.EE.2, 6.EE.3, 6.EE.7, 6.EE.8, 6.EE.9, 6.SP.2, 6.SP.5, 6.G.1, 6.G.2 (6.NS.7, 6.SP.3 not priority)

It may not be necessary to summatively prioritize standards in units where they are italicized.

6th Grade Mathematics



Unit 1: Area and Operations (with whole numbers and decimals)

Grade 6 Mathematics

Unit 1: Area and Operations (with whole numbers and decimals)

This unit starts the year with a deep dive into operations with whole numbers and decimals. Students use the context of area problems to write, interpret, and evaluate expressions that represent areas. Students understand that areas can be composed and decomposed and use this to visualize properties of operations (distributive property, for example).

Duration: 25 Days

<i>Standards for Mathematical Practice</i>	
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.
<i>Priority Standards</i>	
Standards	Clarifications
<p>Cluster: Solve real-world and mathematical problems involving area, surface area and volume.</p> <p>KY.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.</p>	<p>Area of the listed shapes may be thought of as a rectangle with larger area, subtracting the areas exterior to the actual shape to obtain the true area, or as a composite area of smaller triangles and rectangles which sum to the true area of the given shape. Students recognize given shapes can be combined to find area or decomposed to find area, such as surface area, and one method may be more efficient than the other.</p> <p>Coherence KY.5.NF.4→KY.6.G.1→KY.7.G.6</p>

<p>MP.1, MP.6, MP.8</p>	
<p>Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>KY.6.EE.2 Write, read and evaluate expressions in which letters stand for numbers.</p> <p>a. Write expressions that record operations with numbers and with letters standing for numbers.</p> <p>b. Identify parts of an expression using mathematical terms (sums, term, product, factor, quotient, coefficient); view one or more parts of an expression in a single entity.</p> <p>c. Evaluate expressions for 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 whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).</p> <p>MP.1, MP.3, MP.4</p>	<p>For example,</p> <p>a. Express the calculation “y less than 5” as $5 - y$.</p> <p>b. 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.</p> <p>c. Use the formulas $V = s^3$ and $SA = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 12$ meter.</p> <p style="text-align: center;">KY.5.OA.1 Coherence KY.5.OA.2→KY.6.EE.2</p>
<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.6.NS.3 Fluently add, subtract, multiply and divide multi-digit decimals using an algorithm for each operation.</p>	<p>Emphasis is on the role of the decimal point in operations and how place value is critical to the overall fluency of the performed operations involving decimals.</p> <p style="text-align: center;">KY.5.NBT.5 Coherence KY.5.NBT.7→KY.6.NS.3→KY.7.NS.3</p>

MP.2, MP.6	
<i>Supporting Standards</i>	
Standards	Clarifications
<p>Cluster: Solve real-world and mathematical problems involving area, surface area and volume.</p> <p>KY.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.</p> <p>MP.4, MP.5, MP.6</p>	<p>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 1 meter?</p> <p>Coherence KY.5.G.2→KY.6.G.3</p>
<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.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.</p> <p>MP.8</p>	<p>Express numerical expressions using the distributive property; understand there may be multiple equivalent expressions, but only one will have been completely factored (the greatest common factor removed using the distributive property) such as $6 + 21 = 3(2 + 7)$.</p> <p>Coherence KY.4.OA.4→KY.6.NS.4</p>

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Unit 2: Integers and Number Lines

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Unit 2: Integers and Number Lines

In this unit, students deepen their understanding of positive and negative numbers by working with the number line and eventually the coordinate plane. They develop an understanding of negative numbers, opposites, and absolute values and can relate these concepts to the number line. The students compare values of numbers by placing them on the number line. They consider simple inequalities that arise from problems and use the number line to show all possible solutions. Throughout this unit, students start with vertical or horizontal number lines and build toward solving problems using the coordinate plane.

Duration: 30

<i>Standards for Mathematical Practice</i>	
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.
<i>Priority Standards</i>	
Standards	Clarifications
<p>Cluster: Apply and extend previous understanding of numbers to the system of rational numbers.</p> <p>KY.6.NS.6 Understand a rational number as a point on the number line. Extend number line</p>	<p>a. Emphasis is on student understanding that every positive location on a number line has an opposite the same distance from zero in the negative direction and vice versa. Logically following from this is the fact that zero, as it has no positive or negative sign, is its own opposite.</p>

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.

a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize 0 is its own opposite and the opposite of a positive number is a negative, and the opposite of a negative number is a positive, such as $-(-3) = 3$.

b. 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.

c. 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.

