Algebra I   Worksheet #5   Unit 12   Selected Homework Solutions
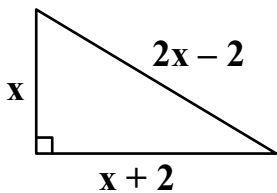
Solve each of the following problems algebraically. Show your work neatly organized.

2. One number is equal to the square of another. Their sum is 30. What are the numbers?

x
x^2

$$x^2 + x = 30$$
$$x^2 + x - 30 = 0$$
$$(x + 6)(x - 5) = 0$$
$$x = -6 \quad \text{or} \quad x = 5$$
$$x^2 = 36 \qquad x^2 = 25$$

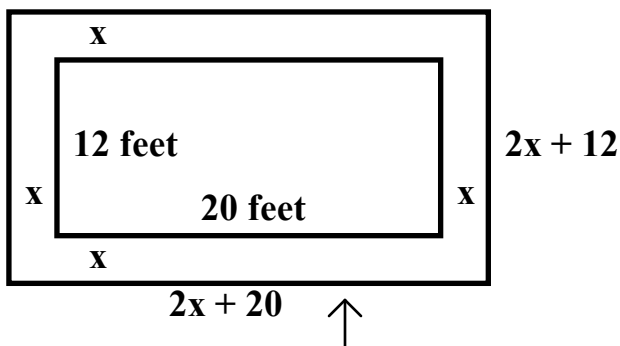**They are -6 and 36 or 5 and 25.**

5. The length of the hypotenuse of a right triangle is two inches less than twice the length of the shorter leg. The longer leg is two inches longer than the shorter leg. Find the length of each side.

$2x - 2$
x
$x + 2$

$$x^2 + (x + 2)^2 = (2x - 2)^2$$
$$x^2 + x^2 + 4x + 4 = 4x^2 - 8x + 4$$
$$2x^2 + 4x + 4 = 4x^2 - 8x + 4$$
$$0 = 2x^2 - 12x$$

$$2x(x - 6) = 0$$
$$2x = 0 \text{ or } x - 6 = 0$$
$$x = 0 \text{ or } x = 6$$
$$x + 2 = 8$$
$$2x - 2 = 10$$

The sides are 6 inches, 8 inches, and 10 inches long.

8. A rectangular garden 20 feet long and 12 feet wide is surrounded by a rock path of uniform width. If the area of the path is 185 square feet, then what is its width?

x
12 feet
x
20 feet
x
2x + 20
2x + 12
x

Let x represent the width of the path.
$$(2x + 12)(2x + 20) = 425$$
$$4x^2 + 64x + 240 = 425$$
$$4x^2 + 64x - 185 = 0$$
$$(2x + 37)(2x - 5) = 0$$
$$2x + 37 = 0 \text{ or } 2x - 5 = 0$$
$$2x = -37 \text{ or } 2x = 5$$
$$x = -18.5 \text{ or } x = 2.5$$

The area of the large rectangle is equal to the area of the garden plus the area of the path = 240 + 185 = 425 square feet.

The path is 2.5 feet wide.