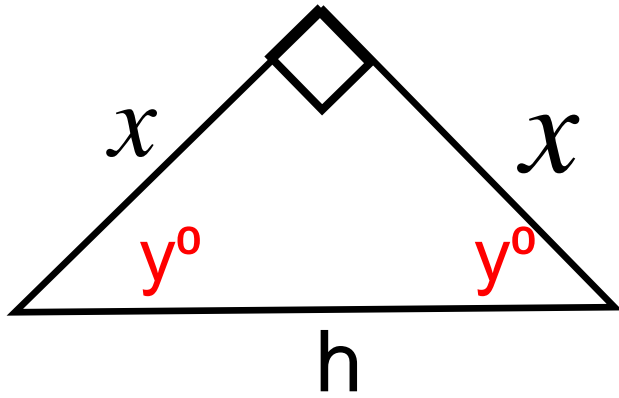


# Math- 2

## Lesson 7-7

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

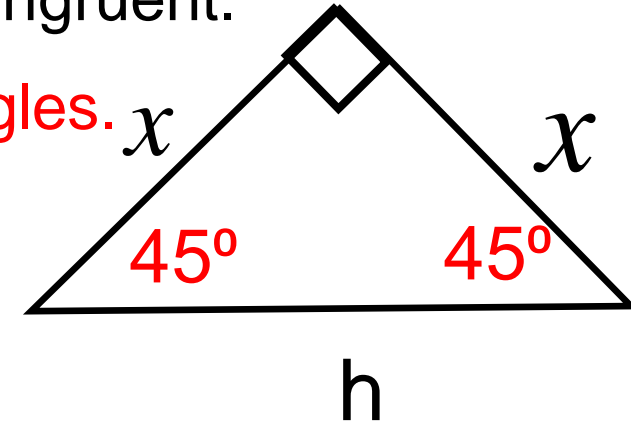
Isosceles Right Triangle: a right triangle with two sides that are congruent.



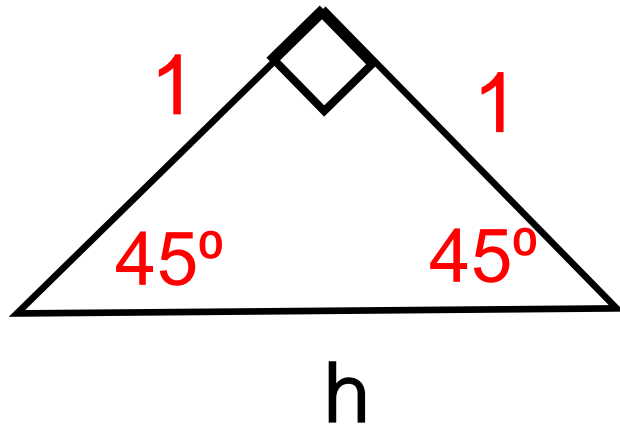
1) Find the measures of the base angles.

