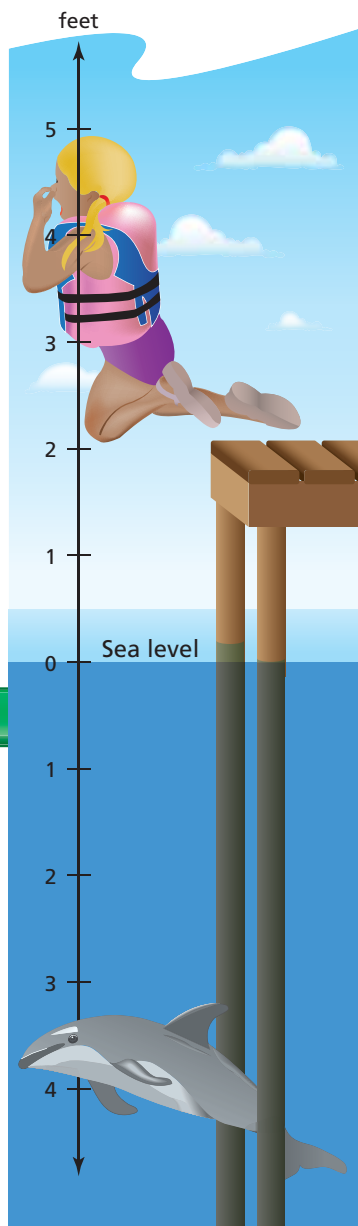


# B.5 Fractions and Decimals on the Number Line

**Essential Question** How can you use a number line to add and subtract fractions and decimals?

## 1 ACTIVITY: Adding on a Number Line



**Work with a partner.**

- A dolphin is 3.5 feet below sea level. Graph this point on the number line.
- The dolphin rises 3 feet. Graph this point on the number line. Did you move up or down on the number line?
- Use your result to find the sum of  $-3.5$  and  $3$ .

$$-3.5 + 3 = \square$$

3.5 feet below sea level

Rise 3 feet

## 2

## ACTIVITY: Subtracting on a Number Line

**Work with a partner.**

- You are standing on a dock that is 2 feet above sea level. Graph this point on the number line.
- You jump off the dock and descend a distance of 6.5 feet. Graph this point on the number line. Did you move up or down on the number line?
- Use your result to find the difference of 2 and 6.5.

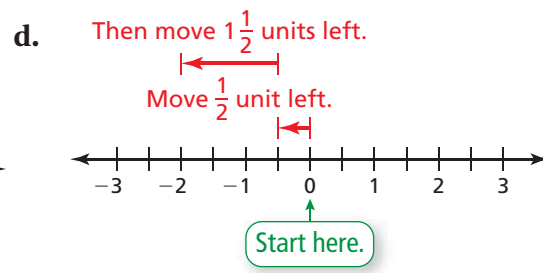
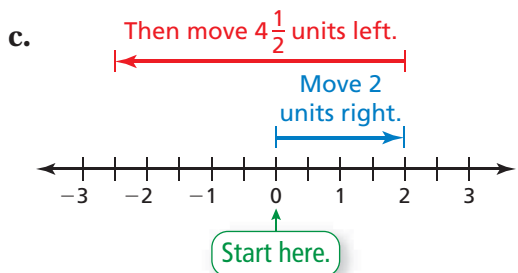
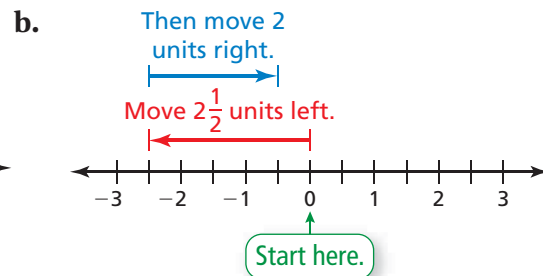
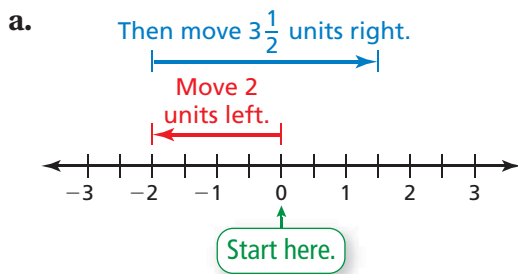
$$2 - 6.5 = \square$$

2 feet above sea level

Descend 6.5 feet

### 3 ACTIVITY: Adding and Subtracting on a Number Line

Work with a partner. Write the sum or difference that is shown on the number line.



