

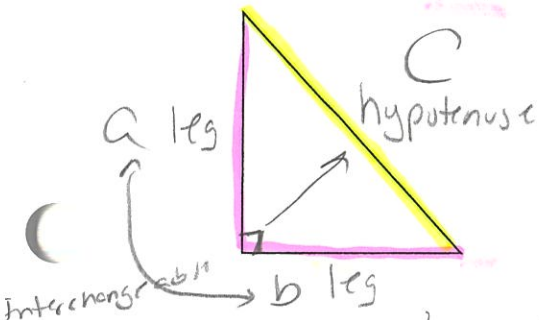
The Pythagorean Theorem

❖ The Pythagorean Theorem is used when working with right triangles.

It can be used to:

- Prove that a triangle is a right triangle.
- To find a missing side of a right triangle.

❖ The important thing about working with the Pythagorean Theorem is that you must be able to identify the hypotenuse or the longest side. The other sides are known as legs.



The side opposite the right angle is always the hypotenuse.

❖ Formula: $a^2 + b^2 = c^2$ or
 $leg^2 + leg^2 = hypotenuse^2$

❖ Steps: 1) Write out the formula

2) Substitute the given values

3) Square the numbers

4) Solve the remaining equation

5) Take the $\sqrt{\quad}$ of both sides to get your final answer

exponents 1st
PEMDAS

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

$$3^2 + 4^2 = c^2$$

$$9 + 16 = c^2$$

$$\sqrt{25} = \sqrt{c^2}$$

$$5 = c$$

** Label your final answer with the correct unit in a word problem

** Remember $\sqrt{x^2} = x$

** Press: (2nd) (x²) to get the $\sqrt{\quad}$ sign

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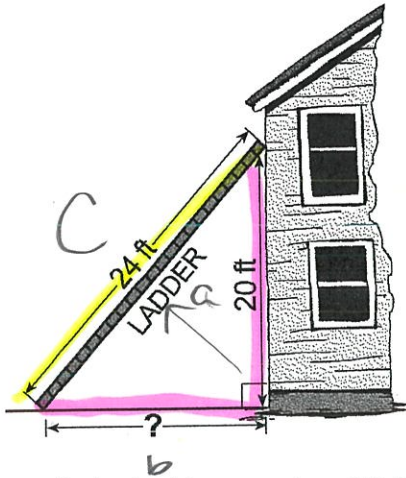
Mrs. Roubos

Date: _____

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Pythagorean Theorem Classwork

- 1) A 24-ft ladder is leaning against the side of a building.



If the top of the ladder reaches 20 ft up the building, how far is the bottom of ladder from the base of the building? [Round your answer to the nearest foot.]

$$a^2 + b^2 = c^2 \quad \rightarrow \text{nearest whole \#}$$

$$20^2 + b^2 = 24^2$$

$$400 + b^2 = 576$$

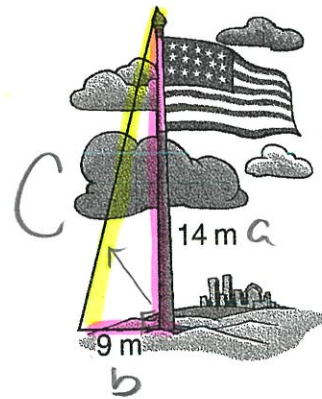
$$\begin{array}{r} -400 \\ \hline \end{array} \quad \begin{array}{r} -400 \\ \hline \end{array}$$

$$\sqrt{b^2} = \sqrt{176}$$

$$b = 13$$

$$\boxed{13 \text{ ft}}$$

- 2) In the figure below, the height of the flag pole is 14 meters. A wire runs from the top of the pole and is bolted to the ground 9 meters from the pole.



If the wire is tight, how long is the wire?
[Express your answer to the nearest hundredth of a meter.]

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

$$14^2 + 9^2 = c^2$$

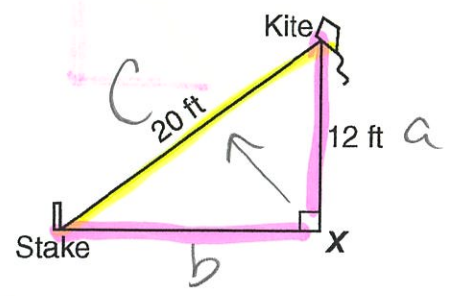
$$196 + 81 = c^2$$

$$\sqrt{277} = \sqrt{c^2}$$

$$c = 16.64$$

$$\boxed{16.64 \text{ m}}$$

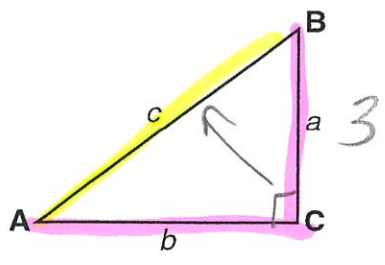
- 3) The accompanying diagram shows a kite that has been secured to a stake in the ground with a 20-foot string. The kite is located 12 feet from the ground, directly over point X.