MP.2, MP.4

- b. Emphasis is on generalizing patterns about where coordinates are located on a coordinate plane.
- c. The intent is for students to see a coordinate axis is the combination of a vertical number line and a horizontal number line.

KY.6.EE.6

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

Cluster: Apply and extend previous understanding of numbers to the system of rational numbers.

KY.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

For example, represent the vertices of a rectangle in the coordinate plane and find distances between horizontal and vertical vertices accurately. Given a vertex of $(-2, 3)$, a length of 5 and a width of 11, locate the other three vertices of the rectangle.

Coherence KY.5.G.2→KY.6.NS.8

<p>the same second coordinate.</p> <p>MP.5, MP.7</p>	
<p>Cluster: Reason about and solve one-variable equation and inequalities.</p> <p>KY.6.EE.8 Write an inequality of the form $x > c$, $x < c$, $x \geq c$, or $x \leq c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of these forms have infinitely many solutions; represent solutions of such inequalities on vertical and horizontal number lines.</p> <p>MP.3, MP.7</p>	<p>Emphasis is on students understanding the phrases “more than”, “less than”, “at least” and “at most” represent constraints and conditions and are therefore associated with the operators listed in real-world problems. Students also understand an inequality does not yield a specific value, but rather an infinite range of values. Students also appropriately represent solutions to inequalities using both open and closed circles, along with direction, on vertical and horizontal number lines.</p> <p>Coherence KY.6.EE.8→KY.7.EE.4</p>
<i>Supporting Standards</i>	
Standards	Clarifications
<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.6.NS.2 Fluently divide multi-digit numbers using an algorithm.</p> <p>a. Convert a rational number to a decimal using long division.</p> <p>b. Know that the decimal form of a rational number terminates in 0s or eventually repeats.</p>	<p>Divide a rational number a/b using long division, making sure to include rational numbers equivalent to terminating decimals and rational numbers equivalent to repeating decimals.</p> <p>b. Students understand and explain when they have a 0 remainder in a long division problem, the quotient (answer) is a terminating decimal; students understand when they notice a pattern in the process of dividing, they conclude they will never reach a 0 remainder and they then notate the part of the quotient that is repeating by marking a bar over those values.</p>

<p>MP.7, MP.8</p>	<p>Coherence KY.5.NBT.6→KY.6.NS.2</p>
<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.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.</p> <p>MP.8</p>	<p>Express numerical expressions using the distributive property; understand there may be multiple equivalent expressions, but only one will have been completely factored (the greatest common factor removed using the distributive property) such as $6 + 21 = 3(2 + 7)$.</p> <p>Coherence KY.4.OA.4→KY.6.NS.4</p>
<p>Cluster: Apply and extend previous understanding of numbers to the system of rational numbers.</p> <p>KY.6.NS.5 Understand that positive and negative numbers are used together to describe quantities having opposite directions or values; use positive and negative numbers to represent quantities in real- world contexts, explaining the meaning of 0 in each situation.</p> <p>MP.1. MP.2, MP.4</p>	<p>For example, positive and negative temperatures or elevations, with the understanding that zero means the freezing point Celsius of water or sea level.</p> <p>Coherence KY.6.NS.5→KY.7.NS.1</p>
<p>Cluster: Apply and extend previous understanding of numbers to the system of rational numbers.</p> <p>KY.6.NS.7 Understand ordering and absolute value of rational numbers.</p>	<p>a. Interpret two numbers, including two negatives, as one is to the left or right (or above or below) the other on a number line diagram.</p> <p>b. Understand, as with 6.NS.7a, positive and negative rational numbers represent real-life situations and can be compared.</p>

a. Interpret statements of inequality as statements about the relative position of two numbers on a number line diagram.

b. Write, interpret and explain statements of order for rational numbers in real-world contexts.

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.

d. Distinguish comparisons of absolute value from statements about order.

MP.1, MP.2, MP.4

c. Interpret a positive or negative direction from zero as an absolute value, or magnitude, to describe a real-life situation.

d. Recognize a number's distance from zero can be compared to another number's distance from zero with a "less than" or "greater than" distinction.

