



Marietta City Schools
2023–2024 District Unit Planner

Enhanced Algebra: Concepts & Connections (Grade 8)

Unit title	<i>Unit 3: Investigating Rational and Irrational Numbers</i>	MYP year	3	Unit duration (hrs)	9 - 13.5 hrs
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Mastering Content and Skills through INQUIRY (Establishing the purpose of the Unit): *What will students learn?*

GA DoE Standards

Standards

- 8.NR.1** : Solve problems involving irrational numbers and rational approximations of irrational numbers to explain real-life applications.
- 8.NR.1.1**: Distinguish between rational and irrational numbers using decimal expansion. Convert a decimal expansion which repeats eventually into a rational number.
 - 8.NR.1.2**: Approximate irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.
- 8.NR.2** : Solve problems involving radicals and integer exponents including relevant application situations; apply place value understanding with scientific notation and use scientific notation to explain real-life phenomena.
- 8.NR.2.1** Apply the properties of integer exponents to generate equivalent numerical expressions.
 - 8.NR.2.2** 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 $|x| \leq 25$) has two solutions and $x^3 = p$ (where p is a negative or positive rational number and $|x| \leq 10$) has one solution. Evaluate square roots of perfect squares ≤ 625 and cube roots of perfect cubes ≥ -1000 and ≤ 1000 .
 - 8.NR.2.3** 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.
 - 8.NR.2.4** Add, subtract, multiply and divide numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Interpret scientific notation that has been generated by technology (e.g., calculators or online technology tools).
- A.NR.5** : Investigate rational and irrational numbers and rewrite expressions involving square roots and cube roots.
- A.NR.5.1**: Rewrite algebraic and numeric expressions involving radicals.
 - A.NR.5.2**: Using numerical reasoning, show and explain that the sum or product of rational numbers is rational, the sum of a rational number and an irrational number is irrational, and the product of a nonzero rational number and an irrational number is irrational.
- A.MM.1** : Apply mathematics to real-life situations; model real-life phenomena using mathematics
- A.MM.1.1** Explain applicable, mathematical problems using a mathematical model.
- Fundamentals**
- Students should be provided with opportunities to learn mathematics in the framework of real-life problems.

- Mathematically applicable problems are those presented in which the given framework makes sense, realistically and mathematically, and allows for students to make decisions about how to solve the problem (model with mathematics).

A.MM.1.2 Create mathematical models to explain phenomena that exist in the natural sciences, social sciences, liberal arts, fine and performing arts, and/or humanities domains.

Fundamentals

- Students should be able to use the content learned in this course to create a mathematical model to explain real-life phenomena.

A.MM.1.4 Use various mathematical representations and structures with this information to represent and solve real-life problems.

Strategies and Methods

- Students should be able to fluently navigate between mathematical representations that are presented numerically, algebraically, and graphically.
- For graphical representations, students should be given opportunities to analyze graphs using interactive graphing technologies.

A.MM.1.5 Define appropriate quantities for the purpose of descriptive modeling.

Fundamentals

- Given a situation, framework, or problem, students should be able to determine, identify, and use appropriate quantities for representing the situation.

A.MP.1-8 : Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.

Concepts/Skills to support mastery of standards

8.NR.1.1: Distinguish between rational and irrational numbers using decimal expansion. Convert a decimal expansion which repeats eventually into a rational number.

8.NR.1.2: Approximate irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.

8.NR.2.1 Apply the properties of integer exponents to generate equivalent numerical expressions.

8.NR.2.2 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 $|x| \leq 25$) has two solutions and $x^3 = p$ (where p is a negative or positive rational number and $|x| \leq 10$) has one solution. Evaluate square roots of perfect squares ≤ 625 and cube roots of perfect cubes ≥ -1000 and ≤ 1000 .

8.NR.2.3 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.

8.NR.2.4 Add, subtract, multiply and divide numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Interpret scientific notation that has been generated by technology (e.g., calculators or online technology tools).

A.NR.5.1: Rewrite algebraic and numeric expressions involving radicals.

