

**Chapter  
12****Fair Game Review**

Write the decimal as a fraction.

1. 0.26

2. 0.79

3. 0.571

4. 0.846

Write the fraction as a decimal.

5.  $\frac{3}{8}$

6.  $\frac{4}{10}$

7.  $\frac{11}{16}$

8.  $\frac{17}{20}$

9. A quarterback completed 0.6 of his passes during a game. Write the decimal as a fraction.

**Chapter  
12****Fair Game Review** (continued)

Evaluate the expression.

10.  $\frac{1}{8} + \frac{1}{9}$

11.  $\frac{2}{3} + \frac{9}{10}$

12.  $\frac{7}{12} - \frac{1}{4}$

13.  $\frac{6}{7} - \frac{4}{5}$

14.  $\frac{5}{9} \cdot \frac{1}{3}$

15.  $\frac{8}{15} \cdot \frac{3}{4}$

16.  $\frac{7}{8} \div \frac{11}{16}$

17.  $\frac{3}{10} \div \frac{2}{5}$

18. You have 8 cups of flour. A recipe calls for  $\frac{2}{3}$  cup of flour. Another recipe calls for  $\frac{1}{4}$  cup of flour. How much flour do you have left after making the recipes?

**12.1****Rational Numbers**

For use with Activity 12.1

**Essential Question** How can you use a number line to order rational numbers?

A **rational number** is a number that can be written as a ratio of two integers.

$$2 = \frac{2}{1}$$

$$-3 = \frac{-3}{1}$$

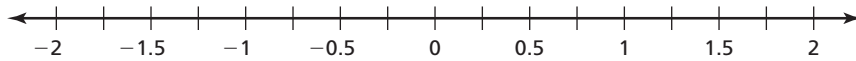
$$-\frac{1}{2} = \frac{-1}{2}$$

$$0.25 = \frac{1}{4}$$

**1 ACTIVITY: Ordering Rational Numbers**

**Work in groups of five. Order the numbers from least to greatest.**

- Use masking tape and a marker to make a number line on the floor similar to the one shown.



- Write the numbers on pieces of paper. Then each person should choose one piece of paper.
- Stand on the location of your number on the number line.
- Use your positions to order the numbers from least to greatest.

The numbers from least to greatest are

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.

a.  $-0.5, 1.25, -\frac{1}{3}, 0.5, -\frac{5}{3}$

b.  $-\frac{7}{4}, 1.1, \frac{1}{2}, -\frac{1}{10}, -1.3$

c.  $-1.4, -\frac{3}{5}, \frac{9}{2}, \frac{1}{4}, 0.9$

d.  $\frac{5}{4}, 0.75, -\frac{5}{4}, -0.8, -1.1$

**12.1 Rational Numbers (continued)****2 ACTIVITY: The Game of Math Card War****Preparation:**

- Cut index cards to make 40 playing cards.\*
- Write each number in the table on a card.

$\frac{3}{2}$	$\frac{3}{10}$	$-\frac{3}{4}$	-0.6	1.25	-0.15	$\frac{5}{4}$	$\frac{3}{5}$	-1.6	-0.3
$\frac{3}{20}$	$\frac{8}{5}$	-1.2	$\frac{19}{10}$	0.75	-1.5	$-\frac{6}{5}$	$-\frac{3}{5}$	1.2	0.3
1.5	1.9	-0.75	-0.4	$\frac{3}{4}$	$-\frac{5}{4}$	-1.9	$\frac{2}{5}$	$-\frac{3}{20}$	$\frac{19}{10}$
$\frac{6}{5}$	$-\frac{3}{10}$	1.6	$-\frac{2}{5}$	0.6	0.15	$\frac{3}{2}$	-1.25	0.4	$-\frac{8}{5}$

**To Play:**

- Play with a partner.
- Deal 20 cards to each player facedown.
- Each player turns one card faceup. The player with the greater number wins. The winner collects both cards and places them at the bottom of his or her cards.
- Suppose there is a tie. Each player lays three cards facedown, then a new card faceup. The player with the greater of these new cards wins. The winner collects all ten cards and places them at the bottom of his or her cards.
- Continue playing until one player has all the cards. This player wins the game.

\*Cut-outs are available in the back of the Record and Practice Journal.