### 4 ACTIVITY: Adding and Subtracting on a Number Line

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

a.  $3 - 4.5$

b.  $-3\frac{1}{2} + 4$

c.  $-2.5 + 2$

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

e.  $8 - 10.25$

f.  $-\frac{1}{4} + 2\frac{1}{4}$

## What Is Your Answer?

5. **IN YOUR OWN WORDS** How can you use a number line to add and subtract fractions and decimals? Give an example of each.

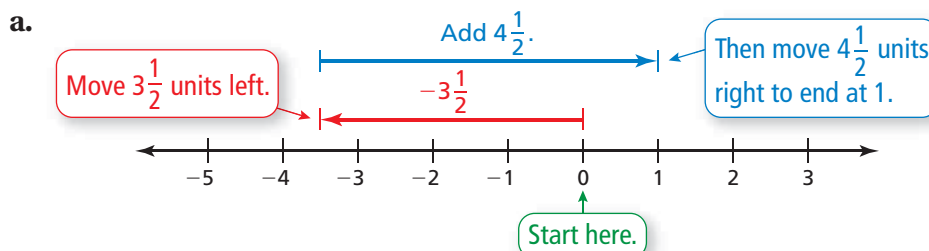
### Practice

Use what you learned about fractions and decimals on the number line to complete Exercises 12–15 on page A40.

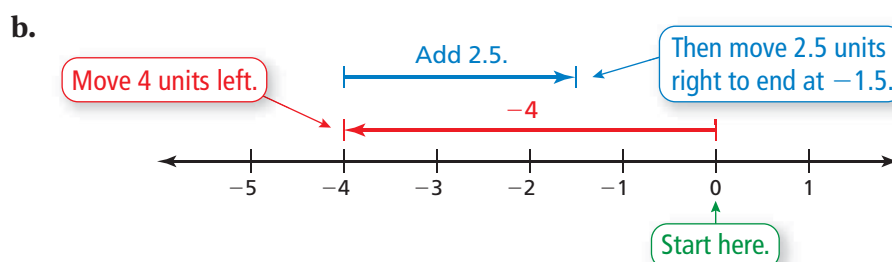
To add a positive fraction or decimal, move to the right on a number line.  
To subtract, move to the left.

## EXAMPLE 1 Adding Fractions and Decimals

Use a number line to find (a)  $-3\frac{1}{2} + 4\frac{1}{2}$  and (b)  $-4 + 2.5$ .



∴ So,  $-3\frac{1}{2} + 4\frac{1}{2} = 1$ .



∴ So,  $-4 + 2.5 = -1.5$ .

### On Your Own

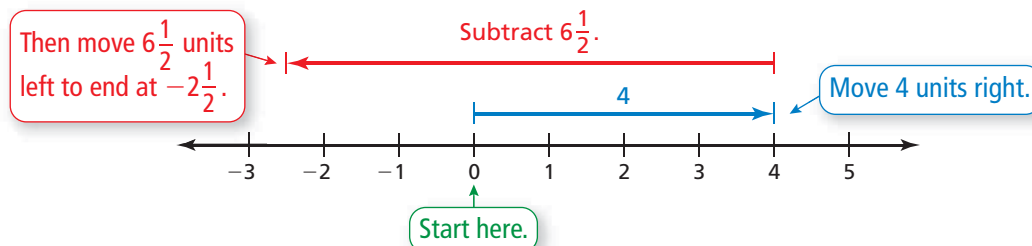
Now You're Ready  
Exercises 4–7

Use a number line to find the sum.

1.  $-1 + 3\frac{1}{2}$       2.  $-4\frac{1}{4} + 3\frac{1}{4}$       3.  $-3.5 + 6$       4.  $-5.5 + 5.5$

## EXAMPLE 2 Subtracting Fractions

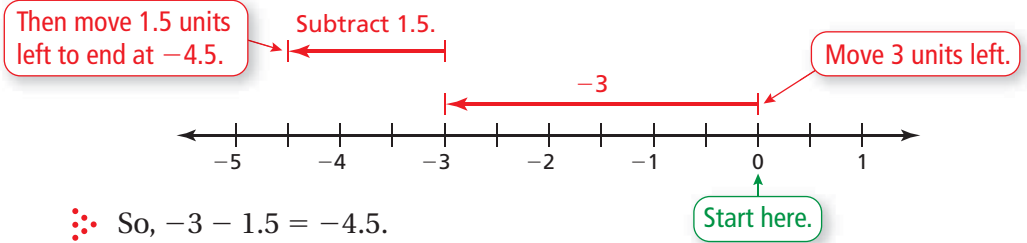
Use a number line to find  $4 - 6\frac{1}{2}$ .



