




Rational Numbers

This module uses the Integer Game: a card game that creates a conceptual understanding of integer operations and serves as a powerful mental model students can rely on during the module. Students build on their understanding of rational numbers to add, subtract, multiply, and divide signed numbers. Previous work in computing the sums, differences, products, and quotients of fractions and decimals serves as a significant foundation as well.

Additional Resources

Online Integer Games: <http://www.hoodamath.com/games/integer.html>

Integer Tilt is very similar to the Integer Game for the Module

 <https://www.khanacademy.org/>

 <http://military.tutor.com/home>

Math Terminology

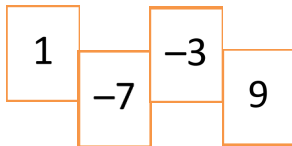
- Absolute Value
- Additive Identity
- Associative Property
- Commutative Property
- Distributive Property
- Equation
- Expression
- Integer
- Inverse
- Multiplicative Identity
- Multiplicative Inverse
- Negatives
- Opposites
- Positives
- Rational Numbers

Big Ideas

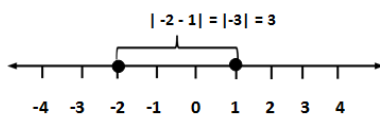
- Addition and Subtraction of Integers and Rational Numbers
- Multiplication and Division of Integers and Rational Numbers
- Applying Operations with Rational Numbers to Expressions and Equations

Tools & Representations

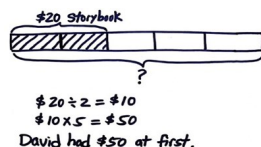
Integer Game



Number lines



Tape Diagrams



Sample problems are on the back

College and Career Ready Standards

Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

- **7.NS.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.2** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
- **7.NS.3** Solve real-world and mathematical problems involving the four operations with rational numbers.

Use properties of operations to generate equivalent expressions.

- **7.EE.2** Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

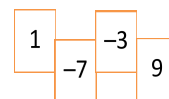
Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

- **7.EE.4** Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

■ Major Standards | □ Supporting Standards | ● Additional Standards

Integer Game

The Integer Game is designed for 2 to 4 players. Each player begins the game with a score of zero. The object of the game is to return to a score of zero by picking up and discarding integer cards. Below are the basic rules:

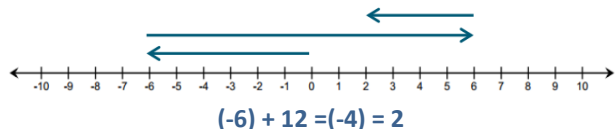


1. Each player is dealt four cards.
2. The dealer turns one more card face up on the playing surface, starting a discard pile. The remaining cards become a draw pile.
3. The player to the dealer's left begins play. On his turn, a player may select the top card from either the draw pile or the discard pile. The player must keep this card and discard another card from his hand to the discard pile.
4. A player's goal is to have his hand's total card value stay as close to zero as possible. So for each turn, a player must determine how the card drawn affects his hand's total card value, by counting up or down accordingly. Also, a player must decide which card to discard so as to keep the total value of his hand as close to zero as possible.
5. Play continues with the next player, in the same manner, until all players have picked up and discarded a card four times.
6. The player(s) with a score of zero (or the closest to zero, wins the round.

You can use regular playing cards to play the game. Black cards are positive number and red cards are negative.

Sample Problem with a Number Line

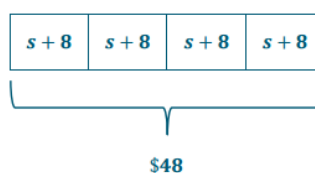
David and Victoria are playing the Integer Card Game. David drew three cards, -6 , 12 , and -4 . What is the sum of the cards in his hand? Model your answer on the number line below.



Sample Problem with a Tape Diagram

For his birthday, Zack and three of his friends went to a movie. They each got a ticket for \$8 and the same snack from the concession stand. If Zack's mom paid \$48 for the group's tickets and snacks, how much did each snack cost?

The equation $4(s + 8) = 48$ represents the situation when s repre-



Since we have 4 boxes that equals \$48, each box will equal \$12.

If $s + 8 = 12$, then $s = 4$.

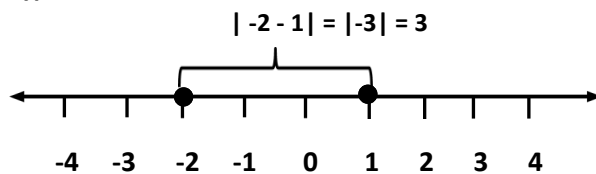
Each snack costs \$4

New Math Terminology and Examples

- **Additive Identity** The additive identity is the number 0. $a + 0 = a$
- **Additive Inverse** An additive inverse of a number is a number such that the sum of the two numbers is 0.

$$a + -a = 0$$

- **Formula for the Distance Between Two Numbers** If p and q are numbers on a number line, then the distance between p and q is $|p - q|$.



- **Multiplicative Identity** The multiplicative identity is the number 1. $a \times 1 = a$