**12.1** Rational Numbers (continued)**What Is Your Answer?**

3. **IN YOUR OWN WORDS** How can you use a number line to order rational numbers? Give an example.

The numbers are in order from least to greatest. Fill in the blank spaces with rational numbers.

4.  $-\frac{1}{2}$ , ,  $\frac{1}{3}$ , ,  $\frac{7}{5}$ ,

5.  $-\frac{5}{2}$ , ,  $-1.9$ , ,  $-\frac{2}{3}$ ,

6.  $-\frac{1}{3}$ , ,  $-0.1$ , ,  $\frac{4}{5}$ ,

7.  $-3.4$ , ,  $-1.5$ , ,  $2.2$ ,

**12.1****Practice**

For use after Lesson 12.1

Write the rational number as a decimal.

1.  $-\frac{9}{10}$

2.  $-4\frac{2}{3}$

3.  $1\frac{7}{16}$

Write the decimal as a fraction or mixed number in simplest form.

4.  $-0.84$

5.  $5.22$

6.  $-1.716$

Order the numbers from least to greatest.

7.  $\frac{1}{5}, 0.1, -\frac{1}{2}, -0.25, 0.3$

8.  $-1.6, \frac{5}{2}, -\frac{7}{8}, 0.9, -\frac{6}{5}$

9.  $-\frac{2}{3}, \frac{5}{9}, 0.5, -1.3, -\frac{10}{3}$

10. The table shows the position of each runner relative to when the first place finisher crossed the finish line. Who finished in second place? Who finished in fifth place?

Runner	A	B	C	D	E	F
Meters	$-1.264$	$-\frac{5}{4}$	$-1.015$	$-0.480$	$-\frac{14}{25}$	$-\frac{13}{8}$

# 12.2

## Adding Rational Numbers

For use with Activity 12.2

**Essential Question** How can you use what you know about adding integers to add rational numbers?

### 1 ACTIVITY: Adding Rational Numbers

Work with a partner. Use a number line to find the sum.

a.  $2.7 + (-3.4)$



$2.7 + (-3.4) = \underline{\hspace{2cm}}$

b.  $1.3 + (-1.5)$

c.  $-2.1 + 0.8$



d.  $-1\frac{1}{4} + \frac{3}{4}$

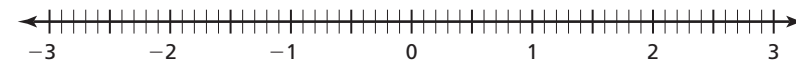
e.  $\frac{3}{10} + \left(-\frac{3}{10}\right)$



### 2 ACTIVITY: Adding Rational Numbers

Work with a partner. Use a number line to find the sum.

a.  $-1\frac{2}{5} + \left(-\frac{4}{5}\right)$

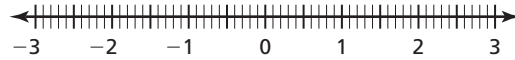
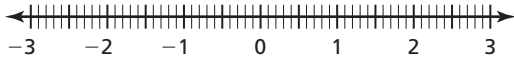


$-1\frac{2}{5} + \left(-\frac{4}{5}\right) = \underline{\hspace{2cm}}$

**12.2 Adding Rational Numbers (continued)**

b.  $-\frac{7}{10} + \left(-1\frac{7}{10}\right)$

c.  $-1\frac{2}{3} + \left(-1\frac{1}{3}\right)$



d.  $-0.4 + (-1.9)$

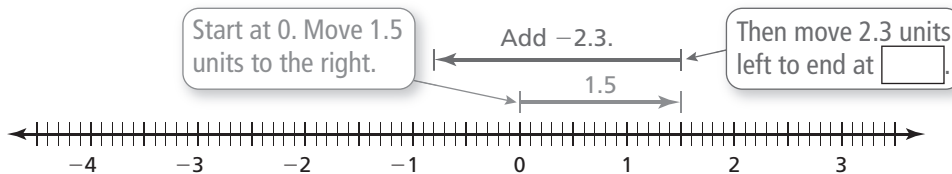
e.  $-2.3 + (-0.6)$



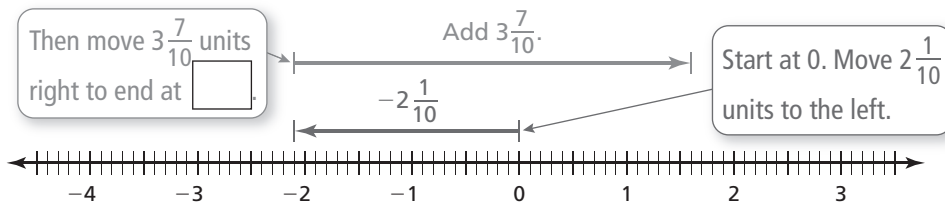
**3 ACTIVITY: Writing Expressions**

Work with a partner. Write the addition expression shown. Then find the sum.

a.

