Plainfield Public Schools
Mathematics
Unit Planning Organizer

Grade	Grade 6
Unit of Study	**Unit 3 : Equations , Rational Number**
Pacing	7 Instructional weeks

Standards for Mathematical Practices
MP1. Make sense of problems and persevere in solving them. MP2. Reason abstractly and quantitatively. MP3. Construct viable arguments and critique the reasoning of others. MP4. Model with mathematics. MP5. Use appropriate tools strategically. MP6. Attend to precision. MP7. Look for and make use of structure. MP8. Look for and express regularity in repeated reasoning.

Hyperlinks are noted underlined in italics

I. Unit Standards

NEW JERSEY STUDENT LEARNING STANDARDS
6.EE.B.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true. **6. EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.** **6. EE.B.8 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.** **6.NS.C.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.** **6.NS.C.6a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., – (–3) = 3, and that 0 is its own opposite.** **6.NS.C.6b. 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.** **6.NS.C.6c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.**

Hyperlinks are noted underlined in italics

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

6.NS.C.7c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.

6.NS.C.7d. 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.C.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.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. 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.

6.G.A.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.
6.G.A.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.

Hyperlinks are noted underlined in italics

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.EE.B.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.**		
Understand	Equations/ inequality	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.**		
Use Write	expressions	1 2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6. EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q and x are all nonnegative rational numbers.**		
Solve	equation	2

Hyperlinks are noted underlined in italics

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6. EE.B.8 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form x > c or x < c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.**		
Write	inequality	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.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.**		
Understand	Rational numbers	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.6a. Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., –(–3) = 3, and that 0 is its own opposite.**		
Recognize	number	1

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.6b. 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.**		
Understand	Order pairs	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.6c. Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.**		
Find	Integers, rational numbers	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.7. Understand ordering and absolute value of rational numbers.**		
Understand	Rational number	1

Hyperlinks are noted underlined in italics

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.7a. 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.**		
Interpret	Inequality	3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.7b. Write, interpret, and explain statements of order for rational numbers in real-world contexts. *For example, write –3 > –7 ˚C to express the fact that –3 ˚C is warmer than –7 ˚C.***		
Write Interpret Explain	Rational numbers	2 3 2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.7c. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. *For example, for an account balance of –30 dollars, write |–30| = 30 to describe the size of the debt in dollars.***		
Understand Interpret	Rational number	1 3

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.7d. 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***		
Distinguish	Absolute value	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.NS.C.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.*(benchmarked)**		
solve	coordinate	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **6.EE.C.9 Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *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*.**		
Use Analyze	Variables Independent variables Dependent variables	2 1

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"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD: **6.G.A.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.**		
Draw	polygon	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
SUPPORTING STANDARD: **6.G.A.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**.		
Find	Triangles Quadrilaterals	2

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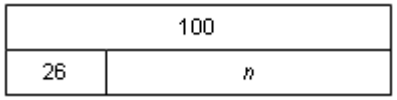
II. New Jersey Student Learning Standards and Mathematical Practices ..Explanations and Examples