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

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



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

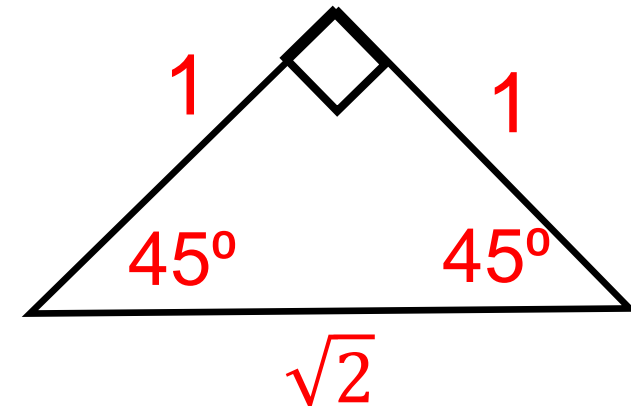


3) Solve for 'h'.  $a^2 + b^2 = c^2$

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

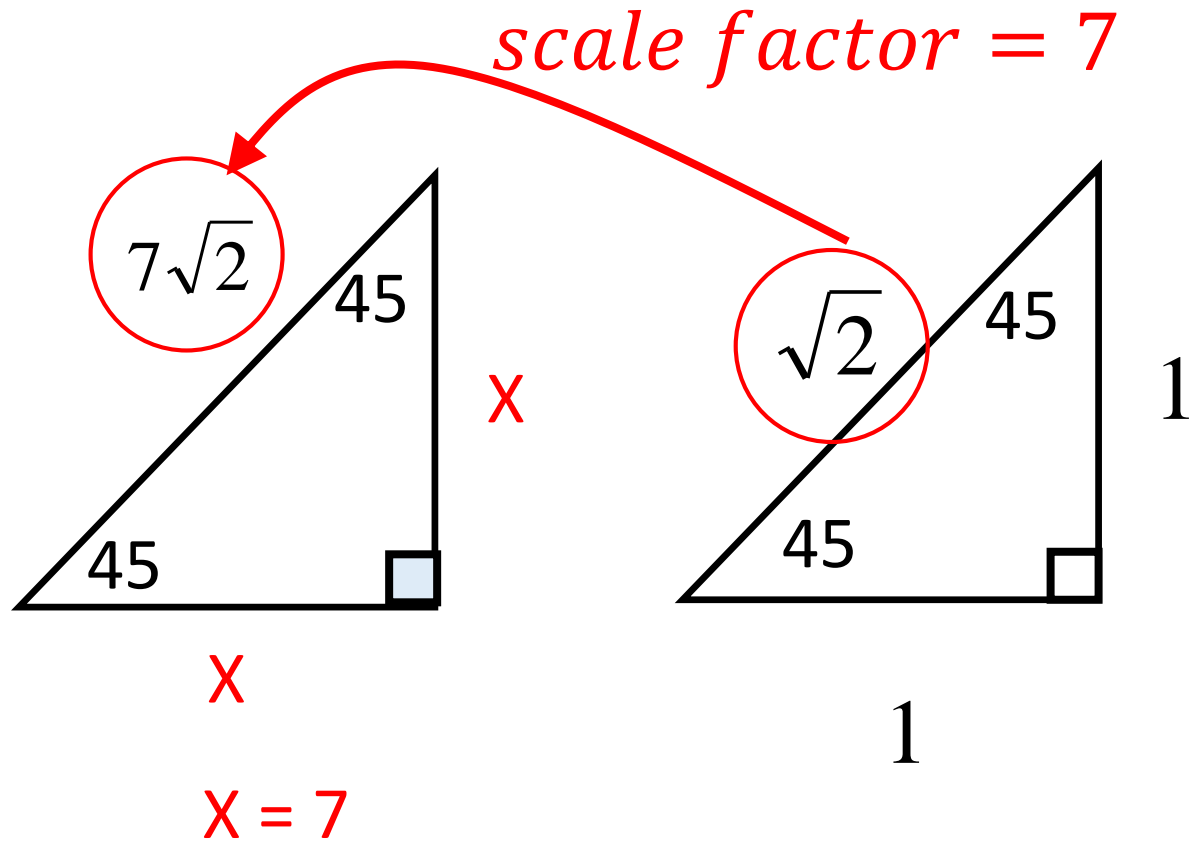
$$2 = c^2$$

$$c = \sqrt{2}$$



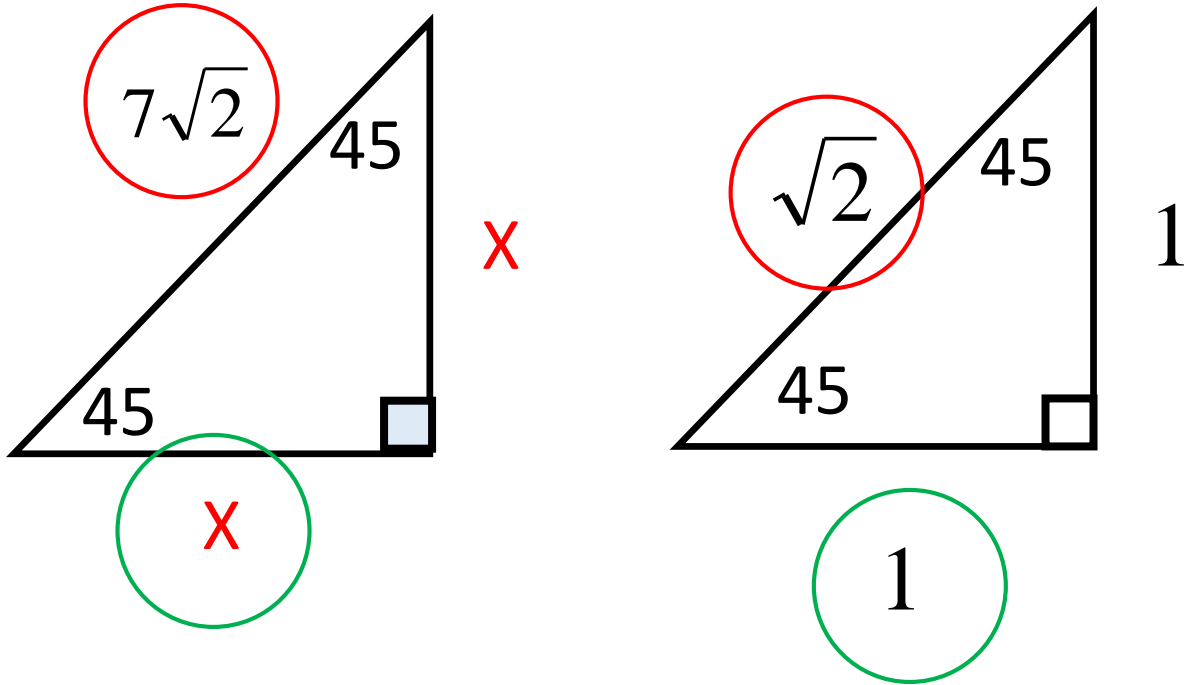
## 45-45-90 Right Triangle

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?



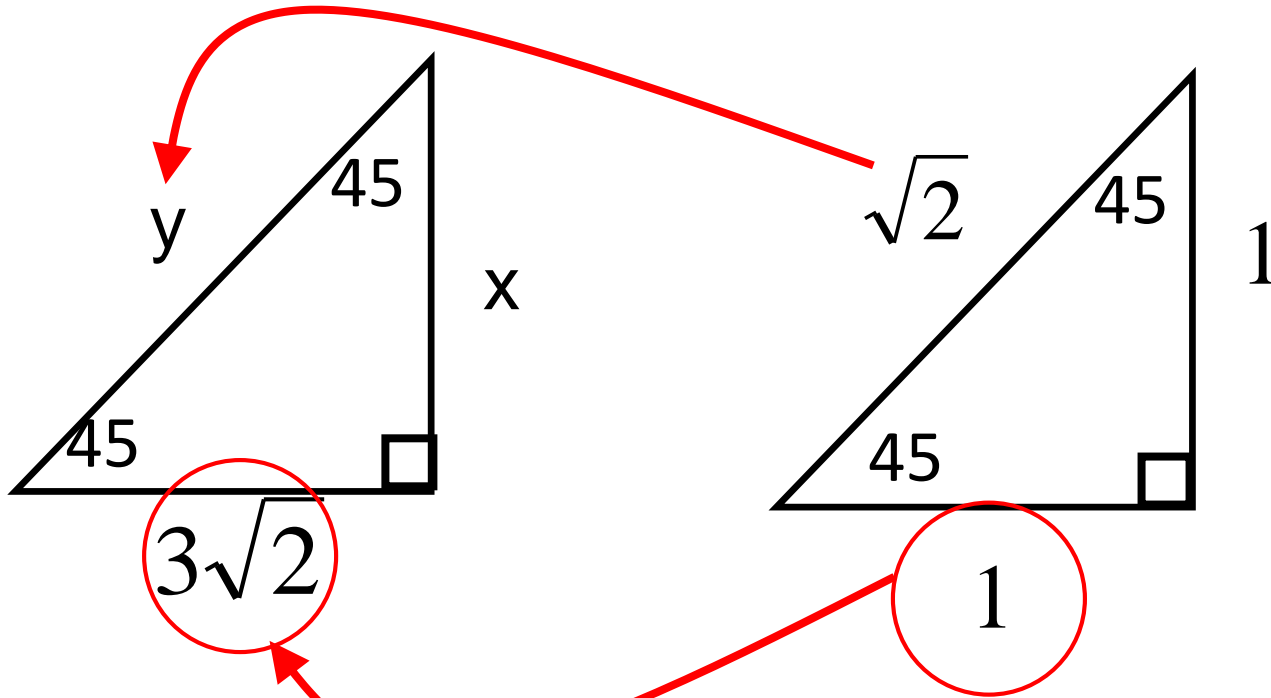
Write a proportion (equation where a fraction equals a fraction)