A.NR.5.2: Using numerical reasoning, show and explain that the sum or product of rational numbers is rational, the sum of a rational number and an irrational number is irrational, and the product of a nonzero rational number and an irrational number is irrational.

MSC.Gifted.S2B-Students will develop and utilize creative thinking through a variety of products and problem solving.

MSC.Gifted.S3B- Students will develop and utilize critical thinking, higher order thinking, logical thinking, and problem-solving skills in various situations.

Vocabulary

[K-12 Mathematics Glossary](#)

Addition Property of Equality	Additive Inverse	Algebraic Expressions	Cube Roots	Square Roots	Equations	Evaluate an Algebraic Expression
Exponents	Inverse Operations	Irrational Numbers	Like Terms	Linear Equations in one variable	Multiplication Property of Equality	Multiplicative Inverse
Radical	Rational Numbers	Scientific Notation	Significant Digits	Operations	Perfect Square	Variable
Product of nonzero rational number	Decimal expansion	Perfect Cubes	Approximate/Estimate	Composite Numbers	Factors	Fractions
Index	Natural Numbers	Non-Repeating Decimals	Non-Terminating Decimals	Prime Numbers	Power	Radicand
Ratio	Real Numbers	Repeating Decimal	Terminating Decimal	Whole Number	Zero	Zero Exponent Rule
Exponent Notation	Negative Exponent Rule	Properties of Integer Exponents	Product Rule	Power Rule	Power of Product Rule	Quotient Rule

Notation

Key concept	Related concept(s)	Global context
Form	Equivalence, Models	Scientific and Technical Innovation

Statement of inquiry

Exploring the relationships between rational and irrational numbers through models can enhance our understanding of their properties and applications in scientific and technical innovation.

Inquiry questions

Factual— How can we simplify exponential expressions?

Conceptual— How are exponents and scientific notation related?

Debatable- What is the best form of representing numbers and expressions?

MYP Objectives	Assessment Tasks	
<i>What specific MYP objectives will be addressed during this unit?</i>	Relationship between summative assessment task(s) and statement of inquiry:	<i>List of common formative and summative assessments.</i>
Objective C: Communicating	Students will use various numeric forms to help them understand scientific principles.	Formative Assessment(s): Unit 3 CFA Summative Assessment(s): Unit 3 Summative Assessment Unit 3 Summative Retest MYP Assessment - Evaluation Statements about Rational and Irrational Numbers
Approaches to learning (ATL)		
Category: Self-Management Skills Cluster: Reflection Skill Indicator: Perseverance demonstrate persistence and performance		

Design Cycle Transdisciplinary

- Inquiring and Analyzing

- Developing Ideas
- Creating a Solution
- Evaluating

Learning Experiences

Add additional rows below as needed.

