

Expressions & Equations: Grade 8

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 of arithmetic of real numbers. - Students will demonstrate the ability to solve equations, inequalities and systems by analyzing structure and applying the properties of equality, inequality and rational expressions. - 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> 8.EE.A.1- Know and apply the properties of integer exponents to generate equivalent numerical expressions. 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.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. 8.EE.A.4 - Perform operations 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. 8.EE.C.7 - Solve linear equations in one variable. - Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers). - Solve linear equations with rational number coefficients,	Transfer	
	<i>Students will be able to independently use their learning to solve non-routine problems involving finding the value of an unknown and be able to support the validity of their solutions.</i>	
	Meaning	
	ENDURING UNDERSTANDINGS <i>Students will understand that...</i> - rules of arithmetic and algebra can be used together with notions of equivalence to transform equations and inequalities so solutions can be found. - the number of solutions to a problem is dependent upon the context of the situation.	ESSENTIAL QUESTIONS - How do we ensure equality? - When is it appropriate for things to not be equal?
	Acquisition	
	<i>Students will know...</i> - that bases must be the same in order to perform operations with exponents. - that exponents are subtracted when like bases are being divided. - that any number raised to the zero power is equal to one. - that negative exponents occur when there are more factors in the denominator. These exponents can be expressed as a positive if left in the denominator. - that exponents are added when like bases are being multiplied. - that exponents are multiplied when a power is raised to a power. - the commonly used perfect squares and cubes - that non-perfect squares and non-perfect cubes are irrational. - that cubing a number and taking the cube root of a number are inverse operations. - that scientific notation is used to express very large or very small numbers.	<i>Students will be skilled at...</i> - evaluating exponents with rational bases and integer exponents. - simplifying expressions involving exponents. - identifying square roots and cube roots of perfect squares and perfect cubes. - evaluating and simplifying variable expressions involving squares & square roots, and cubes & cube roots. - using square roots and cube roots to solve algebraic equations. - converting between standard and scientific notation. - comparing numbers written in scientific notation. - using a scientific calculator to express a number in scientific notation. - using the four operations on numbers in scientific notation. - solving multi-step linear equations with rational coefficients. - solving linear equations with variables on both sides.

including equations whose solutions require expanding expressions using the distributive property and collecting like terms. - MP1 Make sense of problems and persevere in solving them. - MP2 Reason abstractly and quantitatively. - MP4 Model with mathematics. - MP6 Attend to precision. - MP7 Look for and make use of structure. - MP8 Look for and express regularity in repeated reasoning.	<i>that some equations have no solutions and that some equations have an infinite number of solutions.</i> <u>vocabulary:</u> linear, monomial, perfect cube, perfect square, cube root, perfect cube, scientific notation	<i>simplifying variable expressions using properties.</i> <i>interpreting $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers) to determine the number of solutions</i> <i>making sense of solutions, especially in real-world scenarios.</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>. - RST.6-8.7 Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually.		<i>reason effectively</i> <i>use systems thinking</i> <i>make judgments and decisions</i> <i>solve problems</i> <i>access and evaluate information</i>

Stage 2 - Evidence	
Evaluative Criteria	Assessment Evidence
	PERFORMANCE TASK(S):
	OTHER EVIDENCE:

Stage 3 – Learning Plan	
Summary of Key Learning Events and Instruction	
Language Arts Integration	Mathematics Integration
1.OA.1 Use	1.OA.1 Use

<i>Technology Integration</i>	<i>District Materials</i>
• 1.OA.1 Use	