COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Order and Number Sense

Desired Results

Related standard(s):

6.NS.2
6.NS.3
6.NS.5
6.NS.6
6.NS.7
6.EE.1
6.EE.2

Transfer

Students will be able to independently use their learning to…

- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks	
Knowledge	Skills
Students will know… • Expressions are mathematical phrases that contain operations, numbers, and/or variables. • Numerical expressions contain only numbers. • Algebraic expressions contain variables. • Expressions are evaluated or simplified. • Repeated multiplication can be represented with exponents. • Scientific calculators follow the order of operations. • Absolute value is the distance from zero. • The size/value of a number is in reference to zero. • Integers are whole numbers and their opposites.	*Students will be able to…* • Translate between algebra and words. • Evaluate algebraic expressions. • Evaluate expressions with powers. • Use order of operations to evaluate expressions. • Find absolute value of a number. • Model integers on a number line. • Compare and order integers.

TASKS from CCSS for *Order and Number Sense*

6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.

6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

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.

6.NS.6. 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.
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
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.

6.NS.7. 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.
b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3° C > –7° C to express the fact that –3° C is warmer than –7° C.
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.
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.

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

6.EE.2. 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 “Subtract y from 5” as 5 – y.
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.
c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2to find the volume and surface area of a cube with sides of length s = 1/2.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Integers

Desired Results

Related standard(s):

6.NS.2
6.NS.3
6.NS.5
6.NS.6
6.NS.7
6.NS.8
6.EE.1
6.EE.2

Transfer

Students will be able to independently use their learning to…

- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks	
Knowledge	Skills
Students will know… • Integers are whole numbers and their opposites. • When adding: same-sign integers, find their sum, keep the sign; different-sign integers, find their difference, keep the sign of the number with the larger absolute value. • When subtracting integers, add the opposite of the second integer. • When multiplying/dividing same sign integers, the product/quotient is positive. • When multiplying/dividing opposite sign integers, the product/quotient is negative.	*Students will be able to…* • Add, subtract, multiply and divide integers. • Evaluate expressions using integers. • Use integers to model and solve real-world problems. • Calculate the mean, median, mode, and range for a data set. • Plot points in a coordinate plane.

TASKS from CCSS for *Integers*

6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.

6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

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.

6.NS.6. 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.
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
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.

6.NS.7. 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.
b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3° C > –7° C to express the fact that –3° C is warmer than –7° C.
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.
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.

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.

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

6.EE.2. 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 “Subtract y from 5” as 5 – y.
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.
c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2to find the volume and surface area of a cube with sides of length s = 1/2.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Graphing

Desired Results

Related standard(s):

6.NS.6
6.NS.8
6.EE.6
6.G.3

Transfer

Students will be able to independently use their learning to…

- Apply and extend previous understandings of numbers to the system of rational numbers.
- Reason about and solve one-variable equations and inequalities.
- Solve real-world and mathematical problems involving area, surface area, and volume.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks	
Knowledge	Skills
Students will know… • The coordinate plane is formed by the intersection of two number lines that meet at right angles at their zero points. • The horizontal number line is called the x-axis. • The vertical number line is called the y-axis. • The axes divide the coordinate plane into four quadrants. • The point at which the number lines intersect is called the origin (0, 0). • An ordered pair of numbers (x, y) is used to locate any point on a coordinate plane. • The first number in an ordered pair is called the x-coordinate, and tells how far left or right of the origin the point is located. • The second number in an ordered pair is called the y-coordinate, and tells how far up or down from the origin the point is located.	*Students will be able to…* • Identify and plot points in a coordinate plane. • Draw polygons in the coordinate plane given coordinates for the vertices. • Find distances on the coordinate plane between two points.

TASKS from CCSS for *Graphing*

6.NS.6. 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.
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
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.

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.

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.