Objective or Content	Learning Experiences	Personalized Learning and Differentiation
<p>A.NR.5: Investigate Rational and Irrational Numbers and rewrite expressions involving square roots and cube roots.</p> <p>A.NR.5.1: Rewrite algebraic and numeric expressions involving radicals.</p> <p>A.NR.5.2: Using numerical reasoning, show and explain that the sum or product of rational numbers is rational, the sum of a rational number and an irrational number is irrational, and the product of a nonzero rational number and an irrational number is irrational.</p>	<p>Equivalent Radical Expressions: Length, Perimeter, and Area</p> <p>https://lor2.gadoe.org/gadoe/file/533733ba-3fa6-4fc8-8e2f-e163cf69d6ff/1/Equivalent-Radical-Expressions-Length-Perimeter-Area-EA-Unit-3-Student-Reproducibles.pdf (Student Document)</p> <p>https://lor2.gadoe.org/gadoe/file/533733ba-3fa6-4fc8-8e2f-e163cf69d6ff/1/Equivalent-Radical-Expressions-Length-Perimeter-Area-EA-Unit-3-Learning-Plan.pdf (Teacher Document)</p> <p>Learning Plan Description: In this learning plan, students will use their prior knowledge to identify and calculate equivalent radicals. Students will use radicals to solve problems involving length and perimeter of objects.</p> <p>Learning Goal:</p> <ol style="list-style-type: none"> 1. I can determine equivalent radical expressions 2. I can add and subtract radical expressions 3. I can multiply radical expressions 	<p>Differentiated Support: Students may be intentionally grouped for shared peer learning. Support will be provided through explicit instruction, small group, visual representations, and manipulatives (hands on and technology)</p>
<p>8.NR.1 : Solve problems involving irrational numbers and rational approximations of irrational numbers to explain real-life applications.</p> <p>8.NR.1.1: Distinguish between rational and irrational numbers using decimal expansion. Convert a decimal expansion which repeats eventually into a rational number.</p>	<p>Translating Between Repeating Decimals and Fractions (FAL)</p> <p>https://lor2.gadoe.org/gadoe/file/16b8e33d-7dcc-448c-9b65-569a76afd60d/1/Translating-Between-Student-8U5.pdf (Student Document)</p> <p>https://lor2.gadoe.org/gadoe/file/16b8e33d-7dcc-448c-9b65-569a76afd60d/1/Translating-Between-8U5.pdf (Teacher Document)</p> <p>https://lor2.gadoe.org/gadoe/file/16b8e33d-7dcc-448c-9b65-569a76afd60d/1/Translating</p>	<p>Differentiated Support: The teacher will ask probing questions, provide visual representations, and use manipulatives to engage students for meaningful learning.</p>

<p>8.NR.1.2: Approximate irrational numbers to compare the size of irrational numbers, locate them approximately on a number line, and estimate the value of expressions.</p>	<p>-Between-Lesson-Guide-8U5.pdf (Lesson Guide)</p> <p>https://lor2.gadoe.org/gadoe/file/16b8e33d-7dcc-448c-9b65-569a76afd60d/1/Translating-Between-Blackline-8U5.pdf (Blackline Master)</p> <p>Learning Plan Description: In this learning plan, students are asked to translate between decimal and fraction notation, particularly when the decimals are repeating, create and solve simple equations to find the fractional equivalent of a repeating decimal, and understand the effect of multiplying a decimal by a power of 10.</p> <p>Learning Goals:</p> <ol style="list-style-type: none"> 1. I can translate between decimal and fraction notation, particularly when the decimals are repeating. 2. I can create and solve simple linear equations to find fractional equivalent or repeating decimals. 3. I can understand the effect of multiplying a decimal by a power of 10. 	
<p>8.NR.2 : Solve problems involving radicals and integer exponents including relevant application situations; apply place value understanding with scientific notation and use scientific notation to explain real-life phenomena.</p> <p>8.NR.2.1 Apply the properties of integer exponents to generate equivalent numerical expressions.</p>	<p>Generalizing Patterns of Exponent Properties</p> <p>https://lor2.gadoe.org/gadoe/file/e7531553-72a7-4102-9486-f7c4ea153914/1/Generalizing-Patterns-of-Exponent-Properties-Student-Reusable-8U5.pdf (Student Document)</p> <p>https://lor2.gadoe.org/gadoe/file/e7531553-72a7-4102-9486-f7c4ea153914/1/Generalizing-Patterns-of-Exponent-Properties-8U5.pdf (Teacher Document)</p> <p>Learning Plan Description: In this learning plan, students generalize patterns of exponent properties. Students will use their generalizations to discover and name the Product, Power to a Power, Quotient, Zero Power, and Negative Exponent Rules.</p> <p>Learning Goals:</p> <ol style="list-style-type: none"> 1. I can simplify and evaluate numerical expressions involving integer exponents. 	<p>Differentiated Support: Students will be supported and enriched according to their level of understanding and proficiency of the concepts and standards. (formal and informal assessments)</p>
<p>Content Resources</p>		

GADOE (Learning Plans)

SaVVas: Envision Algebra 1 - **Lesson Topic 1-1, GA-5, 9-3, 9-4**

SaVVas: Envision Grade 8 - **Lesson Topic 1-1 - 1-10**