11.1 Lesson

Key Vocabulary
terminating decimal
repeating decimal
rational number

A **terminating decimal** is a decimal that ends.

1.5, –0.25, 10.625

A **repeating decimal** is a decimal that has a pattern that repeats.

$-1.333\ldots = -1.\overline{3}$

$0.151515\ldots = 0.\overline{15}$

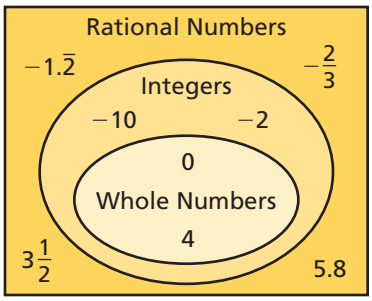
Use *bar notation* to show which of the digits repeat.

Terminating and repeating decimals are examples of *rational numbers*.

Key Idea

Rational Numbers

A **rational number** is a number that can be written as $\frac{a}{b}$ where a and b are integers and $b \neq 0$.



EXAMPLE 1 Writing Rational Numbers as Decimals

a. Write $-2\frac{1}{4}$ as a decimal.

Notice that $-2\frac{1}{4} = -\frac{9}{4}$.

Divide 9 by 4.

$$\begin{array}{r} 2.25 \\ 4\overline{)9.00} \\ -\ 8 \\ \hline 1\ 0 \\ -\ 8 \\ \hline 20 \\ -\ 20 \\ \hline 0 \end{array}$$

The remainder is 0. So, it is a terminating decimal.

∴ So, $-2\frac{1}{4} = -2.25$.

b. Write $\frac{5}{11}$ as a decimal.

Divide 5 by 11.

$$\begin{array}{r} 0.4545 \\ 11\overline{)5.0000} \\ -\ 44 \\ \hline 60 \\ -\ 55 \\ \hline 50 \\ -\ 44 \\ \hline 60 \\ -\ 55 \\ \hline 5 \end{array}$$

The remainder repeats. So, it is a repeating decimal.

∴ So, $\frac{5}{11} = 0.\overline{45}$.

On Your Own

Now You're Ready
Exercises 11–18

Write the rational number as a decimal.

1. $-\frac{6}{5}$
2. $-7\frac{3}{8}$
3. $-\frac{3}{11}$
4. $1\frac{5}{27}$

EXAMPLE 2 Writing a Decimal as a Fraction

Write -0.26 as a fraction in simplest form.

$$-0.26 = -\frac{26}{100}$$

Write the digits after the decimal point in the numerator.

The last digit is in the hundredths place. So, use 100 in the denominator.

$$= -\frac{13}{50}$$

Simplify.

On Your Own

Now You're Ready
Exercises 20–27

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

5. -0.7 **6.** 0.125 **7.** -3.1 **8.** -10.25

EXAMPLE 3 Ordering Rational Numbers

Creature	Elevations (km)
Anglerfish	$-\frac{13}{10}$
Squid	$-2\frac{1}{5}$
Shark	$-\frac{2}{11}$
Whale	-0.8

The table shows the elevations of four sea creatures relative to sea level. Which of the sea creatures are deeper than the whale? Explain.

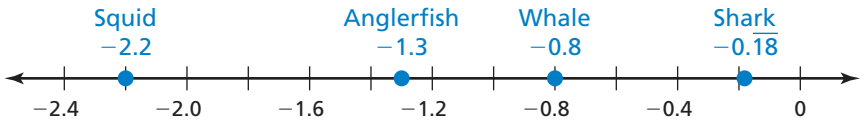
Write each rational number as a decimal.

$$-\frac{13}{10} = -1.3$$

$$-2\frac{1}{5} = -2.2$$

$$-\frac{2}{11} = -0.\overline{18}$$

Then graph each decimal on a number line.



∴ Both -2.2 and -1.3 are less than -0.8. So, the squid and the anglerfish are deeper than the whale.

On Your Own

Now You're Ready
Exercises 28–33

9. WHAT IF? The elevation of a dolphin is $-\frac{1}{10}$ kilometer. Which of the sea creatures in Example 3 are deeper than the dolphin? Explain.

11.1 Exercises

Vocabulary and Concept Check

1. **VOCABULARY** How can you tell that a number is rational?
2. **WRITING** You have to write 0.63 as a fraction. How do you choose the denominator?

Tell whether the number belongs to each of the following number sets: *rational numbers, integers, whole numbers.*

3. -5
4. $-2.1\overline{6}$
5. 12
6. 0

Tell whether the decimal is *terminating* or *repeating*.

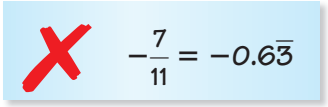
7. $-0.4848\ldots$
8. -0.151
9. 72.72
10. $-5.2\overline{36}$

Practice and Problem Solving

Write the rational number as a decimal.

1 11. $\frac{7}{8}$
12. $\frac{5}{11}$
13. $-\frac{7}{9}$
14. $-\frac{17}{40}$
15. $1\frac{5}{6}$
16. $-2\frac{17}{18}$
17. $-5\frac{7}{12}$
18. $8\frac{15}{22}$

19. **ERROR ANALYSIS** Describe and correct the error in writing the rational number as a decimal.



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

2 20. -0.9
21. 0.45
22. -0.258
23. -0.312
24. -2.32
25. -1.64
26. 6.012
27. -12.405

Order the numbers from least to greatest.

3 28. $-\frac{3}{4}, 0.5, \frac{2}{3}, -\frac{7}{3}, 1.2$
29. $\frac{9}{5}, -2.5, -1.1, -\frac{4}{5}, 0.8$
30. $-1.4, -\frac{8}{5}, 0.6, -0.9, \frac{1}{4}$
31. $2.1, -\frac{6}{10}, -\frac{9}{4}, -0.75, \frac{5}{3}$
32. $-\frac{7}{2}, -2.8, -\frac{5}{4}, \frac{4}{3}, 1.3$
33. $-\frac{11}{5}, -2.4, 1.6, \frac{15}{10}, -2.25$

34. **COINS** You lose one quarter, two dimes and two nickels.
    a. Write the amount as a decimal.
    b. Write the amount as a fraction in simplest form.

35. **HIBERNATION** A box turtle hibernates in sand at $-1\frac{5}{8}$ feet. A spotted turtle hibernates at $-1\frac{16}{25}$ feet. Which turtle is deeper?

Copy and complete the statement using <, >, or =.

36. $-2.2 \square -2.42$

37. $-1.82 \square -1.81$

38. $\frac{15}{8} \square 1\frac{7}{8}$

39. $-4\frac{6}{10} \square -4.65$

40. $-5\frac{3}{11} \square -5.\overline{2}$

41. $-2\frac{13}{16} \square -2\frac{11}{14}$

42. OPEN-ENDED Find one terminating decimal and one repeating decimal between $-\frac{1}{2}$ and $-\frac{1}{3}$.

Player	Hits	At Bats
Eva	42	90
Michelle	38	80

43. SOFTBALL In softball, a batting average is the number of hits divided by the number of times at bat. Does Eva or Michelle have the higher batting average?

44. QUIZ You miss 3 out of 10 questions on a science quiz and 4 out of 15 questions on a math quiz. Which quiz has a higher percent of correct answers?

45. SKATING Is the half pipe deeper than the skating pool? Explain.

46. EVERGLADES The table shows the changes from the average water level of a pond in Everglades National Park over several weeks. Order the numbers from least to greatest.

Week	1	2	3	4
Change (inches)	$-\frac{7}{5}$	$-1\frac{5}{11}$	-1.45	$-1\frac{91}{200}$

47. Critical Thinking Given: a and b are integers.

a. When is $-\frac{1}{a}$ positive?

b. When is $\frac{1}{ab}$ positive?

Fair Game Review What you learned in previous grades & lessons

Add or subtract.

48. $\frac{3}{5} + \frac{2}{7}$

49. $\frac{9}{10} - \frac{2}{3}$

50. $8.79 - 4.07$

51. $11.81 + 9.34$

52. MULTIPLE CHOICE In one year, a company has a profit of −$2 million. In the next year, the company has a profit of $7 million. How much more money did the company make the second year?

(A) $2 million (B) $5 million (C) $7 million (D) $9 million

11.2 Lesson

Key Idea

Adding and Subtracting Rational Numbers

Words To add or subtract rational numbers, use the same rules for signs as you used for integers.

Numbers $\frac{4}{5} - \frac{1}{5} = \frac{4-1}{5} = \frac{3}{5}$

$-\frac{1}{3} + \frac{1}{6} = \frac{-2}{6} + \frac{1}{6} = \frac{-2+1}{6} = \frac{-1}{6} = -\frac{1}{6}$

EXAMPLE 1 Adding Rational Numbers

Study Tip

In Example 1, notice how $-\frac{8}{3}$ is written as $-\frac{8}{3} = \frac{-8}{3} = \frac{-16}{6}$.

Find $-\frac{8}{3} + \frac{5}{6}$. **Estimate** $-3 + 1 = -2$

$-\frac{8}{3} + \frac{5}{6} = \frac{-16}{6} + \frac{5}{6}$ Rewrite using the LCD (least common denominator).

$= \frac{-16+5}{6}$ Write the sum of the numerators over the like denominator.

$= \frac{-11}{6}$, or $-1\frac{5}{6}$ Simplify.

∴ The sum is $-1\frac{5}{6}$. **Reasonable?** $-1\frac{5}{6} \approx -2$ ✓

EXAMPLE 2 Adding Rational Numbers

Find $-4.05 + 7.62$.

$-4.05 + 7.62 = 3.57$ $|7.62| > |-4.05|$. So, subtract $|-4.05|$ from $|7.62|$.

Use the sign of 7.62.

∴ The sum is 3.57.

On Your Own

Now You're Ready
Exercises 4–12

Add.

1. $-\frac{7}{8} + \frac{1}{4}$
2. $-6\frac{1}{3} + \frac{20}{3}$
3. $2 + \left(-\frac{7}{2}\right)$
4. $-12.5 + 15.3$
5. $-8.15 + (-4.3)$
6. $0.65 + (-2.75)$

EXAMPLE 3 Subtracting Rational Numbers

Find $-4\frac{1}{7} - \left(-\frac{6}{7}\right)$. **Estimate** $-4 - (-1) = -3$

$$-4\frac{1}{7} - \left(-\frac{6}{7}\right) = -4\frac{1}{7} + \frac{6}{7}$$ Add the opposite of $-\frac{6}{7}$.

$$= -\frac{29}{7} + \frac{6}{7}$$ Write the mixed number as an improper fraction.

$$= \frac{-23}{7}, \text{ or } -3\frac{2}{7}$$ Simplify.

∴ The difference is $-3\frac{2}{7}$. **Reasonable?** $-3\frac{2}{7} \approx -3$ ✓

On Your Own

Subtract.

7. $\frac{1}{3} - \left(-\frac{1}{3}\right)$ **8.** $-3\frac{1}{3} - \frac{5}{6}$ **9.** $4\frac{1}{2} - 5\frac{1}{4}$

EXAMPLE 4 Real-Life Application

Clearance: 11 ft 8 in.

In the water, the bottom of a boat is 2.1 feet below the surface and the top of the boat is 8.7 feet above it. Towed on a trailer, the bottom of the boat is 1.3 feet above the ground. Can the boat and trailer pass under the bridge?

Step 1: Find the height h of the boat.

$h = 8.7 - (-2.1)$ Subtract the lowest point from the highest point.

$= 8.7 + 2.1$ Add the opposite of -2.1.

$= 10.8$ Add.

Step 2: Find the height t of the boat and trailer.

$t = 10.8 + 1.3$ Add the trailer height to the boat height.

$= 12.1$ Add.

∴ Because 12.1 feet is greater than 11 feet 8 inches, the boat and trailer cannot pass under the bridge.

On Your Own

Now You're Ready
Exercises 13–21

10. WHAT IF? In Example 4, the clearance is 12 feet 1 inch. Can the boat and trailer pass under the bridge?

11.2 Exercises

Vocabulary and Concept Check

1. **WRITING** Explain how to find the sum $-8.46 + 5.31$.

2. **OPEN-ENDED** Write an addition expression using fractions that equals $-\frac{1}{2}$.

3. **DIFFERENT WORDS, SAME QUESTION** Which is different? Find "both" answers.

Add -4.8 and 3.9.	What is 3.9 less than -4.8?
What is -4.8 increased by 3.9?	Find the sum of -4.8 and 3.9.

Practice and Problem Solving

Add. Write fractions in simplest form.

1 2 **4.** $\frac{11}{12} + \left(-\frac{7}{12}\right)$ **5.** $-\frac{9}{14} + \frac{2}{7}$ **6.** $\frac{15}{4} + \left(-4\frac{1}{3}\right)$

7. $2\frac{5}{6} + \left(-\frac{8}{15}\right)$ **8.** $4 + \left(-1\frac{2}{3}\right)$ **9.** $-4.2 + 3.3$

10. $-3.1 + (-0.35)$ **11.** $12.48 + (-10.636)$ **12.** $20.25 + (-15.711)$

Subtract. Write fractions in simplest form.

3 4 **13.** $\frac{5}{8} - \left(-\frac{7}{8}\right)$ **14.** $\frac{1}{4} - \frac{11}{16}$ **15.** $-\frac{1}{2} - \left(-\frac{5}{9}\right)$

16. $-5 - \frac{5}{3}$ **17.** $-8\frac{3}{8} - 10\frac{1}{6}$ **18.** $-1 - 2.5$

19. $5.5 - 8.1$ **20.** $-7.34 - (-5.51)$ **21.** $6.673 - (-8.29)$

22. **ERROR ANALYSIS** Describe and correct the error in finding the difference.

✗ $\frac{3}{4} - \frac{9}{2} = \frac{3 - 9}{4 - 2} = \frac{-6}{2} = -3$

23. **SPORTS DRINK** Your sports drink bottle is $\frac{5}{6}$ full. After practice the bottle is $\frac{3}{8}$ full. Write the difference of the amounts after practice and before practice.

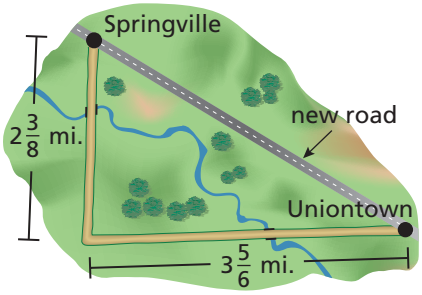
24. **BANKING** Your bank account balance is –$20.85. You deposit $15.50. What is your new balance?

Evaluate.

25. $2\frac{1}{6} - \left(-\frac{8}{3}\right) + \left(-4\frac{7}{9}\right)$ **26.** $6.3 + (-7.8) - (-2.41)$ **27.** $-\frac{12}{5} + \left|-\frac{13}{6}\right| + \left(-3\frac{2}{3}\right)$

28. **REASONING** When is the difference of two decimals an integer? Explain.

29. **RECIPE** A cook has $2\frac{2}{3}$ cups of flour. A recipe calls for $2\frac{3}{4}$ cups of flour. Does the cook have enough flour? If not, how much more flour is needed?



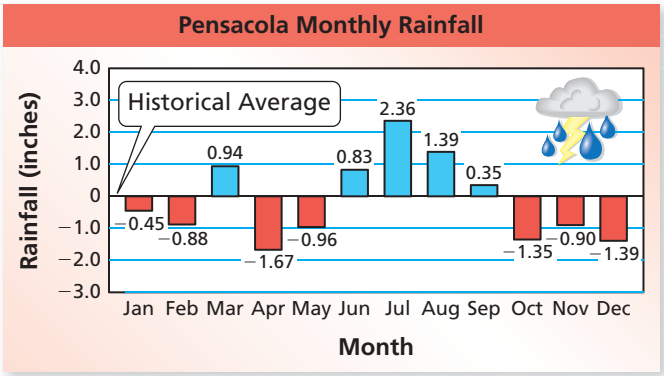
30. **ROADWAY** A new road that connects Uniontown to Springville is $4\frac{1}{3}$ miles long. What is the change in distance when using the new road instead of the dirt roads?

RAINFALL **In Exercises 31–33, the bar graph shows the differences in rainfall from the historical average in Pensacola, Florida.**

31. What is the difference in rainfall between the wettest and driest months?

32. Find the sum of the differences for the year.

33. What does the sum in Exercise 32 tell you about the rainfall for the year?



ALGEBRA **Add or subtract. Write the answer in simplest form.**

34. $-4x + 8x - 6x$

35. $-\frac{3n}{8} + \frac{2n}{8} - \frac{n}{8}$

36. $-4a - \frac{a}{3}$

37. $\frac{5b}{8} + \left(-\frac{2b}{3}\right)$

38. **Puzzle** Fill in the blanks to make the solution correct.

$$5.\square 4 - (\square.8\square) = -3.61$$

Fair Game Review What you learned in previous grades & lessons

Evaluate.

39. 5.2×6.9

40. $7.2 \div 2.4$

41. $2\frac{2}{3} \times 3\frac{1}{4}$

42. $9\frac{4}{5} \div 3\frac{1}{2}$

43. **MULTIPLE CHOICE** A sports store has 116 soccer balls. Over 6 months, it sells eight soccer balls per month. How many soccer balls are in inventory at the end of the 6 months?

(A) -48 (B) 48 (C) 68 (D) 108

11.3 Lesson

Key Idea

Multiplying and Dividing Rational Numbers

Words To multiply or divide rational numbers, use the same rules for signs as you used for integers.

Numbers

$$-\frac{2}{7} \cdot \frac{1}{3} = \frac{-2 \cdot 1}{7 \cdot 3} = \frac{-2}{21} = -\frac{2}{21}$$

$$-\frac{1}{2} \div \frac{4}{9} = \frac{-1}{2} \cdot \frac{9}{4} = \frac{-1 \cdot 9}{2 \cdot 4} = \frac{-9}{8} = -\frac{9}{8}$$

Remember

The *reciprocal* of $\frac{a}{b}$ is $\frac{b}{a}$.

EXAMPLE 1 Dividing Rational Numbers

Find $-5\frac{1}{5} \div 2\frac{1}{3}$. **Estimate** $-5 \div 2 = -2\frac{1}{2}$

$-5\frac{1}{5} \div 2\frac{1}{3} = -\frac{26}{5} \div \frac{7}{3}$ Write mixed numbers as improper fractions.

$= \frac{-26}{5} \cdot \frac{3}{7}$ Multiply by the reciprocal of $\frac{7}{3}$.

$= \frac{-26 \cdot 3}{5 \cdot 7}$ Multiply the numerators and the denominators.

$= \frac{-78}{35}$, or $-2\frac{8}{35}$ Simplify.

∴ The quotient is $-2\frac{8}{35}$. **Reasonable?** $-2\frac{8}{35} \approx -2\frac{1}{2}$ ✓

EXAMPLE 2 Multiplying Rational Numbers

Find $-2.5 \cdot 3.6$.

$$\begin{array}{r} -2.5 \\ \times\ 3.6 \\ \hline 1\,5\,0 \\ 7\,5\,0 \\ \hline -9.0\,0 \end{array}$$

The decimals have different signs.

The product is negative.

∴ The product is -9.

EXAMPLE 3 Standardized Test Practice

Which number, when multiplied by $-\frac{5}{3}$, gives a product between 5 and 6?

Ⓐ -6 Ⓑ $-3\frac{1}{4}$ Ⓒ $-\frac{1}{4}$ Ⓓ 3

Use the guess, check, and revise method.

Guess 1: Because the product is positive and the known factor is negative, choose a number that is negative. Try Choice Ⓒ.

$$-\frac{1}{4}\left(-\frac{5}{3}\right) = \frac{-1 \cdot (-5)}{4 \cdot 3} = \frac{5}{12}$$

Guess 2: The result of Choice Ⓒ is not between 5 and 6. So, choose another number that is negative. Try Choice Ⓑ.

$$-3\frac{1}{4}\left(-\frac{5}{3}\right) = -\frac{13}{4}\left(-\frac{5}{3}\right) = \frac{-13 \cdot (-5)}{4 \cdot 3} = \frac{65}{12} = 5\frac{5}{12}$$

∴ $5\frac{5}{12}$ is between 5 and 6. So, the correct answer is Ⓑ.

On Your Own

Now You're Ready
Exercises 10–33

Multiply or divide.

1. $-\frac{6}{5} \div \left(-\frac{1}{2}\right)$
2. $\frac{1}{3} \div \left(-2\frac{2}{3}\right)$
3. $\left(-\frac{1}{2}\right)^3$
4. $1.8(-5.1)$
5. $-6.3(-0.6)$
6. $(-1.3)^2$

EXAMPLE 4 Real-Life Application

Account Positions

Stock	Original Value	Current Value	Change
A	600.54	420.15	−180.39
B	391.10	518.38	127.28
C	380.22	99.70	−280.52

An investor owns stocks A, B, and C. What is the mean change in value of the stocks?

$$\text{mean} = \frac{-180.39 + 127.28 + (-280.52)}{3} = \frac{-333.63}{3} = -111.21$$

∴ The mean change in value of the stocks is −$111.21.

On Your Own

7. In Example 4, the change in value of stock D is $568.23. What is the mean change in value of the four stocks?

11.3 Exercises

Vocabulary and Concept Check

1. **WRITING** How is multiplying and dividing rational numbers similar to multiplying and dividing integers?

Find the reciprocal.

2. $-\frac{2}{5}$
3. -3
4. $\frac{16}{9}$
5. $-2\frac{1}{3}$

Tell whether the expression is *positive* or *negative* without evaluating.

6. $-\frac{3}{10} \times \left(-\frac{8}{15}\right)$
7. $1\frac{1}{2} \div \left(-\frac{1}{4}\right)$
8. -6.2×8.18
9. $\frac{-8.16}{-2.72}$

Practice and Problem Solving

Divide. Write fractions in simplest form.

1 10. $-\frac{7}{10} \div \frac{2}{5}$
11. $\frac{1}{4} \div \left(-\frac{3}{8}\right)$
12. $-\frac{8}{9} \div \left(-\frac{8}{9}\right)$
13. $-\frac{1}{5} \div 20$
14. $-2\frac{4}{5} \div (-7)$
15. $-10\frac{2}{7} \div \left(-4\frac{4}{11}\right)$
16. $-9 \div 7.2$
17. $8 \div 2.2$
18. $-3.45 \div (-15)$
19. $-0.18 \div 0.03$
20. $8.722 \div (-3.56)$
21. $12.42 \div (-4.8)$

Multiply. Write fractions in simplest form.

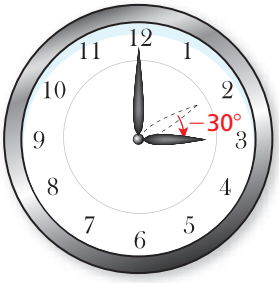
2 3 22. $-\frac{2}{3} \times \frac{2}{9}$
23. $-\frac{1}{4} \times \left(-\frac{4}{3}\right)$
24. $\frac{5}{6}\left(-\frac{8}{15}\right)$
25. $-2\left(-1\frac{1}{4}\right)$
26. $-3\frac{1}{3} \cdot \left(-2\frac{7}{10}\right)$
27. $\left(-1\frac{2}{3}\right)^3$
28. $0.4 \times (-0.03)$
29. $-0.05 \times (-0.5)$
30. $-8(0.09)$
31. $-9.3 \cdot (-5.1)$
32. $-95.2 \cdot (-0.12)$
33. $(-0.4)^3$

ERROR ANALYSIS **Describe and correct the error.**

34. ✗ $-2.2 \times 3.7 = 8.14$

35. ✗ $-\frac{1}{4} \div \frac{3}{2} = -\frac{4}{1} \times \frac{3}{2} = -\frac{12}{2} = -6$

36. **HOUR HAND** The hour hand of a clock moves $-30°$ every hour. How many degrees does it move in $2\frac{1}{5}$ hours?



37. **SUNFLOWER SEEDS** How many 0.75-pound packages can be made with 6 pounds of sunflower seeds?

Evaluate.

38. $-4.2 + 8.1 \times (-1.9)$

39. $2.85 - 6.2 \div 2^2$

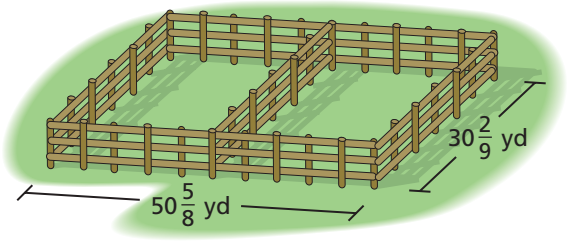
40. $-3.64 \cdot \left|-5.3\right| - 1.5^3$

41. $1\frac{5}{9} \div \left(-\frac{2}{3}\right) + \left(-2\frac{3}{5}\right)$

42. $-3\frac{3}{4} \times \frac{5}{6} - 2\frac{1}{3}$

43. $\left(-\frac{2}{3}\right)^2 - \frac{3}{4}\left(2\frac{1}{3}\right)$

44. OPEN-ENDED Write two fractions whose product is $-\frac{3}{5}$.



45. FENCING A farmer needs to enclose two adjacent rectangular pastures. How much fencing does the farmer need?

46. GASOLINE A 14.5-gallon gasoline tank is $\frac{3}{4}$ full. How many gallons will it take to fill the tank?

47. BOARDWALK A section of a boardwalk is made using 15 boards. Each board is $9\frac{1}{4}$ inches wide. The total width of the section is 144 inches. The spacing between each board is equal. What is the width of the spacing between each board?

48. RUNNING The table shows the changes in the times (in seconds) of four teammates. What is the mean change?

Teammate	Change
1	−2.43
2	−1.85
3	0.61
4	−1.45

49. Critical Thinking Consider $(-2)^1$, $(-2)^2$, $(-2)^3$, $(-2)^4$, $(-2)^5$, and $(-2)^6$.

a. Evaluate each expression.

b. What pattern do you notice?

c. What is the sign of $(-2)^{49}$?

Fair Game Review What you learned in previous grades & lessons

Add or subtract.

50. $-6.2 + 4.7$

51. $-8.1 - (-2.7)$

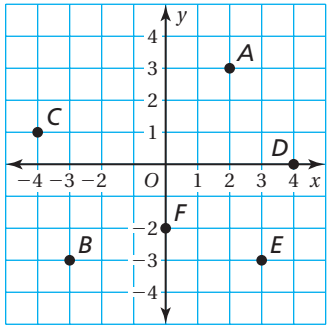
52. $\frac{9}{5} - \left(-2\frac{7}{10}\right)$

53. $-4\frac{5}{6} + \left(-3\frac{4}{9}\right)$

54. MULTIPLE CHOICE What are the coordinates of the point in quadrant IV?

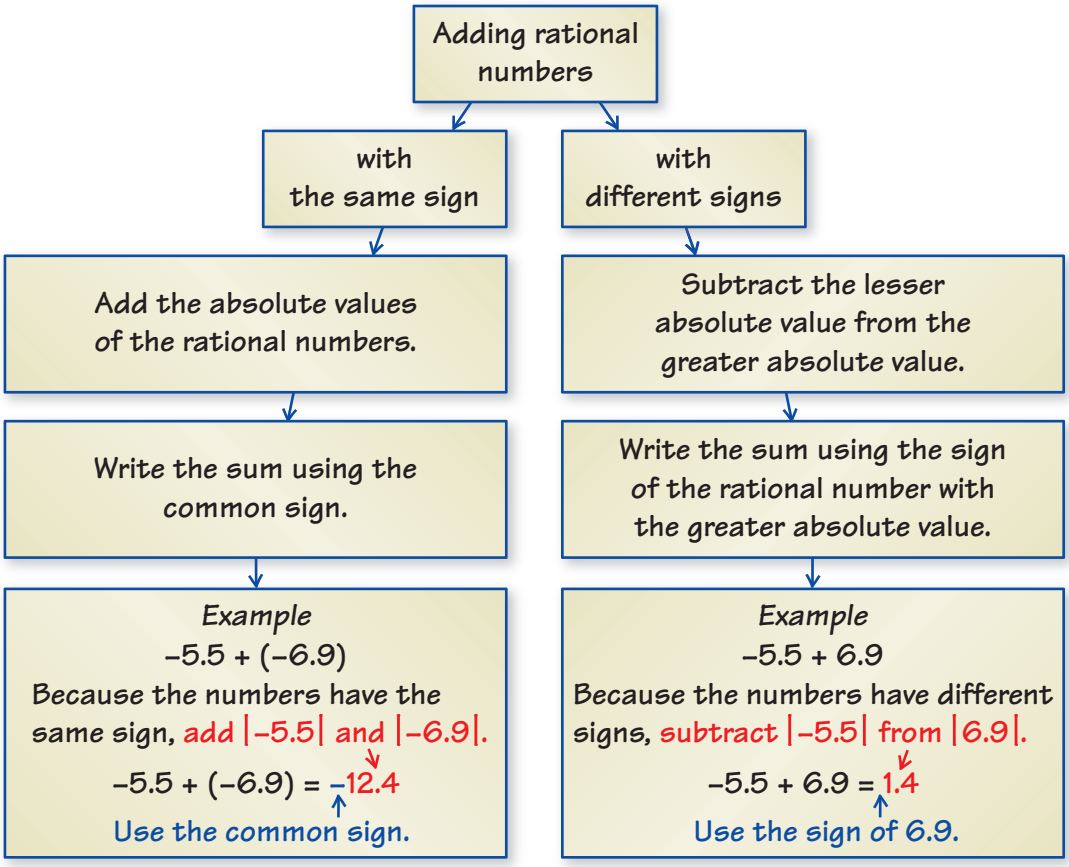
Ⓐ $(-4, 1)$ Ⓑ $(-3, -3)$

Ⓒ $(0, -2)$ Ⓓ $(3, -3)$



11 Study Help

You can use a **process diagram** to show the steps involved in a procedure. Here is an example of a process diagram for adding rational numbers.



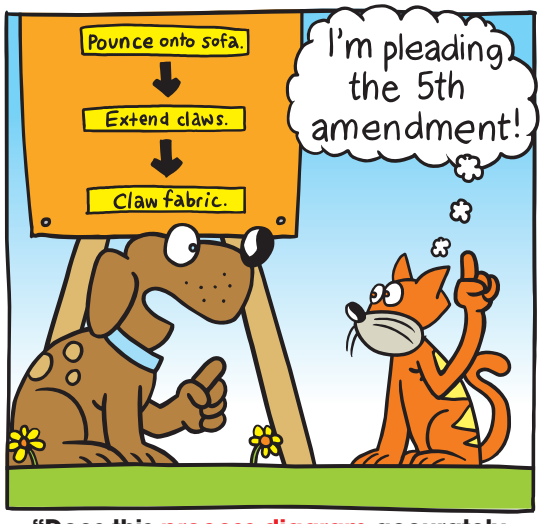
On Your Own

Make a process diagram with examples to help you study these topics. Your process diagram can have one or more branches.