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

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Unit 3: Rational Numbers

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Unit 3: Rational Numbers

This unit uses volume as a concrete model of multiplication. Using volume problems as a context, students develop their procedural fluency in multiplying and dividing positive and negative whole numbers and fractions.

Duration: 30 Days

<i>Standards for Mathematical Practice</i>	
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.
<i>Priority Standards</i>	
Standards	Clarifications
<p>Cluster: Solve real-world and mathematical problems involving area, surface area and volume.</p> <p>KY.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 volumes of right rectangular prisms with rational number edge lengths in the context of solving real-world and mathematical problems.</p>	<p>Coherence KY.5.MD.5→KY.6.G.2→KY.7.G.6</p>

<p>MP.2, MP.5, MP.6</p>	
<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.6.NS.3 Fluently add, subtract, multiply and divide multi-digit decimals using an algorithm for each operation.</p> <p>MP.2, MP.6</p>	<p>Emphasis is on the role of the decimal point in operations and how place value is critical to the overall fluency of the performed operations involving decimals.</p> <p style="text-align: center;">KY.5.NBT.5 Coherence KY.5.NBT.7→KY.6.NS.3→KY.7.NS.3</p>
<p>Cluster: Apply and extend previous understanding of numbers to the system of rational numbers.</p> <p>KY.6.NS.6 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.</p> <p>a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize 0 is its own opposite and the opposite of a positive number is a negative, and the opposite of a negative number is a positive, such as $-(-3) = 3$.</p> <p>b. 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>c. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the</p>	<p>d. Emphasis is on student understanding that every positive location on a number line has an opposite the same distance from zero in the negative direction and vice versa. Logically following from this is the fact that zero, as it has no positive or negative sign, is its own opposite.</p> <p>e. Emphasis is on generalizing patterns about where coordinates are located on a coordinate plane.</p> <p>f. The intent is for students to see a coordinate axis is the combination of a vertical number line and a horizontal number line.</p> <p style="text-align: center;">KY.6.EE.6 Coherence KY.5.G.1→KY.6.NS.6→KY.7.NS.1</p>

<p>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.</p> <p>MP.2, MP.4</p>	
Supporting Standards	
Standards	Clarifications
<p>Cluster: Solve real-world and mathematical problems involving area, surface area and volume.</p> <p>KY.6.G.4 Classify three-dimensional figures including cubes, prisms, pyramids, cones and spheres.</p> <p>MP.2, MP.3</p>	<p>Emphasis is on classifying three-dimensional shapes and specifically the attributes of each shape that make it unique to its classification.</p> <p>Coherence KY.6.G.4→KY.7.G.6</p>
<p>Cluster: Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</p> <p>KY.6.NS.1 Interpret and compute quotients of fractions and solve word problems involving division of fractions by fractions.</p> <p>MP.1, MP.2, MP.3</p>	<p>For example, create a story context for $(2/3) \div (3/4)$ and use a visual fraction model to show the quotient: How much chocolate will each person get if 3 people share $1/2$ lb. of chocolate equally? How many $1/4$-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 mile?</p> <p>Coherence KY.5.NF.7→KY.6.NS.1→KY.7.NS.2</p>

<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.6.NS.2 Fluently divide multi-digit numbers using an algorithm.</p> <p>a. Convert a rational number to a decimal using long division.</p> <p>b. Know that the decimal form of a rational number terminates in 0s or eventually repeats.</p> <p>MP.7, MP.8</p>	<p>Divide a rational number a/b using long division, making sure to include rational numbers equivalent to terminating decimals and rational numbers equivalent to repeating decimals.</p> <p>b. Students understand and explain when they have a 0 remainder in a long division problem, the quotient (answer) is a terminating decimal; students understand when they notice a pattern in the process of dividing, they conclude they will never reach a 0 remainder and they then notate the part of the quotient that is repeating by marking a bar over those values.</p> <p>Coherence KY.5.NBT.6→KY.6.NS.2</p>
<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.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.</p> <p>MP.8</p>	<p>Express numerical expressions using the distributive property; understand there may be multiple equivalent expressions, but only one will have been completely factored (the greatest common factor removed using the distributive property) such as $6 + 21 = 3(2 + 7)$.</p> <p>Coherence KY.4.OA.4→KY.6.NS.4</p>
<p>Cluster: Reason about and solve one-variable equation and inequalities.</p> <p>KY.6.EE.8 Write an inequality of the form $x > c$, $x < c$, $x \geq c$, or $x \leq c$ to represent a constraint or</p>	<p>Emphasis is on students understanding the phrases “more than”, “less than”, “at least” and “at most” represent constraints and conditions and are therefore associated with the operators listed in real-world problems. Students also understand an inequality does</p>

