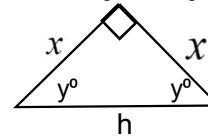


Math- 3A

Lesson 13-9

Using Proportions To Solve
45-45-90 Right Triangles.

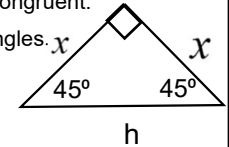
Isosceles Right Triangle: a right triangle with two sides that are congruent.



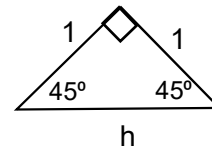
1) Find the measures of the base angles. x

$$y^\circ + y^\circ + 90 = 180$$

$$2y^\circ = 90 \quad y = 45^\circ$$



2) "X" can be any number. To make it **really** easy, lets just make $x = 1$.

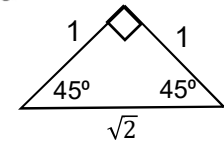


3) Solve for 'h': $a^2 + b^2 = c^2$

$$1^2 + 1^2 = c^2$$

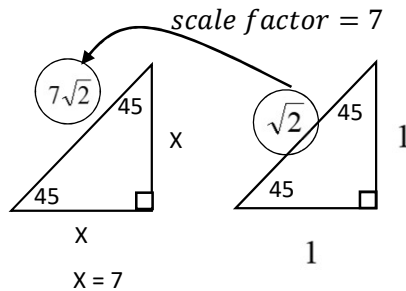
$$2 = c^2$$

$$c = \sqrt{2}$$



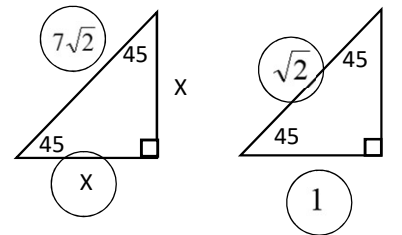
45-45-90 Right Triangle

Can you use scale factors to solve for the lengths of sides of similar 45-45-90 right triangles?



45-45-90 Right Triangle

Can you use a proportion to solve for the lengths of sides of similar 45-45-90 right triangles?



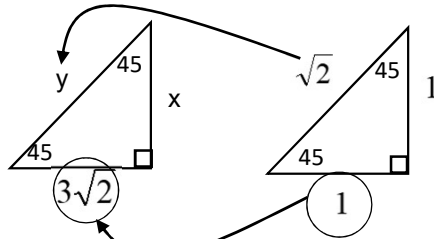
Write a proportion (equation where a fraction equals a fraction)

$$\frac{7\sqrt{2}}{\sqrt{2}} = \frac{x}{1}$$

$$\frac{7\sqrt{2}}{\sqrt{2}} = \frac{x}{1}$$

$$x = 7$$

Use the scale factor to solve for the lengths of sides of similar 45-45-90 triangle.



$$y = (\text{scale factor}) * \sqrt{2}$$

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

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

$$y = 3 * 2$$

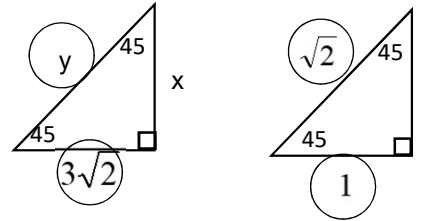
$$y = 6$$

$$\text{scale factor} = 3\sqrt{2}$$

Isosceles Right Triangle!

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

Use scale factors or proportions to solve for the lengths of sides of similar 45-45-90 right triangles.



Isosceles Right Triangle!

