Unit 1: The Number System

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 1**
Length: **6-7 weeks**
Status: **Published**

Brief Summary of Unit

Introduction: In seventh-grade math, students delve into the fascinating realm of number systems, exploring various numerical representations and operations according to the New Jersey State Learning Standards. Within this unit, students engage in a range of activities, from conducting operations with rational numbers to converting them into alternative numerical forms. Emphasis is placed on solving real-world problems, fostering a holistic understanding of how rational numbers operate within everyday scenarios. Throughout these lessons, students cultivate proficiency in addition, subtraction, multiplication, and division of rational numbers, harnessing these skills to tackle diverse problem-solving challenges effectively.

Revision Date: 5/30/24

Standards

1	Make sense of problems and persevere in solving them
2	Reason abstractly and quantitatively
3	Construct viable arguments and critique the reasoning of others
4	Model with mathematics
5	Use appropriate tools strategically
6	Attend to precision
L.VL.7.3	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, including technical meanings, choosing flexibly from a range of strategies.
7	Look for and make use of structure
8	Look for and express regularity in repeated reasoning
7.NS.A.1.a	Describe situations in which opposite quantities combine to make 0.
L.VI.7.4	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
7.NS.A.1.b	Understand $p + q$ as the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
7.NS.A.1.c	Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.

7.NS.A.1.d	Apply properties of operations as strategies to add and subtract rational numbers.
7.NS.A.2.a	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as (−1)(−1) = 1 and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
7.NS.A.2.b	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If □ and □ are integers, then −(□/□) = (−□)/□ = □/(−□). Interpret quotients of rational numbers by describing real-world contexts.
7.NS.A.2.c	Apply properties of operations as strategies to multiply and divide rational numbers.
7.NS.A.2.d	Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.
7.NS.A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.
MS-LS4-6	Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Essential Questions

- How can rational numbers be represented and manipulated in different numerical forms, and what significance do these representations hold within real-world contexts?
- How does algebra provide the language through which we communicate the patterns in mathematics?
- How does numeric reasoning involve fluency and facility with numbers?
- In what ways can the understanding and application of rational numbers aid in problem-solving situations, and how can these skills be applied across various disciplines and everyday scenarios?
- What real-world situations could be represented using integers?
- What strategies can be employed to perform operations such as addition, subtraction, multiplication, and division with rational numbers, and how do these operations relate to one another?
- When performing the four basic operations with rational numbers, why are only two sets of rules really needed for computation?
- Why can’t the absolute value of a number be negative?

Enduring Understandings

- A rational number is any number that can be written in the form of a/b.
- Absolute value is the distance that the number is from zero on a number line.
- Commutative and Associative Properties can be used to add and subtract rational numbers
- Commutative, Associative and Distributive Properties can be used to multiply rational numbers.
- Integers are all whole numbers, including zero and their opposites.
- Multiplying and dividing rational numbers can both be evaluated by counting the number of negative signs in the expression ie. (-1)(-1) = 1
- Opposites are the same distance from zero, but on opposite sides.
- Subtracting rational numbers is the same as adding the opposite.
- The absolute value of a number is not the same as a number’s opposite.

- When adding rational numbers, if the signs are the same, find the sum, sign stays the same. If the signs are different, find the difference of the absolute values, sign is the same as the number with the greater absolute value.
- Zero is neither positive nor negative.

Students Will Know

- How to add, subtract, multiply and divide rational numbers using models and rules.
- How to apply addition and subtraction with rational numbers to model real-life problems.
- How to divide to compute terminating or repeating decimals.
- How to explain the rules for multiplying and dividing integers.
- How to find the approximate location of rational numbers on a number line.
- How to order and compare rational numbers on a number line from least to greatest.
- How to use a number line to find the absolute value of a number.
- That division by zero is not defined.
- The rules for adding and subtracting integers using absolute value.
- The symbol for absolute value

Students Will Be Skilled At

- Using a number line to find the absolute value of a number.
- Applying models and rules to the four operations using rational numbers
- Compairing and ordering rational numbers on a number line.
- Dividing to compute terminating and repeating decimals.
- Finding the approximate location of a rational number on a number line.

Evidence/Performance Tasks

Assessments

- Formative: Daily assessments using examples from class notes, iReady MyPath, Big Ideas Math online platform problems, and NJSLA test bank problems
- Summative: Teacher-created assessments, NJSLA test bank problems, Big Ideas Math online platform problems, Big Ideas Math unit assessments
- Benchmark: iReady diagnostic assessments and district placement assessments in addition to unit assessments from Big Ideas Math
- Alternative Assessments: Student-centered activities such as scavenger hunts, various projects involving real world applications, and adaptive learning tasks in iReady, Khan Academy, and Big Ideas Math

- Answer essential questions
- Class discussion of daily topic
- Classwork and homework that assess the essential questions
- Compare and order rational numbers using inequalities and number lines.
- Complete Unit 1 NJ Model Curriculum Assessment
- Evaluate and model addition and subtraction of integers.
- Evaluate and model multiplication and division of integers.
- Provide alternative means of assessments for certain students
- Teacher Observation
- Tests and quizzes that assess the essential questions
- Use and evaluate rational number operations in real world problems.
- Written assignments that assess the essential questions that involves providing explanations

Learning Plan

Week 1: Integer Operations

Day 1-2: Adding Integers

- Introduction to Integers: Define integers and discuss their placement on the number line.
- Adding Positive Integers: Practice adding positive integers using visual representations (yellow/red counter chips) and number lines.
- Adding Negative Integers: Introduce the concept of adding negative integers and explore strategies for combining positive and negative numbers.
- Real-World Applications: Apply addition of integers to real-life scenarios, such as temperature changes or financial transactions.

