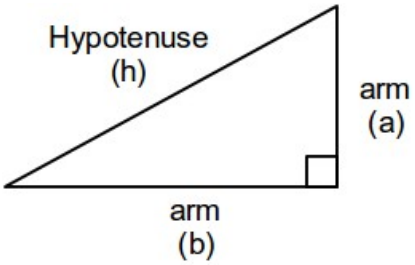
Name: _____ Date: _____

MFM2P: Foundations of Mathematics 10 Similarity and Trigonometry

Pythagorean Theorem

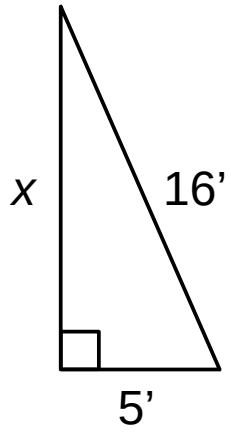


In a right-angled triangle with arms *a* and *b*, and hypotenuse *h*, the lengths of the sides are related by the equation $a^2+b^2=h^2$.

"A 16' ladder leans against a wall. If the base of the ladder is 5' from the wall, how high up the wall does the ladder reach?"

1. Draw a picture, if not provided, labelling the side lengths given and the side to find.

2. Use the equation $a^2+b^2=h^2$ to solve for the unknown side.



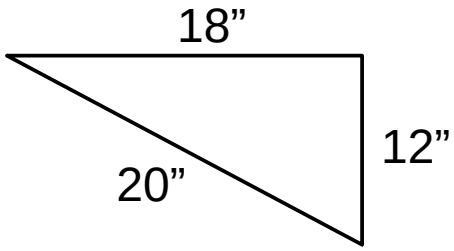
$$\begin{aligned} x^2+5^2 &= 16^2 \\ x^2+25 &= 256 \\ x^2 &= 256-25 \\ x^2 &= 231 \\ x &= \sqrt{231} \\ x &\approx 15.2 \end{aligned}$$

3. Answer the Question

   "The ladder reaches approximately 15.2' up the wall."

4. Examples

A. A contractor checks the corner of a room for a right angle by making the following measurements with a tape measure. Is the corner right-angled?



If the triangle contains a right angle, the side lengths will satisfy the Pythagorean Theorem.

$$\begin{aligned} a^2+b^2 &= h^2 \\ 18^2+12^2 &= 20^2 \\ 324+144 &= 400 \\ 468 &= 400 \end{aligned}$$

Since $468 \neq 400$, the Pythagorean Theorem is not satisfied, and the corner is not right-angled.