∴ So,  $4 - 6\frac{1}{2} = -2\frac{1}{2}$ .

### EXAMPLE 3 Subtracting Decimals

Use a number line to find  $-3 - 1.5$ .

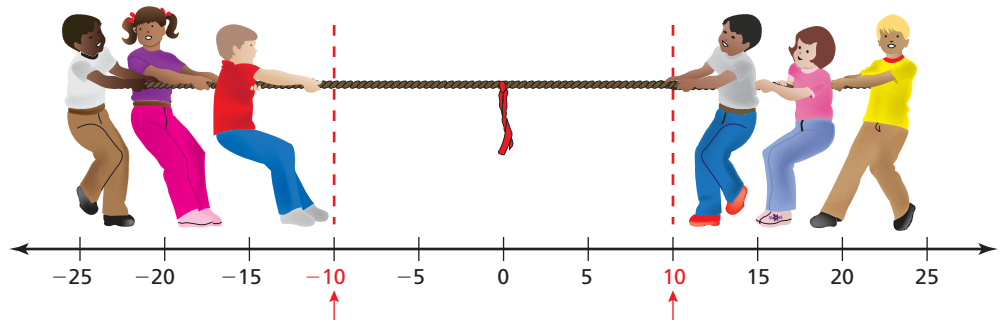


### EXAMPLE 4 Real-Life Application

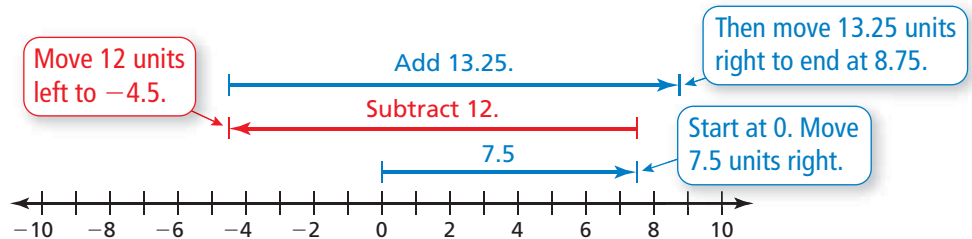
#### Reading

For a team to win, the flag needs to reach either  $-10$  or  $10$ .

In a game of *tug-of-war*, a team wins by pulling the flag over their goal line. The flag begins halfway between the two goal lines. During a game, the flag moves  $7.5$  feet to the right,  $12$  feet to the left, and  $13.25$  feet back to the right. Did a team win? Explain.



Check the position of the flag using a number line.



No.  $8.75$  is less than  $10$ . So, a team has not won yet.

### On Your Own

Use a number line to find the difference.

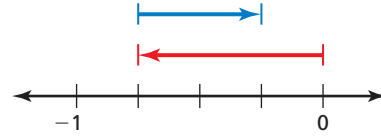
Now You're Ready  
Exercises 8–28

5.  $3 - 5\frac{1}{2}$       6.  $-2 - \frac{1}{2}$       7.  $-0.5 - 3.5$       8.  $0 - 4.25$

9. **WHAT IF?** In Example 4, as the tug-of-war continues, the flag moves  $6\frac{1}{2}$  feet to the left and  $10.5$  feet to the right. Did a team win? Explain.

## Vocabulary and Concept Check

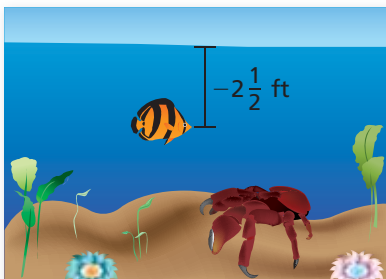
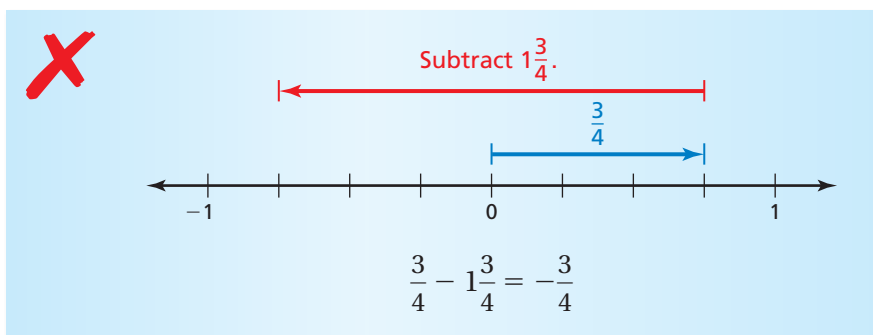
- REASONING** Which direction do you move on a number line when you subtract a positive decimal? Explain.
- WRITING** Write the sum or difference shown by the number line. Find the sum or difference.
- NUMBER SENSE** Without using a number line, determine if the sum of  $-2\frac{1}{4}$  and  $1\frac{3}{4}$  is *positive* or *negative*. Explain.



