

## Integer Game

### Description

The Integer Game is a card game used throughout Grade 7 Module 2 to help students develop a conceptual understanding of integer operations. Game-play and rules can be adapted to meet the needs of a specific lesson objective or topic standard. This description of how to play the game sets the basis for use in the lessons.

### How to Play

The Integer Game is designed for 2 to 4 players. Students play the game with a learning partner or with a cooperative learning group of students. 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. The number of cards dealt to each player can be adjusted based on students' familiarity with an operation and to differentiate for varying student ability levels. Below are the basic rules:

1. A student serves as the dealer (as well as a player) and provides each player with 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 or her 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 their hand to the discard pile.
4. A player's goal is to have their 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 their 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 their hand as close to zero as possible. (See *Scaffolding Ideas* on page 16.)
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, as in Lesson 2) wins the round.

### How the Integer Game is used in the Lessons

**Lesson 1:** Students try to reach a score of zero by obtaining the same number of positive points as negative points. This can be done by obtaining cards that are *additive inverses* or by obtaining combinations of cards that total opposite values. Students' prior work with recognizing and identifying numbers' opposites in Grade 6 serves as the basis for the extension to the addition of integers in this lesson.

**Lesson 2:** Students in this lesson start totaling their cards' values by using the number line and vectors as modeling tools to combine the values of positive and negative numbers. Players may win a round in this lesson if they obtain a score of zero or if they are the player whose score is closest to zero. The game-play and number line modeling fosters a conceptual understanding of absolute value as both distance (on the number line) and magnitude with regards to the amount by which a player's total point value is over or under zero.

**Lesson 3:** The Integer Game is used as a point of reference in Lesson 3 as the addition of integers becomes formalized.

**Lesson 4:** The Integer Game is again used as a point of reference in Lesson 4. Its simulation is used by students to justify the rules for adding integers.

**Lesson 5:** Students examine how picking up (adding) integer cards and laying down (subtracting) integer cards affects their score. They know that from earlier game-play that adding a positive value increases their score while adding a negative value decreases their score. Students also recognize that laying a card down is the opposite of picking a card up, so laying a card down represents subtraction. They understand that when a positive value is taken out of their hand their score decreases, but when a negative value is taken out of their hand their score increases. This serves as the basis for students' conceptual understanding of subtraction as "adding the opposite."

**Lesson 10:** Students consider scenarios involving multiple sets of cards. They understand that picking up multiple cards of the same value is repeated addition of that value, and when the value is negative, it is the same as repeated subtraction of that value. They realize that laying down multiple negative cards (the opposite move) represents multiplying a negative integer by a negative integer. Examining these scenarios supports the development of the rules for multiplying integers (and eventually all signed numbers) in Lesson 11.

**Lesson 11:** The Integer Game is used as a point of reference in Lesson 11 as students use various scenarios as described in Lesson 10 to justify the rules for multiplying signed numbers.

**Lesson 12:** The Integer Game is revisited to model properties of equality (using "if-then" statements). Students will use sets of cards with the same total score but different card values to explore what happens to the scores when equal values are added, subtracted, multiplied, or even divided from each of the hands.

## The Integer Cards

1	2	3	4
5	6	7	8
9	10	11	12

$-1$	$-2$	$-3$	$-4$
$-5$	$-6$	$-7$	$-8$
$-9$	$-10$	$-11$	$-12$