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.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Properties Used in Algebra

Desired Results

Related standard(s):

6.EE.2
6.EE.3
6.EE.4

Transfer

Students will be able to independently use their learning to…

- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks	
Knowledge	Skills
Students will know… • The Commutative Property states the order in which number are added or multiplied does not change the sum or product. • The Associative Property states the way numbers are grouped when added or multiplied does not change the sum or product. • The Additive Identity Property states when 0 is added to any number, the sum is the number. • The Multiplicative Identity Property states when any number is multiplied by 1, the product is the number. • Multiplicative Property of Zero states when any number is multiplied by 0, the product is 0. • The Distributive Property states that to multiply a number by a sum or difference, multiply each number inside the parentheses by the number outside the parentheses. • Two expressions are said to be equivalent if they have the same value.	*Students will be able to…* • Identify & use properties of addition & multiplication. • Identify & use the Distributive Property. • Identify parts of an expression. • Simplify algebraic expressions. • In an expression, terms are separated by addition and subtraction symbols. • Like terms have identical variable parts raised to the same power. • In a term, the number multiplied by the variable is the coefficient of the variable. • A term that has no variable is a constant term. • Constant terms are also like terms. • An algebraic expression is in simplest form if it has no like terms and no parentheses.

TASKS from CCSS for *Properties Used in Algebra*

6.EE.2. 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 "Subtract y from 5" as 5 – y.
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.
c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2to find the volume and surface area of a cube with sides of length s = 1/2.

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.

6.EE.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for. Reason about and solve one-variable equations and inequalities.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Equations, Inequalities, & Functions

Desired Results

Related standard(s):

6.NS.2
6.NS.3
6.NS.5
6.NS.6
6.NS.7
6.NS.8
6.EE.2
6.EE.3
6.EE.4
6.EE.5
6.EE.6
6.EE.7
6.EE.8
6.EE.9

Transfer

Students will be able to independently use their learning to…

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Apply and extend previous understandings of numbers to the system of rational numbers.
- 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.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)

Students will understand that…

- The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning.
- Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms.
- Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events.
- Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems.
- Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships.
- Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.

Essential Questions (EQs)

Students will keep considering…

- How are symbols and expressions utilized as representations in mathematics?
- In what ways can a quantity be represented?
- In what ways is measurement useful?
- How can I use patterns, relations, and functions?
- How are geometric concepts and relations conceptualized?
- What roles can data play in the decision making process?

Grade Level Benchmarks

Knowledge

Students will know…

Equations:

- An equation is a mathematical sentence formed by placing an equal sign (=) between two expressions.
- Solving an equation means finding the value for the variable that makes the equation true.
- By using inverse operations to get the variable alone on one side of the equation, you can find a solution for the equation.
- Inverse operations are 2 operations that undo each other.
- When you perform the same inverse operation on each side of an equation, the two sides remain equal.

Inequalities:

- An inequality is a statement formed by placing one of the following symbols between two expressions:
  < (less than), > (greater than),
  ≤ (less than or equal to), ≥ (greater than or equal to).
- Inequalities can have an infinite number of solutions.
- The solutions of inequalities can be graphed on a number line.
- When you graph an inequality in the form of $x < 5$, put an open circle at 5 to show that the point 5 is not included in the graph. Then start an arrow at 5 on the number line and continue the arrow left to show all values less than 5 as the solution.
- When you graph an inequality in the form of $x \leq 5$, put a closed circle at 5 to show that the point 5 is included in the graph. Then start an arrow at 5 on the number line and continue the arrow left to show all values less than 5 as part of the solution.
- Solving an inequality means finding the values for the variable that make the inequality true.
- By using inverse operations to get the variable alone on one side of the inequality, you can find the solutions for the inequality.
- Adding or subtracting the same number from each side of an inequality does not affect the inequality sign.
- When multiplying or dividing each side of an inequality by a negative number, the inequality symbol must be reversed.

Functions:

- A function is a pairing of each number in one set with a number in a second set. Starting with a number in the first set, called an input, the function pairs it with exactly one in the second set, called an output.
- Functions may be represented using ordered pairs, input-output tables, or graphs.
- A linear function is a function whose graph is a straight line.

Skills

Students will be able to…

Equations:

- Solve one-step equations by adding, subtracting, multiplying, or dividing.
- Solve problems by writing & solving equations.

Inequalities:

- Write & graph inequalities.
- Solve one-step inequalities by adding, subtracting, multiplying, or dividing.
- Solve problems by writing & solving inequalities.

Functions:

- Evaluate functions.
- Write function rules.
- Graph linear functions in a coordinate plane.