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

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

$$X = 7$$

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



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

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

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

$$y = 3 * 2$$

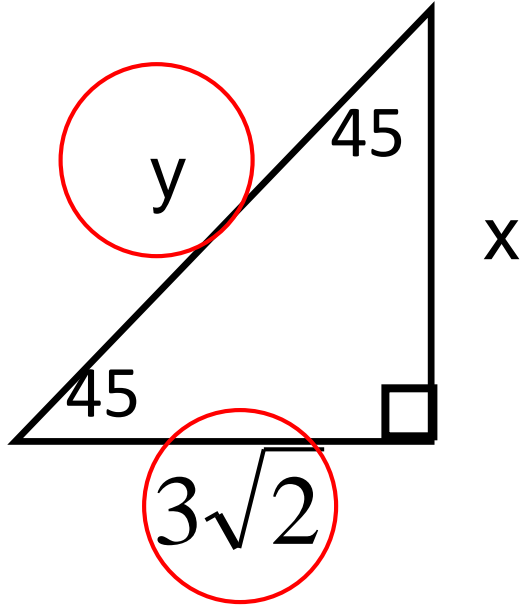
$$y = 6$$

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

Isosceles Right Triangle!

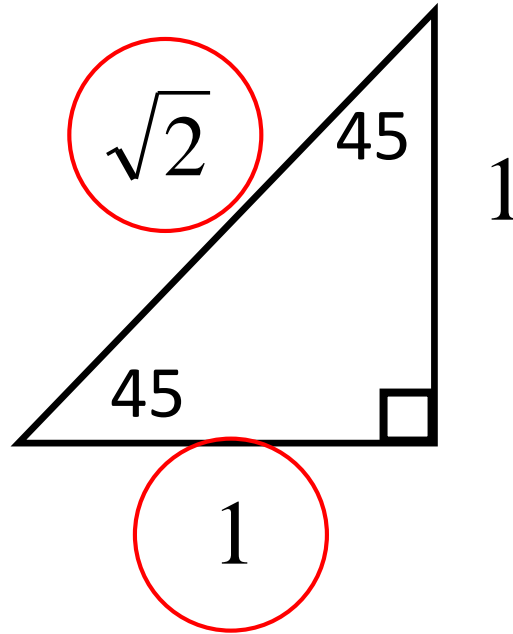
$$x = 3\sqrt{2}$$

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)

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

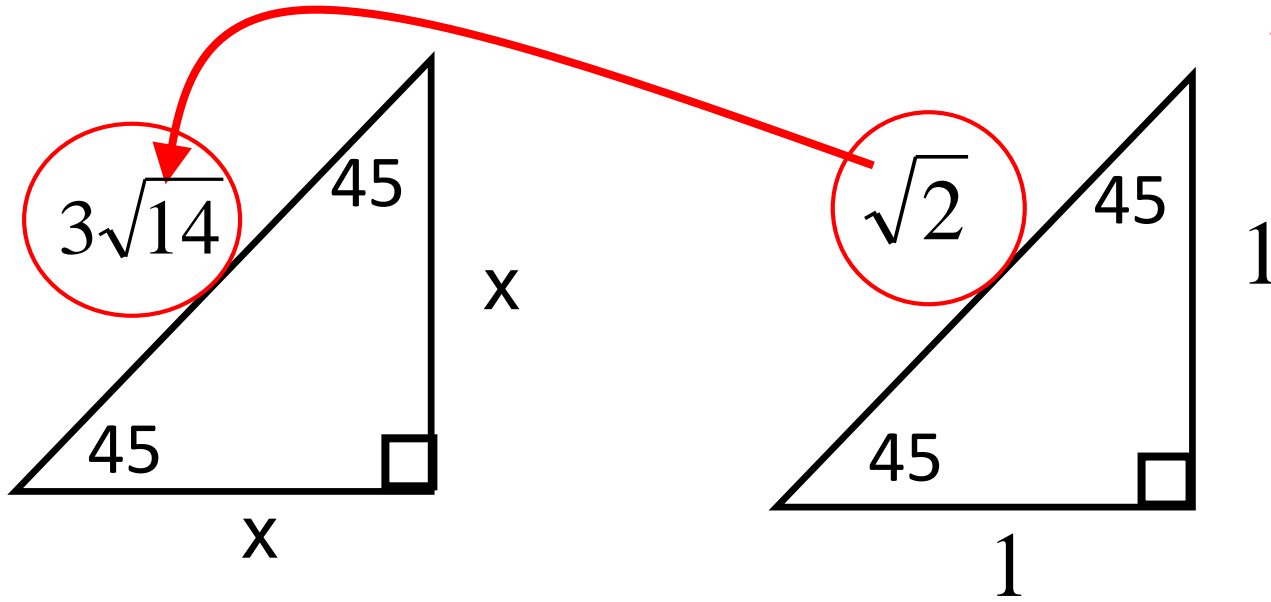
$$\frac{3\sqrt{2}}{1} * \frac{\sqrt{2}}{1} = \frac{y}{\cancel{\sqrt{2}}} * \frac{\cancel{\sqrt{2}}}{1}$$

