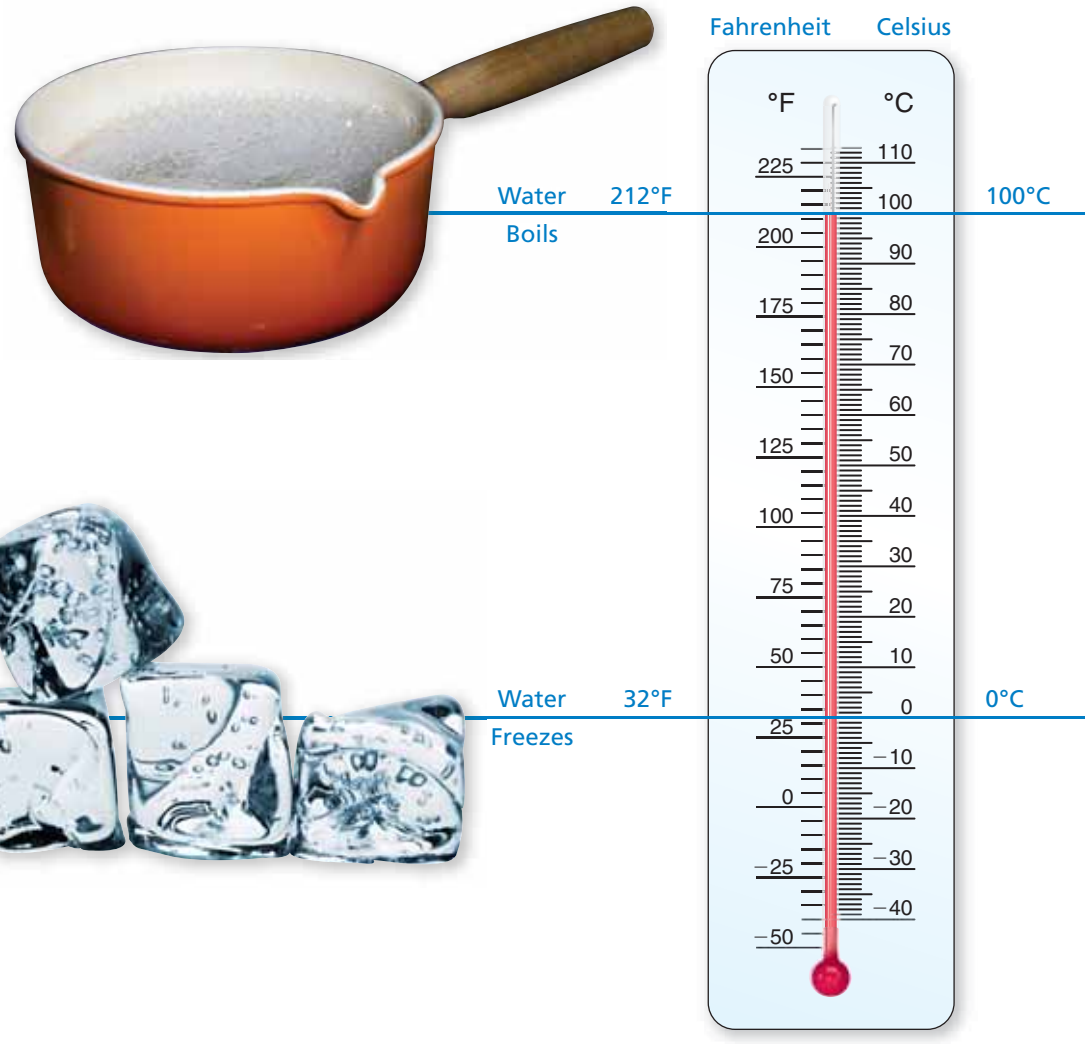
English Spanish

B.1 Solving Multi-Step Equations

Essential Question How can you convert temperatures between the Fahrenheit and Celsius scales?

1 ACTIVITY: Comparing Fahrenheit and Celsius

Work with a partner. The temperature scales show the relationship between the Fahrenheit and Celsius scales. Use the two scales to complete the table.



F	0°	32°	70°	80°	90°	100°	212°
C							

2 ACTIVITY: Comparing Fahrenheit and Celsius

Work with a partner.

a. Plot the points from the table in Activity 1.

b. Draw a line through the points.

c. Find the slope of the line. Write the slope as a fraction in simplest form.

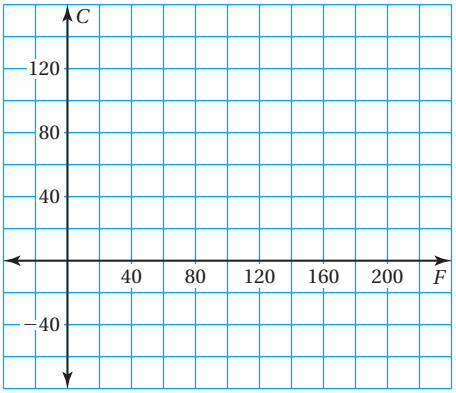
d. Which of the following shows the relationship between C and F?

$C = \frac{5}{9}(F + 32)$

$C = \frac{5}{9}(F - 32)$

$C = \frac{9}{5}(F + 32)$

$C = \frac{9}{5}(F - 32)$



3 ACTIVITY: Converting Temperatures

Work with a partner. You have email pals in four countries that use the Celsius scale. Write each temperature in degrees Fahrenheit. Then use the scale in Activity 1 to check that your answer is reasonable.

a. Canada: 19°C

b. Mexico: 35°C

c. Japan: 28°C

d. Russia: 6°C

What Is Your Answer?

4. IN YOUR OWN WORDS How can you convert temperatures between the Fahrenheit and Celsius scales? Give two examples.

Practice Use what you learned about multi-step equations to complete Exercises 3–5 on page A14.

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B.1 Lesson

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EXAMPLE 1 Combining Like Terms to Solve an Equation

Solve $-2x + 4x - 12 = 40$. Check your solution.

$-2x + 4x - 12 = 40$	Write the equation.
$2x - 12 = 40$	Combine like terms.
$+ 12 \quad + 12$	Undo the subtraction by adding 12 to each side.
$2x = 52$	Simplify.
$\frac{2x}{2} = \frac{52}{2}$	Undo the multiplication by dividing each side by 2.
$x = 26$	Simplify.

∴ The solution is $x = 26$.

Check

$$-2x + 4x - 12 = 40$$
$$-2(26) + 4(26) - 12 \stackrel{?}{=} 40$$
$$-52 + 104 - 12 \stackrel{?}{=} 40$$
$$40 = 40 \checkmark$$

EXAMPLE 2 Using the Distributive Property to Solve an Equation

Solve $4(2x - 7) + 5 = -39$.

$4(2x - 7) + 5 = -39$	Write the equation.
$4(2x) - 4(7) + 5 = -39$	Use Distributive Property.
$8x - 28 + 5 = -39$	Multiply.
$8x - 23 = -39$	Combine like terms.
Undo the subtraction. → $+ 23 \quad + 23$	Add 23 to each side.
$8x = -16$	Simplify.
Undo the multiplication. → $\frac{8x}{8} = \frac{-16}{8}$	Divide each side by 8.
$x = -2$	Simplify.

∴ The solution is $x = -2$.

On Your Own

Now You're Ready
Exercises 6–11

Solve the equation. Check your solution.

1. $51 - 2z - 8z = 23$
2. $2 + \frac{1}{2}y - 34 = -12$
3. $-2(x + 5) - 4x = 11$
4. $3 - 2.5(3 - 2d) = 5.5$

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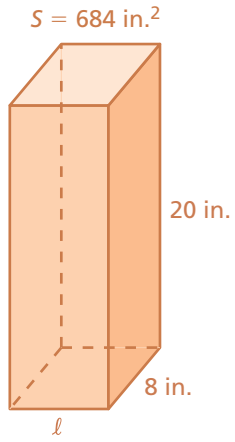
EXAMPLE 3 Using a Formula



The surface area of a rectangular prism can be found using the formula $S = 2\ell w + 2\ell h + 2wh$. What is the length of the prism?

$S = 2\ell w + 2\ell h + 2wh$	Write the formula.
$684 = 2\ell(8) + 2\ell(20) + 2(8)(20)$	Substitute.
$684 = 16\ell + 40\ell + 320$	Simplify.
$684 = 56\ell + 320$	Combine like terms.
$-320 \quad -320$	Subtract 320 from each side.
$364 = 56\ell$	Simplify.
$\frac{364}{56} = \frac{56\ell}{56}$	Divide each side by 56.
$6.5 = \ell$	Simplify.

∴ The length is 6.5 inches.

EXAMPLE 4 Real-Life Application

Your order for concert tickets is shown. You receive one free song download per ticket. How many song downloads do you receive?

Let x be the number of tickets.

Each ticket has a \$6.50 service charge. | The order has a \$3.30 processing fee. | Each ticket is \$37. | The total is \$220.80.

$37x + 6.5x + 3.3 = 220.8$	Write an equation.
$43.5x + 3.3 = 220.8$	Combine like terms.
$-3.3 \quad -3.3$	Subtract 3.3 from each side.
$43.5x = 217.5$	Simplify.
$\frac{43.5x}{43.5} = \frac{217.5}{43.5}$	Divide each side by 43.5.
$x = 5$	Simplify.

Review Order

Item	Charge
TICKET PRICE	\$37.00 per ticket
Service Charges	\$6.50 per ticket
Processing Fee	**\$3.30**
Will Call	**Free**
TOTAL	**\$220.80**

∴ You purchase 5 tickets. So, you receive 5 song downloads.

On Your Own

5. **WHAT IF?** In Example 3, the surface area of the prism is 656 square inches. What is the length of the prism?
6. **WHAT IF?** In Example 4, you change your order. The total is \$133.80. How many song downloads do you receive?

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B.1 Exercises

Check It Out
Help with Homework
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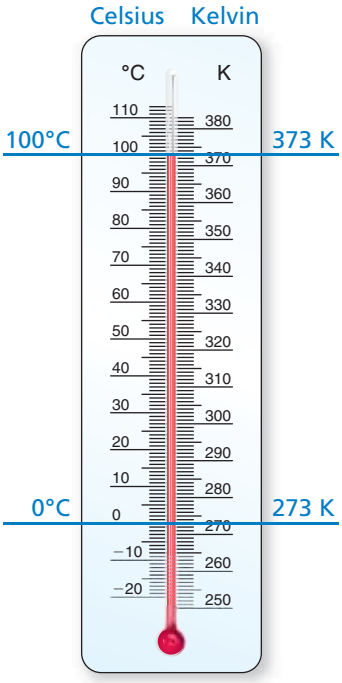
Vocabulary and Concept Check

1. **REASONING** Describe the steps you would use to solve the equation $6x + 3x + 2 = 8$.
2. **REASONING** Describe the steps you would use to solve the equation $2(4x - 5) + 11 = -63$.

Practice and Problem Solving

Use the temperature scales to convert between Celsius and Kelvin.



3. Kelvin is a temperature scale used by scientists. Convert 40°C to Kelvin.
4. Water boils at 100°C. At what temperature does water boil on the Kelvin scale?
5. Write an equation that describes the relationship between Kelvin and Celsius.

Solve the equation. Check your solution.

1 2 6. $-3x + 7x = 17 + 11$

7. $3x + 12x - 20 = 25$

8. $-5n + 6n + 15 - 3n = -3$

9. $3(2m + 9) - 1 = 2$

10. $4(x - 3) + 7 - 10x = 5$

11. $\frac{2}{3}(y - 12) = -6$

12. **ERROR ANALYSIS** Describe and correct the error in solving the equation.

✗
$2x - 6x + 4 = 12$
$-4x + 4 = 12$
$x + 4 = -3$
$x = -7$

13. **PUZZLE** Twenty-five more than 3 times the quantity of a number decreased by 9 is 43. Find the number.

3 14. **CYLINDER** What is the diameter of a soup can if the lateral surface area is 188.4 square centimeters and the height is 10 centimeters?

15. **MOVIES** You and three friends go to the movies.

   a. Your group purchases 2 specials, 2 single tickets, and one additional box of popcorn. The total is $36.50. What is the price of a single ticket?
   b. The price of 2 boxes of popcorn and 3 drinks is fifty cents more than purchasing one special. What is the price of a drink?

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16. **PUZZLE** During a recent season, there were 18 girls on the high school softball team. There were equal numbers of freshmen, sophomores, and seniors on the team. The number of juniors was two less than the number of seniors. How many juniors were on the team?

17. **SALE** A store is having a clearance sale. The total for a skirt, a pair of shoes, and a pair of socks is $25.60 before tax. The pair of socks costs $3.50. The original prices of the skirt and the shoes were the same. What is the sale price of the skirt?

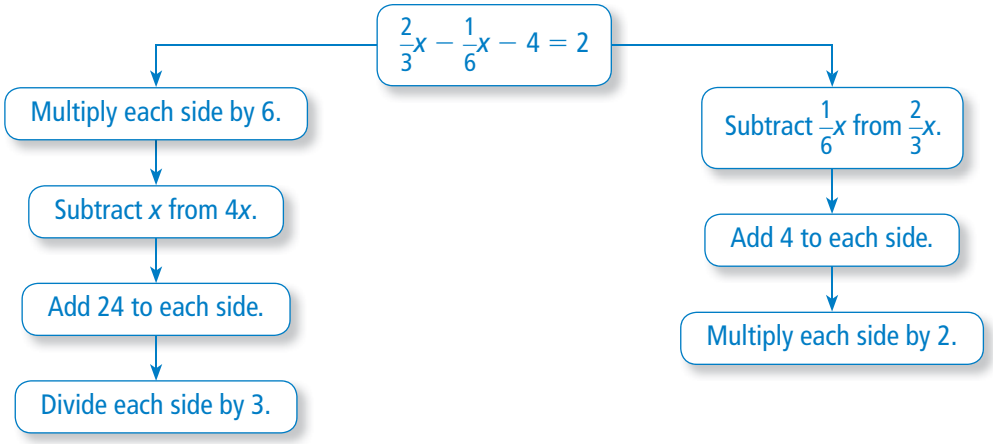
18. **RUNNING** Use the clues given by the table.

a. You ran a total of 12 miles this week. Make a table showing the number of miles you ran each day.

b. Did you run every day? Explain.

Day	Mon.	Tues.	Wed.	Thurs.	Fri.
Distance	x	$\frac{1}{6}x$	$1-\frac{1}{4}x$	$x-\frac{2}{3}$	x

19. Critical Thinking Use the graphic organizer to solve the equation in two different ways. What are the advantages and disadvantages of each way?



Fair Game Review What you learned in previous grades & lessons

Simplify. SKILLS REVIEW HANDBOOK

20. $12[10-(3+6)]+14$

21. $2[4+(3+6)]-12-2$

22. **MULTIPLE CHOICE** What is the value of the expression below? SECTION 1.4

$$-4^2-(-3)^2+1$$

(A) -24 (B) -6 (C) 3 (D) 6