Expressions and Equations (EE) **Reason about and solve one-variable equations and inequalities.**		
Standards **Students are expected to:**	Mathematical Practices	Explanations and Examples
6.EE.B.5. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.	*6.MP.1.* Make sense of problems and persevere in solving them. *6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics. *6.MP.7.* Look for and make use of structure.	Beginning experiences in solving equations should require students to understand the meaning of the equation as well as the question being asked. Solving equations using reasoning and prior knowledge should be required of students to allow them to develop effective strategies such as using reasoning, fact families, and inverse operations. Students may use balance models in representing and solving equations and inequalities. Consider the following situation: Joey had 26 papers in his desk. His teacher gave him some more and now he has 100. How many papers did his teacher give him? This situation can be represented by the equation 26 + *n* = 100 where *n* is the number of papers the teacher gives to Joey. This equation can be stated as "some number was added to 26 and the result was 100." Students ask themselves "What number was added to 26 to get 100?" to help them determine the value of the variable that makes the equation true. Students could use several different strategies to find a solution to the problem. Reasoning: 26 + 70 is 96. 96 + 4 is 100, so the number added to 26 to get 100 is 74. Use knowledge of fact families to write related equations: *n* + 26 = 100, 100 - *n* = 26, 100 - 26 = *n*. Select the equation that helps you find *n* easily. Use knowledge of inverse operations: Since subtraction "undoes" addition then subtract 26 from 100 to get the numerical value of *n* Scale model: There are 26 blocks on the left side of the scale and 100 blocks on the right side of the scale. All the blocks are the same size. 74 blocks need to be added to the left side of the scale to make the scale balance. Bar Model: Each bar represents one of the values. Students use this visual representation to demonstrate that 26 and the unknown value together make 100.  *Continued on next page*

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6.EE.B.5. *continued*		**Examples:** ● The equation $0.44s = 11$ where *s* represents the number of stamps in a booklet. The booklet of stamps costs 11 dollars and each stamp costs 44 cents. How many stamps are in the booklet? Explain the strategies you used to determine your answer. Show that your solution is correct using substitution. ● Twelve is less than 3 times another number can be shown by the inequality $12 < 3n$ $12 < 3n12 < 3n$. What numbers could possibly make this a true statement?
6.EE.B.6. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.	*6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics. *6.MP.7.* Look for and make use of structure.	**Connecting writing expressions with story problems and/or drawing pictures will give students a context for this work. It is important for students to read algebraic expressions in a manner that reinforces that the variable represents a number.** **Examples:** ● Maria has three more than twice as many crayons as Elizabeth. Write an algebraic expression to represent the number of crayons that Maria has. (Solution: 2*c* + 3 where *c* represents the number of crayons that Elizabeth has.) ● An amusement park charges $28 to enter and $0.35 per ticket. Write an algebraic expression to represent the total amount spent. (Solution: 28 + 0.35*t* where *t* represents the number of tickets purchased) ● Andrew has a summer job doing yard work. He is paid $15 per hour and a $20 bonus when he completes the yard. He was paid $85 for completing one yard. Write an equation to represent the amount of money he earned. (Solution: 15*h* + 20 = 85 where *h* is the number of hours worked) ● Describe a problem situation that can be solved using the equation 2*c* + 3 = 15; where *c* represents the cost of an item ● Bill earned $5.00 mowing the lawn on Saturday. He earned more money on Sunday. Write an expression that shows the amount of money Bill has earned. (Solution: $5.00 + *n)*

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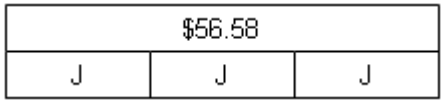
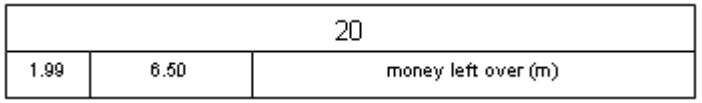
6.EE.B.7. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers	*6.MP.1.* Make sense of problems and persevere in solving them. *6.MP.2.* Reason abstractly and quantitatively. *6.MP.3.* Construct viable arguments and critique the reasoning of others. *6.MP.4.* Model with mathematics. *6.MP.7.* Look for and make use of structure.	**Students create and solve equations that are based on real world situations. It may be beneficial for students to draw pictures that illustrate the equation in problem situations. Solving equations using reasoning and prior knowledge should be required of students to allow them to develop effective strategies.** **Examples:** ● Meagan spent $56.58 on three pairs of jeans. If each pair of jeans costs the same amount, write an algebraic equation that represents this situation and solve to determine how much one pair of jeans cost.  Sample Solution: Students might say: "I created the bar model to show the cost of the three pairs of jeans. Each bar labeled *J* is the same size because each pair of jeans costs the same amount of money. The bar model represents the equation 3*J* = $56.58. To solve the problem, I need to divide the total cost of 56.58 between the three pairs of jeans. I know that it will be more than $10 each because 10 x 3 is only 30 but less than $20 each because 20 x 3 is 60. If I start with $15 each, I am up to $45. I have $11.58 left. I then give each pair of jeans $3. That's $9 more dollars. I only have $2.58 left. I continue until all the money is divided. I ended up giving each pair of jeans another $0.86. Each pair of jeans costs $18.86 (15+3+0.86). I double check that the jeans cost $18.86 each because $18.86 x 3 is $56.58." ● Julio gets paid $20 for babysitting. He spends $1.99 on a package of trading cards and $6.50 on lunch. Write and solve an equation to show how much money Julio has left. (Solution: 20 = 1.99 + 6.50 + *x*, *x* = $11.51) 