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

$$3 * 2 = y$$

$$6 = y$$

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



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

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

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

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

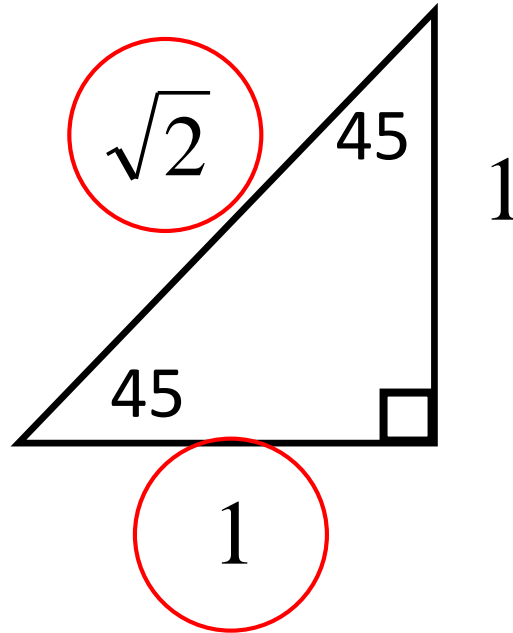
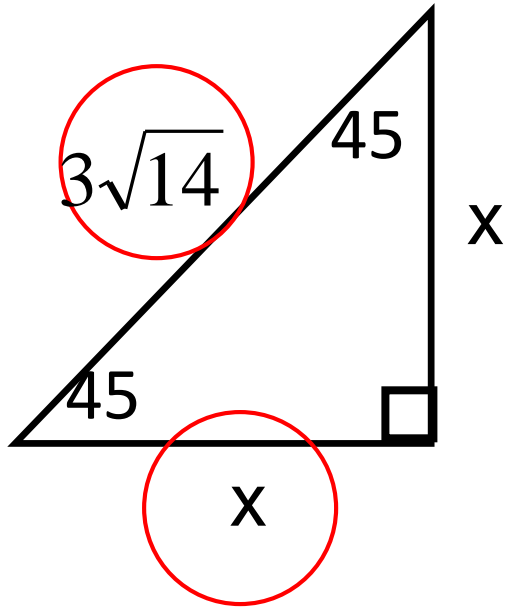
$$(\text{scale factor}) = 3\sqrt{7}$$

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

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

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)



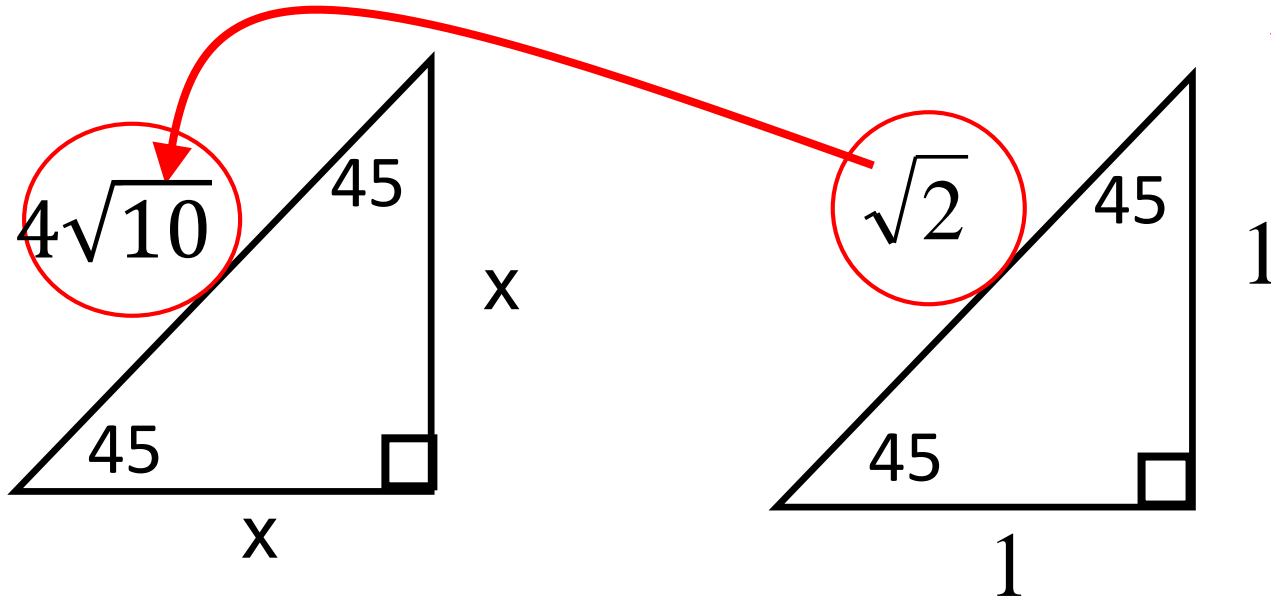
$$\frac{3\sqrt{14}}{\sqrt{2}} = \frac{x}{1}$$