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

Write a proportion (equation where a fraction equals a fraction)

$$\frac{3\sqrt{2}}{1} = \frac{y}{\sqrt{2}}$$

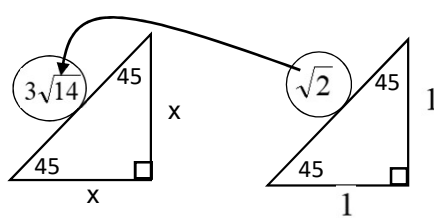
$$\frac{3\sqrt{2}}{1} * \frac{\sqrt{2}}{1} = \frac{y}{\sqrt{2}} * \frac{\sqrt{2}}{1}$$

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

$$3 * 2 = y$$

$$6 = y$$

Use the scale factor to solve for the lengths of sides of similar 45-45-90 triangle.



$$x = (\text{scale factor}) * 1$$

$$x = 3\sqrt{7}$$

$$\sqrt{2} * (\text{scale factor}) = 3\sqrt{14}$$

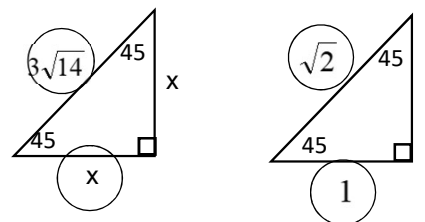
$$\div \sqrt{2} \qquad \div \sqrt{2}$$

$$(\text{scale factor}) = \frac{3\sqrt{14}}{\sqrt{2}}$$

$$(\text{scale factor}) = \frac{3\sqrt{2}\sqrt{7}}{\sqrt{2}}$$

$$(\text{scale factor}) = 3\sqrt{7}$$

Use scale factors or proportions to solve for the lengths of sides of similar 45-45-90 right triangles.



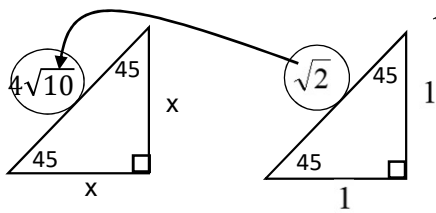
Write a proportion (equation where a fraction equals a fraction)

$$\frac{3\sqrt{14}}{\sqrt{2}} = \frac{x}{1}$$

$$\frac{3\sqrt{2}\sqrt{7}}{\sqrt{2}} = x$$

$$x = 3\sqrt{7}$$

Use the scale factor to solve for the lengths of sides of similar 45-45-90 triangle.

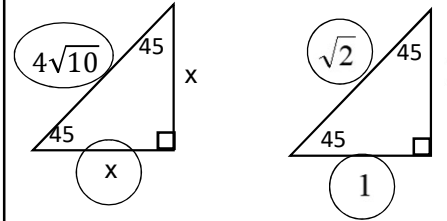


$$\begin{aligned}\sqrt{2} * (\text{scale factor}) &= 4\sqrt{10} \\ \div \sqrt{2} &\quad \div \sqrt{2} \\ (\text{scale factor}) &= \frac{4\sqrt{10}}{\sqrt{2}} \\ (\text{scale factor}) &= \frac{4\sqrt{2}\sqrt{5}}{\sqrt{2}}\end{aligned}$$

$$\begin{aligned}x &= (\text{scale factor}) * 1 \\ x &= 4\sqrt{5}\end{aligned}$$

$$(\text{scale factor}) = 4\sqrt{5}$$

Use scale factors or proportions to solve for the lengths of sides of similar 45-45-90 right triangles.

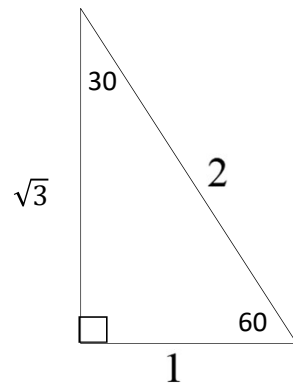


Write a proportion (equation where a fraction equals a fraction)

$$\begin{aligned}\frac{4\sqrt{10}}{\sqrt{2}} &= \frac{x}{1} \\ \frac{4\sqrt{2}\sqrt{5}}{\sqrt{2}} &= x \\ x &= 4\sqrt{5}\end{aligned}$$

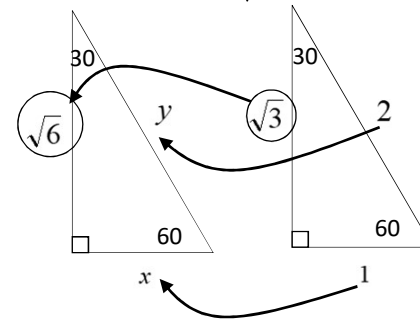
You must memorize the 30-60-90 triangle.

