Plainfield Public Schools
Mathematics
Unit Planning Organizer

Grade/Course	Accelerated 7
Unit of Study	**Unit 1 Number System**
Pacing	9 weeks

Standard 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.

I. Unit Standards

7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.

7. NS.A.1.A Describe situations in which opposite quantities combine to make 0. *For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the round* ?

7.NS. B1. Understand *p* + *q* as the number located a distance |*q*| from *p*, in the positive or negative direction depending on whether *q* is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
7.NS.A.1.C Understand subtraction of rational numbers as adding the additive inverse, p - q = p+ (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
7.NS.A.1. D Apply properties of operations as strategies to add and subtract rational numbers.
7.NS.A.2. A Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1) (-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

7.NS.A.2. B Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers by describing real-world contexts
7.NS.A.2.C Apply properties of operations as strategies to multiply and divide rational numbers.

7.NS.A.2. D Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

8.NS.1 Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational numbers located to the right of –7 on a number line oriented from left to right.

8.NS.2 Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions. For example, by truncating the decimal expansion of the square root of 2, show that the square root of 2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27

8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.

8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notations are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.NS.A.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.**		
Apply	Rational numbers	3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7. NS.A.1.A Describe situations in which opposite quantities combine to make 0. *For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the round*** ?		
Describe	Opposite quantities	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.NS. B1. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.**		
Show	Additive inverse	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: 7.NS.A.1.C Understand subtraction of rational numbers as adding the additive inverse, p - q = p+ (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.		
show	Rational number Absolute value	1

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: 7.NS.A.1. D Apply properties of operations as strategies to add and subtract rational numbers.		
Apply	Rational number	2

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: 7.NS.A.2.A Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (-1)(-1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.		
Interpret	Products of rational numbers	3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.NS.A.2.B Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If *p* and *q* are integers, then -(*p*/*q*) = (-*p*)/*q* = *p*/(-*q*). Interpret quotients of rational numbers by describing real-world contexts**		
Interpret	Quotient of rational number	3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.NS.A.2.C Apply properties of operations as strategies to multiply and divide rational numbers.**		
Apply	Operations of rational numbers	3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.NS.A.2.D Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.**		
Convert	Rational number	4

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.NS.A.3 Solve real-world and mathematical problems involving the four operations with rational numbers.**		
Solve	Rational number	3

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.EE.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients**		
Apply Expand	Properties of operations	2 4

"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD: **7.EE.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.** *For example, a + 0.05a = 1.05a means that "increase by 5 percent" is the same as "multiply by 1.05.*		
Understand	expressions	1

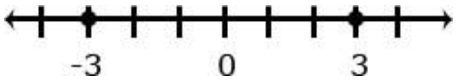
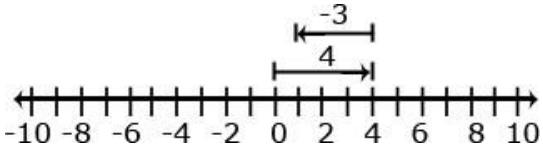
"Unwrapped" Skills (students need to be able to do)	"Unwrapped" Concepts (students need to know)	DOK Levels
FOCUS STANDARD **8.EE.A.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27**		

Know Apply	Integer exponents	1 2

“Unwrapped” Skills (students need to be able to do)	**“Unwrapped” Concepts (students need to know)**	**DOK Levels**
ADDITIONAL STANDARD **8.EE.A.3 Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. For example, estimate the population of the United States as 3 × 108 and the population of the world as 7 × 109, and determine that the world population is more than 20 times larger.**		
Use	numbers	2

“Unwrapped” Skills (students need to be able to do)	**“Unwrapped” Concepts (students need to know)**	**DOK Levels**
ADDITIONAL STANDARD **8.EE.A.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notations are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology**		
Perform	Operations with numbers	2

II . Mathematical Standards /Practices Explanations and Examples

Standards ***Students are expected to:***	*Mathematical Practices*	*Explanations and Examples*
7.NS.A.1. Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram. a **Describe situations in which opposite quantities combine to make 0.** ***For example, in the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the round?*** a. Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0	*7.MP.2.* Reason abstractly and quantitatively. *7.MP.4.* Model with mathematics. *7.MP.7.* Look for and make use of structure.	Visual representations may be helpful as students begin this work; they become less necessary as students become more fluent with the operations. Examples: ● Use a number line to illustrate: o $p - q$ o $p + (- q)$ o If this equation is true: $p – q = p + (-q)$ ● -3 and 3 are shown to be opposites on the number line because they are equal distance from zero and therefore have the same absolute value and the sum of the number and its opposite is zero.  ● You have $4 and you need to pay a friend $3. What will you have after paying your friend? 4 + (-3) = 1 or (-3) + 4 = 1 

(are additive inverses). Interpret sums of rational numbers by describing real-world contexts. b. Understand subtraction of rational numbers as adding the additive inverse, $p – q = p + (–q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts. Apply properties of operations as strategies to add and subtract rational numbers		
7.NS.A.2. Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	*7.MP.2.* Reason abstractly and quantitatively. *7.MP.4.* Model with mathematics. *7.MP.7.* Look for and make use	Multiplication and division of integers is an extension of multiplication and division of whole numbers. Example: ● Examine the family of equations. What patterns do you see? Create a model and context for each of the products.

<table>
<tr>
<td>a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (–1)(–1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.

Continued on next page</td>
<td>of structure.</td>
<td></td>
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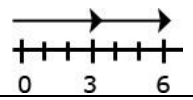
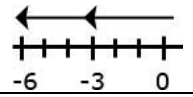
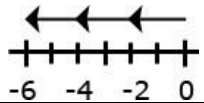
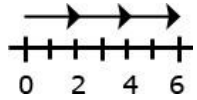
<table>
<tr><td>Equation</td><td>Number Line Model</td><td>Context</td></tr>
<tr><td>2 x 3 = 6</td><td> 
</td><td>Selling two posters at $3.00 per poster</td></tr>
<tr><td>2 x -3 = -6</td><td> 
</td><td>Spending $3.00 each on two posters</td></tr>
<tr><td>-2 x 3 = -6</td><td> 
</td><td>Owing $2.00 to each of your three friends</td></tr>
<tr><td>-2 x -3 = 6</td><td> 
</td><td>Forgiving three debts of $2.00 each</td></tr>
<tr><td></td><td></td><td></td></tr>
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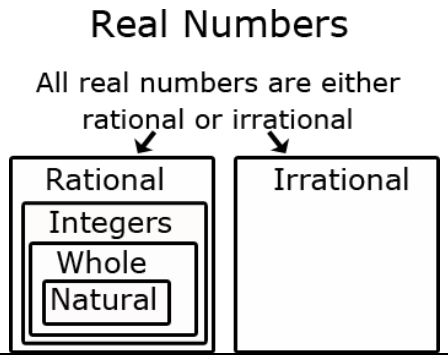
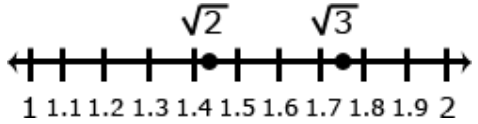
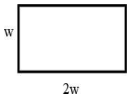
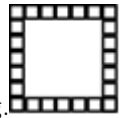
7.NS.A.2. *continued* b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts. c. Apply properties of operations as strategies to multiply and divide rational numbers. d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.		
The Number System (NS) **Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.**		
Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*