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

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



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



$$\sqrt{2} * (\text{scale factor}) = 4\sqrt{10}$$

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

$$(\text{scale factor}) = \frac{4\sqrt{10}}{\sqrt{2}}$$

$$(\text{scale factor}) = \frac{4\cancel{\sqrt{2}}\sqrt{5}}{\cancel{\sqrt{2}}}$$

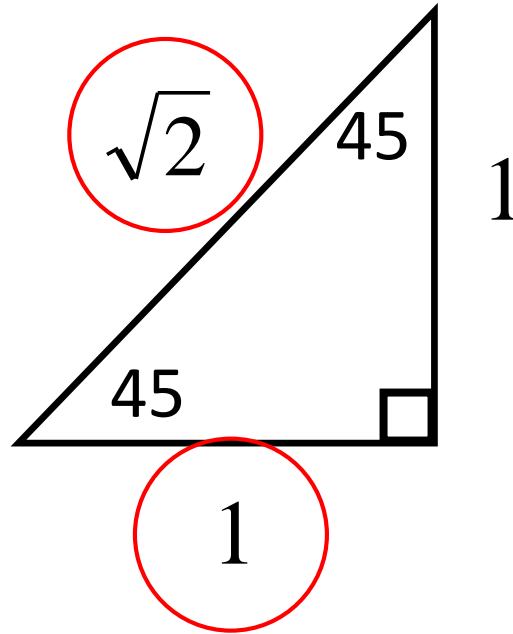
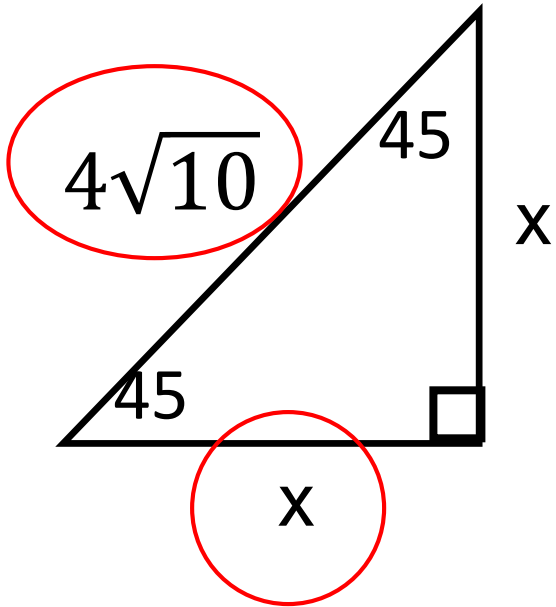
$$(\text{scale factor}) = 4\sqrt{5}$$

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

$$x = 4\sqrt{5}$$

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)



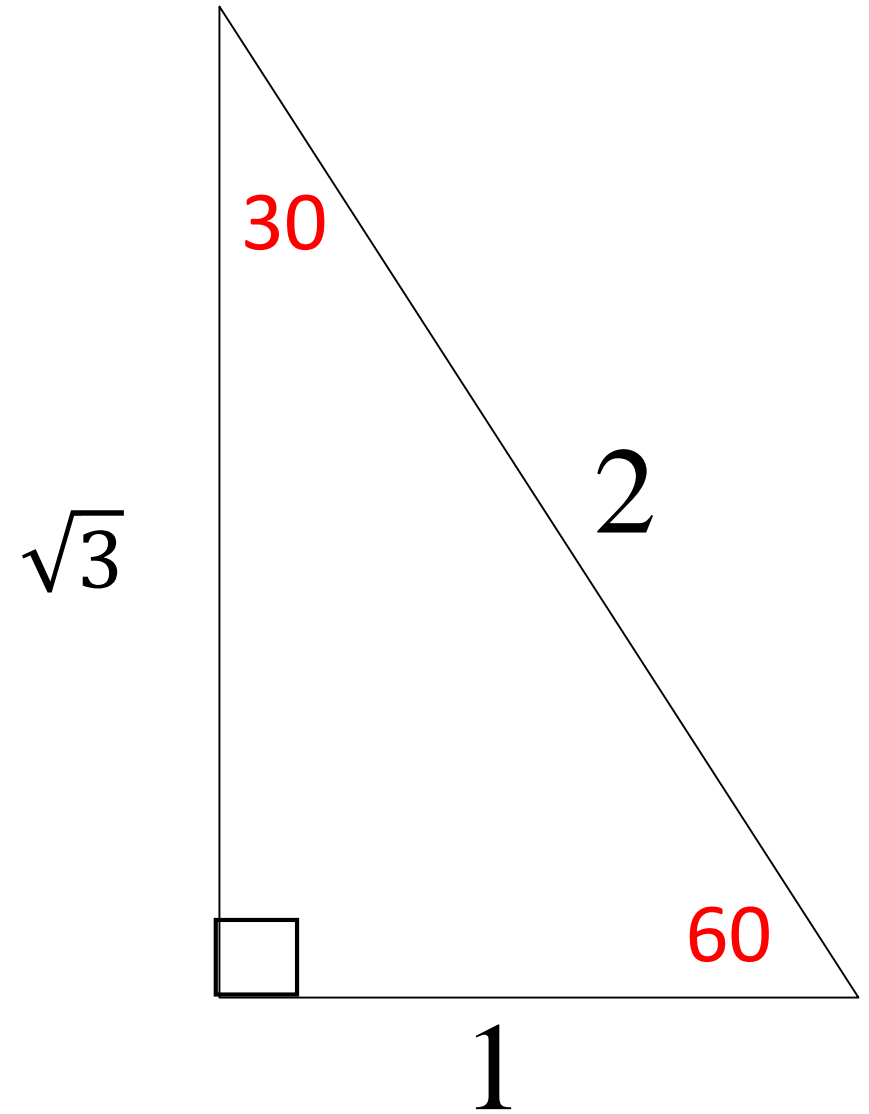
$$\frac{4\sqrt{10}}{\sqrt{2}} = \frac{x}{1}$$

