NAME _____ DATE _____

4–9 Area Problems

Objective: To solve some problems involving area.

Formula

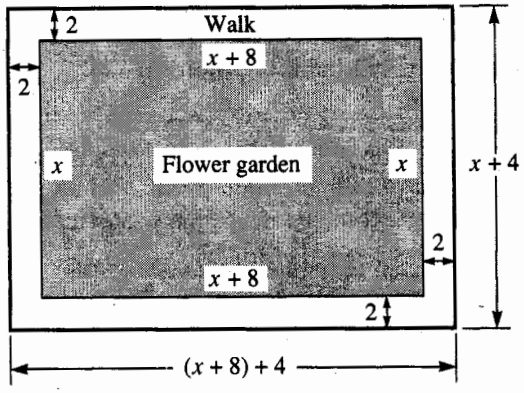
Area of rectangle = length × width

Example A rectangular flower garden is 8 ft longer than it is wide. It is surrounded by a brick walk 2 ft wide. The area of the walk is 176 ft^2. Find the dimensions of the flower garden.

Solution

Step 1 The problem asks for the dimensions of the flower garden.
Make a sketch.

Step 2 Let x = the width of the flower garden.
Then $x + 8$ = the length of the flower garden.
Label your sketch.



Step 3 Area of walk = Area of garden and walk − Area of garden

$$176 = (x + 12)(x + 4) - x(x + 8)$$

Step 4

$$176 = x^2 + 16x + 48 - x^2 - 8x$$
$$176 = 8x + 48$$
$$128 = 8x$$
$$16 = x \text{ and } x + 8 = 24$$

Step 5 *Check:* If the dimensions of the flower garden are 16 ft and 24 ft, the dimensions of the flower garden and walk are 20 ft and 28 ft.

Area of the flower garden and walk = $20 \cdot 28 = 560$ (ft^2)
Area of the flower garden = $16 \cdot 24 = 384$ (ft^2)
Area of walk = $560 - 384 = 176$ (ft^2)

The dimensions of the flower garden are 24 ft and 16 ft.

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4–9 Area Problems *(continued)*

Solve.

1. A rectangle is twice as long as it is wide. If its length and width are both decreased by 4 cm, its area is decreased by 164 cm^2. Find its original dimensions.
2. A rectangle is three times as long as it is wide. If its length and width are both increased by 3 m, its area is increased by 81 m^2. Find its original dimensions.
3. A rectangle is 8 cm longer than it is wide. If its length and width are both increased by 2 cm, its area is increased by 68 cm^2. Find its original dimensions.
4. A rectangle is 12 cm longer than it is wide. If its length and width are both decreased by 2 cm, its area is decreased by 108 cm^2. Find its original dimensions.
5. A rectangular fish pond is 8 ft longer than it is wide. A wooden walk 2 ft wide is placed around the pond. The area covered by the pond and walk is 160 ft^2 greater than the area covered by the pond alone. What are the dimensions of the pond?
6. A rectangular swimming pool is 10 m longer than it is wide. A walkway 2 m wide surrounds the pool. Find the dimensions of the pool if the area of the walkway is 216 m^2.
7. A poster is 24 cm taller than it is wide. If it is mounted on a piece of cardboard so that there is a 6 cm border on all sides and if the area of the border alone is 720 cm^2, what are the dimensions of the poster?
8. A poster is 20 cm longer than it is wide. It is mounted on a piece of cardboard so that there is a 10 cm border on all sides. If the area of the border is 2400 cm^2, what is the area of the poster?
9. A house has two rooms of equal area. One room is square and the other is 6 ft narrower and 9 ft longer than the square room. Find the area of each room.
10. A baker has two pans with the same area. One pan is square and the other is 6 cm narrower and 8 cm longer than the square pan. Find the area of each pan.

Mixed Review Exercises

Simplify.

1. $(-3 + 7) + (-6)$
2. $4(c - 1) + (2)c + 7$
3. $(3x^2y)^4$
4. $y - (-5) - [y + (-3)]$
5. $4^3 \cdot 2^2$
6. $(5 \cdot 4 + 3 \cdot 4) \div (4 \cdot 2)$
7. $-\frac{8}{3} + \frac{2}{3} + 2$
8. $\left(\frac{1}{3}x^3\right)\left(\frac{3}{5}x^2\right)$
9. $-\frac{x}{8}(-96)$
10. $(-7 + 11) + (-4)$
11. $\left(\frac{1}{2}x^2\right)\left(\frac{2}{5}x\right)$
12. $(2x^2y)^3$