

TOPIC 5

Adding and Subtracting Rational Numbers

Lesson 5.1

Math Football
Using Models to Understand Integer Addition

Lesson 5.2a/b

Walk the line
Adding Integers, Part I

Lesson 5.3a/b

Two-Color Counters
Adding Integers, Part II

Lesson 5.4a/b

What's the Difference?
Subtracting Integers

Lesson 5.5

All Mixed Up
Adding and Subtracting Rational Numbers

Objective Using Models to Understand Integer Addition

Warm-Up



Sketch a number line and plot each value.

1. -3

2. 0

3. 1

4. $\frac{1}{2}$

5. 3



GETTING STARTED

Hut! Hut! Hike!

You and a partner are going to play **Math Football**. You will take turns rolling two number cubes to determine how many yards you can advance the football toward your end zone.

Player 1 will be the Home Team and Player 2 will be the Visiting Team.

In the first half, the Home Team will move toward the Home end zone, and the Visiting Team will move toward the Visiting end zone.

Rules

Players both start at the zero yard line and take turns. On your turn, roll two number cubes, one red and one black. The number on each cube represents a number of yards. Move your football to the left the number of yards shown on the red cube. Move your football to the right the number of yards shown on the black cube. Start each of your next turns from the ending position of your previous turn.

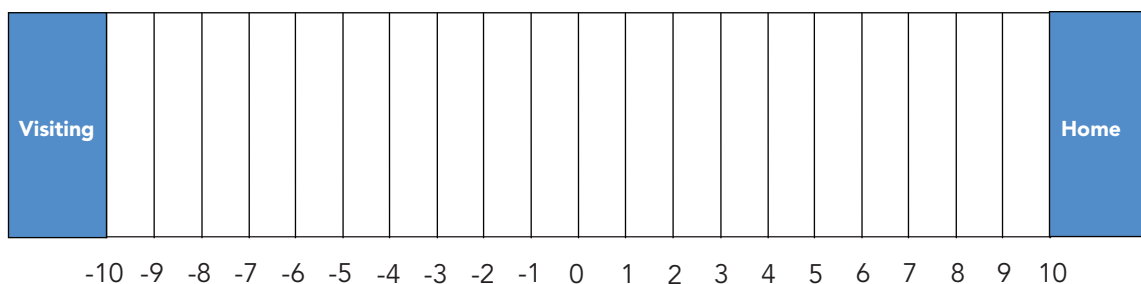
Scoring

When players reach their end zone, they score 6 points. If players reach their opponent's end zone, they lose 2 points. An end zone begins on either the +10 or -10 yard line. **Each player gets 5 rolls.**

Example:

	Player	Starting Position	Results of the Number Cubes Roll	End Position
First Turn	Home Team	0	Red 3 and Black 5	+2
	Visiting Team	0	Red 5 and Black 6	+1
Second Turn	Home Team	+2	Red 1 and Black 6	+7
	Visiting Team	+1	Red 6 and Black 2	-3

1. Read through the table. After two turns, which player is closest to their end zone?





Let's play Math Football. Begin by selecting the home or visiting team. Your teacher will set the length of time for each half. You will play two halves. Make sure to switch ends at half-time with the Home Team moving toward the Visiting end zone, and the Visiting Team moving toward the Home end zone. Good luck!

1. Once your game is finished, answer each question.

a. When you are trying to get to the Home end zone, which number cube do you want to show the greater value? Explain your reasoning.

b. When you are trying to get to the Visiting end zone, which number cube do you want to show the greater value? Explain your reasoning.

c. Did you ever find yourself back at the same position you ended on your previous turn? Describe the values on the cubes that would cause this to happen.

