



Marietta City Schools

District Unit Planner

Everything on the unit planner must be included on the unit curriculum approval statement.

Grade 8 Mathematics

Unit title	Unit 2: Exponents	MYP year	3	Unit duration (hrs)	25 Hours
------------	-------------------	----------	---	---------------------	----------

Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GSE Standards

Standards

Work with radicals and integer exponents.

MGSE8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.

MGSE8.EE.2 Use square root and cube root symbols to represent solutions to equations. Recognize that $x^2 = p$ (where p is a positive rational number and $|x| < 25$) has 2 solutions and $x^3 = p$ (where p is a negative or positive rational number and $|x| < 10$) has one solution. Evaluate square roots of perfect squares < 625 and cube roots of perfect cubes > -1000 and < 1000 .

MGSE8.EE.3 Use numbers expressed in scientific notation 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.

MGSE8.EE.4 Add, subtract, multiply and divide numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Understand 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 (e.g. calculators).

Analyze and solve linear equations and pairs of simultaneous linear equations.

MGSE8.EE.7 Solve linear equations in one variable.

MGSE8.EE.7a. 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).

MGSE8.EE.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

Know that there are numbers that are not rational, and approximate them by rational numbers.

MGSE8.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 number.

MGSE8.NS.2 Use rational approximation of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions (e.g., estimate π^2 to the nearest tenth). For example, by truncating the decimal expansion of $\sqrt{2}$ (square root of 2), show that $\sqrt{2}$ is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.

Concepts/Skills to be Mastered by Students

- Distinguish between rational and irrational numbers and show the relationship between the subsets of the real number system.
- Recognize that every rational number has a decimal representation that either terminates or repeats.
- Recognize that irrational numbers must have decimal representations that neither terminate or repeat.
- Understand that the value of a square root can be approximated between integers and that non-perfect square roots are irrational.
- Locate rational and irrational numbers on a number line diagram.
- Use the properties of exponents to extend the meaning beyond counting-number exponents.
- Recognize perfect squares and cubes, understanding that non-perfect squares and non perfect cubes are irrational.
- Recognize that squaring a number and taking the square root of a number are inverse operations; likewise, cubing a number and taking the cube root are inverse operations.
- Express numbers in scientific notation.
- Compare numbers, where one is given in scientific notation and the other is given in standard notation.
- Compare and interpret scientific notation quantities in the context of the situation.
- Use laws of exponents to add, subtract, multiply and divide numbers written in scientific notation.
- Solve one-variable equations with the variables being on both sides of the equals sign, including equations with rational numbers, the distributive property, and combining like terms.
- Analyze and represent contextual situations with equations, identify whether there is one, none, or many solutions, and then solve to prove conjectures about the solutions.

Vocabulary

- Addition Property of Equality- The same number can be added to both sides of an equation and the sides remain equal.
- Additive Inverses- Two numbers that have a sum of 0.
- Algebraic Expression- An algebraic expression is a mathematical phrase that consists of variables, numbers, and operation symbols.
- Cube Root- The cube root of a number, n , is a number whose cube equals n .
- Equation- An equation is a mathematical sentence that includes an equals sign to compare two expressions.
- Evaluate an Algebraic Expression- To evaluate an algebraic expression, replace each variable with a number, and then follow the order of operations.
- Exponent- An exponent is a number that shows how many times a base is used as a factor.
- Inverse Operation- Inverse operations are operations that undo each other.
- Irrational- An irrational number is a number that cannot be written in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$. In decimal form, an irrational number cannot be written as a terminating or repeating decimal.
- Like Terms- Terms that have identical variable parts are like terms.
- Linear Equation in One Variable- An equation is a linear equation if the graph of all of its solutions is a line.
- Multiplication Property of Equality- Both sides of an equation can be multiplied by the same nonzero number and the sides remain equal.
- Multiplicative Inverses
- Perfect Square- A perfect square is a number that is the square of an integer.

- Radical- An expression that uses a root, such as square root, cube root.
- Rational- A rational number is a number that can be written in the form $\frac{a}{b}$ or $-\frac{a}{b}$, where a is a whole number and b is a positive whole number. The rational numbers include the integers.
- Scientific Notation- A number in scientific notation is written as the product of two factors, one greater than or equal to 1 and less than 10, and the other a power of 10.
- Significant Digits- The number of digits that are meaningful.
- Solution- A solution of an equation is a value of the variable that makes the equation true.
- Square Root- A square root of a number is a number that, when multiplied by itself, equals the original number.
- Variable - A variable is a letter that represents an unknown value.

Key concept	Related concept(s)	Global context
Form	Justification and Simplification	Scientific and Technical Innovation
Statement of inquiry		
Various numeric forms can be used to enhance our understanding of scientific principles.		
Inquiry questions		
<p>Factual— How can we simplify exponential expressions?</p> <p>Conceptual— How are exponents and scientific notation related?</p> <p>Debatable- What is the best form of representing numbers and expressions?</p>		
MYP Objectives	Assessment Tasks	
<i>What specific MYP objectives will be addressed during this unit?</i>	<i>Relationship between summative assessment task(s) and statement of inquiry:</i>	<i>List of common formative and summative assessments.</i>

<p>Criterion A: Knowledge and Understanding</p> <p>Criterion B: Investigating Patterns</p> <p>Criterion C: Communication</p> <p>Criterion D: Applying Mathematics In real life contexts.</p>	<p>Students will use various numeric forms to help them understand scientific principles.</p>	<p><u>Formative Assessment(s):</u></p> <p>Unit 2 CFA</p> <p><u>Summative Assessment(s):</u></p> <p>Unit 2: Exponents</p> <p>MYP: SAAVAS Performance Task</p>
--	---	--

Approaches to learning (ATL)

Give and receive meaningful feedback.

Bring necessary equipment and supplies to class.

Category:

Cluster:

Skill Indicator:

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
<p>MGSE8.NS.2 Use rational approximation of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.</p>	<p>SAAVAS Mid Topic Performance Task (Topic 1)</p>	<p>Lessons prior to this will determine the amount of scaffolding each student may need to complete this task. Students will be placed in groups according to who will be able to work independently and who should receive additional examples to work and reason through.</p>

<p>MGSE8.EE.1 Know and apply the properties of integer exponents to generate equivalent numerical expressions.</p>	<p>Exponent Rules Inquiry Activity</p>	<p>The intention of this task is for it to be student-centered. The task will allow students to use reasoning skills to discover the concept. Students will work in groups to discuss their math processes in order to arrive at the rules for exponents. The teacher will serve as a facilitator during this activity.</p>
<p>MGSE8.EE.7b Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.</p>	<p>Multi-Step Equations Error Analysis</p>	<p>The purpose of this activity is to strengthen their skills with solving equations. In order to understand the process of this concept, the students will work to identify an error and then explain the correct procedures. Teachers will provide opportunities for students to “turn and talk” to each other about the concept. This strategy further enables students to process the skill for more understanding.</p>
<p>Content Resources</p>		