Your name

Mrs. Theo

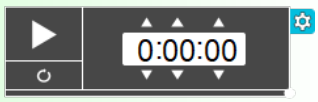
8/3/21

Pythagorean Theorem

Notes

Mental Floss - Monday, Aug 30th

Solve the equations below.
Leave your answers in radical form (square root, no decimals)



1.) $13^2 + x^2 = 25^2$

$169 + x^2 = 625$

$-169 \quad -169$

$\sqrt{x^2} = \sqrt{456}$

$x = \sqrt{456}$

2.) $\left(\sqrt{5}\right)^2 + x^2 = 12^2$

$5 + x^2 = 144$

$-5 \quad -5$

$\sqrt{x^2} = \sqrt{139}$

$x = \sqrt{139}$

$(\sqrt{5})^2$

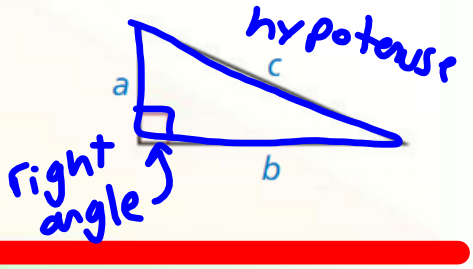
$\sqrt{5} \cdot \sqrt{5}$

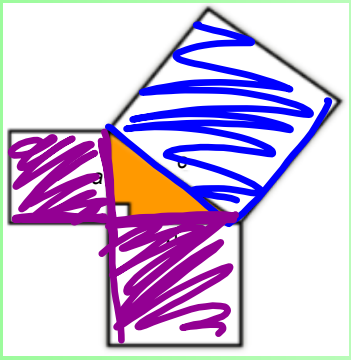
$\sqrt{5 \cdot 5}$

$\sqrt{25}$

Theorem 9.1 Pythagorean Theorem

In a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs.

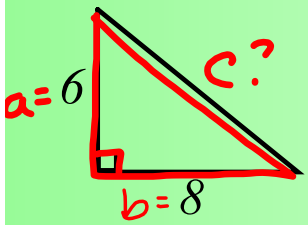




If right triangle, then $a^2 + b^2 = c^2$.

Do It Together - Example #1

Using the **Pythagorean Theorem**, determine the lengths of the missing sides of the right triangles below. Express your answer as a either a **whole number** or in **radical form**.



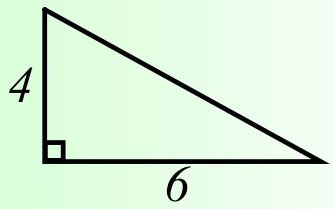
$a^2 + b^2 = c^2$

$(6)^2 + (8)^2 = c^2$

$36 + 64 = c^2$

$\sqrt{100} = \sqrt{c^2}$

$10 = c$



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

$4^2 + 6^2 = c^2$

$16 + 36 = c^2$

$\sqrt{52} = \sqrt{c^2}$

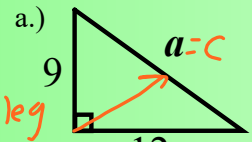
$c = \sqrt{52}$

Do It In Your Groups - Example #2

Find the missing side lengths in the right triangles below.

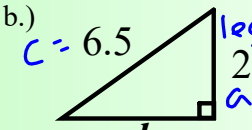
0:07:00

a.)



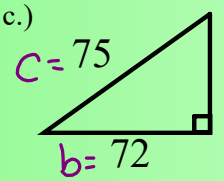
leg leg leg
$a^2+b^2=c^2$
$9^2+12^2=a^2$
$81+144=a^2$
$225=a^2$
$a=15$

b.)



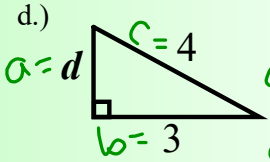
leg leg
$a^2+b^2=c^2$
$2.5^2+b^2=6.5^2$
$6.25+b^2=42.25$
$-6.25 \quad -6.25$
$b^2=36$
$b=6$

c.)



$a^2+b^2=c^2$
$c^2+72^2=75^2$
$c^2+5184=5625$
$-5184 \quad -5184$
$c^2=441$
$c=21$

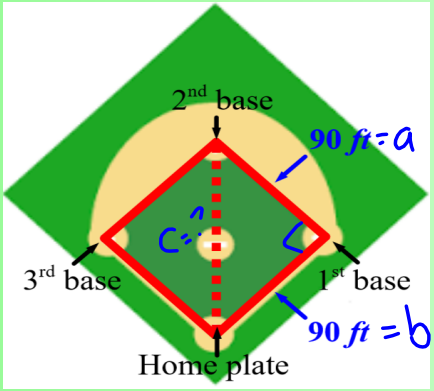
d.)



$a^2+b^2=c^2$
$d^2+3^2=4^2$
$d^2+9=16$
$d^2=7$
$d=\sqrt{7}$

Example #4

The bases on a professional baseball field are located at the vertices of a square. A runner starts at home plate and travels to 1st, 2nd, 3rd, then home again in order. The distance between consecutive bases (1st to 2nd, for example) is 90 feet. If a player in the field wanted to throw a ball directly from home plate to 2nd base, how far would that throw need to go



$a^2+b^2=c^2$
$90^2+90^2=c^2$
$8100+8100=c^2$
$16200=c^2$
$c=\sqrt{16200}$ ft

The throw would need to be 127.28 ft

Example #5

The height of a delivery truck bed is three feet. The edge of a ramp on the ground is six feet away from the truck. To the nearest tenth of a foot, how long is the ramp?