$$\frac{4\cancel{\sqrt{2}}\sqrt{5}}{\cancel{\sqrt{2}}} = x$$

$$x = 4\sqrt{5}$$

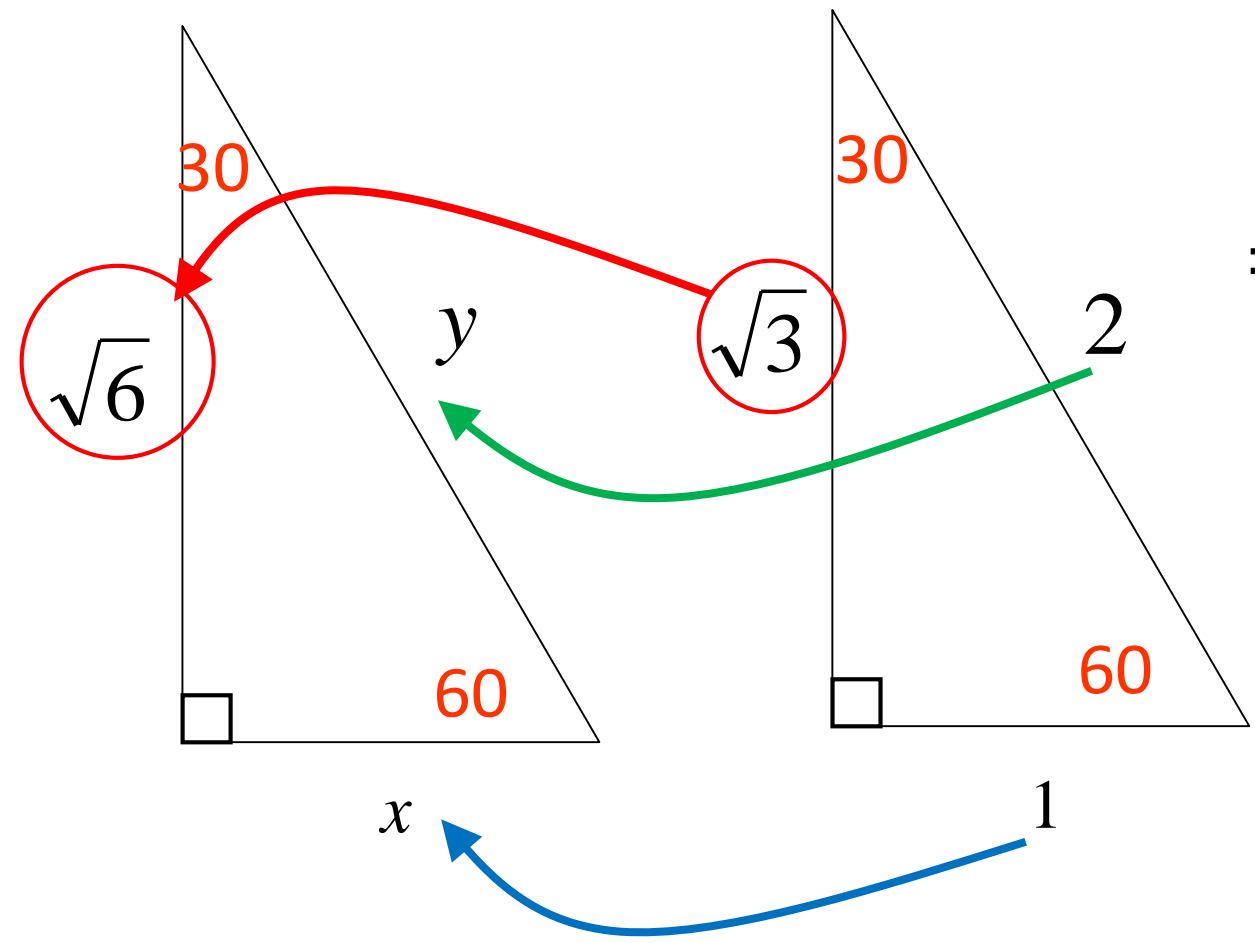
You must memorize the 30-60-90 triangle.

“one-two-three-root”



# 30-60-90 Right Triangle Solve Using Scale Factors

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



$$y = 2(SF)$$

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

$$x = (SF) * 1$$

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

# 30-60-90 Right Triangle

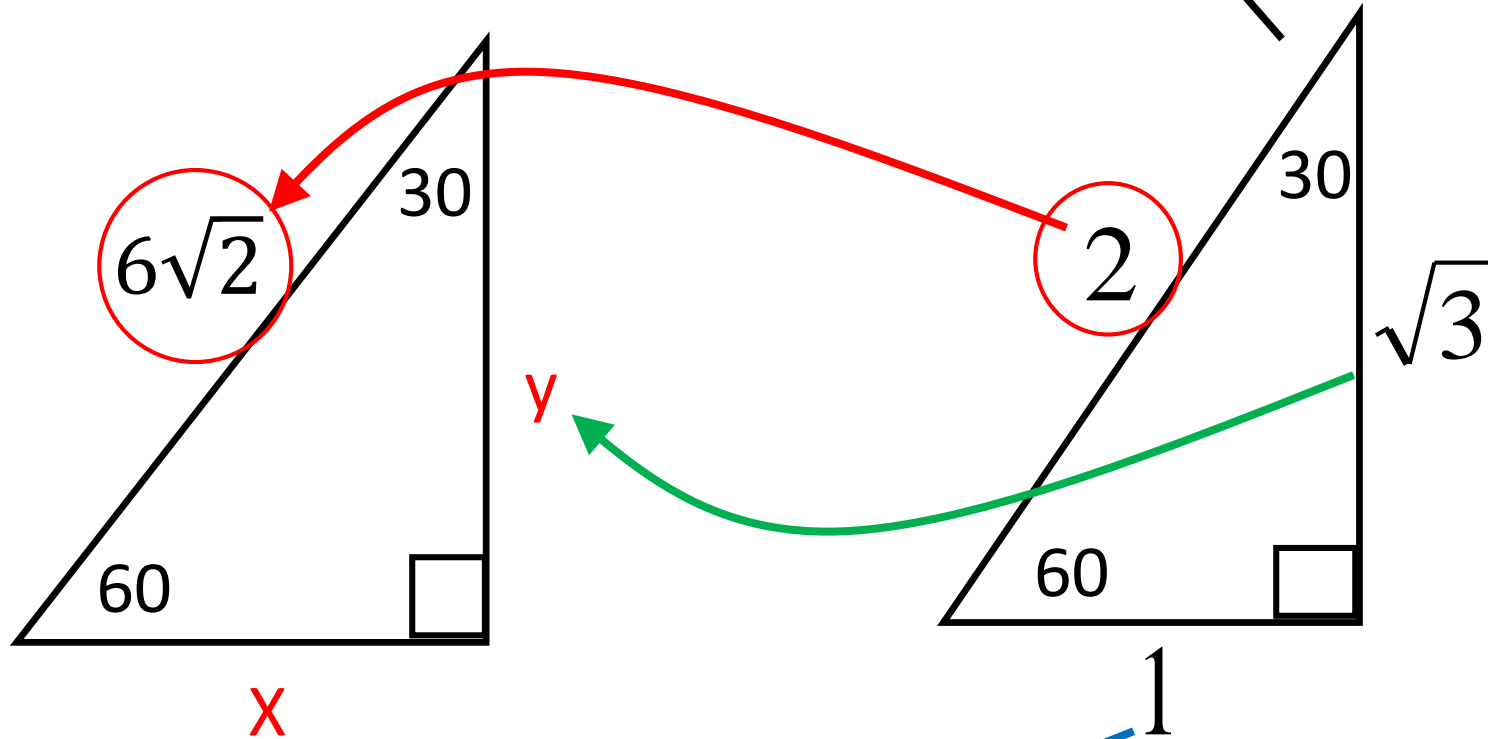
# Solve Using Scale Factors

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

$$SF = \frac{2 * 3 * \sqrt{2}}{2}$$

$\Rightarrow$

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



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

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

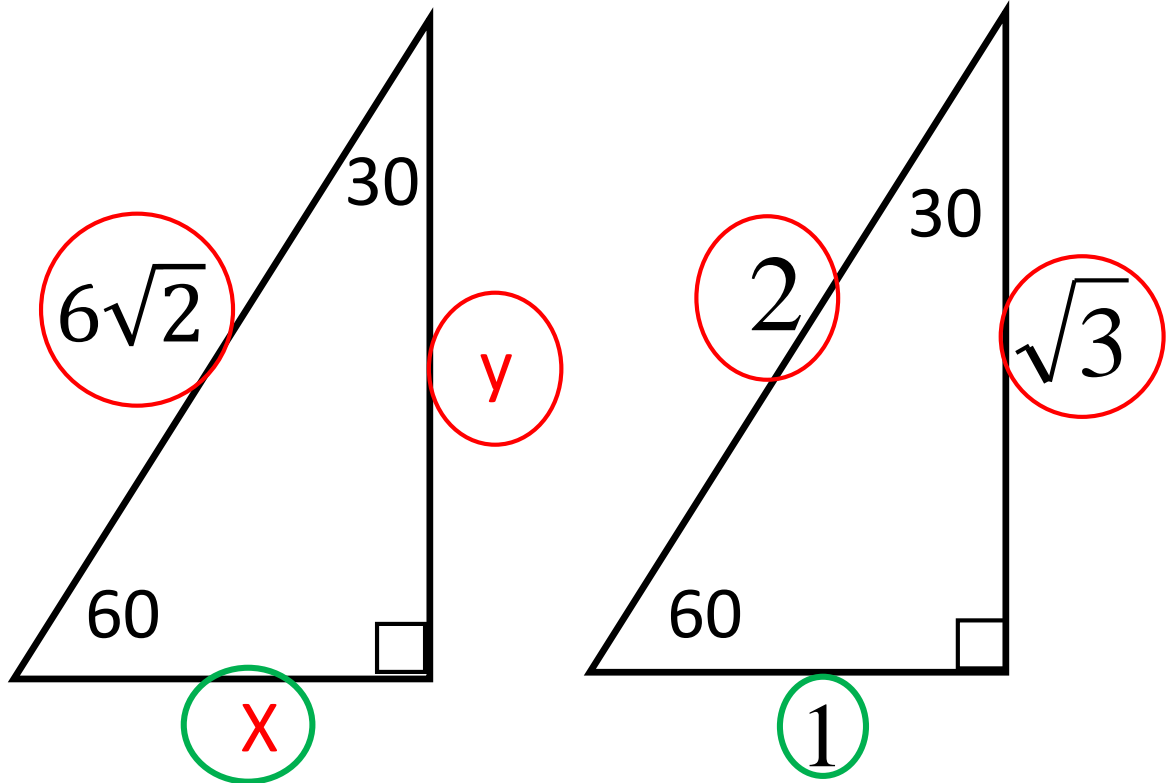
$$\Rightarrow y = 3\sqrt{6}$$

$$x = (SF) * 1$$

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

# 30-60-90 Right Triangle Solve with a proportion

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



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

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

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

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

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

$$\Rightarrow \boxed{3\sqrt{6} = y}$$

Solve using the scale factor.

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

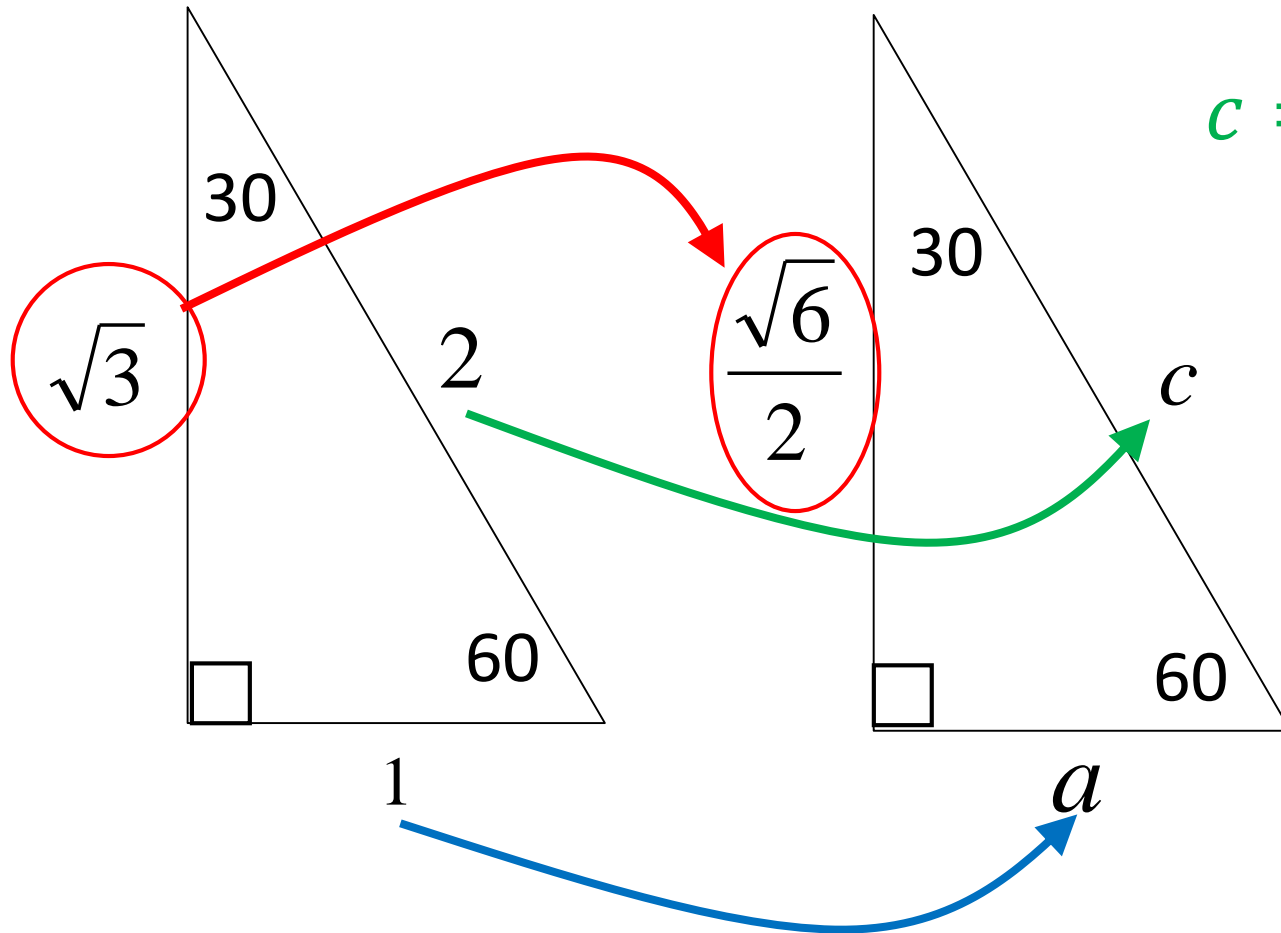
$$\Rightarrow \boxed{SF = \frac{\sqrt{2}}{2}}$$

