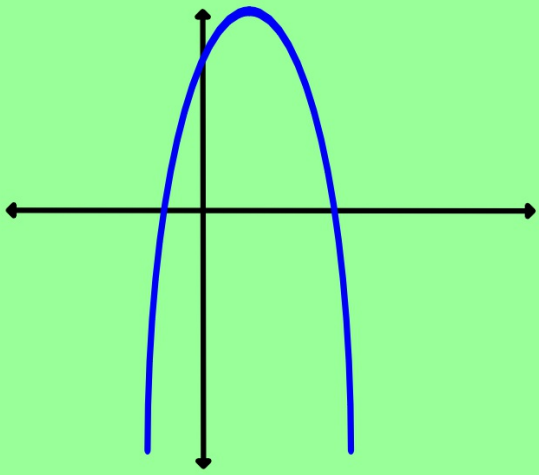
Quadratic Equations: Application and Word Problems (AREA)



Warm Up December 12, 2018

1.) What is the sum of the zeros of the quadratic equation below?

$$2m^2 - 51 = 22m + 1$$

$$-22m-1 \quad -22m-1$$

$$2m^2 - 22m - 52 = 0$$

$$ac = -26$$

$$-1 \mid 26$$

$$+2 \quad -13$$

$$2(m^2 - 11m - 26) = 0$$

$$2(m+2)(m-13) = 0$$

$$-2+13$$

$$11$$

$$\cancel{2=0} \quad m+2=0 \quad m-13=0$$

$$-2 \quad -2 \qquad +13 \quad +13$$

$$m=-2 \qquad m=13$$

2.) Which function has the greatest y-intercept?

A. $f(x) = x^2 + 5x \boxed{- 13}$

$(0,-13)$

B. $f(x) = 2^x - 4$

$1(2)^x - 4$

$(0,-3)$

C. $3x - y = 9$

$$-3x \quad -3x$$

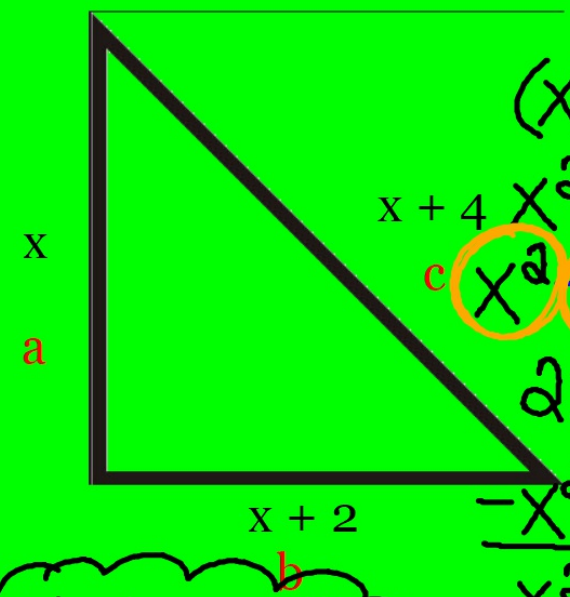
$$\frac{-y}{-1} = \frac{-3x}{-1} + \frac{9}{-1}$$

$(0,-9)$

$$y = 3x - 9$$

Right Triangle Practice

Use the Pythagorean Theorem to find the missing sides.