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<table>
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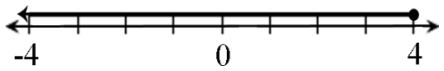
<td>6.MP.1. Make sense of problems and persevere in solving them.

6.MP.2. Reason abstractly and quantitatively.

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

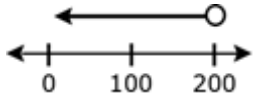
6.MP.4. Model with mathematics.

6.MP.7. Look for and make use of structure.</td>
<td>Examples:

• Graph x ≤ 4.
 

• Jonas spent more than $50 at an amusement park. Write an inequality to represent the amount of money Jonas spent. What are some possible amounts of money Jonas could have spent? Represent the situation on a number line.

• Less than $200.00 was spent by the Flores family on groceries last month. Write an inequality to represent this amount and graph this inequality on a number line.

Solution: 200 > x
 
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<td>6.EE.C.9. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. For</td>
<td>6.MP.1. Make sense of problems and persevere in solving them.

6.MP.2. Reason abstractly and quantitatively.

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

6.MP.4. Model with mathematics.

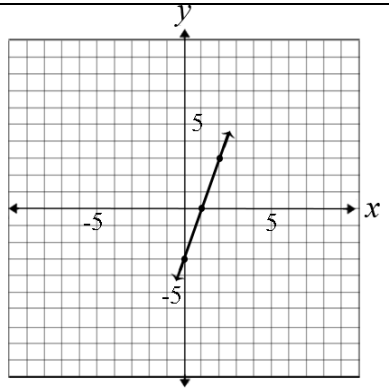
6.MP.7. Look for and make use of structure.</td>
<td>Students can use many forms to represent relationships between quantities. Multiple representations include describing the relationship using language, a table, an equation, or a graph. Translating between multiple representations helps students understand that each form represents the same relationship and provides a different perspective on the function.

Examples:

• What is the relationship between the two variables? Write an expression that illustrates the relationship.

<table><tr><td>X</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Y</td><td>2.5</td><td>5</td><td>7.5</td><td>10</td></tr></table>
• Use the graph below to describe the change in y as x increases by 1.</td>
</tr>
</table>

Hyperlinks are noted underlined in italics

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.	*6.MP.8. Look for and express regularity in repeated reasoning*	 Continued on next page

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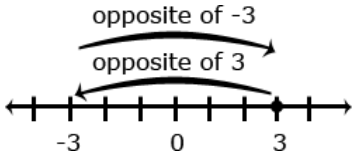
6.NS.C.6. Understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates. a. Recognize opposite signs of numbers as indicating locations on opposite 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.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics.	Number lines can be used to show numbers and their opposites. Both 3 and -3 are 3 units from zero on the number line. Graphing points and reflecting across zero on a number line extends to graphing and reflecting points across axes on a coordinate grid. The use of both horizontal and vertical number line models facilitates the movement from number lines to coordinate grids.  **Example:** • Graph the following points in the correct quadrant of the coordinate plane. If you reflected each point across the x-axis, what are the coordinates of the reflected points? What similarities do you notice between coordinates of the original point and the reflected point? $\left(\frac{1}{2}, -3\frac{1}{2}\right)$ $\left(-\frac{1}{2}, -3\right)$ $(0.25, -0.75)$