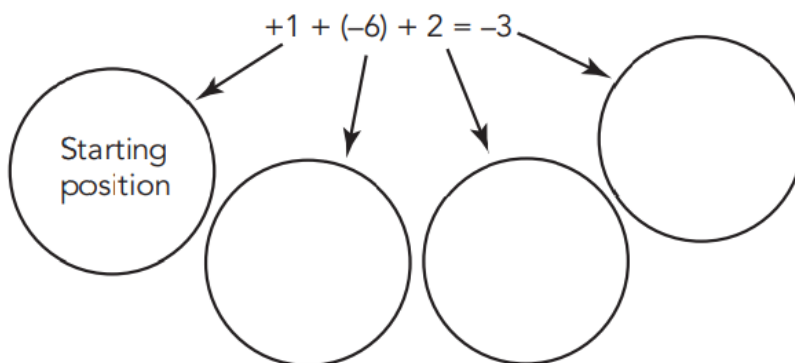
d. Describe the roll that causes you to move your football the greatest distance either left or right.



You can write equations to describe the results of number cube rolls. Think of the result of rolling the red number cube as a negative number and the result of rolling the black number cube as a positive number.

	Player	Starting Position	Results of the Number Cube Roll	End Position	Number Sentence
First Turn	Home Team	0	Red 3 and Black 5	+2	$0 + (-3) + 5 = +2$
	Visiting Team	0	Red 5 and Black 6	+1	$0 + (-5) + 6 = +1$
Second Turn	Home Team	+2	Red 1 and Black 6	+7	$+2 + (-1) + 6 = +7$
	Visiting Team	+1	Red 6 and Black 2	-3	$+1 + (-6) + 2 = -3$

1. Describe each part of the number sentence for the second turn of the Visiting Team player.



Play Math Football again. But this time, work with your partner to get to the Home end zone together in the first half and the Visiting end zone in the second half. Write equations to record your moves.

2. Think about the number cube rolls you made in the game.

a. What kind of rolls move you closer to the Home end zone?

b. What kind of rolls move you closer to the Visiting end zone?

3. Write an equation for each situation. Use the game board for help.

a. The Home Team player starts at the zero yard line and rolls a red 6 and a black 2. What is the ending position?

Equation: _____

b. The Visiting Team player starts at the zero yard line and rolls a red 5 and a black 4. What is the ending position?

Equation: _____

c. The Home Team player starts at the 5 yard line and rolls a red 2 and a black 2. What is the ending position?

Equation: _____

d. The Visiting Team player starts at the -5 yard line and rolls a red 4 and a black 6. What is the ending position?

Equation: _____

e. Suppose the Home Team player is at the $+8$ yard line. Complete the table and write two equations that will put the player into the Home end zone.

Starting Position	Roll of the Red Number Cube	Roll of the Black Number Cube	Equation
+8			
+8			

f. Suppose the Visiting Team player is at the -8 yard line. Complete the table and write two equations that will put the player into the Visiting end zone.

Starting Position	Roll of the Red Number Cube	Roll of the Black Number Cube	Equation
-8			
-8			

Show You KNOW

Mission: Possible, and Impossible

Consider the moves you made in the Math Football game.

1. In which direction would you move if you roll:
 - a. a larger number on the black cube than on the red cube?
 - b. a larger number on the red cube than on the black cube?
 - c. two black cubes?
 - d. a black cube and a red cube?
 - e. two red cubes?
2. Is it possible to decrease in value if rolling two black cubes?
Explain your reasoning.
3. Is it possible to increase in value if rolling two red cubes?
Explain your reasoning.



LESSON 5.1
Math Football



Objective

Using Models to Understand Integer Addition

Practice

1. Determine the ending position by adding and subtracting the indicated steps from each starting position.

Starting Position	Steps Backward	Steps Forward	Ending Position
+3	4	5	
+7	6	2	
+5	2	4	
0	5	8	
-4	3	7	
+1	7	9	
-6	1	5	
-2	5	6	
8	3	1	
-9	2	4	

2. Write an equation to represent the movement indicated by the starting point, steps backward, and steps forward.

Starting Position	Steps Backward	Steps Forward	Equation
+2	4	7	
-7	3	5	
+6	9	4	
+4	6	1	
-5	2	9	
0	5	3	
-3	1	4	
-8	2	6	
0	8	2	
+9	7	8	