## Practice and Problem Solving

Use a number line to find the sum or difference.

- |   |    |                     |                               |                                |                                |            |               |           |                               |
|---|----|---------------------|-------------------------------|--------------------------------|--------------------------------|------------|---------------|-----------|-------------------------------|
| 1 | 4. | $-4 + 2\frac{1}{3}$ | 5.                            | $-1\frac{1}{4} + 4\frac{3}{4}$ | 6.                             | $-6 + 0.4$ | 7.            | $0 + 2.2$ |                               |
| 2 | 3  | 8.                  | $6 - 4\frac{3}{4}$            | 9.                             | $-3\frac{1}{3} - 4\frac{2}{3}$ | 10.        | $-5 - 3.25$   | 11.       | $-6.8 - 0.4$                  |
|   |    | 12.                 | $4 - 6.5$                     | 13.                            | $-6\frac{1}{2} + 3$            | 14.        | $-3.25 + 2$   | 15.       | $-3\frac{1}{3} - \frac{1}{3}$ |
|   |    | 16.                 | $-4\frac{1}{2} - \frac{3}{4}$ | 17.                            | $-2.8 - 0.4$                   | 18.        | $-0.5 + 5.25$ | 19.       | $-\frac{2}{3} + 3\frac{1}{3}$ |
20. **ERROR ANALYSIS** Describe and correct the error in finding  $\frac{3}{4} - 1\frac{3}{4}$ .



- CRAB** The crab is 2 feet below the fish. Write and evaluate an expression for the elevation of the crab relative to sea level.
- FISH** The fish swims up  $1\frac{1}{2}$  feet. Write and evaluate an expression for the new elevation of the fish relative to sea level.

Use a number line to evaluate the expression.

4 23.  $9.5 - 11 + 2\frac{1}{4}$

24.  $2\frac{3}{4} - 3.5 - 4\frac{3}{4}$

25.  $-\frac{1}{3} + 3\frac{2}{3} - 5\frac{2}{3}$

26.  $-14.5 - \frac{3}{4} - 3.5$

27.  $8.5 - 12.5 + 2\frac{1}{3}$

28.  $-7.25 - 5.75 + 11\frac{2}{3}$

29. **TEMPERATURE** The motor on a freezer runs when the temperature inside the freezer rises above  $-17.5^{\circ}\text{C}$ . The door of the freezer is left open. The temperature in the freezer rises to  $6.75^{\circ}\text{C}$ . After the door is closed, the temperature drops  $23.25^{\circ}\text{C}$ . Does the motor need to run? Explain.

30. **BANK ACCOUNT** The table shows your bank account transactions.

Check #	Date	Transaction Description	Payment/Debit (-)	Deposit/Credit (+)	Balance
					22.00
124	4/4	Music CD	16.50		
	4/7	Deposit		15.00	
125	4/12	Jeans	20.75		

- a. Find the balance after each of the transactions.  
 b. The bank charges a \$30 overdraft fee when the account balance is less than \$0. Will the bank charge an overdraft fee for any of the transactions? Explain.



31. **Critical Thinking** Describe a plan to find the number of yards gained or lost on fourth down. How many yards were gained or lost on fourth down?

First and goal at the 1-yard line: Lost  $2\frac{1}{2}$  yards

Second down: Lost  $3\frac{1}{4}$  yards

Third down: Gained  $1\frac{1}{2}$  yards

Fourth down: Stopped  $1\frac{1}{2}$  yards short of the goal line



### Fair Game Review what you learned in previous grades & lessons

Use a number line to order the numbers from least to greatest.

32. 18%, 0.21,  $\frac{1}{5}$

33. 0.09, 85%,  $\frac{8}{10}$

34.  $\frac{3}{8}$ , 0.35, 32%

35. 64%,  $\frac{2}{3}$ , 0.7

36. **MULTIPLE CHOICE** Which number is between  $-5.6$  and  $-5.9$ ?

(A)  $-5.92$

(B)  $-5.61$

(C)  $-5.59$

(D)  $-5.56$