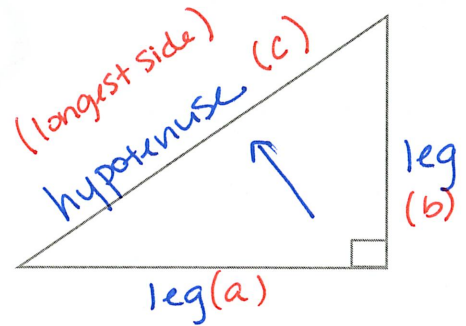


Chapter 7.1: Apply the Pythagorean Theorem

Pythagorean Theorem (Theorem 7.1):

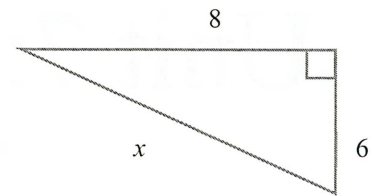
In a right triangles, the square of the hypotenuse equals the Sum of the squares of the legs.

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

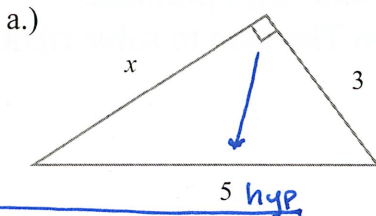


Example #1: Find the length of the hypotenuse of the right triangle

$$\begin{aligned} 8^2 + 6^2 &= x^2 \\ 64 + 36 &= x^2 \\ \sqrt{100} &= \sqrt{x^2} \\ \boxed{10} &= x \end{aligned}$$

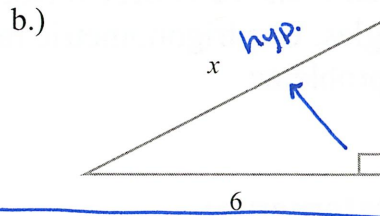


Example #2: Identify the unknown side as a leg or hypotenuse. Then, find the unknown side length of the right triangle. Write your answer in simplest radical form. √ might be in your answer.



$$\begin{aligned} x^2 + 3^2 &= 5^2 \\ x^2 + 9 &= 25 \\ -9 & \quad -9 \\ \sqrt{x^2} &= \sqrt{16} \\ x &= 4 \end{aligned}$$

Leg: $x = 4$ units

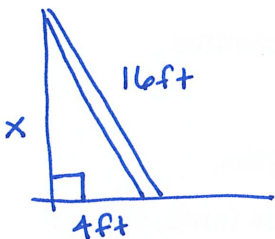


$$\begin{aligned} 4^2 + 6^2 &= x^2 \\ 16 + 36 &= x^2 \\ \sqrt{52} &= \sqrt{x^2} \\ 2 \sqrt{13} &= x \end{aligned}$$

Hypotenuse: $x = 2\sqrt{13}$

Example #3: A 16ft ladder rests against the side of the house, and the base of the ladder is 4ft away. Approximately how high above the ground is the top of the ladder?

decimal answer.



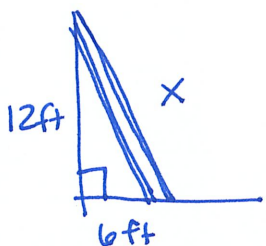
$$\begin{aligned} x^2 + 4^2 &= 16^2 \\ x^2 + 16 &= 256 \\ -16 & \quad -16 \\ \sqrt{x^2} &= \sqrt{240} \end{aligned}$$

$x = 15.49$ ft

$x = 2\sqrt{13}$

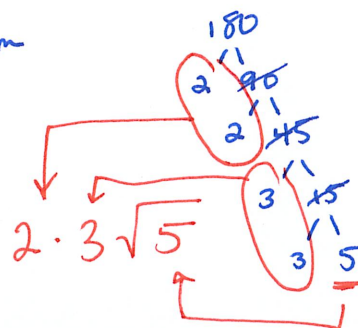
Example #4: The top of a ladder rests against a wall, 12ft above the ground. The base of the ladder is 6ft away from the wall. Find the exact length of the ladder?

Simplest radical form



$$\begin{aligned} 12^2 + 6^2 &= x^2 \\ 144 + 36 &= x^2 \\ \sqrt{180} &= \sqrt{x^2} \end{aligned}$$

$x = 6\sqrt{5}$ ft



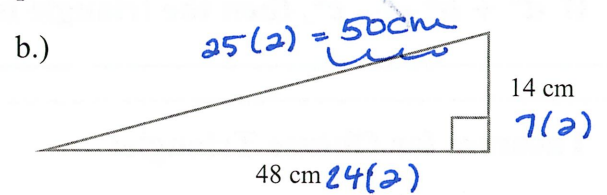
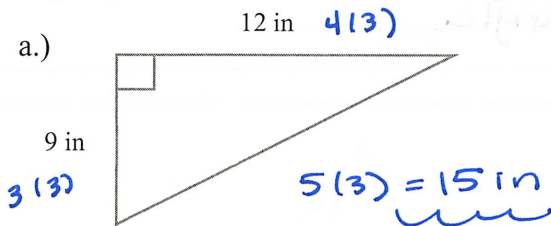
Pythagorean Triples:

A set of 3 positive integers a , b and c that satisfy the equation $a^2 + b^2 = c^2$

Common Pythagorean Triples

	3, 4, 5	5, 12, 13	8, 15, 17	7, 24, 25
x 2	6, 8, 10	10, 24, 26	16, 30, 34	14, 48, 50
x 10	30, 40, 50	50, 120, 130	80, 150, 170	70, 240, 250
x	3x, 4x, 5x	5x, 12x, 13x	8x, 15x, 17x	7x, 24x, 25x

Example #5: Find the unknown side length using a Pythagorean Triple.

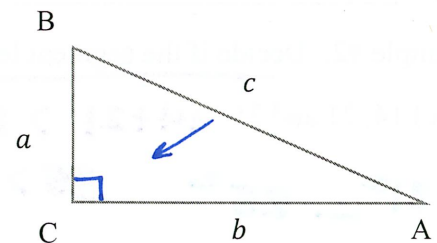


Chapter 7.2: Use the Converse of the Pythagorean Theorem

Converse of the Pythagorean Theorem (Theorem 7.2):

If the square of the length of the longest side of a triangle is equal to the sum of the squares of the lengths of the other two sides, then the triangle is a right triangle.

If $c^2 = a^2 + b^2$, then $\triangle ABC$ is a right triangle



Example #1: Tell whether the given triangle is a right triangle.

