Lindenwold Public Schools

Unit 1
Understanding Rational Numbers
45 Instructional School Days

NJSLS Mathematics

HS.N-RN.A.1 Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. *For example, we define* $5^{1/3}$ *to be the cube root of 5 because we want* $(5^{1/3})^3 = 5^{(1/3)^3}$ *to hold, so* $(5^{1/3})^3$ *must equal 5.*

HS.N-Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

HS.A-CED.A.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

HS.G-MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).★

HS.G-MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).★

HS.A-CED.A.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*

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Rationale and Transfer Goals:

This unit and course is aligned with Camden County Community College and both of their non-credit math courses. The course is actually directed by the math department at Camden County and if students are able to pass the Camden County College final in those courses they will give them credit for the course regardless of what their Accuplacer score is. The accuplacer is a placement test that all students must take when they enter Camden County, it is a timed test on a computer with no calculator. The two non-credit courses go back to the foundation of mathematics to strengthen students' understanding of why we do what we do with math. Integrated Math strengthens the students basic skills, the building blocks of mathematics, and understanding of math so they can develop a comprehensive understanding of higher level mathematics. In the initial unit for this course, the students will develop a more in depth understanding of real numbers and how decimals and fractions are really the same number with just a different look. They will be able to manipulate fractions and decimals to work out multiple situations and problems. Students should gain a greater understanding of why we have an order to operations when using mathematics

Enduring Understandings:

The student will understand that:

- Tools and strategies are strategically selected and used to solve particular applications.
- Reflection on the process and reasonableness of the solution moves students from the symbolic to the practical.
- Connections exist within mathematical concepts and can broaden understanding of the world.
- Mathematical ideas interconnect and build on one another to produce a coherent whole.
- Mathematical conjectures are developed and investigated through observing patterns.
- Sound reasoning requires the ability to distinguish between valid and invalid arguments and to critique the reasoning of others.
- Mathematical ideas must be communicated clearly in written, visual, or oral form.
- Communication of mathematical thinking should demonstrate clear and concise organization.
- Symbols, graphs, pictures, and tables can be used to represent real situations.
- Flexibility in one’s ability to read and interpret various forms is important in understanding problems and solutions.

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Essential Questions:

- How do you read, write and compare (represent) whole numbers, decimals and fractions?
- How do you multiply or divide multiple digit numbers?
- How can the strategy "draw a diagram" help you solve fraction division problems?
- Why do we use numbers, what are their properties, and how does our number system function?
- What makes a strategy effective and efficient and the solution reasonable?
- Why do we use numbers, what are their properties, and how does our number system function?

Content/Objectives		Instructional Actions	
Content ***What students will know***	**Skills** ***What students will be able to do***	**Activities/Strategies** ***How we teach content and skills***	**Evidence (Assessments)** ***How we know students have learned***
-The decimal place-value system -Adding, subtracting, multiplying and dividing whole numbers -Rounding, estimation and order of whole numbers -Exponential Notation and the order of operations -Prime numbers and divisibility -Factoring whole numbers -Fraction basics	-Classify and graph real numbers on a number line. -Use exponential notation -Evaluate expressions containing powers of whole numbers -Evaluate expressions that contain several operations -Find the factors of a number -Determine whether a number is prime, composite, or neither -Find the prime factorization of any number -Find the Greatest Common Factor (GCF) of two numbers -Find the GCF for a group of numbers	Math practice individually, whole group, and small group. Peer group leadership Student presentations of concepts and demonstration of skills Students given access to online practice IXL Partners or group work (groups formed heterogeneously according to ability) Students given access to Khan Academy	**Formative** Teacher observation and questioning Seat and or group work Fist to five/ Thumbs up, thumbs down Homework Student participation at board **Summative** Edpuzzle pro quizzes

-Simplifying fractions -Multiplying fractions -Dividing fractions -Adding and subtracting fractions with like denominators -Adding and subtracting fractions with unlike denominators -Adding and subtracting mixed numbers -Order of operations with fractions -Estimation applications -Place value and rounding of decimals -Conversion of decimals to fractions and fractions to decimals -Adding and subtracting decimals -Multiplying and dividing decimals	-Identify the numerator and denominator of a fraction -Identify proper and improper fractions -Write improper fractions as mixed numbers and mixed numbers as improper fractions -Use the fundamental principle to simplify fractions -Determine if two fractions are equivalent -Find the reciprocal of a fraction -Multiply and divide two fractions -Multiply and divide mixed numbers and fractions -Estimate products by rounding -Solve applications involving multiplication and division of fractions -Add and subtract two like fractions -Add and subtract a group of like fractions -Find the Least Common Multiple (LCM) of a group of numbers -Add or subtract two fractions -Add or subtract any group of fractions -Add or subtract and two mixed numbers	Students given access to Google Classroom Students given access to Screencastify Students given access to EdPuzzle Pro	Notebook Quiz Homework Checks Regular Quizzes and tests Unit 1 Benchmark Assessment

	-Add or subtract any group of mixed numbers -Solve and application that involves addition or subtraction of mixed numbers -Evaluate and expression with grouping symbols -Solve an application that involves evaluating an expression -Use estimation to solve application problems -Identify place value in a decimal form -Write a decimal in words -Write a decimal as a fraction or mixed number -Round decimals to a specified decimal place -Convert a decimal to a fraction and a fraction to a decimal -Convert a common fraction to a repeating decimal and a repeating decimal to a common fraction -Add or subtract two or more decimals -Use addition or subtraction to solve application problems -Multiply or divide two or more decimals		

	-Use multiplication or division to solve application problems -Multiply or divide by powers of 10 -Use multiplication or division by power of 10 to solve application problems		

Spiraling for Mastery		
Content or Skill for this Unit	**Spiral Focus from Previous Unit**	**Instructional Activity**
Adding, Subtracting, Multiplying and Dividing Real Numbers Adding, Subtracting, Multiplying and Dividing Fractions Adding, Subtracting, Multiplying and Dividing mixed numbers Adding, Subtracting, Multiplying and DIviding decimals	8.EE.A.1,2 & 3 Expressions and Equations A. Work with radicals and integer exponents. 1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, 32 × 3–5 = 3–3 = 1/33 = 1/27. 2. Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is irrational. 3. Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very	Students given handouts of powerpoint notes Students provided with google slide presentations Students given access to online help from multiple locations Partners or group work (groups formed heterogeneously according to ability) IXL https://www.ixl.com/inspiration/get-started Open Source activities below from Illustrative Math Tenths and Hundredths FInd the Change

	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 × 108 and the population of the world as 7 × 109 , and determine that the world population is more than 20 times larger. 6.EE.A.1 & 3 Expressions and Equations A. Apply and extend previous understandings of arithmetic to algebraic expressions. 1. Write and evaluate numerical expressions involving whole-number exponents. 3. Apply the properties of operations to generate equivalent expressions. For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y	Dividing by a Fraction is the Same as Multiplying by its Reciprocal Dividing by a Fraction is the Same as Multiplying by its Reciprocal Batting Average Buying Gas Movie Tickets Setting Goals What is the best way to divide Pennies to Heaven Video Game Credits
21st Century Skills:		

CRP2. Apply appropriate academic and technical skills.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11. Use technology to enhance productivity.

Career and Technical Education

9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth

Key resources:

Camden County College Non-credit math course syllabus
IXL
Khan Academy
Illustrative Math
Savvas Envision AGA series

Interdisciplinary Connections

NJSLS ELA

NJSLSA.R7. Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.

NJSLA Science

HS-PS4-1. Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.
HS-PS3-1. Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.