Integers and Rational Numbers

Content Area: **Math**
Course(s):
Time Period: **MP1**
Length: **45**
Status: **Published**

Unit Overview

Unit Summary	Unit Rationale
Students will reinforce their understanding of integers and their opposites. They will use this understanding to further extend their knowledge of integer operations by utilizing number lines and algorithms. Students will also write rational numbers as fractions and decimals within this unit. Students will learn about terminating and repeating decimals as well as be able to recognize a decimal as its specific type.	Unit 1 builds students procedural skill and fluency related to integers and rational numbers. In this unit students also develop conceptual understanding related to these topics. These are key foundational skills that have real world application. It will be important for students to work fluently with positive and negative real numbers through out their academic careers and in their non-academic lives.

NJSLS

7.NS.A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
7.NS.A.1.a	Describe situations in which opposite quantities combine to make 0.
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	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide 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 p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. 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.

Standards for Mathematical Practice

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
7	Look for and make use of structure
8	Look for and express regularity in repeated reasoning

Unit Focus

Enduring Understandings	Essential Questions
• An integer and its opposite are the same distance from 0 on a number line and have a sum of 0. • Rational numbers expressed as fractions can be written in decimal form. • Adding integers requires adding or subtracting their absolute values and understanding the sign of the sum. • Subtracting a number is the same as adding the numbers additive inverse. • Adding and subtracting integers is related to adding and subtracting other rational numbers. • The sign of a product is determined by the sign of the factors in a multiplication expression. • The same properties used to multiply integers also apply when multiplying rational numbers • The relationship between multiplication and division can be useful when dividing positive and negative integers. • Dividing rational numbers is similar to dividing integers. The sign of the quotient depends on the signs of the dividend and divisor. • Problems involving rational numbers can be solved by making sense of the quantities and	• How are integers and their opposites related? • How are rational numbers written as decimals? • How do you use what you know about absolute value to add integers? • How is subtracting integers related to adding integers? • How are adding and subtracting integers related to adding and subtracting other rational numbers? • How do the signs of factors affect their product? • How is multiplying rational numbers like multiplying integers? • How does dividing integers relate to multiplying integers? • How is dividing rational numbers like dividing integers? • How do you decide which rational number operations to use to solve problems? • How do operations with integers relate to the same operations with rational numbers? • How can you determine the correct operation to use to solve problems?

their relationships to each other. • Many real-world problems can be represented with a mathematical model, but that model may not represent a real-world situation exactly.	

Instructional Focus

Learning Targets

Learners will...

- Understand how integers and their opposites are related
- Identify rational numbers and write them in decimal form
- Add positive and negative integers
- Model integer addition in real-life applications
- Understand subtraction of integers as adding the additive inverse, 
- Use properties of operations to add and subtract rational numbers
- Multiply positive and negative integers
- Apply integer multiplication to real-life applications
- Find the product of rational numbers
- Understand how to divide integers by applying the rules of multiplying integers
- Determine equivalencies among integer quotients
- Understand how the signs of integers in a multiplication sentence relate to the sign in a related division statement
- Decide which operations to use to solve problems
- Use precision when solving problems with rational numbers
- Use mathematical modeling to represent a problem situation and to propose a solution
- Test and verify the appropriateness of their math models

Prerequisite Skills

- Use positive and negative numbers to represent quantities in real-world context and explain the meaning of zero in context
- Locate numbers with opposite signs as points on opposite sides of zero on the number line
- Absolute value of a rational number is its distance from zero on the number line
- Add and subtract fractions with unlike denominators, including mixed numbers, by replacing given fractions with equivalent fractions
- Operations with whole numbers. Operations with decimals and fractions
- Ability to place rational numbers on a number line
- The relationship between addition/subtraction and multiplication/division
- Simplify expressions without negative numbers or roots

Common Misconceptions
• Knowing only a limited number of models for interpreting fractions; for example, not recognizing fractions as locations on a number line or as division calculations • Understanding the symbol "-" as subtraction and as a negative • Believe that all rational numbers are positive • Trouble using models to illustrate operations or to connect operations on objects to algorithms • Using rules for integers incorrectly. Working with negative fractions and decimals

Spiraling For Mastery

Current Unit Content/Skills	Spiral Focus	Activity
• Integers • Rational Numbers	• Number Opposites (Grade 6) • Rational Number Operations (Grade 6)	• Math Diagnostic and Intervention System Activities

Assessment

Formative Assessment	Summative Assessment
• Homework • Lesson Checks • MathXL • Quizzes • Exit Tickets • Lesson Reflections • Performance Tasks	• Topic Tests (Common Assessments) • Unit 1 Benchmark (Link-It)

Resources

Key Resources	Supplemental Resources
• Savvas EnVision Math 7 • Pacing Guide	• IXL • Delta Math • Desmos

	• Khan Academy • Maneuvering the Middle

Career Readiness, Life Literacies, and Key Skills

9.4.8.CT	Critical Thinking and Problem-solving
9.4.8.GCA.2	Demonstrate openness to diverse ideas and perspectives through active discussions to achieve a group goal.
9.4.8.IML.4	Ask insightful questions to organize different types of data and create meaningful visualizations.
9.4.8.TL.6	Collaborate to develop and publish work that provides perspectives on a real-world problem.

Interdisciplinary Connections

L.KL.7.2.A	Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases.
SL.PE.7.1.A	Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
SL.PE.7.1.C	Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
SL.PE.7.1.D	Acknowledge new information expressed by others and, when warranted, modify their own views.
MS-ETS1-3	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
6-8.MS-ETS1-3.ETS1.B.1	There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem.
6-8.MS-ETS1-3.ETS1.B.2	Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors.