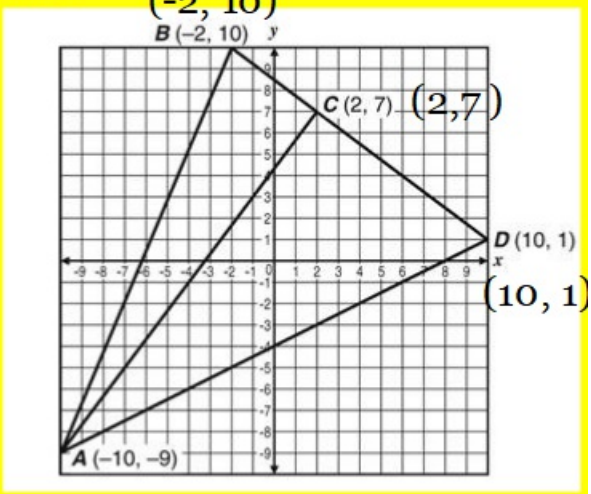
Warm Up May 14, 2019

1.) In the figure below, AC and BD are perpendicular. What is the area of the triange in square units?



(-2, 10)

(2,7)

(10, 1)

(-10, -9)

$A = (1/2)bh$

base (-2, 10) (10,1)

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$d = \sqrt{(10+2)^2 + (1-10)^2}$

$d = \sqrt{144 + 81}$

$d = \sqrt{225} \approx 15$

height

$d = \sqrt{(2+10)^2 + (7+9)^2}$

$d = \sqrt{144 + 256}$

$d = \sqrt{400} \approx 20$

$A = \frac{1}{2}(15)(20)$

$A = 150 \text{ units}^2$

2.) A sequence is shown below.

32, 26, 20, 14, ...

Which explicit formula can be used to determine the *n*th term of the sequence?

$a_n = 6n + 38$

$a_n = -6n + 38$

$a_n = 6n + 32$

$a_n = -6n + 32$

$a_n = d(n-1) + a_1$

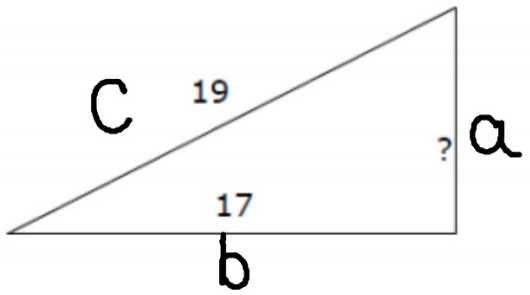
$= -6(n-1) + 32$

$= -6n + 6 + 32$

$a_n = -6n + 38$

Find the length of the missing sides using the Pythagorean Theorem.

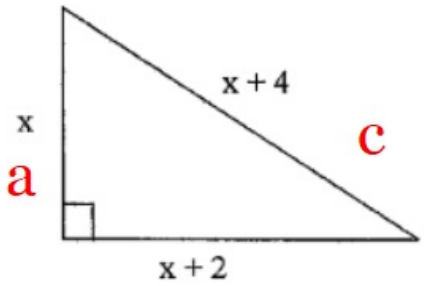
$$a^2 + b^2 = c^2$$



$$(\ a\ )^2 + (\ 17\ )^2 = (\ 19\ )^2$$

Pythagorean Theorem with Quadratics

Use the Pythagorean Theorem to find the missing sides.



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

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

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

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

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

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

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

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

$x + 2 = 0 \quad x - 6 = 0$

$x = -2 \quad +6 \quad +6$

$x = 6$

$x = 6$

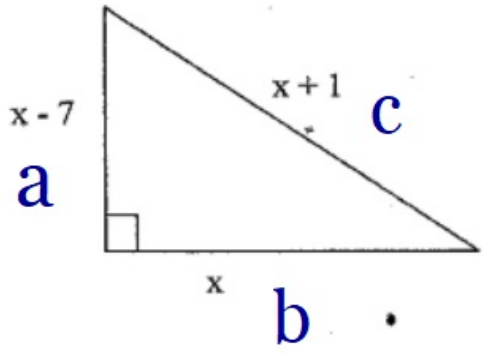
$x + 2 = 8$

$x + 4 = 10$

cannot have negative length of triangle side

Pythagorean Theorem with Quadratics

Use the Pythagorean Theorem to find the missing sides.



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

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

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

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

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

$-x^2 - 2x - 1 \quad -x^2 - 2x - 1$

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

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

$x - 4 = 0 \quad x - 12 = 0$

$x = 4 \quad x = 12$

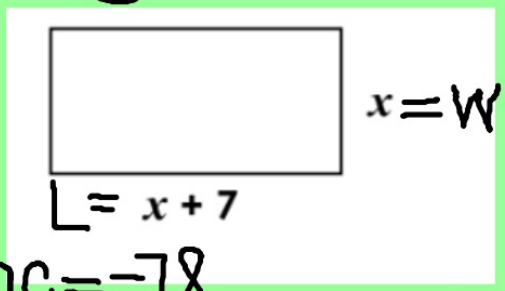
$x = 12$

$x - 7 = 5$

$x + 1 = 13$

Area Application Problems

1.) Given the diagram below, find the value of x if the area of the rectangle is 78 square meters.