What is the distance, in feet, between the stake and point X? [Show all work.]

$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 12^2 + b^2 &= 20^2 \\
 144 + b^2 &= 400 \\
 -144 & \quad -144 \\
 \hline
 b^2 &= 256 \\
 b &= 16 \quad \boxed{16ft}
 \end{aligned}$$

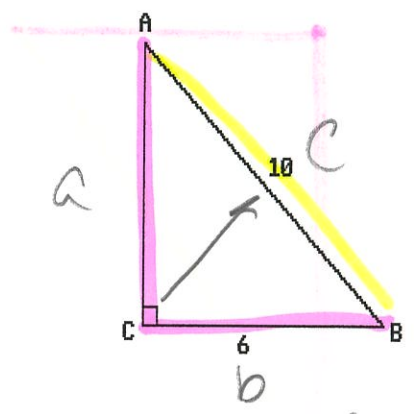
- 4) In the diagram below, $\triangle ABC$ is a right triangle with right angle C.



If $a = 3$ and $b = 4$, what is the measure of c ?

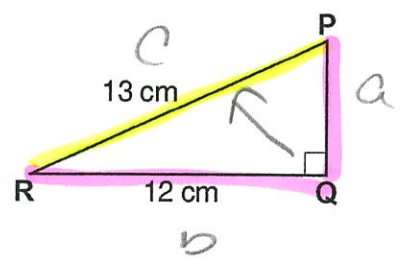
$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 3^2 + 4^2 &= c^2 \\
 9 + 16 &= c^2 \\
 \sqrt{25} &= \sqrt{c^2} \\
 \boxed{c = 5}
 \end{aligned}$$

- 5) In the accompanying diagram, $\triangle ABC$ is a right triangle with the right angle at C. If $AB = 10$ and $BC = 6$, find AC.



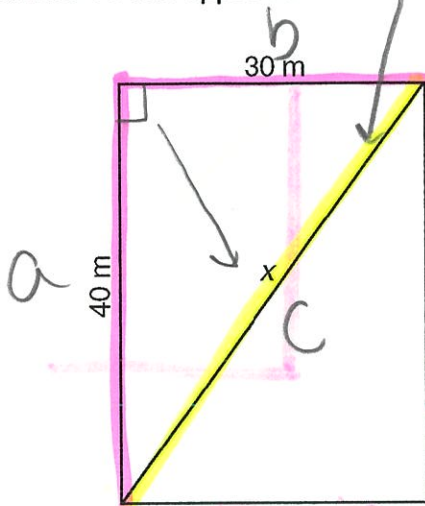
$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 a^2 + 6^2 &= 10^2 \\
 a^2 + 36 &= 100 \\
 -36 & \quad -36 \\
 \hline
 a^2 &= 64 \\
 a &= 8 \quad \boxed{AC = 8}
 \end{aligned}$$

- 6) In the right triangle below, what is the length of side PQ?



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 a^2 + 12^2 &= 13^2 \\
 a^2 + 144 &= 169 \\
 -144 & \quad -144 \\
 \hline
 a^2 &= 25 \\
 a &= 5 \\
 \boxed{PQ = 5cm}
 \end{aligned}$$

- 7) A rectangular field measures 30 m by 40 m. What is the length of the diagonal, x , from one corner to the opposite corner?



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

$$40^2 + 30^2 = c^2$$

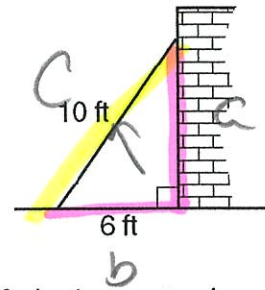
$$1600 + 900 = c^2$$

$$\sqrt{2500} = \sqrt{c^2}$$

$$c = 50$$

$$\boxed{50\text{ m}}$$

- 8) A wall is supported by a brace 10 feet long, as shown in the diagram below.



If one end of the brace is placed 6 feet from the base of the wall, how many feet up the wall does the brace reach?

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

$$a^2 + 6^2 = 10^2$$

$$a^2 + 36 = 100$$

$$\begin{array}{r} -36 \\ \hline \end{array}$$

$$\sqrt{a^2} = \sqrt{64}$$

$$a = 8$$

$$\boxed{8\text{ ft}}$$