TASKS from CCSS for *Equations, Inequalities, & Functions*

6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.

6.NS.3. Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

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.

6.NS.6. 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.
b. Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
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.

6.NS.7. 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.
b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. For example, write –3° C > –7° C to express the fact that –3° C is warmer than –7° C.
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.
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.

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.

6.EE.2. 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 "Subtract y from 5" as 5 – y.
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.
c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2to find the volume and surface area of a cube with sides of length s = 1/2.

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.

6.EE.4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for. Reason about and solve one-variable equations and inequalities.

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.

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.

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.

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 number line diagrams.

6.EE.9.Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Number Theory

Desired Results

Related standard(s):

6.NS.2
6.NS.4

Transfer

Students will be able to independently use their learning to…

- Compute fluently with multi-digit numbers and find common factors and multiples.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks

Knowledge

Students will know…

Factors:
- Two or more numbers that are multiplied to form a product are called factors.
- Divisibility rules can be used to determine whether 2, 3, 5, 6, or 10 are factors of a given number.
- Divisibility rules can be used to decide how to divide a group of objects into equal parts.

Prime Factorization:
- A prime number is a whole number that has exactly two factors, 1 and itself.
- A composite number is a whole number that has more than two factors.
- To factor a number means to write the number as a product of its factors.
- To factor a whole number as a product of prime numbers is called prime factorization.

Monomials:
- A monomial is a number, a variable, or a product of numbers and/or variables.
- Whole numbers and monomials can be factored.

Greatest Common Factor (GCF):
- A whole number that is a factor of two or more nonzero whole numbers is called a common factor.
- The greatest number that is a factor of two or more numbers is called the greatest common factor (GCF).
- Two numbers are relatively prime if their GCF is 1.

Least Common Multiple (LCM):
- A multiple of a number is a product of that number and any nonzero whole number.
- A multiple that is shared by two or more number is called a common multiple.
- The smallest of the nonzero common multiples is called the least common multiple (LCM).

Comparing & Ordering Fractions:
- A fraction is a number of the form a/b, where b does not equal zero; and a is called the numerator and b is called the denominator.
- A fraction is used to describe equal parts of a whole.
- A fraction is in simplest form when the GCF of the numerator and denominator is 1.
- Fractions that represent the same part-to-whole relationship are called equivalent fractions.
- Fractions can be compared and ordered by using a common denominator.
- Fractions with the larger numerator are greater than fractions with the smaller numerator when they have common denominators.

Skills

Students will be able to…

- Find factors of a number.
- Write the prime factorization of a number.
- Identify & factor monomials.
- Find the greatest common factor of two or more numbers or monomials.
- Simplify fractions.
- Find the least common multiple of two or more numbers or monomials.
- Compare & order fractions.
- Compare & order mixed numbers & improper fractions.
- Apply number theory concepts in problem-solving situations.

TASKS from CCSS for *Number Theory*

6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.

6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. 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. For example, express 36 + 8 as 4 (9 + 2). Apply and extend previous understandings of numbers to the system of rational numbers.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Rational Numbers

Desired Results

Related standard(s):

6.NS.1
6.NS.2
6.NS.4

Transfer

Students will be able to independently use their learning to…

- Apply and extend previous understandings of multiplication and division to divide fractions by fractions.
- Compute fluently with multi-digit numbers and find common factors and multiples.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks

Knowledge	Skills
Students will know…	*Students will be able to…*

Rational Numbers:

- The real number system consists of rational numbers and irrational numbers.
- A rational number is a number that can be written as a fraction in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.
- The decimal form of a rational number either terminates or repeats.
- Rational numbers include natural numbers, whole numbers, and integers.
- An irrational number is a number that cannot be expressed as $\frac{a}{b}$, where a and b are integers and $b \neq 0$.
- The decimal form of an irrational number neither terminates nor repeats.

Writing Fractions as Decimals:

- Any rational number can be written as a decimal by dividing the numerator by the denominator.

Adding and Subtracting Fractions:

- A common denominator must exist to add and/or subtract fractions.
- Mixed numbers are written as improper fractions before adding or subtracting to ease calculations.