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

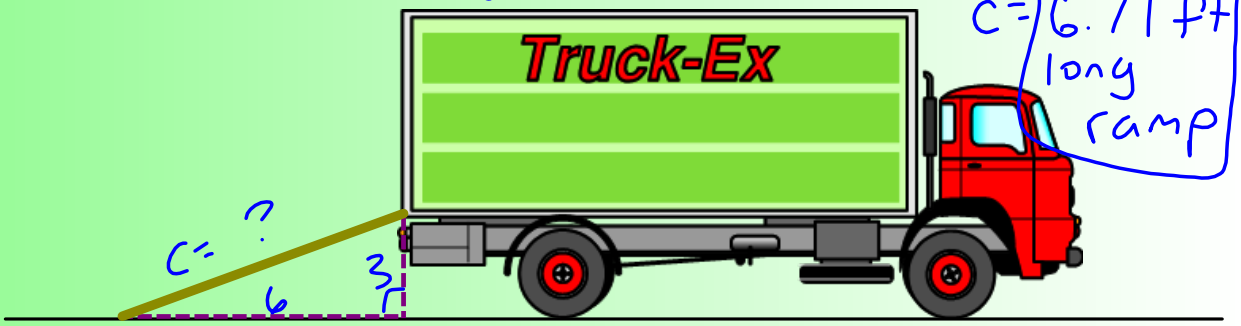
$6^2 + 3^2 = c^2$

$36 + 9 = c^2$

$45 = c^2$

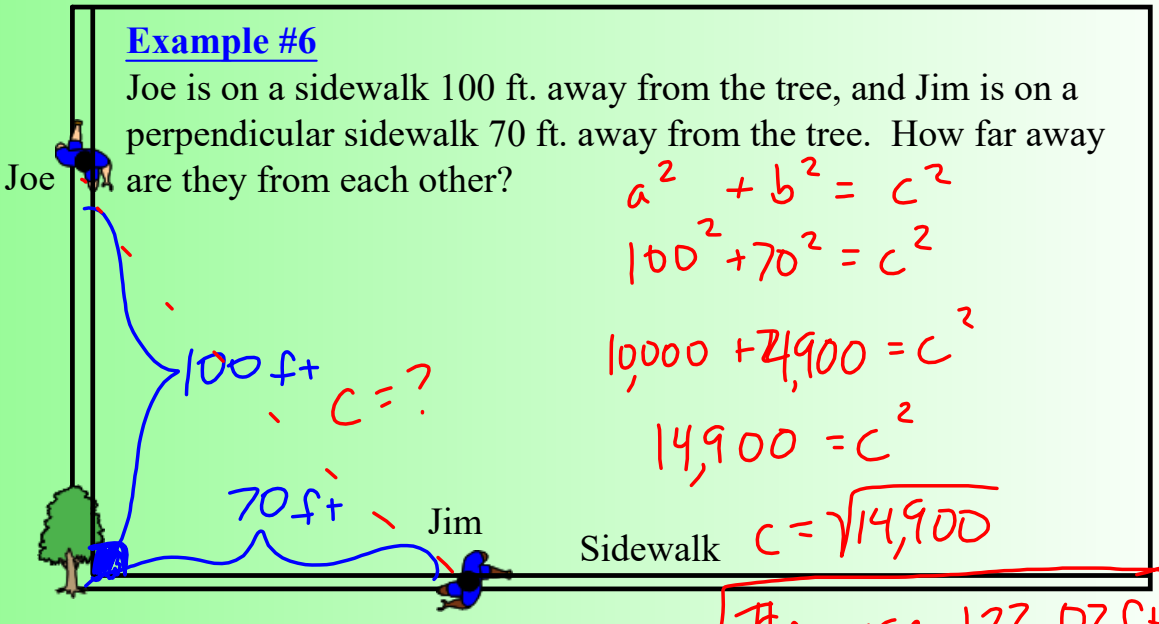
$c = \sqrt{45}$

$c = 6.71$ ft long ramp



Example #6

Joe is on a sidewalk 100 ft. away from the tree, and Jim is on a perpendicular sidewalk 70 ft. away from the tree. How far away are they from each other?



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

$100^2 + 70^2 = c^2$

$10{,}000 + 4{,}900 = c^2$

$14{,}900 = c^2$

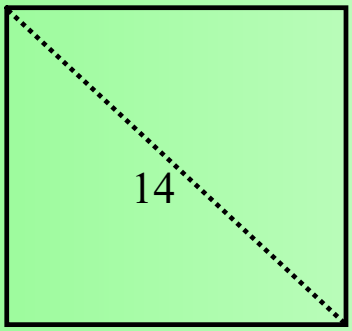
$c = \sqrt{14{,}900}$

They are 122.07 ft apart

Example #3

Find the area of the square with a ***diagonal*** measuring 14 in.

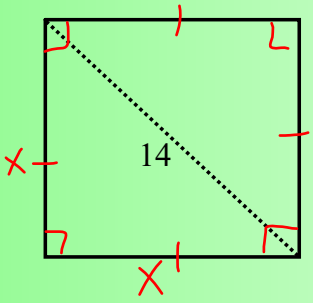
- The area A of a square is defined as $A = s^2$, where s is the length of one side of the square.



Example #3 Pythagorean Theorem Homework

~~Find the area~~ ? of the square with a ***diagonal*** measuring 14 in.

- The area A of a square is defined as $A = s^2$, where s is the length of one side of the square.



Given: Square: all sides equal
Diagnal: 14 in
Square: all angles 90°

Unknown: side lengths for Area

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

Solve: $x^2+x^2=14^2$
$2x^2=196$
$x^2=98$
$x=\sqrt{98}$

$A=s^2$
$A=(\sqrt{98})^2$
$A=98\ in^2$

Sentence Answer: A square with a diagonal of 14 in, has an Area of $98\ in^2$