condition in a real-world or mathematical problem. Recognize that inequalities of these forms have infinitely many solutions; represent solutions of such inequalities on vertical and horizontal number lines.

MP.3, MP.7

not yield a specific value, but rather an infinite range of values. Students also appropriately represent solutions to inequalities using both open and closed circles, along with direction, on vertical and horizontal number lines.

Coherence KY.6.EE.8→KY.7.EE.4

6th Grade Mathematics



Unit 4: Rates and Ratios

6th Grade Mathematics

Unit 4: Rates and Ratios

This unit asks students to consider variability and introduces the concept of rates and ratios. Building from the skills they developed for working with fractions in previous units, students distinguish between parts of wholes, ratios, and rates, noting that in context these represent different relationships, but out of context, strategies for operations are the same. Students encounter many real world situations where rates and ratios are critical in understanding, describing, and answering questions.

Duration: 30 days

<i>Standards for Mathematical Practice</i>	
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.
<i>Priority Standards</i>	
Standards	Clarifications

<p>Cluster: Understanding ratio concepts and use ratio reasoning to solve problems.</p> <p>KY.6.RP.1 Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.</p> <p>MP.2, MP.6</p>	<p>Students use the concept of ratios as a comparison between related quantities; students also express these relationships in equivalent ratios in lowest terms, where appropriate.</p> <p>Coherence KY.5.NF.5→KY.6.RP.1</p>
<p>Cluster: Understanding ratio concepts and use ratio reasoning to solve problems.</p> <p>KY.6.RP.3 Use ratio and rate reasoning to solve real-world and mathematical problems.</p> <p>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.</p> <p>b. Solve rate problems including those involving unit pricing and constant speed.</p> <p>c. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.</p> <p>MP.1, MP.4, MP.7</p>	<p>a. Students find the missing values in a table, assuming the values in the table represent a proportional relationship; students plot the values from a table on a coordinate plane, with appropriate labels and scales; Students compare the ratios of tables, answering, which has a greater/less rate.</p> <p>b. Students find a unit rate from a given situation and reason to apply it to a future scenario.</p> <p>c. For example, convert miles per hour to feet per hour or meters per minute to meters per hour using appropriate conversion ratios.</p> <p>Coherence KY.6.RP.3→KY.7.RP.2</p>
Supporting Standards	
Standards	Clarifications

Cluster: Understanding ratio concepts and use ratio reasoning to solve problems.

KY.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.

MP.2, MP.6

Expectations for unit rates in grade 6 are limited to non-complex fractions; additionally, students reduce ratios of two whole numbers to a unit rate involving a fraction and a denominator of 1. Students describe real-life contexts using ratio language.

Coherence KY.5.NF.3→KY.6.RP.2→KY.7.RP.1

6th Grade Mathematics



Unit 5: Expressions

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Unit 5: Expressions

In this unit, students extend their skills with writing, interpreting, and evaluating numerical expressions to expressions with variables. They understand what a variable is and use them to express relationships in real world and mathematical problems. They use models and properties of operations to determine when expressions are equivalent. They use this understanding of equivalent expressions to consider simple equations and develop strategies for solving equations.