Hyperlinks are noted underlined in italics

6.NS.C.7.

a. 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.*

b. 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.*

c. 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.*

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.*

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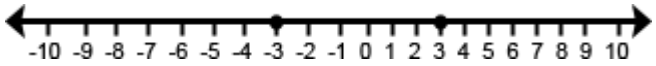
Case 2: One positive and one negative number

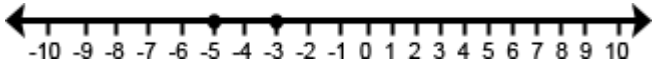


3 > -3

positive 3 is greater than negative 3

negative 3 is less than positive 3

Case 3: Two negative numbers



-3 > -5

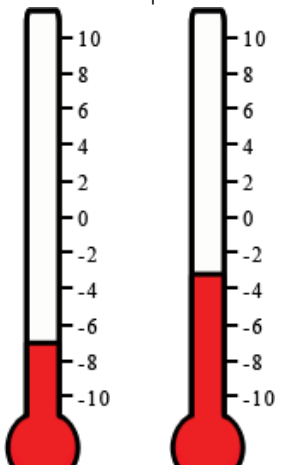
negative 3 is greater than negative 5

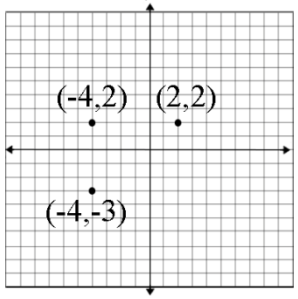
negative 5 is less than negative 3

Comparative statements generate informal experience with operations and lay the foundation for formal work with operations on integers in Grade 7.

Example:

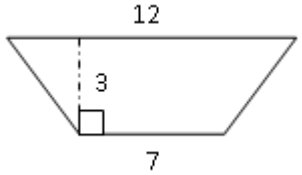
- One of the thermometers shows -3°C and the other shows -7°C. Which thermometer shows which temperature? Which is the colder temperature? How much colder? Write an inequality to show the relationship between the temperatures and explain how the model shows this relationship.



Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
6.NS.C.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.MP.1.* Make sense of problems and persevere in solving them. *6.MP.2.* Reason abstractly and quantitatively. *6.MP.4.* Model with mathematics. *6.MP.5.* Use appropriate tools strategically. *6.MP.7.* Look for and make use of structure.	**Example:** • If the points on the coordinate plane below are the three vertices of a rectangle, what are the coordinates of the fourth vertex? How do you know? What are the length and width of the rectangle?  To determine the distance along the x-axis between the point (-4, 2) and (2, 2) a student must recognize that -4 is $\|-4\|$ or 4 units to the left of 0 and 2 is $\|2\|$ or 2 units to the right of zero, so the two points are total of 6 units apart along the x-axis. Students should represent this on the coordinate grid and numerically with an absolute value expression, $\|-4\| + \|2\|$.

Hyperlinks are noted underlined in italics

PPS Mathematics Curriculum Grade 6

Standards	*Mathematical practices*	Explanations and Examples
6.G.A.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.MP.1.* Make sense of problems and persevere in solving them. *6.MP.2.* Reason abstractly and quantitatively. *6.MP.3.* Construct viable arguments and critique the reasoning of others. *6.MP.4.* Model with mathematics. *6.MP.5*. Use appropriate tools strategically. *6.MP.6.* Attend to precision. *6.MP.7.* Look for and make use of structure. *6.MP.8.* Look for and express regularity in repeated reasoning.	Special quadrilaterals include rectangles, squares, parallelograms, trapezoids, rhombi, and kites. Students can use tools such as the Isometric Drawing Tool on NCTM's Illuminations site to shift, rotate, color, decompose and view figures in 2D or 3D. (*http://illuminations.nctm.org/ActivityDetail.aspx?ID=125*) Examples: • Find the area of a triangle with a base length of three units and a height of four units. • Find the area of the trapezoid shown below using the formulas for rectangles and triangles.  • A rectangle measures 3 inches by 4 inches. If the lengths of each side double, what is the effect on the area? • The area of the rectangular school garden is 24 square units. The length of the garden is 8 units. What is the length of the fence needed to enclose the entire garden? • The sixth grade class at Hernandez School is building a giant wooden H for their school. The H will be 10 feet tall and 10 feet wide and the thickness of the block letter will be 2.5 feet. o How large will the H be if measured in square feet? o The truck that will be used to bring the wood from the lumber yard to the school can only hold a piece of wood that is 60 inches by 60 inches. What pieces of wood (how many pieces and what dimensions) are needed to complete the project?

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6.G.A.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.	6.MP.1. Make sense of problems and persevere in solving them.
	
	6.MP.2. Reason abstractly and quantitatively.
	
	6.MP.4. Model with mathematics.
	
	6.MP.5. Use appropriate tools strategically.
	
	6.MP.7. Look for and make use of structure.
		Example:
		
		• On a map, the library is located at (-2, 2), the city hall building is located at (0,2), and the high school is located at (0,0). Represent the locations as points on a coordinate grid with a unit of 1 mile.
		  ○ What is the distance from the library to the city hall building? The distance from the city hall building to the high school? How do you know?
		  ○ What shape is formed by connecting the three locations? The city council is planning to place a city park in this area. How large is the area of the planned park?

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III. Essential Questions and Corresponding Ideas

Essential Questions	Corresponding Big Ideas
Define variable? How is a variable used in situations studied? If the values of a dependent variable increase as the values of a related independent variable increase, how is that relationship shown in each of the following?	Expressions are powerful tools for exploring, reasoning about, and representing situations. . Using variables permits representing varying quantities. This use of variables is particularly important in studying relationships between varying quantities.
What does it mean to solve an equation, and what strategies are available for solving equations?	The equals sign can indicate that two expressions are equivalent. It is often important to find the value(s) of a variable for which two expressions represent the same quantity. Finding the value(s) of a variable for which two expressions represent the same quantity is known as *solving an equation.*
What does it mean to solve an inequality? What will graph of such solutions look like for inequalities in the form ax>b and a+x<b (if a and b are both positive numbers)?	An inequality is another way to describe a relationship between expressions; instead of showing that the values of two expressions are equal, inequalities indicate that the value of one expression is greater than (or greater than or equal to) the value of the other expression.
How do strategies help in finding equations to express relationships?	In solving an inequality, multiplying or dividing both expressions by a negative number reverses the sign that indicates the relationships between the two expressions.
How does the value of y change as the	The equals sign can be used in defining or giving a name to an expression or function rule.

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value of x increases? How is the pattern of change shown in a table, graph, and equation of the function?	Functions provide a tool for describing how variables change together. Using a function in this way is called *modeling*, and the function is called a *model*. Functions can be represented in multiple ways—in algebraic symbols, graphs, verbal descriptions, tables, and so on—and these representations, and the links among them, are useful in analyzing patterns of change. One important way of describing functions is by identifying the rate at which the variables change together. It is useful to group functions into *families* with similar patterns of change because these functions, and the situations that they model, share certain general characteristics. Some representations of a function may be more useful than others, depending on how they are used. *Source:* *Lloyd, G., Herbel-Eisenmann, B., & Star, J.R. (2011). Developing essential understanding of expressions, equations, and functions for teaching mathematics in grades 6-8. Reston, VA: The National Council of Teachers of Mathematics, Inc*

