

Algebra I Worksheet #6 Unit 12 Selected Homework Solutions

Solve each of the following problems algebraically. Show your work neatly organized.

3. One number is one more than three times another. The sum of their squares is 29. What are the numbers?

$$\begin{aligned}
 & x && x^2 + (3x + 1)^2 = 29 \\
 & 3x + 1 && x^2 + 9x^2 + 6x + 1 = 29 \\
 & && 10x^2 + 6x - 28 = 0 \\
 & && 5x^2 + 3x - 14 = 0 \\
 & && (5x - 7)(x + 2) = 0 \\
 & && 5x - 7 = 0 \quad \text{or} \quad x + 2 = 0 \\
 & && x = 7/5 \quad \text{or} \quad x = -2 \\
 & && 3x + 1 = 26/5 \quad 3x + 1 = -5
 \end{aligned}$$

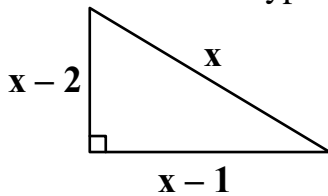
They are 7/5 and 26/5 or -2 and -5.

5. The length of a rectangle is three inches more than twice its width. The area of the rectangle is 20 square inches. What are the dimensions of the rectangle?

$$\begin{aligned}
 \text{Width: } x \text{ (inches)} &&& x(2x + 3) = 20 \\
 \text{Length: } 2x + 3 &&& 2x^2 + 3x - 20 = 0 \\
 \text{Area: } 20 \text{ square inches} &&& (2x - 5)(x + 4) = 0 \\
 &&& x = 5/2 \quad x = -4 \\
 &&& 2x + 3 = 8
 \end{aligned}$$

The rectangle is 8 inches long and 2.5 inches wide.

6. One leg of a right triangle is two inches shorter than the hypotenuse. The other leg is one inch shorter than the hypotenuse. Find the length of each side of the triangle.



$$\begin{aligned}
 (x - 2)^2 + (x - 1)^2 &= x^2 && (x - 1)(x - 5) = 0 \\
 x^2 - 4x + 4 + x^2 - 2x + 1 &= x^2 && x - 1 = 0 \quad \text{or} \quad x - 5 = 0 \\
 2x^2 - 6x + 5 &= x^2 && x = 1 \quad \text{or} \quad x = 5 \\
 x^2 - 6x + 5 &= 0 && x - 2 = 3 \\
 &&& x - 1 = 4
 \end{aligned}$$

The sides are 3 inches, 4 inches, and 5 inches long.