1. writing rational numbers as decimals
2. subtracting rational numbers
3. dividing rational numbers

After you complete this chapter, make process diagrams with examples for the following topics.

4. solving equations using addition or subtraction
5. solving equations using multiplication or division
6. solving two-step equations



"Does this process diagram accurately show how a cat claws furniture?"

11.1–11.3 Quiz

Write the rational number as a decimal.

1. $-\frac{3}{20}$

2. $-\frac{11}{6}$

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

3. -0.325

4. -1.28

Add or subtract. Write fractions in simplest form.

5. $-\frac{4}{5} + \left(-\frac{3}{8}\right)$

6. $-5.8 + 2.6$

7. $\frac{12}{7} - \left(-\frac{2}{9}\right)$

8. $9.1 - 12.9$

Multiply or divide. Write fractions in simplest form.

9. $-2\frac{3}{8} \times \frac{8}{5}$

10. $-9.4 \times (-4.7)$

11. $-8\frac{5}{9} \div \left(-1\frac{4}{7}\right)$

12. $-8.4 \div 2.1$

13. **STOCK** The value of stock A changes $-\$3.68$ and the value of stock B changes $-\$3.72$. Which stock has the greater loss? Explain.

14. **PARASAILING** A parasail is at 200.6 feet above the water. After five minutes, the parasail is at 120.8 feet above the water. What is the change in height of the parasail?

15. **FOOTBALL** The table shows the statistics of a running back in a football game. How many total yards did he gain?

Quarter	1	2	3	4	Total
Yards	$-8\frac{1}{2}$	23	$42\frac{1}{2}$	$-2\frac{1}{4}$	?

16. **LATE FEES** You were overcharged \$4.52 on your cell phone bill three months in a row. The cell phone company will add $-\$4.52$ to your next bill for each month you were overcharged. How much will be added to your next bill?

11.4 Lesson

Key Vocabulary
equivalent equations

Key Ideas

Addition Property of Equality

Words Two equations are **equivalent equations** if they have the same solutions. Adding the same number to each side of an equation produces an equivalent equation.

Algebra If $a = b$, then $a + c = b + c$.

Subtraction Property of Equality

Words Subtracting the same number from each side of an equation produces an equivalent equation.

Algebra If $a = b$, then $a - c = b - c$.

EXAMPLE 1 Solving Equations

Remember
To solve equations, use *inverse operations* that "undo" each other. For example, use addition to solve an equation with subtraction.

a. Solve $x - 5 = -1$.

$x - 5 = -1$ Write the equation.

$+5 \quad +5$ Add 5 to each side.

$x = 4$ Simplify.

∴ So, the solution is $x = 4$.

Check

$x - 5 = -1$

$4 - 5 \stackrel{?}{=} -1$

$-1 = -1$ ✓

b. Solve $z + \frac{3}{2} = \frac{1}{2}$.

$z + \frac{3}{2} = \frac{1}{2}$ Write the equation.

$-\frac{3}{2} \quad -\frac{3}{2}$ Subtract $\frac{3}{2}$ from each side.

$z = -1$ Simplify.

∴ So, the solution is $z = -1$.

On Your Own

Now You're Ready
Exercises 5–20

Solve the equation. Check your solution.

1. $p - 5 = -2$
2. $w + 13.2 = 10.4$
3. $x - \frac{5}{6} = -\frac{1}{6}$

EXAMPLE 2 Standardized Test Practice

A company has a profit of \$750 this week. This profit is \$900 more than the profit P last week. Which equation can be used to find P?

Ⓐ $750 = 900 - P$ Ⓑ $750 = P + 900$

Ⓒ $900 = P - 750$ Ⓓ $900 = P + 750$

Words The profit this week is \$900 more than the profit last week.

Equation $750 = P + 900$

∴ The equation is $750 = P + 900$. The correct answer is Ⓑ.

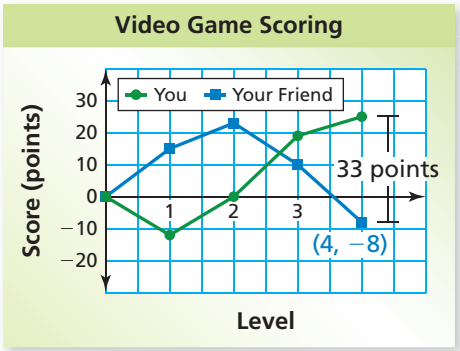
On Your Own

Now You're Ready
Exercises 22–25

4. A company has a profit of \$120.50 today. This profit is \$145.25 less than the profit P yesterday. Write an equation that can be used to find P.

EXAMPLE 3 Real-Life Application

The line graph shows the scoring while you and your friend played a video game. Write and solve an equation to find your score after Level 4.



You can determine the following from the graph.

Words Your friend's score is 33 points less than your score.

Variable Let s be your score after Level 4.

Equation $-8 = s - 33$

$-8 = s - 33$ Write equation.

$+ 33 \quad + 33$ Add 33 to each side.

$25 = s$ Simplify.

∴ Your score after Level 4 is 25 points.

Reasonable? From the graph, your score after Level 4 is between 20 points and 30 points. So, 25 points is a reasonable answer.

On Your Own

5. **WHAT IF?** In Example 3, you have -12 points after Level 1. Your score is 27 points less than your friend's score. What is your friend's score?

11.4 Exercises

Vocabulary and Concept Check

1. **VOCABULARY** What property would you use to solve $m + 6 = -4$?
2. **VOCABULARY** Name two inverse operations.
3. **WRITING** Are the equations $m + 3 = -5$ and $m = -2$ equivalent? Explain.
4. **WHICH ONE DOESN'T BELONG?** Which equation does *not* belong with the other three? Explain your reasoning.

$x + 3 = -1$ $\quad$ $x + 1 = -5$ $\quad$ $x - 2 = -6$ $\quad$ $x - 9 = -13$

Practice and Problem Solving

Solve the equation. Check your solution.

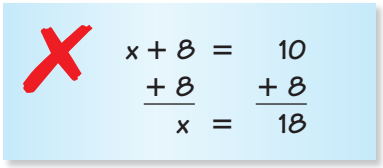
1 **5.** $a - 6 = 13$ **6.** $-3 = z - 8$ **7.** $-14 = k + 6$ **8.** $x + 4 = -14$

9. $c - 7.6 = -4$ **10.** $-10.1 = w + 5.3$ **11.** $\frac{1}{2} = q + \frac{2}{3}$ **12.** $p - 3\frac{1}{6} = -2\frac{1}{2}$

13. $g - 9 = -19$ **14.** $-9.3 = d - 3.4$ **15.** $4.58 + y = 2.5$ **16.** $x - 5.2 = -18.73$

17. $q + \frac{5}{9} = \frac{1}{6}$ **18.** $-2\frac{1}{4} = r - \frac{4}{5}$ **19.** $w + 3\frac{3}{8} = 1\frac{5}{6}$ **20.** $4\frac{2}{5} + k = -3\frac{2}{11}$

21. ERROR ANALYSIS Describe and correct the error in finding the solution.



Write the verbal sentence as an equation. Then solve.

2 **22.** 4 less than a number n is -15.

23. 10 more than a number c is 3.

24. The sum of a number y and -3 is -8.

25. The difference between a number p and 6 is -14.

In Exercises 26–28, write an equation. Then solve.

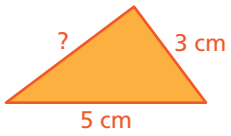
26. DRY ICE The temperature of dry ice is $-109.3°$F. This is 184.9°F less than the outside temperature. What is the outside temperature?

27. PROFIT A company makes a profit of \$1.38 million. This is \$2.54 million more than last year. What was the profit last year?