7.NS.A.3. Solve real-world and mathematical problems involving the four operations with rational numbers. (Computations with rational numbers extend the rules for manipulating fractions to complex fractions.)	*7.MP.1.* Make sense of problems and persevere in solving them. *7.MP.2.* Reason abstractly and quantitatively. *7.MP.5.* Use appropriate tools strategically. *7.MP.6.* Attend to precision. *7.MP.7.* Look for and make use of structure. *7.MP.8.* Look for and express regularity in repeated reasoning.	**Examples**: Your cell phone bill is automatically deducting $32 from your bank account every month. How much will the deductions total for the year? -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 + -32 = 12 (-32) It took a submarine 20 seconds to drop to 100 feet below sea level from the surface. What was the rate of the descent? $\frac{-100 \text{ feet}}{20 \text{ seconds}} = \frac{-5 \text{ feet}}{1 \text{ second}} = -5 \text{ ft/sec}$

The Number System (NS) **Know that there are numbers that are not rational, and approximate them by rational numbers.**		
Standards *Students are expected to:*	Mathematical Practices	Explanations and Examples
8.NS.A.1. Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.	*8.MP.2.* Reason abstractly and quantitatively. *8.MP.6.* Attend to precision. *8.MP.7.* Look for and make use of structure.	Students can use graphic organizers to show the relationship between the subsets of the real number system. 

8.NS.A.2. Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). *For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*	*8.MP.2*. Reason abstractly and quantitatively. *8.MP.4*. Model with mathematics. 8.*MP.7*. Look for and make use of structure. *8.MP.8.* Look for and express regularity in repeated reasoning.	Students can approximate square roots by iterative processes. **Examples**: • Approximate the value of $\sqrt{5}$ to the nearest hundredth. Solution: Students start with a rough estimate based upon perfect squares. $\sqrt{5}$ falls between 2 and 3 because 5 falls between $2^2 = 4$ and $3^2 = 9$. The value will be closer to 2 than to 3. Students continue the iterative process with the tenths place value. $\sqrt{5}$ falls between 2.2 and 2.3 because 5 falls between $2.2^2 = 4.84$ and $2.3^2 = 5.29$. The value is closer to 2.2. Further iteration shows that the value of $\sqrt{5}$ is between 2.23 and 2.24 since 2.23^2 is 4.9729 and 2.24^2 is 5.0176. • Compare √2 and √3 by estimating their values, plotting them on a number line, and making comparative statements.  Solution: Statements for the comparison could include: ○ √2 is approximately 0.3 less than √3 ○ √2 is between the whole numbers 1 and 2 ○ √3 is between 1.7 and 1.8

Expressions and Equations (EE) **Use properties of operations to generate equivalent expressions.**		
Standards *Students are expected to:*	*Mathematical Practices*	*Explanations and Examples*
7.EE.A.1. Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.	*7.MP.2.* Reason abstractly and quantitatively. *7.MP.6.* Attend to precision. *7.MP.7.* Look for and make use of structure.	**Examples**: • Write an equivalent expression for $3(x+5)-2$. • Suzanne thinks the two expressions $2(3a-2)+4a$ and $10a-2$ are equivalent? Is she correct? Explain why or why not? • Write equivalent expressions for: $3a+12$. Possible solutions might include factoring as in $3(a+4)$, or other expressions such as $a+2a+7+5$. • A rectangle is twice as long as wide. One way to write an expression to find the perimeter would be $w+w+2w+2w$. Write the expression in two other ways. Solution: $6w$ OR $2(w)+2(2w)$  . • An equilateral triangle has a perimeter of $6x+15$. What is the length of each of the sides of the triangle? Solution: $3(2x+5)$, therefore each side is $2x+5$ units long.