Multiplying Fractions

- To multiply fractions, multiply the numerators and multiply the denominators.
- If the fractions have common factors in the numerators and denominators, they can be simplified before multiplication.
- If you multiply two fractions, each less than one, the product is lees than each of the original fractions.
- Mixed numbers are written as improper fractions before multiplying.

Dividing Fractions

- Two numbers whose product is 1 are called multiplicative inverses or reciprocals.
- To divide by a fraction, multiply by its reciprocal.
- Mixed numbers are written as improper fractions before dividing.

- Identify rational numbers.
- Write fractions as decimals and vice versa.
- Add & subtract fractions.
- Multiply fractions.
- Divide fractions.
- Use fractions to solve problems.

TASKS from CCSS for *Rational Numbers*

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) ÷ (3/4) and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3. (In general, (a/b) ÷ (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? Compute fluently with multi-digit numbers and find common factors and multiples.

6.NS.2. Fluently divide multi-digit numbers using the standard algorithm.

6.NS.4. Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12. 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. For example, express 36 + 8 as 4 (9 + 2). Apply and extend previous understandings of numbers to the system of rational numbers.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Ratios & Proportions

Desired Results

Related standard(s):

6.RP.1
6.RP.2
6.RP.3
6.EE.2

Transfer

Students will be able to independently use their learning to…

- Understand ratio concepts and use ratio reasoning to solve problems.
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks

Knowledge	Skills
Students will know… **Ratios & Rates:** • A ratio is a comparison of two numbers by division. • Ratios are usually written in simplest form. • A rate is a ratio of two measurements having different kinds of units. • A unit rate is a rate that has a denominator of 1 when expressed in fraction form. **Unit Analysis:** • Unit analysis is the process of including units of measurement when you compute. **Using Proportions:** • A proportion is an equation stating that two ratios are equal. • The cross products of a proportion are equal.	*Students will be able to…* • Use ratios to compare two quantities. • Use rates to compare two quantities with different units. • Solve proportions. • Use proportions to solve real-world problems.

TASKS from CCSS for *Ratios & Proportions*

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 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

6.RP.2. Understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 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."

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.

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.

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?

c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

6.EE.2. 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 "Subtract y from 5" as 5 – y.

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.

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2to find the volume and surface area of a cube with sides of length s = 1/2.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Percents

Desired Results

Related standard(s):

6.RP.1
6.RP.3
6.EE.2

Transfer

Students will be able to independently use their learning to…

- Understand ratio concepts and use ratio reasoning to solve problems.
- Apply and extend previous understandings of arithmetic to algebraic expressions.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks

Knowledge	Skills
Students will know…	*Students will be able to…*
Fractions, Decimals, and Percents: • A percent is a ratio that compares a number to 100. **Using the Percent Proportion:** • The percent proportion is written as $\frac{part}{base} = \frac{percent}{100}$. **Using the Percent Equation:** • The percent equation is written as $part = percent \bullet base$. **Percent of change:** • A percent of change tells the percent an amount has increased or decreased in relation to the original amount. • When an amount increases, the percent of change is a percent of increase. • When an amount decreases, the percent of change is a percent of decrease.	• Relate fractions, decimals, and percents. • Use proportions to solve percent problems. • Use equations to solve percent problems. • Find discounts, markups, sales tax, and tips. • Find a percent of change in a quantity.

TASKS from CCSS for *Percents*

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 1 beak." "For every vote candidate A received, candidate C received nearly three votes."

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.

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.

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?

c. Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.

d. Use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

6.EE.2. 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 "Subtract y from 5" as 5 – y.

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.

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). For example, use the formulas V = s3 and A = 6 s2to find the volume and surface area of a cube with sides of length s = 1/2.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Data Analysis

Desired Results

Related standard(s):

6.SP.1
6.SP.2
6.SP.3
6.SP.4
6.SP.5

Transfer

Students will be able to independently use their learning to…

- Apply understanding of statistical variability.
- Summarize and describe distributions.
- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments and critique the reasoning of others.
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks

Knowledge	Skills

Students will know…
 	
Central tendency describes the middle of a data set using one number (mean, median, mode):
• The mean of a data set is the sum of the values divided by the number of values. An outlier can have a strong effect on the mean of a data set.
• The median of a data set is the middle value when the values are written in numerical order. If a data set has an even number of values, the median is the man of the two middle values.
• The mode of a data set is the value that occurs most often. A data set can have no mode, one mode, or more than one mode.
 	
Variability describes how spread out the data is using several methods (range, quartiles):
• The range of a data set is the difference of the greatest value and the least value.
• The interquartile range of a data set is the difference of the upper quartile and the lower quartile.
• Because outliers affect the range but not the interquartile range of a data set, the interquartile range is sometimes a more representative measure of how spread out the data is.
 	
A box-and-whisker plot is a type of display that shows the variability of a data set:
• To display data in a box-and-whisker plot, ordered data are divided into a lower half and an upper half by the median:
  ○ The median of the lower half is the lower quartile. The median of the upper half is the upper quartile.
  ○ The lower extreme is the least data value. The upper extreme is the greatest data value.
• The four groups of data (lower extreme to lower quartile; lower quartile to median; median to upper quartile; and upper quartile to upper extreme) are represented by the two parts of the box and two whiskers in a box-and-whisker plot.
• All four sections of data contain approximately the same number of data values. The length of the sections when graphed tells you how spread out the data are.
 	
Frequency tables, line plots, and histograms are other types of displays that show how data are distributed:
• Frequency tables and line plots group data into intervals to show the number of data values in that interval.
• A histogram displays data from a frequency table:
  ○ A histogram has one bar for each interval. The length of a bar indicates the frequency of the interval. There is no space between bars because there are no gaps between intervals.
  ○ Because intervals of a histogram have equal size, the bars have equal width.
	Students will be able to…
	
	• Describe data using mean, median, mode.
	• Find measures of variability.
	• Display data using box-and-whisker plots.
	• Display data using frequency tables and line plots.
	• Display data using histograms.

TASKS from CCSS for *Data Analysis*

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.

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.

6.SP.3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

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

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

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. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered.
d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

COURSE: Mathematics **LEVEL**: Grade 6 **UNIT/FOCUS**: Geometry & Measurement

Desired Results

Related standard(s):

6.G.1
6.G.2
6.G.4

Transfer

Students will be able to independently use their learning to…

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

Meaning

Enduring Understandings (EUs)	Essential Questions (EQs)
Students will understand that…	*Students will keep considering…*
• The use and manipulation of symbols and expressions provide a variety or representations for solving problems and expressing mathematical concepts, relationships, and reasoning. • Understandings of number – "how many" or "how much" – and number types extend applications of arithmetic properties, operations, and number systems and guide the use of computational strategies and algorithms. • Measurement attributes, processes, and tools, help us to quantify, compare, and solve problems involving objects, situations, and events. • Patterns, relations, and functions are used to represent and analyze change in various contexts, make predictions and generalizations, and provide models and explanations for real-world problems. • Visualizations, spatial reasoning, and properties of two- and three- dimensional figures can be used to analyze, represent, and model geometric concepts and relationships. • Questions are posed and investigated by collecting data or retrieving existing data, and representing, analyzing, and interpreting data. Investigations, inferences, and predictions are used to make critical and informed decisions.	• How are symbols and expressions utilized as representations in mathematics? • In what ways can a quantity be represented? • In what ways is measurement useful? • How can I use patterns, relations, and functions? • How are geometric concepts and relations conceptualized? • What roles can data play in the decision making process?

Grade Level Benchmarks	
Knowledge	Skills
Students will know… **Measurements of 2-D shapes:** • Perimeter is the measurement of the outside of the figure. • Area is the measurement within a figure. **Measurements of 3-D shapes:** • A solid is a three-dimensional figure that encloses part of space. • A prism is a solid formed by polygons. Prisms have two congruent bases that lie in parallel lines. • A two-dimensional representation of a solid is called a net. • Surface area of a solid is equal to the area of its net. • Surface area is measured in square units. • Volume of a solid is the amount of space that the solid contains. • Volume is measured in cubic units.	*Students will be able to…* • Find the perimeter and area of polygons. • Identify characteristics of three-dimensional polyhedron. • Find the surface area and volume of prisms. • Use measurements and geometry to solve real-life problems. • Use a calculator to find geometric measurements.

TASKS from CCSS for *Geometry & Measurement*

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

6.G.2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = l w h and V = b h to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

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