

Algebra II

4.3 & 4.4 Solving Quadratic Equations by Factoring

Obj: To set an equation equal to zero, factor and solve.

$$(6.23)(\pi)(3.2/8.56)(6-6)(-18.3) = ?$$

Solving Quadratic Equations

1. Set = to 0.
2. Factor the polynomial
3. Set each factor = to 0 and solve.

$$x^2 = 18 - 3x$$

$$x^2 + 3x - 18 = 0$$

$$(x+6)(x-3) = 0$$

$$x+6=0 \quad x-3=0$$

$$\boxed{x = -6 \quad x = 3}$$

$$3x - 6 = x^2 - 10$$

$$0 = x^2 - 3x - 4$$

$$0 = (x-4)(x+1)$$

$$0 = x - 4 \quad 0 = x + 1$$

$$\boxed{4 = x \quad -1 = x}$$

Solving Quadratic Equations

1. Set = to 0.
2. Factor the polynomial
3. Set each factor = to 0 and solve.

$$9t^2 - 12t + 4 = 0$$

$$(3t - 2)(3t - 2) = 0$$

$$3t - 2 = 0$$

$$3t = 2$$

$$t = \frac{2}{3}$$

$$18x^2 - 3x - 3 = 0$$

$$(3x + 1)(6x - 3) = 0$$

$$3x + 1 = 0 \quad 6x - 3 = 0$$

$$3x = -1$$

$$6x = 3$$

$$x = -\frac{1}{3} \quad x = \frac{1}{2}$$

Solving Quadratic Equations

1. Set = to 0.
2. Factor the polynomial
3. Set each factor = to 0 and solve.

$$8x^2 + 4x = 14x^2$$

$$0 = 6x^2 + 4x$$

$$0 = 2x(3x + 2)$$

$$0 = 2x \quad 3x + 2 = 0$$

$$3x = -2$$

$$0 = x$$

$$x = -\frac{2}{3}$$

$$(x - 1)^2 - 4 = 0$$

$$x^2 - 2x + 1 - 4 = 0$$

$$x^2 - 2x - 3 = 0$$

$$(x - 3)(x + 1) = 0$$

$$x - 3 = 0 \quad x + 1 = 0$$

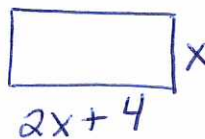
$$x = 3$$

$$x = -1$$

Solving Quadratic Equations Word Problems:

1. Draw a picture and label the variable.
2. Write an equation, simplify and solve it.
3. Answer the question.

One side of a rectangle is 4 feet more than twice the other side. If the area is 30 square feet, find the dimensions of the rectangle.

$$\begin{aligned}
 x(2x+4) &= 30 \\
 2x^2+4x &= 30 \\
 2x^2+4x-30 &= 0 \\
 2(x^2+2x-15) &= 0 \\
 2(x+5)(x-3) &= 0
 \end{aligned}$$


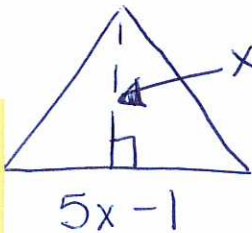
due to ignore negative

$$\begin{aligned}
 x+5=0 & \quad x-3=0 \\
 x=-5 & \quad x=3 \quad \leftarrow \text{answer}
 \end{aligned}$$

Solving Quadratic Equations Word Problems:

1. Draw a picture and label the variable.
2. Write an equation, simplify and solve it.
3. Answer the question.

The base of a triangle is one less than five times the height. The area is 38 square inches. Find the height and base of the triangle.

$$\begin{aligned}
 A &= \frac{1}{2}bh \\
 38 &= .5(5x-1)(x) \\
 38 &= (2.5x-.5)(x) \\
 2[38 &= 2.5x^2-.5x] \\
 76 &= 5x^2-x \\
 0 &= 5x^2-x-76 \\
 0 &= (5x+19)(x-4)
 \end{aligned}$$


$$\begin{aligned}
 5x+19 &= 0 \\
 5x &= -19 \\
 x &= -\frac{19}{5}
 \end{aligned}$$

$$\begin{aligned}
 x-4 &= 0 \\
 x &= 4
 \end{aligned}$$

Solving Quadratic Equations Word Problems:

1. Draw a picture and label the variable.
2. Write an equation, simplify and solve it.
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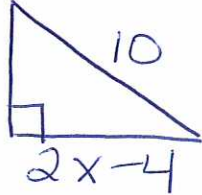
One leg of a right triangle is four less than twice the other. The hypotenuse is 10 inches. Find the lengths of the other legs.

$$a^2 + b^2 = c^2$$

$$x^2 + (2x-4)^2 = 10^2$$

$$x^2 + 4x^2 - 16x + 16 = 100$$

$$5x^2 - 16x - 84 = 0$$

$$(5x + 14)(x - 6) = 0$$


$$(2x-4)(2x-4)$$

$$4x^2 - 8x - 8x + 16$$

$$\begin{array}{r} 960 \\ -16 \\ \hline 84 \end{array}$$

$$5x + 14 = 0$$

$$\frac{5x = -14}{5}$$

$$x = \frac{-14}{5}$$

$$x - 6 = 0$$

$$\boxed{x = 6}$$