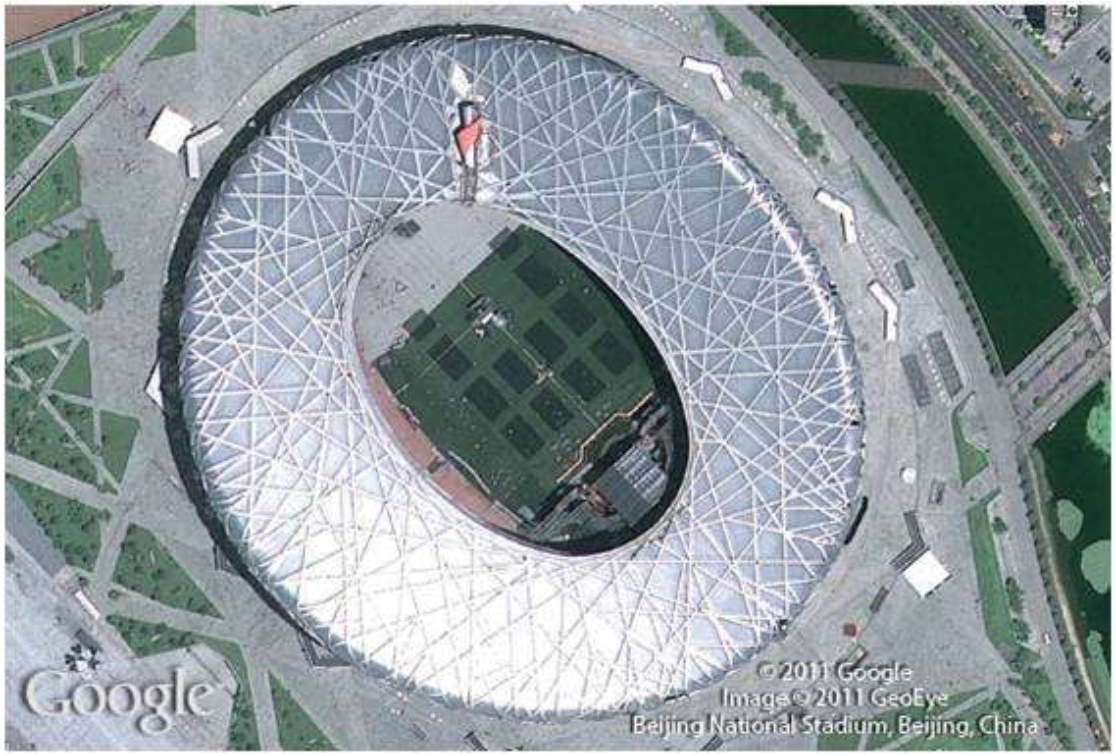
Decimals

5



SECTION 5.6

Equations Containing Decimals

Objectives

A Solve equations containing decimals.

B Solve applications involving equations with decimals.

A Solving Equations

Example 1

Solve the equation $x + 8.2 = 5.7$.

Solution:

We use the addition property of equality to add –8.2 to each side of the equation.

$$x + 8.2 = 5.7$$

$$x + 8.2 + \mathbf{(-8.2)} = 5.7 + \mathbf{(-8.2)} \qquad \text{Add } -8.2 \text{ to each side.}$$

$$x + 0 = -2.5 \qquad \text{Simplify each side.}$$

$$x = -2.5$$

Example 2

Solve: $3y = 2.73$

Solution:

To isolate *y* on the left side, we divide each side by 3.

$$3y = 2.73$$

$$\frac{3y}{\mathbf{3}} = \frac{2.73}{\mathbf{3}}$$ Divide each side by 3.

$$y = 0.91$$

Example 3

Solve: $\frac{1}{2}x - 3.78 = 2.52.$

Solution:

We begin by adding 3.78 to each side of the equation. Then we multiply each side by 2.

$$\frac{1}{2}x - 3.78 = 2.52$$

$$\frac{1}{2}x - 3.78 + \mathbf{3.78} = 2.52 + \mathbf{3.78}$$ Add 3.78 to each side.

$$\frac{1}{2}x = 6.30$$

Example 3

cont'd

$$\mathbf{2}\left(\frac{1}{2}x\right) = \mathbf{2}(6.30)$$

Multiply each side by 2.

$$x = 12.6$$

B Applications

Applications

Now we'll apply the Blueprint for Problem Solving to the forthcoming application that involve equations with decimals.

Example 6

Diane has $1.60 in dimes and nickels. If she has 7 more dimes than nickels, how many of each coin does she have?

Solution:

We use our Blueprint for Problem Solving as a guide to solving this application problem.

Step 1: *Read and list.*

Known items: We have dimes and nickels, seven more dimes than nickels.

Unknown items: Number of dimes and the number of nickels

Example 6

cont'd

Step 2: *Assign a variable and translate information.*

If we let x = the number of nickels, then the number of dimes must be $x + 7$, because Diane has 7 more dimes than nickels. Since each nickel is worth 5 cents, the amount of money she has in nickels is $0.05x$. Similarly, since each dime is worth 10 cents, the amount of money she has in dimes is $0.10(x + 7)$.

Example 6 – *Solution*

cont'd

Here is a table that summarizes what we have so far:

	Nickels	Dimes
Number of	x	$x + 7$
Value of	$0.05x$	$0.10(x + 7)$

Example 6 – *Solution*

cont'd

Step 3: *Reread and write an equation.*

Because the total value of all the coins is \$1.60, the equation that describes this situation is

$$\underbrace{\text{Amount of money in nickels}}_{0.05x} + \underbrace{\text{Amount of money in dimes}}_{0.10(x+7)} = \underbrace{\text{Total amount of money}}_{1.60}$$

Example 6 – *Solution*

cont'd

Step 4: *Solve the equation.*

Let's show the essential steps in the solution.

$$0.05x + 0.10x + 0.70 = 1.60$$ Distributive property

$$0.15x + 0.70 = 1.60$$ Add $0.05x$ and $0.10x$ to get $0.15x$.

$$0.15x = 0.90$$ Add -0.70 to each side.

$$x = 6$$ Divide each side by 0.15.

Example 6 – *Solution*

cont'd

Step 5: *Write the answer.*

Because $x = 6$, Diane has 6 nickels. To find the number of dimes, we add 7 to the number of nickels (she has 7 more dimes than nickels). The number of dimes is $6 + 7 = 13$.

Step 6: *Reread and check.*

$$\begin{aligned} 6 \text{ nickels are worth } 6(\$0.05) &= \$0.30 \\ 13 \text{ dimes are worth } 13(\$0.10) &= \$1.30 \\ \hline \text{The total value is } \$1.60. & \end{aligned}$$