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

$(x)^2 + \boxed{(x+2)^2} = \boxed{(x+4)^2}$

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

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

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

$-x^2 - 8x - 16 \quad -x^2 - 8x - 16$

$x^2 - 4x - 12 = 0$

$ac = -12$

1	-12
2	-6
3	-4

$(x+2)(x-6) = 0$

$\cancel{x+2=0}$

$\cancel{-2 \quad -2}$

$\cancel{x=-2}$

$x-6=0$

$+6 \quad +6$

$x=6$

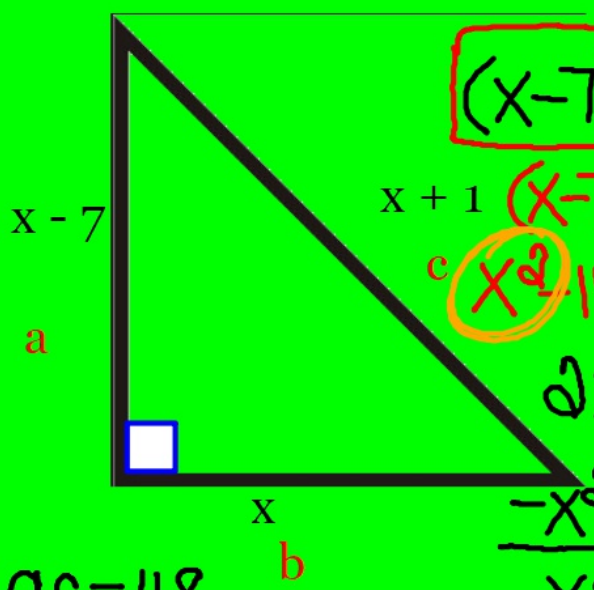
$x = 6$ units

$x+2 = 8$ units

$x+4 = 10$ units

Right Triangle Practice

Use the Pythagorean Theorem to find the missing sides.



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

$$\boxed{(x-7)^2} + (x)^2 = \boxed{(x+1)^2}$$

$$(x-7)(x-7) + x^2 = (x+1)(x+1)$$

$$x^2 - 14x + 49 + x^2 = x^2 + 2x + 1$$

$$2x^2 - 14x + 49 = x^2 + 2x + 1$$

$$-x^2 - 2x - 1 \qquad -x^2 - 2x - 1$$

$$x^2 - 16x + 48 = 0$$

$$(x-12)(x-4) = 0$$

$$x - 12 = 0 \qquad \cancel{x - 4 = 0}$$

$$x = 12 \text{ units} \qquad \cancel{x = 4}$$

$$x - 7 = 5 \text{ units}$$

$$x + 1 = 13 \text{ units}$$

$ac = 48$

1	48
2	24
3	16
4	12

Area Application Problems

Use the CUBES Method to annotate each exercise.

L = · w A=LW

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

↳ length + width

$L = 2w$

$A = 72\ in^2$

$A = LW$

$(2w)(w) = 72$

$\frac{2w^2}{2} = \frac{72}{2}$

$\sqrt{w^2} = \sqrt{36}$

$w = \pm 6$

$w = 6$ in.

$L = 12$ in.

2w

$A = 72\ in^2$

w

L = · w

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.

4w

w

$A = 144 \text{ in}^2$

$A = LW$

$(4w)(w) = 144$

$4w^2 = 144$

$-144 \quad -144$

$\frac{4w^2}{4} - \frac{144}{4} = 0$

$4(w^2 - 36) = 0$

$4(w+6)(w-6) = 0$

$\cancel{4 = 0}$ $\quad \cancel{w+6=0}$ $\quad w-6=0$

$\cancel{w=-6}$ $\quad w=6$

$L = 24$ in.

$w = 6$ in

3.) 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 = L

$A = LW$

$W = L - 5$

$A = 84\ m^2$

$L(L-5) = 84$

$L^2 - 5L = 84$

$-84 \quad -84$

$L^2 - 5L - 84 = 0$

$(L-12)(L+7) = 0$

$L - 12 = 0 \qquad \cancel{L + 7 = 0}$

$+12 \quad +12 \qquad \cancel{L = -7}$

$L = 12$

$L = 12\ m$

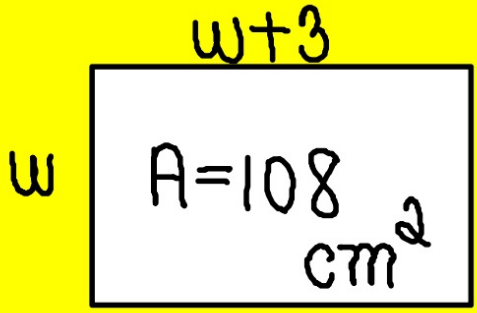
$W = 7\ m$

$ac = -84$

-1	84
-2	42
-3	28
-4	21
-6	14
-7	12

L = + w

4.) The length of a rectangle is 3 cm more than the width. The area is 108 square centimeters. Find the length and the width of the rectangle.



$$A = LW$$

$$(w+3)(w) = 108$$

$$w^2 + 3w = 108$$

$$-108 \quad -108$$

$$w^2 + 3w - 108 = 0$$

$$(w+12)(w-9) = 0$$

$$\cancel{w+12=0} \qquad w-9=0$$

$$\cancel{w=-12} \qquad w=9$$

$w = 9$ cm

$L = 12$ cm