Day 3-4: Subtracting Integers

- Introduction to Subtracting Integers: Define subtraction and discuss its relationship to addition.
- Subtracting Positive Integers: Practice subtracting positive integers using various methods, including number lines and counters.
- Subtracting Negative Integers: Explore subtracting negative integers and reinforce the concept through examples and exercises.
- Problem-Solving: Apply subtraction of integers to solve word problems and analyze situations involving differences or changes.

Week 2: Integer Operations

Day 5-6: Multiplying & Dividing Integers

- Introduction to Multiplying Integers: Define multiplication and discuss the rules for multiplying positive and negative integers.
- Multiplying Positive and Negative Integers: Practice multiplying integers using visual models and numerical examples.
- Patterns and Rules: Identify patterns and rules for multiplying integers, such as the product of two negatives yielding a positive result.
- Real-World Scenarios: Apply multiplication of integers to real-world situations, such as calculating gains or losses in business transactions.

Day 7-8: Dividing Integers

- Introduction to Dividing Integers: Define division and discuss its relationship to multiplication.
- Dividing Integers by Positive Numbers: Practice dividing integers by positive numbers and explore strategies for interpreting the results.
- Dividing Integers by Negative Numbers: Introduce dividing integers by negative numbers and discuss the rules and implications.
- Problem-Solving: Apply division of integers to solve word problems and analyze situations involving sharing or distribution.

Day 9: All Operations with Integers

- Practice: Adding, subtracting, multiplying, and dividing integers and applying the operations to real-world scenarios.
- Multiple Operations: Solve problems involving multiple operations (PEMDAS).
- **Absolute Value (part of standards, but NOT on NJSLA)- preview it or save it for June)

Week 3: Rational Numbers

Day 10-11: Understanding Rational Numbers

- Introduction to Rational Numbers: Define rational numbers, fractions, and decimals.
- Number Line Exploration: Place rational numbers on a number line.
- Classification Activity: Sort numbers into rational and irrational categories.
- Practice: Solve problems involving identification and classification of rational numbers.
- Practice: Solve problems involving ordering rational numbers from least to greatest.

*Advanced Math 7 covers identifying & classifying irrational numbers in more detail.

Day 12-13: Converting Between Fractions and Decimals

- Conversion Techniques: Introduce methods for converting between fractions and decimals.
- Guided Practice: Step-by-step practice with conversions.
- Problem-Solving: Solve real-world scenarios requiring conversion.
- Exit Ticket: Assess conversion skills.

Day 14-16: Adding Rational Numbers

- Addition Rules Review: Review rules for adding fractions and decimals.
- Visual Aids: Use models (e.g., fraction bars) to illustrate addition.
- Guided Practice: Step-by-step practice problems.
- Partner Work: Solve real-life scenarios and word problems involving addition of rational numbers.

Week 4: Rational Numbers

Day 17-19: Subtracting Rational Numbers

- Subtraction Rules Review: Review rules for subtracting fractions and decimals.
- Visual Aids: Use number lines and models for subtraction.
- Guided Practice: Diverse problems with varying complexity.
- Partner Work: Solve application problems involving subtraction of rational numbers.
- Cumulative Quiz: Assess understanding of adding and subtracting rational numbers.

Week 5: Rational Numbers

Day 20-22: Multiplying Rational Numbers

- Multiplication Rules Review: Review multiplication rules for fractions and decimals.
- Guided Practice: Practice a variety of problems.
- Group/Partner Activities: Apply multiplication to real-life scenarios and word problems.

Day 23-25: Dividing Rational Numbers

- Division Rules Review: Review rules for dividing fractions and decimals.
- Visual Aids: Step-by-step demonstrations of division.
- Guided Practice: Diverse problems with varying complexity.

- Partner Work: Solve application problems involving division of rational numbers.
- Unit Assessment: Test covering all operations with rational numbers.

*Advanced Math 7 may cover square and cubed roots along with operations involving roots. (if time permits)

Materials

Core instructional materials: Core Book List including Big Ideas Math textbook and online platform for all levels of grade 6, 7, 8, and Algebra 1

Supplemental materials: Khan Academy, Edia, Delta Math, & iReady.

- Calculators/Math Tools
- District approved textbook
- Manipulatives
- Teacher created activiites
- Teacher created notes
- Websites, such as Khan Academy

Suggested Strategies for Modifications

Possible accommodations/modifications for Grade 7