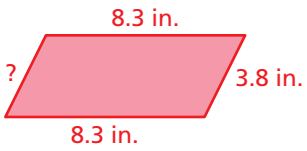
28. PIER The difference between the lengths of a paddle boat and a pier is $-7\frac{3}{4}$ feet. The pier is $18\frac{1}{2}$ feet long. How long is the paddle boat?

GEOMETRY **Write and solve an equation to find the unknown side length.**

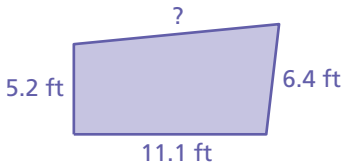
29. Perimeter = 12 cm



30. Perimeter = 24.2 in.



31. Perimeter = 34.6 ft



In Exercises 32–36, write an equation. Then solve.

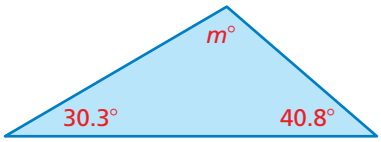
Four Seasons Hotel Miami

32. **SKYSCRAPERS** The height of the Four Seasons Hotel in Miami is 234 feet less than the Bank of America Plaza in Atlanta. What is the height of the Bank of America Plaza?

33. **BUNGEE JUMPING** Your first jump is $50\frac{1}{6}$ feet higher than your second jump. Your first jump reaches $-200\frac{2}{5}$ feet. What is the height of your second jump?

34. **TRAVEL** Gainesville is $65\frac{3}{5}$ kilometers from Ocala. A bus traveling from Ocala is $24\frac{1}{3}$ kilometers from Gainesville. How far has the bus traveled?

35. **GEOMETRY** The sum of the measures of the angles of a triangle equals 180°. What is the measure of the missing angle?



36. **SKATEBOARDING** The table shows your scores in a skateboarding competition. The leader has 311.62 points. What score do you need in the fourth round to win?

Round	1	2	3	4
Points	63.43	87.15	81.96	?

37. **CRITICAL THINKING** Find the value of $2x - 1$ when $x + 6 = 2$.

Critical Thinking **Find the values of x.**

38. $|x| = 2$

39. $|x| - 2 = 4$

40. $|x| + 5 = 18$

Fair Game Review What you learned in previous grades & lessons

Multiply or divide.

41. -7×8

42. $6 \times (-12)$

43. $18 \div (-2)$

44. $-26 \div 4$

45. **MULTIPLE CHOICE** A class of 144 students voted for a class president. Three-fourths of the students voted for you. Of the students who voted for you, $\frac{5}{9}$ are female. How many female students voted for you?

Ⓐ 50 Ⓑ 60 Ⓒ 80 Ⓓ 108

11.5 Lesson

Key Ideas

Multiplication Property of Equality

Words Multiplying each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \cdot c = b \cdot c$.

Division Property of Equality

Words Dividing each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \div c = b \div c$, $c \neq 0$.

EXAMPLE 1 Solving Equations

a. Solve $\frac{x}{3} = -6$.

$\frac{x}{3} = -6$ Write the equation.

$3 \cdot \frac{x}{3} = 3 \cdot (-6)$ Multiply each side by 3.

$x = -18$ Simplify.

∴ So, the solution is $x = -18$.

b. Solve $18 = -4y$.

$18 = -4y$ Write the equation.

$\frac{18}{-4} = \frac{-4y}{-4}$ Divide each side by –4.

$-4.5 = y$ Simplify.

∴ So, the solution is $y = -4.5$.

Check

$18 = -4y$

$18 \stackrel{?}{=} -4(-4.5)$

$18 = 18$ ✓

On Your Own

Solve the equation. Check your solution.

1. $\frac{x}{5} = -2$
2. $-a = -24$
3. $3 = -1.5n$

Now You're Ready
Exercises 7–18

EXAMPLE 2 Solving an Equation Using a Reciprocal

Solve $-\frac{4}{5}x = -8$.

$$-\frac{4}{5}x = -8$$ Write the equation.

$$-\frac{5}{4} \cdot \left(-\frac{4}{5}x\right) = -\frac{5}{4} \cdot (-8)$$ Multiply each side by $-\frac{5}{4}$, the reciprocal of $-\frac{4}{5}$.

$$x = 10$$ Simplify.

∴ So, the solution is $x = 10$.

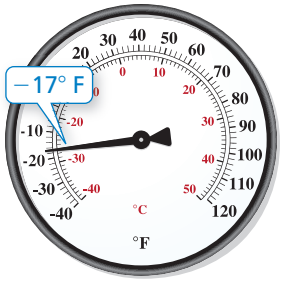
On Your Own

Now You're Ready
Exercises 19–22

Solve the equation. Check your solution.

4. $-14 = \frac{2}{3}x$ **5.** $-\frac{8}{5}b = 5$ **6.** $\frac{3}{8}h = -9$

EXAMPLE 3 Real-Life Application



Record low temperature in Georgia

The record low temperature in Georgia is 8.5 times the record low temperature in Florida. What is the record low temperature in Florida?

Words The record low in Georgia is 8.5 times the record low in Florida.

Variable Let t be the record low in Florida.

Equation $-17 = 8.5 \times t$

$$-17 = 8.5t$$ Write equation.

$$\frac{-17}{8.5} = \frac{8.5t}{8.5}$$ Divide each side by 8.5.

$$-2 = t$$ Simplify.

∴ The record low temperature in Florida is $-2°$F.

On Your Own

7. The record low temperature in Hawaii is –0.15 times the record low temperature in Alaska. The record low temperature in Hawaii is 12°F. What is the record low temperature in Alaska?

11.5 Exercises

Vocabulary and Concept Check

1. **WRITING** Explain why multiplication can be used to solve equations involving division.

2. **OPEN-ENDED** Turning a light on and then turning the light off are considered to be inverse operations. Describe two other real-life situations that can be thought of as inverse operations.

Describe the inverse operation that will undo the given operation.

3. Multiplying by 5 **4.** Subtracting 12 **5.** Dividing by -8 **6.** Adding -6

Practice and Problem Solving

Solve the equation. Check your solution.

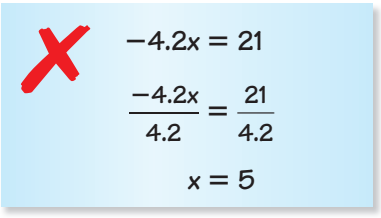
1 **7.** $3h = 15$ **8.** $-5t = -45$ **9.** $\frac{n}{2} = -7$ **10.** $\frac{k}{-3} = 9$

11. $5m = -10$ **12.** $8t = -32$ **13.** $-0.2x = 1.6$ **14.** $-10 = -\frac{b}{4}$

15. $-6p = 48$ **16.** $-72 = 8d$ **17.** $\frac{n}{1.6} = 5$ **18.** $-14.4 = -0.6p$

2 **19.** $\frac{3}{4}g = -12$ **20.** $8 = -\frac{2}{5}c$ **21.** $-\frac{4}{9}f = -3$ **22.** $26 = -\frac{8}{5}y$

23. ERROR ANALYSIS Describe and correct the error in finding the solution.



Write the verbal sentence as an equation. Then solve.

24. A number divided by -9 is -16.

25. A number multiplied by $\frac{2}{5}$ is $\frac{3}{20}$.

26. The product of 15 and a number is -75.

27. The quotient of a number and -1.5 is 21.

In Exercises 28 and 29, write an equation. Then solve.

28. NEWSPAPERS You make \$0.75 for every newspaper you sell. How many newspapers do you have to sell to buy the soccer cleats?

29. ROCK CLIMBING A rock climber averages $12\frac{3}{5}$ feet per minute. How many feet does the rock climber climb in 30 minutes?

OPEN-ENDED **(a) Write a multiplication equation that has the given solution. (b) Write a division equation that has the same solution.**

30. -3 **31.** -2.2 **32.** $-\frac{1}{2}$ **33.** $-1\frac{1}{4}$

34. REASONING Which of the methods can you use to solve $-\frac{2}{3}c = 16$?

Multiply each side by $-\frac{2}{3}$.

Multiply each side by $-\frac{3}{2}$.

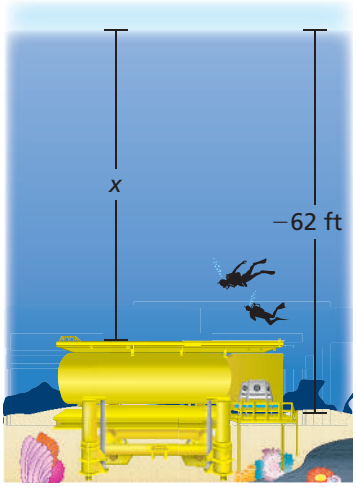
Divide each side by $-\frac{2}{3}$.

Multiply each side by 3, then divide each side by -2.

35. STOCK A stock has a return of $-\$1.26$ per day. Write and solve an equation to find the number of days until the total return is $-\$10.08$.

36. ELECTION In a school election, $\frac{3}{4}$ of the students vote. There are 1464 ballots. Write and solve an equation to find the number of students.

37. OCEANOGRAPHY Aquarius is an underwater ocean laboratory located in the Florida Keys National Marine Sanctuary. Solve the equation $\frac{31}{25}x = -62$ to find the value of x.



38. SHOPPING The price of a bike at store A is $\frac{5}{6}$ the price at store B. The price at store A is \$150.60. Write and solve an equation to find how much you save by buying the bike at store A.

39. CRITICAL THINKING Solve $-2|m| = -10$.

40. Number Sense In four days, your family drives $\frac{5}{7}$ of a trip. Your rate of travel is the same throughout the trip. The total trip is 1250 miles. How many more days until you reach your destination?

Fair Game Review What you learned in previous grades & lessons

Subtract.

41. $5 - 12$ **42.** $-7 - 2$ **43.** $4 - (-8)$ **44.** $-14 - (-5)$

45. MULTIPLE CHOICE Of the 120 apartments in a building, 75 have been scheduled to receive new carpet. What fraction of the apartments have not been scheduled to receive new carpet?

(A) $\frac{1}{4}$ (B) $\frac{3}{8}$ (C) $\frac{5}{8}$ (D) $\frac{3}{4}$

11.6 Lesson

EXAMPLE 1 Solving a Two-Step Equation

Solve $-3x + 5 = 2$. Check your solution.

$$-3x + 5 = 2$$ Write the equation.

$$-5 \quad -5$$ Subtract 5 from each side.

$$-3x = -3$$ Simplify.

$$\frac{-3x}{-3} = \frac{-3}{-3}$$ Divide each side by -3.

$$x = 1$$ Simplify.

So, the solution is $x = 1$.

Check

$$-3x + 5 = 2$$

$$-3(1) + 5 \stackrel{?}{=} 2$$

$$-3 + 5 \stackrel{?}{=} 2$$

$$2 = 2 \checkmark$$

On Your Own

Now You're Ready
Exercises 6–17

Solve the equation. Check your solution.

1. $2x + 12 = 4$ **2.** $-5c + 9 = -16$ **3.** $3(x - 4) = 9$

EXAMPLE 2 Solving a Two-Step Equation

Solve $\frac{x}{8} - \frac{1}{2} = -\frac{7}{2}$.

$$\frac{x}{8} - \frac{1}{2} = -\frac{7}{2}$$ Write the equation.

$$+\frac{1}{2} \quad +\frac{1}{2}$$ Add $\frac{1}{2}$ to each side.

$$\frac{x}{8} = -3$$ Simplify.

$$8 \cdot \frac{x}{8} = 8 \cdot (-3)$$ Multiply each side by 8.

$$x = -24$$ Simplify.

So, the solution is $x = -24$.

Study Tip

You can simplify the equation in Example 2 before solving. Multiply each side by the LCD of the fractions, 8.

$$\frac{x}{8} - \frac{1}{2} = -\frac{7}{2}$$

$$x - 4 = -28$$

$$x = -24$$

On Your Own

Now You're Ready
Exercises 20–25

Solve the equation. Check your solution.

4. $\frac{m}{2} + 6 = 10$ **5.** $-\frac{z}{3} + 5 = 9$ **6.** $\frac{2}{5} + 4a = -\frac{6}{5}$

EXAMPLE 3 Combining Like Terms Before Solving

Solve $3y - 8y = 25$.

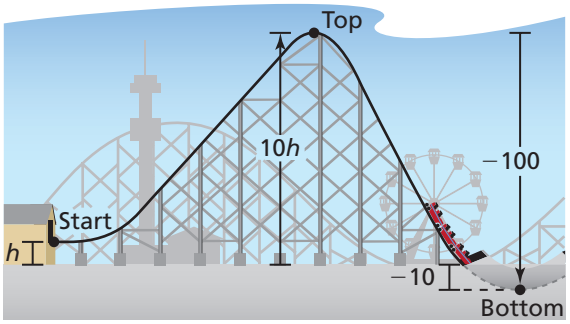
$3y - 8y = 25$ Write the equation.

$-5y = 25$ Combine like terms.

$y = -5$ Divide each side by -5.

∴ So, the solution is $y = -5$.

EXAMPLE 4 Real-Life Application



The height at the top of a roller coaster hill is 10 times the height h of the starting point. The height decreases 100 feet from the top to the bottom of the hill. The height at the bottom of the hill is −10 feet. Find h.

Location	Verbal Description	Expression
Start	The height at the start is h.	h
Top of hill	The height at the top of the hill is 10 times the starting height h.	$10h$
Bottom of hill	Height decreases by 100 feet. So, subtract 100.	$10h - 100$

The height at the bottom of the hill is -10 feet. Solve $10h - 100 = -10$ to find h.

$10h - 100 = -10$ Write equation.

$10h = 90$ Add 100 to each side.

$h = 9$ Divide each side by 10.

∴ The height at the start is 9 feet.

On Your Own

Now You're Ready
Exercises 29–34

Solve the equation. Check your solution.

7. $4 - 2y + 3 = -9$ **8.** $7x - 10x = 15$ **9.** $-8 = 1.3m - 2.1m$

10. WHAT IF? In Example 4, the height at the bottom of the hill is -5 feet. Find the height h.

11.6 Exercises

Vocabulary and Concept Check

1. WRITING How do you solve two-step equations?

Match the equation with the first step to solve it.

2. $4 + 4n = -12$ **3.** $4n = -12$ **4.** $\frac{n}{4} = -12$ **5.** $\frac{n}{4} - 4 = -12$

A. Add 4. **B.** Subtract 4. **C.** Multiply by 4. **D.** Divide by 4.

Practice and Problem Solving

Solve the equation. Check your solution.

6. $2v + 7 = 3$ **7.** $4b + 3 = -9$ **8.** $17 = 5k - 2$

9. $-6t - 7 = 17$ **10.** $8n + 16.2 = 1.6$ **11.** $-5g + 2.3 = -18.8$

12. $2t - 5 = -10$ **13.** $-4p + 9 = -5$ **14.** $11 = -5x - 2$

15. $4 + 2.2h = -3.7$ **16.** $-4.8f + 6.4 = -8.48$ **17.** $7.3y - 5.18 = -51.9$

ERROR ANALYSIS **Describe and correct the error in finding the solution.**

18.

$$-6 + 2x = -10$$
$$-6 + \frac{2x}{2} = -\frac{10}{2}$$
$$-6 + x = -5$$
$$x = 1$$

19.

$$-3x + 2 = -7$$
$$-3x = -9$$
$$-\frac{3x}{3} = \frac{-9}{3}$$
$$x = -3$$

Solve the equation. Check your solution.