7.EE.A.2. Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."	*7.MP.2. Reason abstractly and quantitatively.* *7.MP.6. Attend to precision.* *7.MP.7. Look for and make use of structure.* *7.MP.8. Look for and express regularity in repeated reasoning.*	Ted made an additional $27 dollars in overtime. Write an expression that represents the weekly wages of both if J = the number of hours that Jamie worked this week and T = the number of hours Ted worked this week? Can you write the expression in another way? Students may create several different expressions depending upon how they group the quantities in the problem. o One student might say: "To find the total wage, I would first multiply the number of hours Jamie worked by 9. Then I would multiply the number of hours Ted worked by 9. I would add these two values with the $27 overtime to find the total wages for the week." The student would write the expression. $9J + 9T + 27$ o Another student might say: "To find the total wages, I would add the number of hours that Ted and Jamie worked. I would multiply the total number of hours worked by 9. I would then add the overtime to that value to get the total wages for the week." The student would write the expression $9(J + T) + 27$ o A third student might say: "To find the total wages, I would need to figure out how much Jamie made and add that to how much Ted made for the week. To figure out Jamie's wages, I would multiply the number of hours she worked by 9. To figure out Ted's wages, I would multiply the number of hours he worked by 9 and then add the $27 he earned in overtime. My final step would be to add Jamie and Ted wages for the week to find their combined total wages." The student would write the expression $(9J) + (9T + 27)$ ● Given a square pool as shown in the picture, write four different expressions to find the total number of tiles in the border. Explain how each of the expressions relates to the diagram and demonstrate that the expressions are equivalent. Which expression do you think is most useful? Explain your thinking. 

Expressions and Equations (EE) **Understand the connections between proportional relationships, lines, and linear equations.**		
Standards Students are expected to:	Mathematical Practices	Explanations and Examples
8.EE.A.1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32×3–5 = 3–3 = 1/33 = 1/27.	8.MP.2. Reason abstractly and quantitatively. 8.MP.5. Use appropriate tools strategically. 8.MP.6. Attend to precision. 8.MP.7. Look for and make use of structure.	*Examples:* • $\frac{4^3}{5^2} = \frac{64}{25}$ • $\frac{4^3}{4^7} = 4^{3-7} = 4^{-4} = \frac{1}{4^4} = \frac{1}{256}$ • $\frac{4^{-3}}{5^2} = 4^{-3}$, $\frac{1}{5^2} = \frac{1}{4^3}$, $\frac{1}{5^2} = \frac{1}{64}$, $\frac{1}{25} = \frac{1}{16,000}$
8.EE.A.3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. *For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.*	*8.MP.2.* Reason abstractly and quantitatively. *8.MP.5.* Use appropriate tools strategically. *8.MP.6.* Attend to precision.	
8.EE.A.4. Perform operations	*8.MP.2.* Reason abstractly and	Students can convert decimal forms to scientific notation and apply rules of exponents to

with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology.	quantitatively. *8.MP.5.* Use appropriate tools strategically. *8.MP.6*. Attend to precision.	simplify expressions. In working with calculators or spreadsheets, it is important that students recognize scientific notation. Students should recognize that the output of 2.45E+23 is 2.45 x 10^{23} and 3.5E-4 is 3.5 x 10^{-4}. Students enter scientific notation using E or EE (scientific notation), * (multiplication), and ^ (exponent) symbols.

Essential Questions……...Corresponding Big Ideas

Essential Questions	Corresponding Big Ideas
How is the number system used to fit different situations? How can we compare and contrast numbers? When are negative numbers used and why are they important? Why is it useful for me to know the absolute value of a number? Why do we need to agree on a specific order of operations? How does changing the order of operations affect the outcome when simplifying an expression?	The rational numbers are a set of numbers that includes the whole numbers and integers as well as numbers that can be written as the quotient of two integers, *a* divided by *b*, where *b* is not zero. Rational numbers allow us to make sense of situations that involve numbers that are not whole. The interpretations of the operations on rational numbers are essentially the same as those on whole numbers, but some interpretations require adaptation, and the algorithms are different. The rational numbers allow us to solve problems that are not possible to solve with just whole numbers or integers. Estimation and mental math are more complex with rational numbers than with whole numbers Expressions are powerful tools for exploring, reasoning about and representing situations. Two or more expressions may be equivalent, even when their symbolic forms differ. A relatively small number of symbolic transformations can be applied to expressions yield equivalent expressions. The equal sign an indicate that two expressions are equivalent.