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IV. Student Learning/Goals

Learning Goals	Concepts / Skills	Instructional Clarification ***PARCC Assessment Design Mathematics Test Specifics***	Mathematical Practice
Use substitution to determine whether a given number makes an equation or inequality true. 6.EE.5	**Concept(s):** • Solving an equation or inequality is a process of answering the question: determine which values from a specified set, if any, make the equation or inequality true. **Students are able to:** • substitute a number into an equation to determine whether it makes an equation true. • substitute a number into an inequality to determine whether it makes the inequality true.	• Most of tasks involve values from an infinite set of nonnegative numbers (e.g., even numbers; whole numbers; fractions). • Some tasks involve values from a finite set of nonnegative numbers (e.g., {2, 5, 7, 9}).	MP.2 MP.6 MP.7
Solve real world problems by writing and solving equations of the form $x + p = q$ and $px = q$ (p, q, and x are non-negative rational numbers). 6.EE.B.7	**Concept(s):** • An equation is defined by two expressions that are equivalent to one another. **Students will be able to:** • solve real world problems by writing and solving	• Tasks are algebraic, not arithmetic. • Half of the tasks involve whole-number values of p and q; and half of the tasks involve fraction or decimal values of p and q.	MP.1 MP.2 MP.6 MP.7

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	equations of the form $x + p = q$ (p, q, and x are non-negative and rational). • solve real world problems by writing and solving equations of the form $px = q$ (p, q, and x are non-negative and rational).	• Fractions and decimals should not appear together in the same problem. • These tasks only involve equations with addition and multiplication. • A valid equation and the correct answer are both required for full credit.	
Locate rational numbers and their opposites on horizontal and vertical number line; explain their relation of the opposites to zero. 6.NS.C.6. a, 6. NS.C.6.b Plot pairs of positive and negative rational numbers in the coordinate plane; describe two ordered pairs that differ only by signs as reflections across one or both axes6.NS.C.6.c	**Concept(s):** • Opposite signs of numbers indicate locations on opposite sides of 0 on the number line. • The opposite of the opposite of a number is the number itself (e.g. the opposite of three is -3. The opposite of the opposite of three, -(-3), is equal to the original number, 3). • Signs of numbers in ordered pairs indicate their locations in quadrants of the coordinate plane. • When two ordered pairs	• Tasks have "thin context" or no context. • Students need not recognize or use traditional notation for quadrants (such as I, II, III, IV). • Coordinates are not limited to integers.	MP.5 MP.8

	differ only by signs, the locations of the points are related by reflections across one or both axes. **Students are able to:** • position rational numbers on horizontal and vertical number lines. • position pairs of rational numbers on a coordinate plane. • explain the conditions for which pairs of points are reflections across an axes in the coordinate plane. • locate numbers and their opposites on the number line and explain their relation to 0.		

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Use statements of inequality to determine relative positions of two rational numbers on a number line; write and explain statements of order for rational numbers in real-world contexts. 6.NS.C.7a, 6. NS.C.7b, 6. NS.C.7c, Explain the meaning of absolute value of a rational number as distance from zero on the number line and as magnitude for a positive or negative quantity in a real-world situation. , 6.NS.C.7d	**Concept(s):** • The absolute value of a rational number is its distance from 0 on the number line. **Students are able to:** • given an inequality, determine the position of one rational number relative to another. • write an inequality and explain statements of order for rational numbers in real world situations.	• Tasks may or may not contain context. • Tasks are not limited to integers. • Prompts do not present students with a number line diagram, but students may draw a number line diagram as a strategy.	MP.2 MP.3 MP.5
Write an inequality of the form x > c or x < c to represent a constraint or condition in a real world or mathematical problem and represent them on a number line. 6.EE.B.8	**Concept(s):** • An inequality may represent a constraint (or a condition) in a real-world problem. • Infinity ($x > c$ and $x < c$ have an infinite number of solutions). **Students are able to:** • represent real-world constraint or condition by	• Values of care not limited to integers. • Tasks involve < and >, not ≤ and ≥.	MP.2 MP.6 MP.7