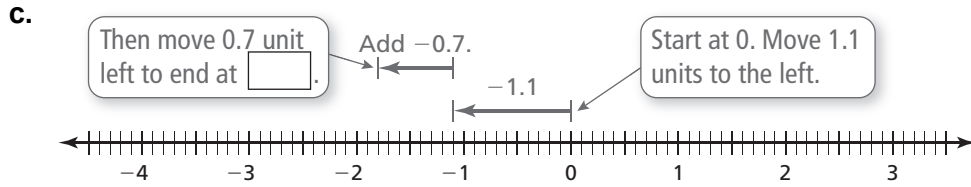


b.





**12.2** Adding Rational Numbers (continued)



**What Is Your Answer?**

4. **IN YOUR OWN WORDS** How can you use what you know about adding integers to add rational numbers?

**PUZZLE** Find a path through the table so that the numbers add up to the sum. You can move horizontally or vertically.

5. Sum:  $\frac{3}{4}$

Start →	$\frac{1}{2}$	$\frac{2}{3}$	$-\frac{5}{7}$	
	$-\frac{1}{8}$	$-\frac{3}{4}$	$\frac{1}{3}$	← End

6. Sum:  $-0.07$

Start →	2.43	1.75	-0.98	
	-1.09	3.47	-4.88	← End

**12.2****Practice**

For use after Lesson 12.2

Add. Write fractions in simplest form.

1.  $-\frac{4}{5} + \frac{3}{20}$

2.  $-8 + \left(-\frac{6}{7}\right)$

3.  $1\frac{2}{15} + \left(-3\frac{1}{2}\right)$

4.  $-\frac{1}{6} + \left(-\frac{5}{12}\right)$

5.  $\frac{9}{10} + (-3)$

6.  $-5\frac{3}{4} + \left(-4\frac{5}{6}\right)$

7.  $0.46 + (-0.642)$

8.  $0.13 + (-5.7)$

9.  $-2.57 + (-3.48)$

10. Before a race, you start  $4\frac{5}{8}$  feet behind your friend. At the halfway point, you are  $3\frac{2}{3}$  feet ahead of your friend. What is the change in distance between you and your friend from the beginning of the race?

# 12.3

## Subtracting Rational Numbers

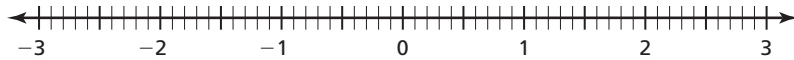
For use with Activity 12.3

**Essential Question** How can you use what you know about subtracting integers to subtract rational numbers?

**1 ACTIVITY:** Subtracting Rational Numbers

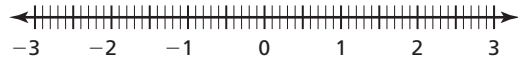
**Work with a partner.** Use a number line to find the difference.

a.  $-1\frac{1}{2} - \frac{1}{2}$

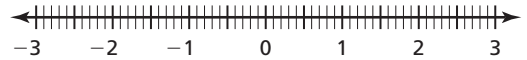


$-1\frac{1}{2} - \frac{1}{2} = \underline{\hspace{2cm}}$

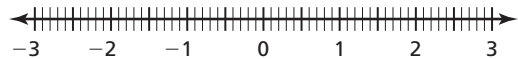
b.  $\frac{6}{10} - 1\frac{3}{10}$



c.  $-1\frac{1}{4} - 1\frac{3}{4}$



d.  $-1.9 - 0.8$



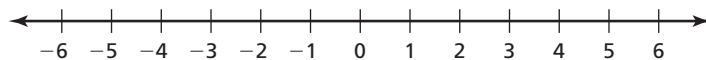
e.  $0.2 - 0.7$



**2 ACTIVITY:** Finding Distances on a Number Line

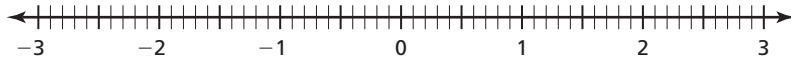
**Work with a partner.**

- a. Plot  $-3$  and  $2$  on the number line. Then find  $-3 - 2$  and  $2 - (-3)$ . What do you notice about your results?



