Pre-Algebra – Unit 7: Powers and Roots

Phoenixville Area School District

Stage 1 Desired Results	
PA Core Standards: **M07.A-N.1.1** Solve real-world and mathematical problems involving the four operations with rational numbers.	*Transfer*
	TRANSFER GOALS *Students will be able to independently use their learning to…* ***Number Sense****: Develop a sound foundation to demonstrate the value of numbers by describing their various representations, relationships, and patterns.* ***Fluency****: Demonstrate automatic recall of addition, subtraction, multiplication, and division of rational numbers.* ***Problem-Solving****: Persistently apply various problem-solving strategies and organized approaches to accurately understand and solve problems and provide evidence to support response.*
	Meaning
PSSA Assessment Anchors: **M08.A-N.1.1** Apply concepts of rational and irrational numbers. **M08.B-E.1.1** Represent and use expressions and equations to solve problems involving radicals and integer exponents.	**UNDERSTANDINGS** *Students will understand that…* - The most appropriate way to solve a problem or represent a quantity depends on the situation, calculations may be done using; mental math or paper and pencil calculations using a variety of mathematically sound algorithms. - Mathematicians flexibly use symbols, numbers, words, and visual representations while maintaining the integrity of the relationship between quantities. - Mathematicians think about reasonableness throughout the problem-solving process. - Expressions are simplified using a predetermined order of operations.	**ESSENTIAL QUESTIONS** *Students will keep considering...* - What is the question asking? How do I get there? - When is it appropriate to use estimation? What would be a reasonable answer? - How do figures/quantities/numbers/ operations relate to one another? - What does this quantity/number/ expression/value mean? What are the ways to represent it? Is there a best way?

	Knowledge and Skills Acquisition	
	KNOWLEDGE *Students will know…* • Negative Exponents • Multiplying & Dividing Monomials • Scientific Notation • Operations with Scientific Notation • Square and Cube Roots • Pythagorean Theorem **VOCABULARY** • Irrational • Exponents • Reciprocal • Square Roots • Scientific Notation • Standard Form	**SKILLS** *Students will be skilled at…* • Estimating the value of irrational numbers without a calculator (limit whole number radicand to less than 144). • Using rational approximations of irrational numbers to compare and order irrational numbers. • Locating rational and irrational numbers at their approximate locations on a number line. • Applying one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). • Using 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 perfect squares (up to and including 122) and cube roots of perfect cubes (up to and including 53) without a calculator. • Estimate very large or very small quantities by using numbers expressed in the form of a single digit times an integer power of 10 and express how many times larger or smaller one number is than another. • Performing operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used.

Stage 2 – Evidence

Code A/M/T	Evaluative Criteria	Assessment Evidence	
A/M/T Acquisition Meaning Making Transfer	*What criteria will be used in each assessment to evaluate attainment of the desired results?*	PERFORMANCE TASK(S) *Students will demonstrate understanding (meaning making and transfer) through complex performance by...* **100 People** Your task is to use integer exponents with real-world numbers and create a presentation to support your non-profit organization. • *Goal:* Your task is to predict the number of people that are without food and shelter in the world today. • *Role/Audience:* You are presenting this data to a group of politicians and asking for government aid for your non-profit organization. • *Situation/Product:* You will convert figures given 100 people to the 7 billion that live in the world and 300 million that live in the USA today. • *Success Criteria:* Your presentation will include numbers based on statistics and a percent of the world's population that are without food and shelter.	Differentiation Considerations:
A/M/T Acquisition Meaning Making Transfer	*What criteria will be used in each assessment to evaluate attainment of the desired results?*	OTHER EVIDENCE **Unit Test** • Multiple Choice • True/False • Matching • How does a negative exponent not result in a negative valued number? • Name two situations in which a scientist would use numbers with at least six whole place values and ones that use at least four decimals. • Explain how square roots are used to solve area problems. • Describe how cube roots are used to solve volume problems.	Differentiation Considerations: