

3-4 Using Equations to Solve Problems

Objective: To use the five-step plan to solve word problems.

Example 1 The sum of 25 and twice a number is 93. Find the number.

Solution

Steps 1, 2 Let n = the number. Then $2n$ = twice the number.

Step 3 The sum of 25 and twice a number is 93.

$$25 + 2n = 93$$

Step 4 Solve. $25 - 25 + 2n = 93 - 25$

$$2n = 68$$

$$n = 34$$

Step 5 *Check in the words of the problem:* Is the sum of 25 and twice 34 equal to 93?

$$25 + 2(34) \stackrel{?}{=} 93$$

$$25 + 68 \stackrel{?}{=} 93$$

$$93 = 93 \checkmark \quad \text{The number is 34.}$$

Solve each problem using the five-step plan to help you.

1. The sum of 17 and twice a number is 87.
Find the number.

2. The sum of 8 and three times a number is 128.
Find the number.

3. Seven more than twice a number is 175.
Find the number.

4. Four less than half a number is 15.
Find the number.

5. When one half of a number is decreased
by 13, the result is 62. Find the number.

6. Six less than two thirds of a number is 18.
Find the number.

Example 2 Find four consecutive even integers whose sum is 44.

Solution

Steps 1, 2 Let n = the first integer. Then $n + 2$ = the second integer,
 $n + 4$ = the third integer, and $n + 6$ = the fourth integer.

Step 3 The sum of the four consecutive even integers is 44.

$$n + (n + 2) + (n + 4) + (n + 6) = 44$$

Step 4 Solve.

$$4n + 12 = 44$$

$$4n = 32$$

$$n = 8$$

$$n + 2 = 10$$

$$n + 4 = 12$$

$$n + 6 = 14$$

{ If you're careful, you can subtract 12
from each side in your head.

← the first integer

← the second integer

← the third integer

← the fourth integer

Step 5 *Check:* $8 + 10 + 12 + 14 \stackrel{?}{=} 44$

$$44 = 44 \checkmark$$

The numbers are 8, 10, 12, and 14.

3-4 Using Equations to Solve Problems (continued)

Solve each problem using the five-step plan to help you.

7. Find three consecutive integers whose sum is 138.
8. Find three consecutive odd integers whose sum is 87.
9. Find three consecutive even integers whose sum is 150.
10. Find four consecutive odd integers whose sum is 144.
11. Find five consecutive integers whose sum is 160.
12. Otto has \$140. If he saves \$2.50 per week, how long will it take him to have \$200?

Example 3 The length of a rectangle is 9 cm more than the width. The perimeter is 78 cm. Find the length and the width.

Solution

Step 1 Draw a diagram to help you understand the problem.

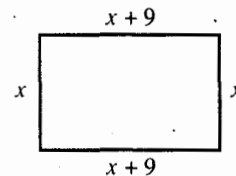
Step 2 Let x = the width. Then $x + 9$ = the length.

Step 3
$$\begin{aligned} \text{perimeter} &= 78 \\ x + (x + 9) + x + (x + 9) &= 78 \end{aligned}$$

Step 4 Solve.
$$\begin{aligned} 4x + 18 &= 78 \\ 4x &= 60 \\ x &= 15 \quad \text{and} \quad x + 9 = 24 \end{aligned}$$

Step 5 *Check:* Is the sum of the lengths of the sides 78 cm?

$$\begin{aligned} 15 + 24 + 15 + 24 &\stackrel{?}{=} 78 \\ 78 &= 78 \checkmark \quad \text{The width is 15 cm. The length is 24 cm.} \end{aligned}$$



Solve each problem using the five-step plan. Draw a diagram to help you.

13. The length of a rectangle is 11 cm more than the width. The perimeter is 90 cm. Find the length and width of the rectangle.
14. The width of a rectangle is 12 cm less than the length. The perimeter is 120 cm. Find the length and width of the rectangle.
15. The perimeter of a rectangle is 232 cm and the width is 56 cm. Find the length of the rectangle.
16. The perimeter of a rectangle is 340 cm and the length is 90 cm. Find the width of the rectangle.

Mixed Review Exercises

Solve.

1. $-3 + y = 2$

2. $x - 1.2 = 6$

3. $y + 6 = 15$

4. $\frac{2}{3}y = 6$

5. $-15 = \frac{c}{2}$

6. $-\frac{1}{5}x = 12$

7. $31 = y - 9$

8. $x - 15 = 16$

9. $0.25y = 8$

10. $3y + 2 = 17$

11. $2x - 3 = 15$

12. $3(a - 1) + 5 = 32$