**12.3 Subtracting Rational Numbers (continued)**

- b. Plot  $\frac{3}{4}$  and 1 on the number line. Then find  $\frac{3}{4} - 1$  and  $1 - \frac{3}{4}$ . What do you notice about your results?



- c. Choose any two points  $a$  and  $b$  on a number line. Find the values of  $a - b$  and  $b - a$ . What do the absolute values of these differences represent? Is this true for any pair of rational numbers? Explain.

**3 ACTIVITY: Financial Literacy**

Work with a partner. The table shows the balance in a checkbook.

- Deposits and interest are amounts added to the account.
- Amounts shown in parentheses are taken from the account.

Date	Check #	Transaction	Amount	Balance
--	--	Previous Balance	--	100.00
1/02/2013	124	Groceries	(34.57)	
1/07/2013		Check deposit	875.50	
1/11/2013		ATM withdrawal	(40.00)	
1/14/2013	125	Electric company	(78.43)	
1/17/2013		Music store	(10.55)	
1/18/2013	126	Shoes	(47.21)	
1/22/2013		Check deposit	125.00	
1/24/2013		Interest	2.12	
1/25/2013	127	Cell phone	(59.99)	
1/26/2013	128	Clothes	(65.54)	
1/30/2013	129	Cable company	(75.00)	

**12.3 Subtracting Rational Numbers (continued)**

You can find the balance in the second row two different ways.

$$100.00 - 34.57 = 65.43$$

Subtract 34.57 from 100.00.

$$100.00 + (-34.57) = 65.43$$

Add  $-34.57$  to 100.00.

- a. Complete the balance column of the table on the previous page.
- b. How did you find the balance in the twelfth row?
  
  
  
  
  
  
  
  
  
  
- c. Use a different way to find the balance in part (b).

**What Is Your Answer?**

4. **IN YOUR OWN WORDS** How can you use what you know about subtracting integers to subtract rational numbers?
  
  
  
  
  
  
  
  
  
  
5. Give two real-life examples of subtracting rational numbers that are not integers.

**12.3****Practice**

For use after Lesson 12.3

**Subtract. Write fractions in simplest form.**

1.  $\frac{4}{9} - \left(-\frac{2}{9}\right)$

2.  $-2\frac{3}{7} - 1\frac{2}{3}$

3.  $-2.35 - (-1.27)$

**Find the distance between the two numbers on a number line.**

4.  $-3\frac{1}{4}, -6\frac{1}{2}$

5.  $-1.5, 2.8$

6.  $-4, -7\frac{1}{3}$

**Evaluate.**

7.  $2\frac{1}{2} + \left(-\frac{7}{6}\right) - 1\frac{3}{4}$

8.  $2.37 - (-1.55) - 2.48$

9. Your friend drinks  $\frac{2}{3}$  of a bottle of water. You drink  $\frac{5}{7}$  of a bottle of water. Find the difference of the amounts of water left in each bottle.

**12.4****Multiplying and Dividing Rational Numbers**

For use with Activity 12.4

**Essential Question** Why is the product of two negative rational numbers positive?

**1 ACTIVITY:** Showing  $(-1)(-1) = 1$

**Work with a partner.** How can you show that  $(-1)(-1) = 1$ ?

To begin, assume that  $(-1)(-1) = 1$  is a true statement. From the Additive Inverse Property, you know that  $1 + (-1) = 0$ . So, substitute  $(-1)(-1)$  for 1 to get  $(-1)(-1) + (-1) = 0$ . If you can show that  $(-1)(-1) + (-1) = 0$  is true, then you have shown that  $(-1)(-1) = 1$ .

