

Warm-Up

12/12/18

Solve:

1. $x^2 - 10x + 21 = 0$ $ac = \frac{21}{-7} = -3$

$$\begin{aligned} & (x^2 - 7x)(-3x + 21) \\ & x(x-7) - 3(x-7) \\ & (x-3)(x-7) \\ & x-3=0 \quad x-7=0 \\ & x=3 \quad x=7 \\ & \{3, 7\} \end{aligned}$$

2. $9x^2 = 36$

$$\begin{aligned} & \frac{-36 - 36}{9x^2 - 36 = 0} \\ & 9(x^2 - 4) \quad \{ -2, 2 \} \\ & \downarrow \\ & 9(x+2)(x-2) \\ & \cancel{9} \quad x+2=0 \quad x-2=0 \\ & \quad \quad x=-2 \quad \quad x=2 \\ & \frac{-b}{2a} = \frac{-12}{2(3)} = \frac{-12}{6} = -2 \end{aligned}$$

3. $y = 3x^2 + 12x - 2$
 $a = 3$ $b = 12$ $c = -2$

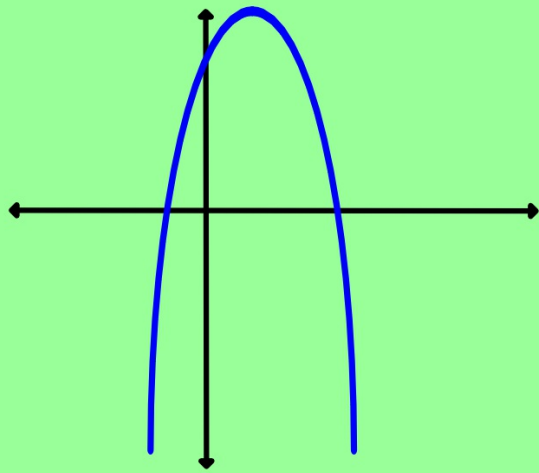
$x = -2$ Roots: 2 roots

Vertex $(-2, -14)$
Min or Max?

$$\begin{aligned} y &= 3(-2)^2 + 12(-2) - 2 \\ & \quad 12 - 24 - 2 \\ y &= -14 \end{aligned}$$

$$\begin{aligned} & b^2 - 4ac \\ & 144 - 4(3)(-2) \\ & 144 + 24 \\ & 168 \end{aligned}$$

Quadratic Equations: Area & Square of a Number Application



Area Application Problems

1. The length of a rectangle is 2^{mult.} times its width. The area of the rectangle is 72 square inches. Find the dimensions of the rectangle.

$$w = \text{width} \quad 2w = \text{length}$$

$$w(2w) = 72$$

$$\begin{array}{r} 2w^2 = 72 \\ -72 \quad -72 \\ \hline \end{array}$$

$$2w^2 - 72 = 0$$

$$2(w^2 - 36)$$

$$2(w+6)(w-6)$$

$$\begin{array}{l} \cancel{2} \neq 0 \quad w+6=0 \quad w-6=0 \\ \quad \quad \quad \cancel{w} - 6 \quad \quad \quad w=6 \end{array}$$

width 6in
length 12in

2. The length of a rectangle is 4 times its width. The area of the rectangle is 144 square inches. Find the dimensions of the rectangle.

$$w = \text{width} \quad 4w = \text{length}$$

$$w(4w) = 144$$

$$\begin{array}{r} 4w^2 = 144 \\ -144 \quad -144 \\ \hline 4w^2 - 144 = 0 \end{array}$$

$$4(w^2 - 36)$$

$$4(w+6)(w-6)$$

$$\begin{array}{l} \cancel{4} \neq 0 \quad w+6=0 \quad w-6=0 \\ \quad \quad \quad \cancel{w} \neq 6 \quad \quad \quad w=6 \end{array}$$

width 6in
length 24in

You Try:

1. The width of a rectangle is 5 meters less than its length. The area is 84 square meters. Find the dimensions of the rectangle.

