

Number System: Pre-Algebra

Stage 1 Desired Results		
ESTABLISHED GOALS: <u>Competencies:</u> - Students will demonstrate the ability to simplify numeric and algebraic expressions by applying the properties of operations and the arithmetic of real numbers. - Students will demonstrate the ability to apply number sense by categorizing and comparing real numbers. - Students will demonstrate the ability to model real world problems by building and analyzing the appropriate expression, equation, or function. - Students will demonstrate the ability to analyze and summarize text and integrate knowledge to make meaning of discipline-specific materials. - Students will demonstrate the ability to produce coherent and supported writing in order to communicate effectively for a range of discipline-specific tasks, purposes, and audiences. - Students will demonstrate the ability to speak purposefully and effectively by strategically making decisions about content, language use, and discourse style. <u>Content Standards:</u> 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, a hydrogen atom has 0 charge because its two constituents are oppositely charged. 7.NS.A.1.b - 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 - Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	Transfer	
	<i>Students will be able to independently use their learning to to compute fluently with numbers in any form and organize information to make comparisons and informed decisions.</i>	
	Meaning	
	ENDURING UNDERSTANDINGS <i>Students will understand that...</i> - the rules of the number system provide us with multiple strategies for solving a problem. - information can be examined by using multiple representations. - attributes are used to categorize information.	ESSENTIAL QUESTIONS How do you know what strategy to use?
	Acquisition	
	<i>Students will know...</i> - the properties of operations can be used as strategies to operate with rational numbers. - every quotient of integers is a rational number, but the divisor cannot be zero. - a number and its opposite have a sum of zero - a rational number when converted to a decimal, eventually repeats or terminates. - that the subtraction of rational numbers is the same as adding the additive inverse. - how to interpret numerical expressions by describing real world contexts. - that rational numbers are real numbers that can be expressed as a ratio of two integers ($\frac{a}{b}$), where b is not zero. - that irrational numbers are those which cannot be expressed as a ratio $\frac{a}{b}$. - that rational numbers can be expressed in decimal form as repeating or terminating decimals. - that real numbers can be compared and ordered. - that squaring a number and taking the square root of a number are inverse operations.	<i>Students will be skilled at...</i> - computing fluently with rational numbers. - performing basic operations with rational numbers by applying the properties of operations. - converting rational numbers to decimals using long division - simplifying complex fractions - creating mathematical problems involving the four operations with rational numbers in order to solve real-world problems. - converting numbers written as a rational number expressed as $\frac{a}{b}$ into decimal expansion. - converting numbers written as a decimal expansion to a rational number expressed as $\frac{a}{b}$. - distinguishing between rational and irrational numbers. - comparing the magnitude of real numbers. - approximating irrational numbers. - approximating the value of expressions involving irrational numbers, for example 2π. - using irrational numbers to solve real-world problems, including those that require the

- o 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. - o 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. - o 7.NS.A.2.c - Apply properties of operations as strategies to multiply and divide rational numbers. - o 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.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.EE.A.2 - Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational. • 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. • 8.G.B.7 - Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. • 8.G.B.8 - Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. • 8.G.B.6 - Explain a proof of the Pythagorean Theorem and its converse. • 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. • MP6 Attend to precision. • MP7 Look for and make use of structure. • MP8 Look for and express regularity in repeated reasoning.	• <i>the Pythagorean Theorem.</i> <i>vocabulary: distributive property, commutative property, associative property, additive inverse, rational numbers, complex fraction, numerical expression, irrational number, radical symbol, square root, decimal expansion, theorem, legs, hypotenuse, square root</i>	<i>Pythagorean Theorem.</i> • <i>explaining a proof of the Pythagorean Theorem and its converse.</i>
Content Area Literacy Standards	21st Century Skills	
• RST.6-8.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks. • RST.6-8.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 6-8 texts and topics</i>.	• <i>make judgements and decisions</i> • <i>solve problems</i> • <i>communicate clearly</i>	

RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually.	<i>use and manage information</i>
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Stage 2 - Evidence	
<i>Evaluative Criteria</i>	<i>Assessment Evidence</i>
	PERFORMANCE TASK(S):
	OTHER EVIDENCE:

Stage 3 – Learning Plan	
Summary of Key Learning Events and Instruction	
<i>Language Arts Integration</i>	<i>Mathematics Integration</i>
1.OA.1 Use	1.OA.1 Use
<i>Technology Integration</i>	<i>District Materials</i>
1.OA.1 Use	