Duration: 40 Days

<i>Standards for Mathematical Practice</i>	
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.
<i>Priority Standards</i>	
Standards	Clarifications
<p>Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>KY.6.EE.2 Write, read and evaluate expressions in which letters stand for numbers.</p> <p>a. Write expressions that record operations with numbers and with letters standing for numbers.</p> <p>b. Identify parts of an expression using</p>	<p>For example,</p> <p>a. Express the calculation “y less than 5” as $5 - y$.</p> <p>b. 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.</p> <p>c. Use the formulas $V = s^3$ and $SA = 6s^2$ to find the volume and surface area of a cube with sides of length $s = 12$ meter.</p> <p style="text-align: center;">KY.5.OA.1</p>

<p>mathematical terms (sums, term, product, factor, quotient, coefficient); view one or more parts of an expression in a single entity.</p> <p>c. Evaluate expressions for 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 whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).</p> <p>MP.1, MP.3, MP.4</p>	<p>Coherence KY.5.OA.2→KY.6.EE.2</p>
<p>Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions</p> <p>KY.6.EE.3 Apply the properties of operations to generate equivalent expressions.</p> <p>MP.7, MP.8</p>	<p>Using Associative, Commutative and Distributive properties to generate equivalent expressions.</p> <p>Coherence KY.5.OA.2→KY.6.EE.3→KY.7.EE.1</p>
<p>Cluster: Reason about and solve one-variable equation and inequalities.</p> <p>KY.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.</p> <p>MP.1, MP.2, MP.3, MP.4</p>	<p>Emphasis is on understanding equations can be solved by using subtraction as an opposite operation of addition and division as an opposite operation of multiplication. Additionally, emphasis is on the importance of keeping the equations balanced when solving.</p> <p>Coherence KY.6.EE.7→KY.7.EE.4</p>

<p>Cluster: Represent and analyze quantitative relationships between dependent and independent variables.</p> <p>KY.6.EE.9 Use variables to represent two quantities in a real-world problem that changes in relationship to one another;</p> <p>a. Appropriately recognize one quantity as the dependent variable and the other as the independent variable.</p> <p>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.</p> <p>c. Analyze the relationship between the dependent and independent variables using graphs and tables and relate these to the question.</p> <p>MP.3, MP.4, MP.7</p>	<p>Students understand in real-world problems, one quantity dependently changes relative to another independent quantity at a constant rate; understand, at times, the quantities given may not have a clear independent/dependent relationship.</p> <p>Coherence KY.5.OA.3→KY.6.EE.9→KY.8.EE.5</p>
<i>Supporting Standards</i>	
Standards	Clarifications
<p>Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>KY.6.EE.1 Write and evaluate numerical expressions involving whole- number</p>	<p>Interpret an exponent of size n as a repetitive multiplication expression of the base multiplied by itself n times; use the standard order of operations using exponents to evaluate numerical expressions.</p> <p>Coherence KY.5.NBT.2→KY.6.EE.1→KY.8.EE.1</p>

<p>exponents.</p> <p>MP.2, MP.6</p>	
<p>Cluster: Apply and extend previous understandings of arithmetic to algebraic expressions.</p> <p>KY.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.</p> <p>MP.2, MP.3, MP.7</p>	<p>Students commonly think of variables as a missing number. The focus of this standard is recognizing the variable represents any number. In other words, they do not seek to find a single number to replace the letter, but they substitute any number and the expressions will be equivalent. When each expression (not just the variable) is altered by the same value, the expressions remain equivalent, no matter the value.</p> <p>Coherence KY.5.OA.2→KY.6.EE.4→KY.7.EE.1</p>
<p>Cluster: Reason about and solve one-variable equation and inequalities.</p> <p>KY.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.</p> <p>MP.1, MP.2, MP.7</p>	<p>From a set of numbers, substitute values to choose which satisfy a given equation or inequality. An equation or inequality with no solutions from the list may be described as having no solutions or an empty set of solutions, given the set of possible values.</p> <p>Coherence KY.6.EE.5→KY.8.EE.8</p>
<p>Cluster: Reason about and solve one-variable equation and inequalities.</p> <p>KY.6.EE.6 Use variables to represent numbers</p>	<p>Represent an unknown quantity in real-world context appropriately with a variable and write an expression to show this.</p> <p>Coherence KY.6.EE.6→KY.7.EE.4</p>

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.

MP.2, MP.6

Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.

KY.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.

MP.8

Express numerical expressions using the distributive property; understand there may be multiple equivalent expressions, but only one will have been completely factored (the greatest common factor removed using the distributive property) such as $6 + 21 = 3(2 + 7)$.

Coherence KY.4.OA.4→KY.6.NS.4

6th Grade Mathematics



Unit 6: Distributions

6th Grade Mathematics

Unit 6: Distributions

In this unit, students extend their understanding of statistical questions from elementary school. They pose statistical questions, gather data, and represent their findings. In 6th grade, they are introduced to the concept of variability in data, and use distributions as a way to consider data sets. They describe distributions by centers, spread, and overall shape.

