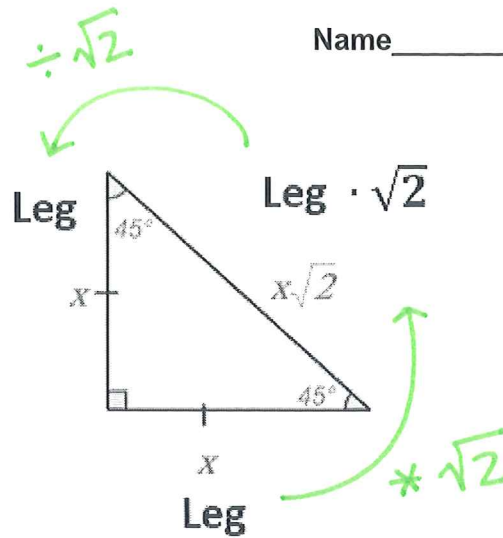


Special Right Triangles

Name _____

45-45-90

Isosceles right triangle



In a 45-45-90 Triangle, if the legs have a length of x , then the hypotenuse has a length of $x\sqrt{2}$.

Example 1: Find the missing side length(s) in each 45-45-90 triangle. Rationalize the denominators.

A.

Diagram: A 45-45-90 triangle with a vertical leg of length 12 cm, a horizontal leg of length x , and a hypotenuse of length y . Both legs are marked with single tick marks. The angles are 45°, 45°, and 90°.

Handwritten solutions:

$$x = \text{leg}$$

$$x = 12$$

$$y = \text{leg} \cdot \sqrt{2}$$

$$y = 12\sqrt{2}$$

B.

Diagram: A 45-45-90 triangle with a vertical leg of length 3 in., a horizontal leg of length x , and a hypotenuse of length y . Both legs are marked with single tick marks. The angles are 45°, 45°, and 90°.

Handwritten solutions:

$$x = \text{leg}$$

$$x = 3$$

$$y = \text{leg} \cdot \sqrt{2}$$

$$y = 3\sqrt{2}$$

C.

Diagram: A 45-45-90 triangle inscribed in a square. The hypotenuse of the triangle is the diagonal of the square and has a length of 18. The legs of the triangle are the sides of the square, both of length x . The angles are 45°, 45°, and 90°.

Handwritten solution:

$$18 = \text{leg} \sqrt{2}$$

$$\frac{18}{\sqrt{2}} = \frac{x \sqrt{2}}{\sqrt{2}}$$

$$x = \frac{18}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{18\sqrt{2}}{2}$$

$$x = 9\sqrt{2}$$

rationalize the denominator

D.

Diagram: A 45-45-90 triangle with a hypotenuse of length $4\sqrt{2}$ and legs of length x and y . Both legs are marked with single tick marks. The angles are 45°, 45°, and 90°.

Handwritten solution:

$$\frac{4\sqrt{2}}{\sqrt{2}} = \frac{\text{leg} \sqrt{2}}{\sqrt{2}}$$

$$4 = \text{leg}$$

$$x = 4$$

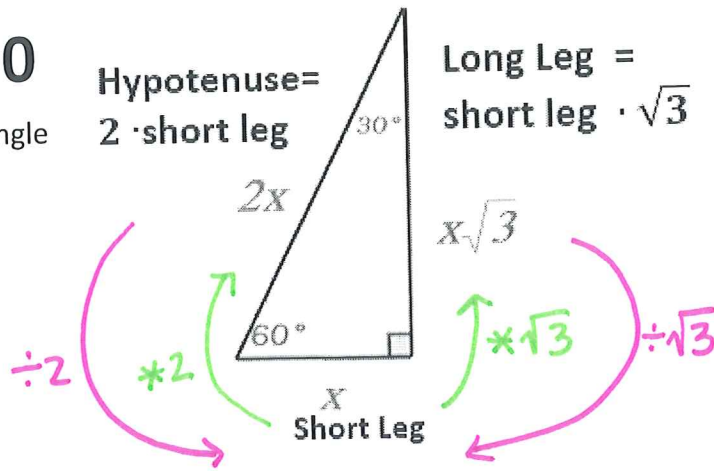
$$y = 4$$

30-60-90

special right triangle

Hypotenuse = $2 \cdot \text{short leg}$

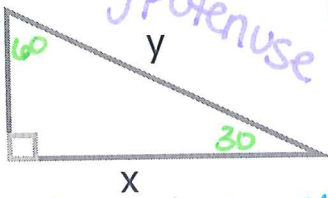
Long Leg = $\text{short leg} \cdot \sqrt{3}$



In a 30-60-90 triangle, the hypotenuse is 2 times the shorter leg and the longer leg is $\sqrt{3}$ times the shorter leg.

Example 2: Find the missing side length(s) in each 30-60-90 triangle. Rationalize the denominators.

A.



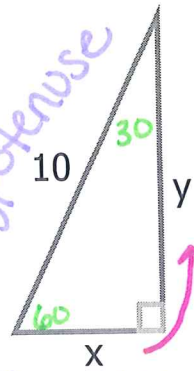
short leg

long leg

hypotenuse $y = \text{short} \cdot 2$
 $y = 15 \cdot 2$
 $y = 30$

$x = \text{short} \cdot \sqrt{3}$
 $x = 15\sqrt{3}$

B.



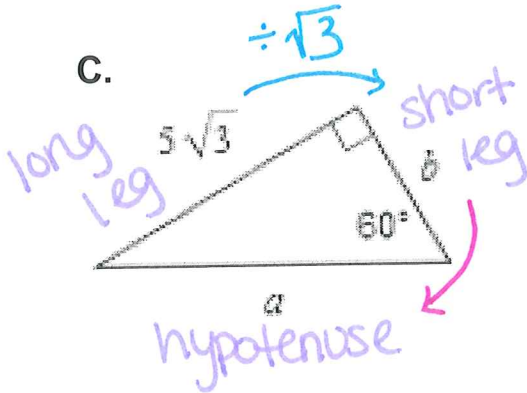
short leg

long leg

$x = \frac{10}{2} = 5$
 $x = 5$

$y = \text{short} \cdot \sqrt{3}$
 $y = 5\sqrt{3}$

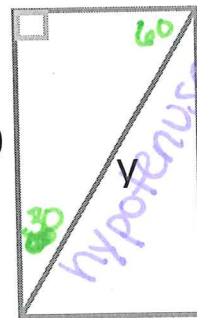
C.



$b = \frac{5\sqrt{3}}{\sqrt{3}}$
 $b = 5$

$a = 5 \cdot 2$
 $a = 10$

D.



long leg

short leg

$20 = \text{short} \cdot \sqrt{3}$
 $\frac{20}{\sqrt{3}} = \frac{x\sqrt{3}}{\sqrt{3}}$ (rationalize the denom.)

$x = \frac{20}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$y = 2 \cdot \text{short}$
 $y = \frac{40\sqrt{3}}{3}$

$x = \frac{20\sqrt{3}}{3}$