	The equal sign indicates the two expressions are equal. The equal sign can be used in defining or giving a name to an expression of function rule. *Sources:* *Lobato, J. E. (2010). Developing essential understanding of ratios, proportions & proportional reasoning for teaching mathematics in grades 6-8. Reston, VA: The National Council of Teachers of Mathematics, Inc.* *Rose, M.Z. (2010). Developing essential understanding of Expressions, Equations & Functions for teaching mathematics in grades 6-8. Reston, VA: The National Council of Teachers of Mathematics, Inc.*

IV. Student Learning Objective

Student Learning Objectives	**Skills /Concepts**	***PARCC Instructional Clarification Mathematics Assessment Test Specifications***	**Mathematical Practices**
Describe real-world situations in which (positive and negative) rational numbers are combined, emphasizing rational numbers that combine to make 0. Represent sums of rational numbers (*p* + *q)* on horizontal and vertical number lines, showing that the distance along the number line is |*q*| and including situations in which *q* is negative and positive. Add and subtract (positive and negative) rational numbers, showing that the distance between two points on a number line is the absolute value of their difference and representing	**Concept(s):** • Opposite quantities combine to make 0 (additive inverses). • *p* + *q* is the number located a distance |*q*| from *p*, in the positive or negative direction depending on whether *q* is positive or negative. • Subtraction of rational numbers as adding the additive inverse, p – *q* = *p* + (–*q*) • The product of two whole numbers is the total number of objects in a number of equal groups. **Students are able to:** • Represent addition and subtraction on a horizontal number line. • Represent addition and subtraction on a vertical number line. • Interpret sums of rational numbers in real-world situations. • Show that the distance between two rational numbers on the number line is the absolute value	▪ Tasks may or may not have a context. ▪ Tasks are not limited to integers. ▪ Contextual tasks might, for example, require students to create or identify a situation described by a specific equation of the general form p – q = p + (–q) such as 3 – 5 = 3 + (–5). ▪ Non-contextual tasks are not computation tasks but rather require students to demonstrate conceptual understanding, for example, by identifying a difference that is equivalent to a given difference. For example, given the difference −1/3 − (1/5 + 5/8), the student might be asked to recognize the equivalent expression –1/3 +	MP.2. MP.3 MP.5 MP.7

subtraction using an additive inverse. 7. NS.A.1, 7. NS.A.1a, 7. NS.A.1b, 7. NS.A.1c, 7. NS.A.1d	of their difference.	–(1/5 + 5/8)	
Multiply and divide signed numbers, including rational numbers, and interpret the products and quotients using real-world contexts. Convert a rational number to a decimal using long division and explain why the decimal is either a terminating or repeating decimal 7.NS.A.2. 7.NS.A.2a, 7.NS.A.2b, 7.NS.A.2d	**Concept(s):** • Every quotient of integers (with nonzero divisor) is a rational number. • Decimal form of a rational number terminates in 0s or eventually repeats. • Integers can be divided, provided that the divisor is not zero. • If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. **Students are able to:** • Multiply and divide signed numbers. • Use long division to convert a rational number to a decimal. .	Present solutions to multistep problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as 1 + 4 = 5 + 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. Tasks focus on demonstrating understanding that a number is rational Tasks do not directly assess the ability to divide two whole numbers.	MP.2 MP.4 MP.7

Apply properties of operations as strategies to add, subtract, multiply, and divide rational numbers. 7.NS.2, 7.NS.2c Solve mathematical and real-world problems involving addition, subtraction, multiplication, and division of signed rational numbers 7. NS.A.3.	**Concept(s):** • The process for multiplying and dividing fractions extends to multiplying and dividing rational numbers. **Students are able to:** • Add and subtract rational numbers. • Multiply and divide rational numbers using the properties of operations. • Apply the convention of order of operations to add, subtract, multiply and divide rational numbers. • Solve real world problems involving the four operations with rational numbers.	▪ Tasks are not limited to integers. ▪ Tasks may involve products and quotients of 2 or rational numbers. ▪ Tasks require students to compute a product or quotient, or demonstrate conceptual understanding, for example, by producing or recognizing an expression equivalent to a given expression. For example, given the expression (−8)(6)/(−3), the student might be asked to recognize or produce the equivalent expression −(8/3)(−6). ▪ Tasks are one-step word problems. ▪ Tasks sample equally between addition/subtraction and multiplication/division. Tasks involve at least one negative number.	MP.1. MP.2 MP.4 MP.5 MP.6