Duration: 25 Days

<i>Standards for Mathematical Practice</i>	
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.
<i>Priority Standards</i>	
Standards	Clarifications
<p>Cluster: Develop understanding of statistical variability.</p> <p>KY.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.</p> <p>MP.2, MP.5, MP.6</p>	<p>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.</p> <p>Coherence KY.6.SP.3→KY.7.SP.4</p>

<p>Cluster: Summarize and describe distributions.</p> <p>KY.6.SP.5 Summarize numerical data sets in relation to their context, such as by:</p> <ul style="list-style-type: none"> a. Reporting the number of observations. b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. c. Determining quantitative measures of center (median and/or mean) to describe distribution of numerical data. d. Describing distributions of numerical data qualitatively relating to shape (using terms such as cluster, mode(s), gap, symmetric, uniform, skewed-left, skewed-right and the presence of outliers) and quantitatively relating to spread/variability (using terms such as range and interquartile range). e. Relating the choice of measures of center and variability to the shape of the data distribution. <p>MP.3, MP.7</p>	<p>Students understand larger numbers of observations create a more accurate statistical representation than smaller numbers of observations.</p> <ul style="list-style-type: none"> b. Students describe how the data measured relates to answering a statistical question. c. Students know methods of finding measures of center, including finding median in non-ordered sets of data and a mean is a mathematical average. d. Students describe the shape of data by inspection using the terms listed and calculate the range and interquartile range of a set of data. e. Students recognize mean and range are appropriate measures for symmetrical data while the median and interquartile range may be better measures for skewed data. <p>Coherence KY.6.SP.5→KY.7.SP.1</p>
<p>Cluster: Compute fluently with multi-digit numbers and find common factors and multiples.</p> <p>KY.6.NS.3 Fluently add, subtract, multiply and divide multi-digit decimals using an algorithm for each operation.</p> <p>MP.2, MP.6</p>	<p>Emphasis is on the role of the decimal point in operations and how place value is critical to the overall fluency of the performed operations involving decimals.</p> <p>KY.5.NBT.5</p> <p>Coherence KY.5.NBT.7→KY.6.NS.3→KY.7.NS.3</p>

Supporting Standards	
Standards	Clarifications
<p>Cluster: Develop understanding of the process of statistical reasoning.</p> <p>KY.6.SP.0 Apply the four-step investigative process for statistical reasoning.</p> <p>a. Formulate Questions: Formulate a statistical question as one that anticipates variability and can be answered with data.</p> <p>b. Collect Data: Design and use a plan to collect appropriate data to answer a statistical question.</p> <p>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.</p> <p>d. Interpret Results: Draw logical conclusions and make generalizations from the data based on the original question.</p> <p>MP.1, MP.4</p>	<p>Emphasis is on understanding answering a statistical question is completed by an investigative process that encompasses questioning, collection, analysis and interpretation of the data gathered.</p> <p>Coherence KY.5.MD.2→KY.6.SP.0→KY.7.SP.1</p>
<p>Cluster: Develop understanding of statistical variability.</p> <p>KY.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.</p> <p>MP.1, MP.3, MP.6</p>	<p>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 a variety of values with associated variability in students’ ages.</p> <p>Coherence KY.5.MD.2→KY.6.SP.1→KY.7.SP.1</p>

<p>Cluster: Develop understanding of statistical variability.</p> <p>KY.6.SP.2 Understand that a set of numerical data collected to answer a statistical question has a distribution which can be described by its center, spread and overall shape.</p> <p>MP.2, MP.6, MP.7</p>	<p>Students distinguish between graphical representations which are skewed or approximately symmetric; use a measure of center to describe a set of data.</p> <p>Coherence KY.5.MD.2→KY.6.SP.2→KY.7.SP.3</p>
<p>Cluster: Summarize and describe distributions.</p> <p>KY.6.SP.4 Display the distribution of numerical data in plots on a number line, including dot plots, histograms and box plots.</p> <p>MP.6, MP.7</p>	<p>Students create the listed graphical representations in the appropriate context and describe the attributes of each.</p> <p>Coherence KY.5.MD.2→KY.6.SP.4→KY.7.SP.1</p>