03_Mastering Rational and Irrational Numbers

Content Area: **Math**
Course(s):
Time Period: **Semester**
Length: **3-4 Weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

This course is designed for senior students who must participate in the NJDOE Portfolio Appeal Process because they have not successfully completed the math portion of the NJ High School Graduation Assessment Requirement. In this course, students will receive targeted instruction in mathematics based on their needs as reflected in state-wide standardized testing. They will be prepared for a fall retake of the math section of the NJGPA as well as a variety of alternative assessments and then prepare a portfolio of constructed response tasks to show their proficiency in the subject. This course is mandatory for those identified students. Grades will be reflected as P/F.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Unit Goals:

- Develop a deep understanding of rational and irrational numbers and their properties.
- Enhance reasoning and explanation skills based on the properties of these numbers.
- Create a comprehensive portfolio showcasing mastery of rational and irrational number concepts.

Enduring Understandings:

- Rational and irrational numbers have distinct properties that influence their operations and comparisons.
- The use of rational and irrational numbers is vital in various real-world applications.
- Effective communication of reasoning is essential for understanding and working with these numbers.

Essential Questions:

- What distinguishes rational numbers from irrational numbers, and how do their properties impact mathematical operations?
- How are rational and irrational numbers applied in everyday situations and different fields?
- How can clear and structured explanations enhance our understanding of rational and irrational numbers?

CONTENT AREA STANDARDS

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.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.

MA.N-RN.B	Use properties of rational and irrational numbers.
MA.N-RN.B.3	Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.
MA.K-12.4	Model with mathematics.
MA.A-APR.D.7	Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.RST.9-10.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.
LA.RST.9-10.7	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand:

- Rational numbers and their properties (e.g., fraction, decimal, integer representations).
- Irrational numbers and their non-repeating, non-terminating decimal expansions.
- Arithmetic operations involving rational numbers.
- Comparing and ordering rational and irrational numbers.
- Real-world applications of rational and irrational numbers

Procedural Knowledge

Students will be able to:

- Identify and classify rational and irrational numbers.
- Describe key properties of rational and irrational numbers.
- Add, subtract, multiply, and divide rational numbers.
- Explain the rules and properties governing operations with rational numbers.
- Use number lines and inequalities to compare and order numbers.
- Provide clear reasoning for the relative positions of numbers.
- Present logical justifications for the choice of number representation in specific contexts

EVIDENCE OF LEARNING

Refer to the 'Formative Assessments' and 'Summative Assessments' sections.

Formative Assessments

- Formative assessments after each week to gauge procedural knowledge and understanding.
- Weekly quizzes evaluating declarative knowledge and problem-solving abilities.

Summative Assessments

- Mid-unit and end-unit projects showcasing problem-solving skills and explanation of reasoning.
- Culminating portfolio assessment evaluating the depth of understanding, clarity of explanations, and application of rational and irrational number concepts in various contexts.

RESOURCES (Instructional, Supplemental, Intervention Materials)

- NJCTL - Numbers, Operations & Expressions Unit
- IXL
- Sample questions and constructed response tasks aligned with the NJSLA Algebra Type II, Sub-Claim C Evidence Statements.
- Rubrics for assessing constructed response tasks

INTERDISCIPLINARY CONNECTIONS

- Career Readiness
  - Utilize critical thinking to make sense of problems and persevere in solving them.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.