20. $\frac{3}{5}g - \frac{1}{3} = -\frac{10}{3}$ **21.** $\frac{a}{4} - \frac{5}{6} = -\frac{1}{2}$ **22.** $-\frac{1}{3} + 2z = -\frac{5}{6}$

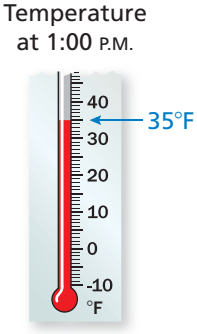
23. $2 - \frac{b}{3} = -\frac{5}{2}$ **24.** $-\frac{2}{3}x + \frac{3}{7} = \frac{1}{2}$ **25.** $-\frac{9}{4}v + \frac{4}{5} = \frac{7}{8}$

In Exercises 26–28, write an equation. Then solve.

26. WEATHER Starting at 1:00 P.M., the temperature changes -4 degrees per hour. How long will it take to reach $-1°$?

27. BOWLING It costs \$2.50 to rent bowling shoes. Each game costs \$2.25. You have \$9.25. How many games can you bowl?

28. CELL PHONES A cell phone company charges a monthly fee plus \$0.25 for each text message. The monthly fee is \$30.00 and you owe \$59.50. How many text messages did you have?



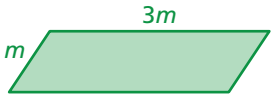
Solve the equation. Check your solution.

29. $3v - 9v = 30$ **30.** $12t - 8t = -52$ **31.** $-8d - 5d + 7d = 72$

32. $6(x - 2) = -18$ **33.** $-4(m + 3) = 24$ **34.** $-8(y + 9) = -40$

35. WRITING Write a real-world problem that can be modeled by $\frac{1}{2}x - 2 = 8$. Then solve the equation.

36. GEOMETRY The perimeter of the parallelogram is 102 feet. Find m.



REASONING Exercises 37 and 38 are missing information. Tell what information is needed to solve the problem.

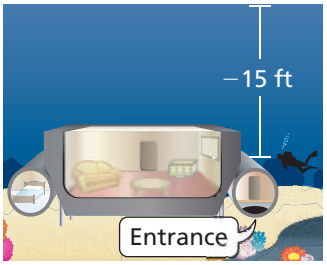
37. TAXI A taxi service charges an initial fee plus \$1.80 per mile. How far can you travel for \$12?

38. EARTH The coldest surface temperature on the moon is 57 degrees colder than twice the coldest surface temperature on Earth. What is the coldest surface temperature on Earth?

39. SCIENCE On Saturday, you catch insects for your science class. Five of the insects escape. The remaining insects are divided into three groups to share in class. Each group has nine insects. How many insects did you catch on Saturday?

a. Solve the problem by working backwards.

b. Solve the equation $\frac{x - 5}{3} = 9$. How does the answer compare with the answer to part (a)?



40. UNDERWATER HOTEL You must scuba dive to the entrance of your room at Jule's Undersea Lodge in Key Largo, Florida. The diver is 1 foot deeper than $\frac{2}{3}$ of the elevation of the entrance. What is the elevation of the entrance?

41. Geometry How much should you change the length of the rectangle so that the perimeter is 54 centimeters? Write an equation that shows how you found your answer.

Fair Game Review What you learned in previous grades & lessons

Multiply or divide.

42. -6.2×5.6 **43.** $\frac{8}{3} \times \left(-2\frac{1}{2}\right)$ **44.** $\frac{5}{2} \div \left(-\frac{4}{5}\right)$ **45.** $-18.6 \div (-3)$

46. MULTIPLE CHOICE Which fraction is *not* equivalent to 0.75?

Ⓐ $\frac{15}{20}$ Ⓑ $\frac{9}{12}$ Ⓒ $\frac{6}{9}$ Ⓓ $\frac{3}{4}$

11.4–11.6 Quiz

Solve the equation. Check your solution.

1. $-6.5 + x = -4.12$

2. $4\frac{1}{2} + p = -5\frac{3}{4}$

3. $-\frac{b}{7} = 4$

4. $2h = -57$

Write the verbal sentence as an equation. Then solve.

5. The difference between a number b and 7.4 is -6.8.

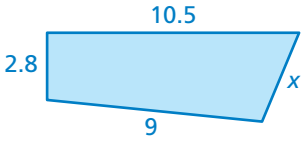
6. $5\frac{2}{5}$ more than a number a is $7\frac{1}{2}$.

7. A number x multiplied by $\frac{3}{8}$ is $-\frac{15}{32}$.

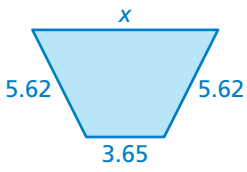
8. The quotient of two times a number k and -2.6 is 12.

Write and solve an equation to find the value of x.

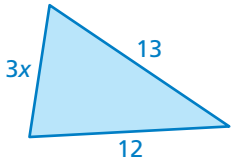
9. Perimeter = 26



10. Perimeter = 23.59



11. Perimeter = 33

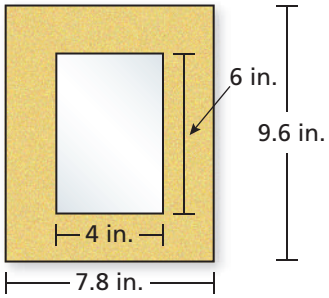


12. **BANKING** You withdraw \$29.79 from your bank account. Now, your balance is $-$\$20.51. Write and solve an equation to find the amount of money in your bank account before you withdrew the money.

13. **WATER LEVEL** During a drought, the water level of a lake changes $-3\frac{1}{5}$ feet per day. Write and solve an equation to find how long it takes for the water level to change -16 feet.

14. **BASKETBALL** A basketball game has four quarters. The length of a game is 32 minutes. You play the entire game except $4\frac{1}{2}$ minutes. Write and solve an equation to find the mean time you play per quarter.

15. **SCRAPBOOKING** The mat needs to be cut to have a 0.5-inch border on all four sides.



a. How much should you cut from the left and right sides?

b. How much should you cut from the top and bottom?

11 Chapter Test

Write the rational number as a decimal.

1. $\frac{7}{40}$ **2.** $-\frac{1}{9}$ **3.** $-\frac{21}{16}$ **4.** $\frac{36}{5}$

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

5. -0.122 **6.** 0.33 **7.** -4.45 **8.** -7.09

Add or subtract. Write fractions in simplest form.

9. $-\frac{4}{9} + \left(-\frac{23}{18}\right)$ **10.** $\frac{17}{12} - \left(-\frac{1}{8}\right)$ **11.** $9.2 + (-2.8)$ **12.** $2.86 - 12.1$

Multiply or divide. Write fractions in simplest form.

13. $3\frac{9}{10} \times \left(-\frac{8}{3}\right)$ **14.** $-1\frac{5}{6} \div 4\frac{1}{6}$ **15.** $-4.4 \times (-6.02)$ **16.** $-5 \div 1.5$

Solve the equation. Check your solution.

17. $7x = -3$ **18.** $2(x + 1) = -2$ **19.** $\frac{2}{9}g = -8$

20. $z + 14.5 = 5.4$ **21.** $-14 = 6c$ **22.** $\frac{2}{7}k - \frac{3}{8} = -\frac{19}{8}$

23. MARATHON A marathon is a 26.2-mile race. You run three marathons in one year. How many miles do you run?

24. RECORD A runner is compared with the world record holder during a race. A negative number means the runner is ahead of the time of the world record holder, and a positive number means that the runner is behind the time of the world record holder. The table shows the time difference between the runner and the world record holder for each lap. What time difference does the runner need for the fourth lap to match the world record?

Lap	Time Difference
1	-1.23
2	0.45
3	0.18
4	?

25. GYMNASTICS You lose 0.3 point for stepping out of bounds during a floor routine. Your final score is 9.124. Write and solve an equation to find your score before the penalty.

26. PERIMETER The perimeter of the triangle is 45. Find the value of x.