Represent a rational number with its decimal expansion, showing that it eventually repeats, and convert such decimal expansions into rational numbers. 8. NS.A.1 Use rational numbers to approximate irrational numbers, locate irrational numbers on a number line, and estimate the value of expressions containing irrational numbers. 8. NS.A.2	**Concept(s):** • Numbers that are not rational are irrational. • Every number has a decimal expansion. • Rational approximation of irrational numbers **Students are able to:** • Compare decimal expansions of rational and irrational numbers. • Represent a rational number with its decimal expansion, showing that it repeats eventually. • Convert a decimal expansion (which repeats eventually) into a rational number. • Compare irrational numbers by replacing each with its rational approximation. • Locate rational approximations on a number line. • Estimate the value of expressions containing irrational numbers.		

Apply the properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. 7.EE.A.1 Apply the properties of integer exponents to simplify and write equivalent numerical expressions. 8.EE.1 Rewrite algebraic expressions in equivalent forms to highlight how the quantities in it are related. 7.EE.A.2.	**Concept(s):** • Rewriting an expression in different forms in a problem context can shed light on the problem. • Exponents as simplified representation of repeated multiplication. **Students are able to:** • Add and subtract linear expressions having rational coefficients, using properties of operations. • Factor and expand linear expressions having rational coefficients, using properties of operations. • apply properties of exponents to numerical expressions. • generate equivalent numerical expressions using positive and negative integer exponents. • Write expressions in equivalent forms to shed light on the problem and interpret the relationship between the quantities in the context of the problem.	Tasks are not limited to integer coefficients. Tasks may involve issues of strategy, e.g., by providing a factored expression such as y(3+x+k) and a fully expanded expression 3y + xy + ky, and requiring students to produce or identify a new expression equivalent to both (such as y(3+x) + yk).	MP.2 MP.7

Estimate and express the values of very large or very small numbers with numbers expressed in the form of a single digit times an integer power of 10. Compare numbers expressed in this form, expressing how many times larger or smaller one is than the other 8. EE.A.3 Perform operations using numbers expressed in scientific notation, including problems where both decimals and scientific notation are used. In real-world problem-solving situations, choose units of appropriate size for measurement of very small and very large quantities and interpret scientific notation generated when technology has been used for calculations. 8.EE.A.4	• Very large and very small quantities can be approximated with numbers expressed in the form of a single digit times an integer power of 10. • estimate very large and very small quantities with numbers expressed in the form of a single digit times an integer power of 10. • compare numbers written in the form of a single digit times an integer power of 10 and express how many times as much one is than the other. • multiply and divide numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. • add and subtract numbers expressed in scientific notation, including problems in which one number is in decimal form and one is in scientific notation. • use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. • interpret scientific notation that has been generated by technology (e.g. recognize 4.1E-2 and 4.1e-2 as 4.1×10^{-2}).		

V. Unit Vocabulary

Rational numbers Absolute value Additive Inverse Terminating decimal Repeating decimal Irrational Number Additive Identity Multiplicative Identity Exponent	Constant Variable Coefficient Linear expressions Numerical expression Variable expression Equation Distributive property Scientific notation

V. Differentiations / Modifications Teaching Strategies

Research Based Effective Teaching Strategies	**Modification** **Enrichment**	**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	**Modifications:** Create a human number line to help student visualize the relationship of rational number and number line. Teacher can also place number line on the floor or any accessible location. The measurement interpretation is usually reflected in the use of the number line as physical model. Decimals are yet another important interpretation of rational number and are very useful in a wide variety of settings. Measurement using the metric system, percent, and money are three of the more important ones. This part–whole sub	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	*Whiteboards* *Small Group / Triads* *Word Walls* *Partially Completed Solution* *Gestures* *Native Language Supports* *Pictures / Photos* *Partner Work* *Work Banks* *Teacher Modeling* *Math Journals* *Have students use word webs in their math journals to represent their meaning of specific words. Students should also illustrate an example of the word and write a sentence using sentence frames to help students them structure their thoughts in*