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	writing an inequality of the form $x > c$ or $x < c$. • graph inequalities of the form $x > c$ or $x < c$ on number lines.		
Write an equation using two variables (independent and dependent) to represent two quantities that change in relationship to one another in a real world problem. Analyze the relationship between the dependent and independent variables and relate the equation to a given graph and to its table of values. 6.EE.C.9.	**Concepts** Two quantities that change in relationship to one another may be represented with an equation in two variables, with a graph, and with a table of values. **Students are able to:** • represent two quantities that related to one another, with variables. • write an equation in two variables. • distinguish the dependent variable from the independent variable. • analyze a given graph and table of values, and relate them to the equation.	Tasks that involve writing an equation should not go beyond the equation types described in 6.EE.7 (x+p =q and px = q where p, q, and x are all nonnegative rational numbers).	MP. 2 MP. 4 MP. 6 MP. 8

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Solve real world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Use the absolute value of the differences of their coordinates to find distances between points with the same first coordinate or same second coordinate. 6.NS.C.8 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. 6.G.A.3	**Students are able to**: • graph points in all four quadrants of the coordinate plane in order to solve real-world and mathematical problems. • draw polygons in the coordinate plane. • use absolute value to find distances between points with the same first coordinate or the same second coordinate. • use coordinates to solve real-world distance, perimeter, and area problems.	• Tasks may or may not contain context. • Finding distances is limited to points with integer coordinates.	MP.1 MP.2 MP.5
Find the area of right triangles, other triangles, special quadrilaterals and polygons by composing into rectangles or decomposing into triangles and other shapes to solve real world	**Students are able to:** • compose rectangles in order to find the area of triangles, special quadrilaterals and	• Tasks do not have a context. • Tasks require focusing on the connection between packing the solid figure and computing the volume.	MP.1 MP.2 MP.5

or mathematical problems. 6.G.A.1	polygons. • decompose triangles, special quadrilaterals, and polygons into triangles and other shapes in order to find their area. • compose rectangles and decompose into triangles in order to solve real-world problems.		

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V. Unit Vocabulary

Unit	
Variable Equations Expressions Inequality Coefficient Term Rational numbers Absolute value Integers Order of operations Coordinates Order pair	Polygon Triangle Quadrilateral

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VII. Differentiating /Modifications Teaching Strategies

Research Based Effective Teaching Strategies	Modifications (how do I differentiate instruction?)	Special Education	Strategies for English Language Learners
Task /Activities that solidifies mathematical concepts Use questioning techniques to facilitate learning Reinforcing Effort, Providing Recognition Practice, reinforce and connect to other ideas within mathematics Promotes linguistic and nonlinguistic representations Cooperative Learning Setting Objectives, Providing Feedback Varied opportunities for students to communicate mathematically Use technological and /or	**Modifications** Before or after school tutorial program Leveled rubrics Increased intervention Small groups Change in pace Calculators Extended time Alternative assessments Tiered activities/products Color coded notes Use of movements Use any form of technology **Extension** Student constructs one graph of three inequalities on the same number line. Then students trade graphs and write a multi-step inequality whose solutions.	Change in pace Calculators Alternative assessments Accommodations as per IEP Modifications as per IEP Use graphic organizer to clarify mathematical functions for students with processing and organizing difficulties'. Constant review of math concepts to strengthen understanding of prior concepts for difficulties recalling facts. Use self-regulations strategies for student to monitor and assess their thinking and performance for difficultly attending to task. Cooperative learning (small group, teaming, peer assisted tutoring) to foster communication and strengthen confidence.	*Whiteboards* *Small Group / Triads* *Word Walls* *Partially Completed Solution* *Gestures* *Native Language Supports* *Pictures / Photos* *Partner Work* *Work Banks* *Teacher Modeling* *Math Journals* *See Connected Math*

