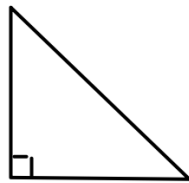


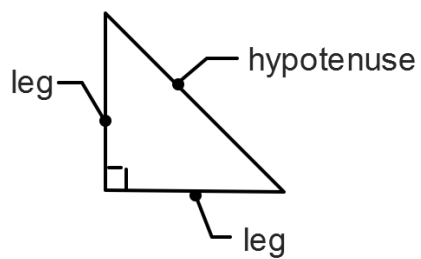
## "Pythagorean Theorem"

When you use the pythagorean theorem  $a^2 + b^2 = c^2$ , you can solve for a side length of a right triangle.



right triangle -

a triangle with one right angle ( $90^\circ$ ) and two acute angles ( $< 90^\circ$ )



hypotenuse -

the side opposite the right angle (this side is always the longest side)

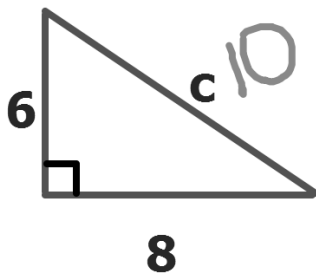
legs -

the sides that form the right angle

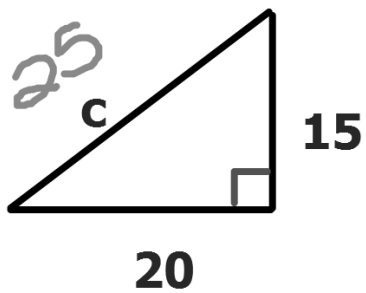
**Pythagorean Theorem:**

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

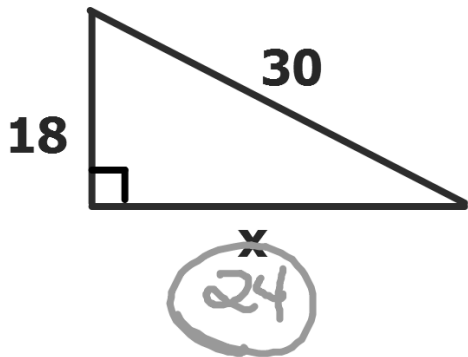
**(a and b are legs, c is the hypotenuse)**



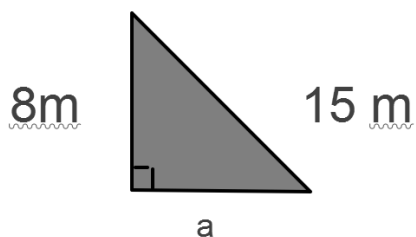
$$\begin{aligned} a^2 + b^2 &= c^2 \\ 6^2 + 8^2 &= c^2 \\ 36 + 64 &= c^2 \\ 100 &= c^2 \\ \boxed{10 = c} \end{aligned}$$



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 15^2 + 20^2 &= c^2 \\
 225 + 400 &= c^2 \\
 625 &= c^2 \\
 25 &= c
 \end{aligned}$$



$$\begin{aligned}
 a^2 + b^2 &= c^2 \\
 18^2 + x^2 &= 30^2 \\
 324 + x^2 &= 900 \\
 \underline{-324} \quad & \quad \underline{-324} \\
 x^2 &= 576 \\
 x &= 24
 \end{aligned}$$



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

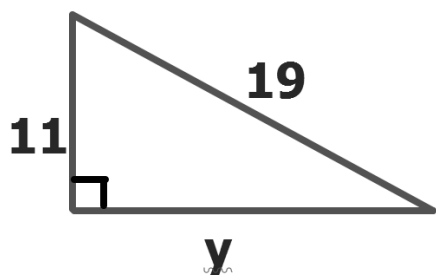
$$a^2 + 8^2 = 15^2$$

$$a^2 + 64 = 225$$

$$\begin{array}{r} -64 \\ \hline a^2 = 161 \end{array}$$

$$a = \sqrt{161}$$

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

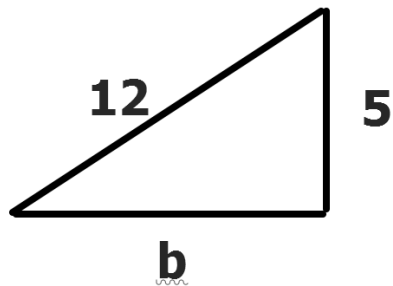


$$11^2 + y^2 = 19^2$$

$$121 + y^2 = 361$$

$$\begin{array}{r} -121 \\ \hline y^2 = 240 \end{array}$$

$$y = \sqrt{240}$$



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

Find the length of the missing side. Leave answer as a square root if it is not a perfect square.

a. 8 ft

b. 9 ft

a. 10 ft

c. 18 ft

$$\begin{aligned}
 8^2 + 9^2 &= c^2 \\
 64 + 81 &= c^2 \\
 145 &= c^2 \\
 \sqrt{145} &= c
 \end{aligned}$$

b. 5 in

c. 11 in

$$\begin{aligned}
 5^2 + b^2 &= 11^2 \\
 25 + b^2 &= 121 \\
 \underline{-25} \quad \underline{-25} & \quad \underline{-25} \\
 b^2 &= 96 \\
 b &= \sqrt{96}
 \end{aligned}$$

If a triangle has sides of 13 cm, 15 cm, and 20 cm, is it a right triangle? (Hint: remember that the hypotenuse is always the longest side in a triangle!)

$$a^2 + b^2 = c^2$$
$$13^2 + 15^2 = 20^2$$
$$169 + 225 \neq 400$$

NO

If a triangle has sides of 9 cm, 12 cm, and 15 cm, is it a right triangle?

$$9^2 + 12^2 = 15^2$$
$$81 + 144 = 225$$
$$225 = 225$$

YES

If a triangle has sides of 11 cm, 15 cm, and 19 cm, is it a right triangle?

$$11^2 + 15^2 = 19^2$$
$$121 + 225 = 361$$
$$346 \neq 361$$

NO