Varied opportunities for students to communicate mathematically Use technological and /or physical tools	construct is one of the basic interpretations of rational numbers Manipulative aids (Cuisenaire Rods , fraction bars , ect) can be used to help develop concepts for addition and subtraction of rational numbers	group, teaming, peer assisted tutoring) to foster communication and strengthen confidence. Use technology and/or hands on	*English.* *When students work in triads or small groups they are able to support each other's learning by giving each*
	Enrichment: Engage students in investigating patterns in repeating decimals; the number of digits that repeat in the decimal form of a fraction is never more than 1 less than the denominator Cross Curricular Activity: Work with social study teacher to study Sieve of Eratosthenes, method used for determining prime and composite numbers. Advance learners		

	investigate mathematical contribution of ancient civilization. Students can also national budget and deficit, gross domestic, international trade and population studies. Work with Science teacher to study astronomy, sub – atomic particles and cellular biology		

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		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 by guided practice and questioning strategies' to clarify and enhance understanding of	*other input and filling in gaps in background. Students often work best when they have defined roles (surrounding the content they are studying) that they are responsible for. Have students note and explain the differences between the use of the symbol (-) for subtraction sentences and for identifying negative numbers. Help make connections between everyday situations and the use of positive numbers, negative numbers, or zero by making posters depicting different scenarios, example a lemonade stand. Include illustrations and paragraph explaining the situation. Show coins and paper money to illustrate the problem. Represent a loss with (-) and a profit or gain with (+). Then have students solve problems about the scenario.* *See Connected Mathematics Program 3 Classroom*

		math big ideas for: 1.Difficulty with process and organization 2.difficulty with oral and written communication Teacher models strategies' and think out aloud strategies to specify step by step process for	*Differentiation for English Language Learners*

V. Instructional Resources and Materials

<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="4">Short constructed responses
Extended responses
Checks for Understanding
Exit tickets
Teacher observation
Group
Timed Practice Test – Multiple Choice & Open-Ended Questions

<u>Performance Tasks:</u>

<u>Giantburgers aligned to 8.EE.A.4</u>

<u>Who has the Better Job aligned to 8.EE.B.5</u>
<u>Additional performance Task for</u></td><td colspan="2"><u>Connected Math Program 3 Grade 7 Unit : Accentuate the Negative : Investigation 1-4</u>

NCTM Visualizing Square and Square Root
Lesson 1: Students Use geoboards to explore the relationships between the area of a square and its side length. 8.EE.A.2
Lesson 2 Students use geoboards to construct non-traditional, "tilted" squares whose side lengths are irrational numbers. 8.NS.A.1, 8.NS.A.2, 8.EE.A.2</td></tr>
<tr><td colspan="2">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</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></td></tr>
</table>

class use *8.EE.A.1 Extending the Definitions of Exponents* *8.G.C.9 A Canister of Tennis Balls* *8.EE.A.3 Ant and Elephant* **Project** *Teach 21 Problem Based Learning : Architectural Planning*	*Mathematics* *Mathematics Assessment Projects* *Achieve the Core* *Illustrative Mathematics* *Mathematics Assessment Projects* *Get the Math* *Webmath.com* *sosmath.com* *Mathplanet.com* *Interactive Mathematics.com* *Inside Mathmatics.org* *Asia Pacific Economic Cooperation : :Lesson Study Videos* *Genderchip.org* *Interactive Geometry* *Mathematical Association of America* *learner.org* *Math Forum : Teacher Place* *Shmoop /common core math*	*Internet 4 Classroom website* *A Maths Dictionary for kids*

Hyperlinks are noted underlined in italics