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physical tools	*See Connected Math Program 3 Classroom Differentiation Gifted Students*	Use technology and/or hands on devices to: clarify abstract concepts and process for: 1. Difficulty interpreting pictures and diagram. 2.difficulties with oral communications 3. Difficulty correctly identifying symbols of numeral 4.Difficulty maintaining attentions Simplify and reduces strategies / Goal structure to enhance motivation, foster independence and self-direction for: 1.difficulty attending to task 2. difficulty with following a sequence of steps to solution. 3.difficulty processing and organizing Scaffolding math idea/concepts guided practice and questioning strategies' to clarify and enhance understanding of math big ideas for : 1.Difficulty with process and	*Program 3 Classroom Differentiating English Language Learners*
21st Century Learning Skills : Teamwork and Collaboration Initiative and Leadership Curiosity and Imagination Innovation and Creativity Critical thinking and Problem Solving Flexibility and Adaptability Effective Oral and Written Communication Accessing and Analyzing Information			

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		organization 2.difficulty with oral and written communication Teacher models strategies' and think out aloud strategies to specify step by step process for 1. Difficulties processing and organization 2. Difficulty attending to tasks. Use bold numbers and/or words to draw students' attention to important information. *See Connected Math Program Classroom Differentiation Special Need Student*	

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VII. Instructional Resources

<table>
<tr><th colspan="3">Instructional Resources and Materials</th></tr>
<tr><th>Formative Assessment</th><th colspan="2">Print</th></tr>
<tr><td rowspan="2">Short constructed responses
Extended responses
Checks for Understanding
Exit tickets
Teacher observation
Projects
Timed Practice Test – Multiple Choice & Open-Ended Questions

<u>Performance Tasks</u>

<u>6.NS.C.8 Nome, Alaska (Benchmark)</u>
<u>6.G.A.1, 6.G.A.3 Polygons in the Coordinate Plane</u>

<u>Additional Tasks</u>

<u>6.EE.B.5 Make Use of Structure</u>
<u>6.EE.B.7 Morning Walk</u>
<u>6.NS.C.5 Warmer in Miami</u>
<u>6.NS.C.6 Mile High</u>
<u>6.NS.C.7 Jumping Flea</u>
<u>6.NS.C.7a Fractions on the Number Line</u></td><td colspan="2">Connected Math Program Grade 6 Unit Variables and Pattern
<u>MP Unit : Variable and Pattern ; Scope and Sequence</u></td></tr>
<tr><td colspan="2">Additional Resources : Print and Technology</td></tr>
<tr><td>Resources for teachers
<u>Connected Math Project (Michigan State University)</u>
<u>My Pearson Training : Connected Math Program</u>
<u>Annenberg Learning : Insight into Algebra 1</u>
<u>National Council of Teachers of Mathematics</u>
<u>Mathematics Assessment Projects</u>
<u>Achieve the Core</u>
<u>Illustrative Mathematics</u>
<u>Mathematics Assessment Projects</u>
<u>Get the Math</u>
<u>Webmath.com</u>
<u>sosmath.com</u>
<u>Mathplanet.com</u>
<u>Interactive Mathematics.com</u>
<u>Inside Mathmatics.org</u>
<u>Asia Pacific Economic Cooperation : :Lesson Study Videos</u>
<u>Genderchip.org</u>
<u>Interactive Geometry</u></td><td>Resources for Students
<u>My Math Universe.com</u>
<u>Math is Fun website</u>
<u>Khan Academy</u>
<u>Figure This.org website</u>
<u>Virtual Nerd website</u>
<u>Math Snacks websites</u>

<u>Internet 4 Classroom website</u>
<u>A Maths Dictionary for kids</u></td></tr>
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6.NS.C.7b Comparing Temperatures *6.EE.B.8 Fishing Adventures 1* **Project (optional):** *Teach 21 Problem Based Learning : More for Your Money*	*Mathematical Association of America* *learner.org* *Math Forum : Teacher Place* *Shmoop /common core math*	

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