Justify each step.

$$\begin{aligned}
 (-1)(-1) + (-1) &= (-1)(-1) + 1(-1) && \underline{\hspace{2cm}} \\
 &= (-1)[(-1) + 1] && \underline{\hspace{2cm}} \\
 &= (-1)0 && \underline{\hspace{2cm}} \\
 &= 0 && \underline{\hspace{2cm}}
 \end{aligned}$$

$$(-1)(-1) = \underline{\hspace{2cm}}$$

**2 ACTIVITY:** Multiplying by  $-1$

**Work with a partner.**

- a. Graph each number below on three different number lines. Then multiply each number by  $-1$  and graph the product on the appropriate number line.

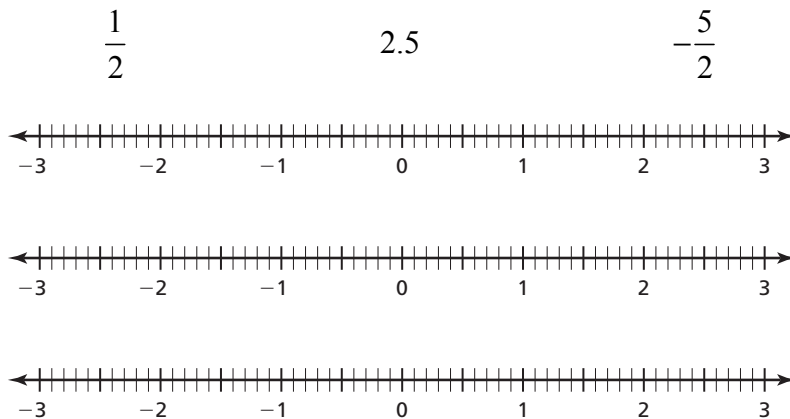
2

8

 $-1$ 

**12.4** Multiplying and Dividing Rational Numbers (continued)

- b. How does multiplying by  $-1$  change the location of the points in part (a)? What is the relationship between the number and the product?
  
- c. Graph each number below on three different number lines. Where do you think the points will be after multiplying by  $-1$ ? Plot the points. Explain your reasoning.



- d. What is the relationship between a rational number  $-a$  and the product  $-1(a)$ ? Explain your reasoning.

**3 ACTIVITY:** Understanding the product of Rational Numbers

**Work with a partner. Let  $a$  and  $b$  be positive rational numbers.**

- a. Because  $a$  and  $b$  are positive, what do you know about  $-a$  and  $-b$ ?
  
- b. Justify each step.
 

$(-a)(-b) = (-1)(a)(-1)(b)$	_____
$= (-1)(-1)(a)(b)$	_____
$= (1)(a)(b)$	_____
$= ab$	_____
  
- c. Because  $a$  and  $b$  are positive, what do you know about the product  $ab$ ?



**12.4** Multiplying and Dividing Rational Numbers (continued)

- d. What does this tell you about products of rational numbers? Explain.

**4** **ACTIVITY:** Writing a Story

**Work with a partner. Write a story that uses addition, subtraction, multiplication, or division of rational numbers.**

- At least one of the numbers in the story has to be negative and *not* an integer.
- Draw pictures to help illustrate what is happening in the story.
- Include the solution of the problem in the story.

If you are having trouble thinking of a story, here are some common uses of negative numbers:

- A profit of  $-\$15$  is a loss of  $\$15$ .
- An elevation of  $-100$  feet is a depth of 100 feet below sea level.
- A gain of  $-5$  yards in football is a loss of 5 yards.
- A score of  $-4$  in golf is 4 strokes under par.

**What Is Your Answer?**

5. **IN YOUR OWN WORDS** Why is the product of two negative rational numbers positive?
6. **PRECISION** Show that  $(-2)(-3) = 6$ .
7. How can you show that the product of a negative rational number and a positive rational number is negative?

**12.4****Practice**

For use after Lesson 12.4

Multiply or divide. Write fractions in simplest form.

1.  $-\frac{8}{9}\left(-\frac{18}{25}\right)$

2.  $-4\left(\frac{9}{16}\right)$

3.  $-3\frac{3}{7} \times 2\frac{1}{2}$

4.  $-\frac{2}{3} \div \frac{5}{9}$

5.  $\frac{7}{13} \div (-2)$

6.  $-5\frac{5}{8} \div \left(-4\frac{7}{12}\right)$

7.  $-1.39 \times (-6.8)$

8.  $-10 \div 0.22$

9.  $-12.166 \div (-1.54)$

10. In a game of tug of war, your team changes  $-1\frac{3}{10}$  feet in position every 10 seconds. What is your change in position after 30 seconds?