“one-two-three-root”



30-60-90 Right Triangle Solve Using Scale Factors

$$\sqrt{3} * (SF) = \sqrt{6} \Rightarrow SF = \frac{\sqrt{6}}{\sqrt{3}} \Rightarrow SF = \frac{\sqrt{2}\sqrt{3}}{\sqrt{3}} \Rightarrow \boxed{SF = \sqrt{2}}$$



$$\begin{aligned}y &= 2(SF) \\ \Rightarrow y &= 2\sqrt{2} \\ x &= (SF) * 1 \\ \Rightarrow x &= \sqrt{2}\end{aligned}$$

30-60-90 Right Triangle Solve Using Scale Factors

$2 * (SF) = 6\sqrt{2} \Rightarrow SF = \frac{\cancel{2} * 3 * \sqrt{2}}{\cancel{2}} \Rightarrow SF = 3\sqrt{2}$

$y = (SF) * \sqrt{3}$
 $\Rightarrow y = 3\sqrt{2}\sqrt{3}$
 $\Rightarrow y = 3\sqrt{6}$

$x = (SF) * 1$
 $\Rightarrow x = 3\sqrt{2}$

30-60-90 Right Triangle Solve with a proportion

Write a proportion (equation where a fraction equals a fraction)

$\frac{6\sqrt{2}}{2} = \frac{y}{\sqrt{3}} \Rightarrow \frac{\cancel{2} * 3 * \sqrt{2}}{\cancel{2}} = \frac{y}{\sqrt{3}}$
 $\Rightarrow 3\sqrt{2} = \frac{y}{\sqrt{3}}$
 $\Rightarrow 3\sqrt{2} * \sqrt{3} = \frac{y}{\sqrt{3}} * \frac{\sqrt{3}}{1}$
 $\Rightarrow 3\sqrt{6} = y$

$\frac{6\sqrt{2}}{2} = \frac{x}{1} \Rightarrow \frac{\cancel{2} * 3 * \sqrt{2}}{\cancel{2}} = \frac{x}{1} \Rightarrow 3\sqrt{2} = x \Rightarrow 3\sqrt{6} = y$

Solve using the scale factor.

$\sqrt{3} * SF = \frac{\sqrt{6}}{2} \Rightarrow SF = \frac{\sqrt{6}}{2} * \frac{1}{\sqrt{3}} \Rightarrow SF = \frac{\sqrt{3} * \sqrt{2}}{2 * \sqrt{3}} \Rightarrow SF = \frac{\sqrt{2} * \sqrt{3}}{2\sqrt{3}}$
 $\Rightarrow SF = \frac{\sqrt{2}}{2}$

$c = 2 * (SF)$
 $\Rightarrow c = \sqrt{2}$

$a = (SF) * 1$
 $\Rightarrow a = \frac{\sqrt{2}}{2}$

Solve using the scale factor.

$\frac{5\sqrt{2}}{3} * SF = \frac{\sqrt{6}}{2} \Rightarrow SF = \frac{\sqrt{6}}{2} * \frac{3}{5\sqrt{2}} \Rightarrow SF = \frac{3\sqrt{3}\sqrt{2}}{10\sqrt{2}} \Rightarrow SF = \frac{3\sqrt{3}}{10}$

$\Rightarrow c = 2 * \frac{3\sqrt{3}}{10}$
 $\Rightarrow c = \frac{3\sqrt{3}}{5}$

$a = (SF) * 1$
 $\Rightarrow a = \frac{3\sqrt{3}}{10}$