$$w = \text{width} \quad w + 5 = \text{length}$$

$$w(w + 5) = 84$$

$$w^2 + 5w = 84$$
$$\begin{array}{r} w^2 + 5w = 84 \\ -84 \quad -84 \\ \hline \end{array}$$

$$w^2 + 5w - 84 = 0$$

$$(w^2 + 12w)(-7w - 84)$$

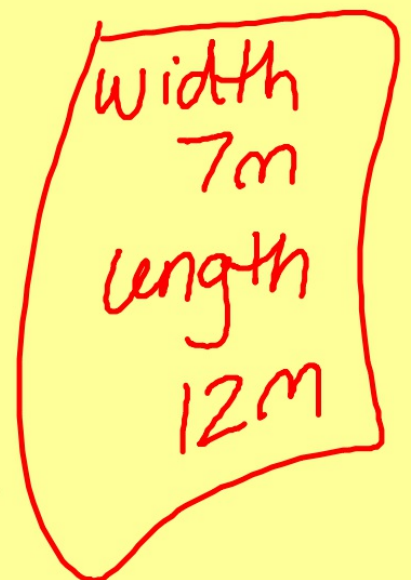
$$w(w + 12) - 7(w + 12)$$

$$(w - 7)(w + 12)$$

$$w - 7 = 0$$
$$w = 7$$

$$w + 12 = 0$$
$$\cancel{w = -12}$$

$$ac = -84$$
$$12 \overline{) -7}$$



2. The length of a rectangle is twice the width. The area is 50 square inches. Find the dimensions of the rectangle.

$$w = \text{width} \quad 2w = \text{length}$$

$$w(2w) = 50$$

$$2w^2 = 50$$

$$\begin{array}{r} -50 \quad -50 \\ \hline 2w^2 - 50 = 0 \end{array}$$

$$2(w^2 - 25)$$

$$\cancel{2}(w+5)(w-5)$$

$$w+5=0$$

$$\cancel{w-5}$$

$$w-5=0$$

$$w=5$$

Width
5 inches
length
10 inches

Square of a number

1. Eight more than the square of a number is the same as 6 times the number. Find the number.

x = the number

$$8 + 2^2 = 6(2)$$
$$8 + 4 = 12$$

$$8 + x^2 = 6x$$
$$\begin{array}{r} -6x \quad -6x \\ \hline x^2 - 6x + 8 = 0 \end{array}$$

$$8 + 4^2 = 6(4)$$
$$8 + 16 = 24$$

$$x^2 - 6x + 8 = 0$$

$$(x^2 - 4x)(-2x + 8)$$

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

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

$$x-2=0 \quad x-4=0$$

$$x=2 \quad x=4$$

$$\{2, 4\}$$

2. Fifteen less than the square of a number is the same as twice the number. Find the number.

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$x =$ the number

$$\begin{array}{r} x^2 - 15 = 2x \\ -2x \quad -2x \\ \hline \end{array}$$

$$x^2 - 2x - 15 = 0$$

$$(x^2 - 5x)(+3x - 15)$$

$$\textcircled{x}(x-5)\textcircled{3}(x-5)$$

$$(x+3)(x-5)$$

$$x+3=0 \quad x-5=0$$

$$x=-3$$

$$x=5$$

$$(-3)^2 - 15 = 2(-3)$$

$$9 - 15 = -6$$

$$(5)^2 - 15 = 2(5)$$

$$25 - 15 = 10$$

$$\boxed{\{-3, 5\}}$$

3. If a number is added to twice its square, the result is 6.
Find the number.

$x = \text{the number}$

$$\begin{array}{r} x + 2x^2 = 6 \\ \underline{-6 \quad -6} \end{array}$$

$$ac = \frac{-12}{4 \pm 3}$$

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

$$(2x^2 + 4x)(-3x - 6) = 0$$

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

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

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

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

$$x = -2$$

$$\left\{ -2, \frac{3}{2} \right\}$$

$$\frac{3}{2} + 2\left(\frac{3}{2}\right)^2 = 6$$

$$\frac{3}{2} + \frac{18}{4}$$

$$\frac{6}{4} + \frac{18}{4}$$

$$\frac{24}{4} = 6$$

$$-2 + 2(-2)^2 = 6$$

$$-2 + 8 = 6$$

4. Seven less than 4 times the square of a number is 18.
Find the number.

$$\begin{array}{r} 4x^2 - 7 = 18 \\ -18 \quad -18 \\ \hline 4x^2 - 25 = 0 \end{array} \quad \left\{ \begin{array}{l} -5 \\ 5 \end{array} \right\}$$
$$\left(2x + 5 \right) \left(2x - 5 \right)$$
$$2x + 5 = 0 \quad 2x - 5 = 0$$
$$x = -\frac{5}{2} \quad x = \frac{5}{2}$$

Complete #1 - 4 on the

**AREA PRACTICE
worksheet**