$A = lw$

$(x+7)(x) = 78$

$x^2 + 7x = 78$

$-78 \quad -78$

$x^2 + 7x - 78 = 0$

$(x-6)(x+13) = 0$

$x - 6 = 0 \quad x + 13 = 0$

$x = 6 \quad x = -13$

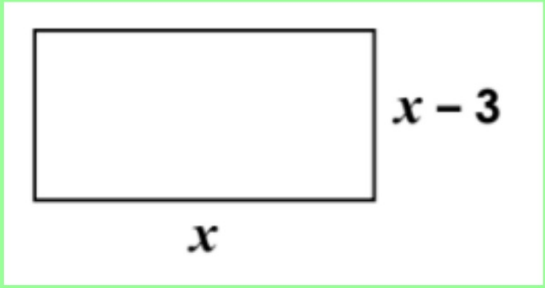
$ac = -78$

-1	78
-2	39
-3	26
-6	13

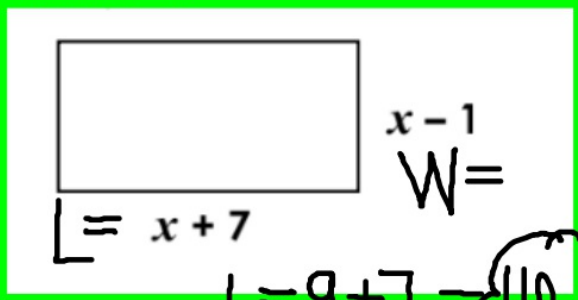
$x = 6$ m

$x + 7 = 13$ cm

2.) Given the diagram below, find the dimensions of the rectangle if the area is 108 square meters.



3.) Find the dimensions of the rectangle below if the area is 128 square feet.



$A = lw$

$(x+7)(x-1) = 128$

$x^2 - x + 7x - 7 = 128$

$x^2 + 6x - 7 = 128$

$-128 \quad -128$

$x^2 + 6x - 135 = 0$

$(x-9)(x+15) = 0$

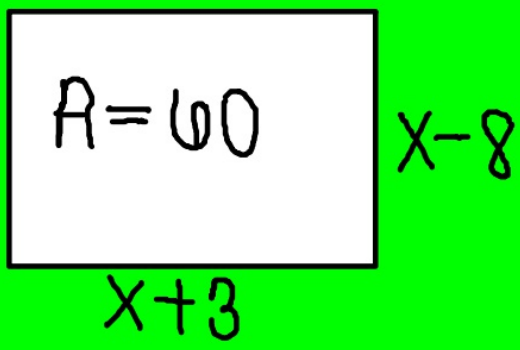
$x - 9 = 0 \quad x + 15 = 0$

$x = 9 \quad x = -15$

$L = 9 + 7 = 16$ ft.

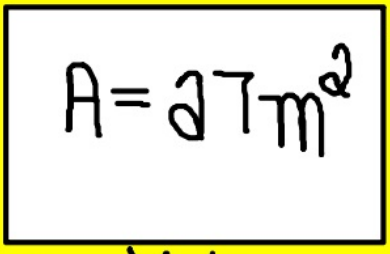
$W = 9 - 1 = 8$ ft.

4.) The dimensions of a rectangle ca be expressed as x + 3 and x – 8. If the area of the rectangle is 60 square inches, find the value of *x*.



Draw a Picture!

6.) The length of a rectangle is 6 meters less than its width. Find the dimensions of the rectangle if its area is 27 square meters.



W = x

L = x − 6

$x(x-6)=27$

$x^2-6x=27$

$-27 \quad -27$

$x^2-6x-27=0$

$(x-9)(x+3)=0$

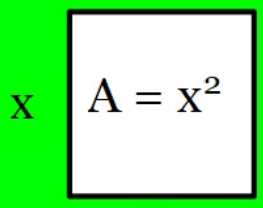
$x-9=0 \quad x+3=0$

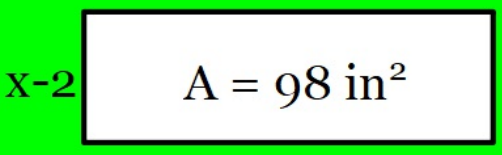
$x=9 \quad x=-3$

L = 3m

W = 9m

7.) A square is altered so that one dimension is increased by 5 inches and the other dimension is decreased by 2 inches. If the area of the resulting rectangle is 98 square inches, find the area of the original square.





$A = x^2$

$A = (9)^2$

$A = 81 \text{ in}^2$

$(x+5)(x-2) = 98$

$x^2 + 3x - 10 = 98$

$-98 \quad -98$

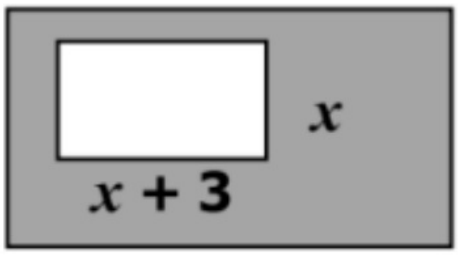
$x^2 + 3x - 108 = 0$

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

$x - 9 = 0 \qquad x + 12 = 0$

$x = 9 \qquad x = -12$

8.) Given the diagram to the left, if the area of the shaded region is 59 square inches, what are the dimensions of the outside rectangle?



$2x - 1$

$x + 6$