$$c = 2 * (SF)$$

$$\Rightarrow \boxed{c = \sqrt{2}}$$

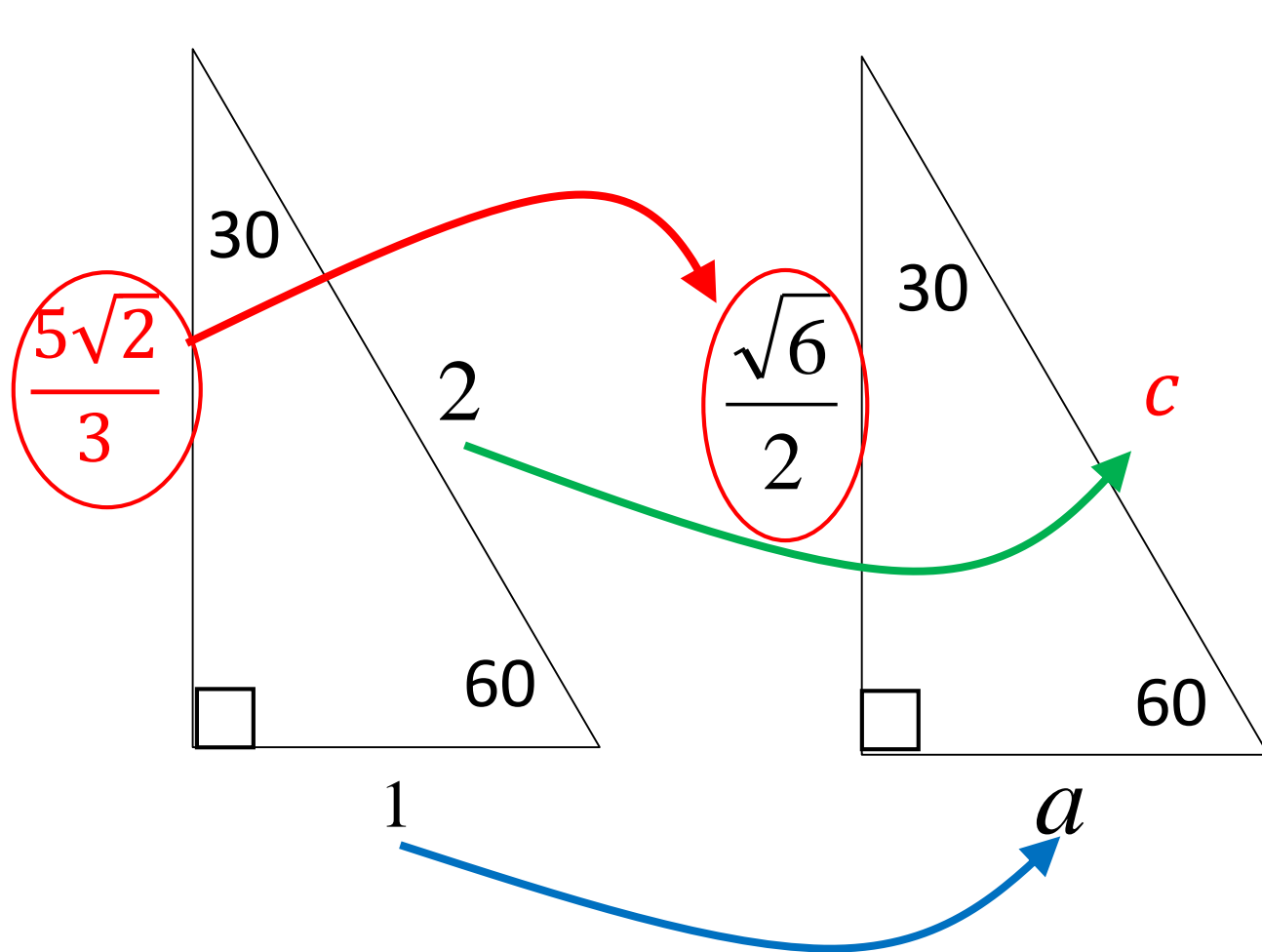
$$a = (SF) * 1$$

$$\Rightarrow \boxed{a = \frac{\sqrt{2}}{2}}$$



Solve using the scale factor.

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



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

$$\Rightarrow \boxed{c = \frac{3\sqrt{3}}{5}}$$

$$a = (SF) * 1$$

$$\Rightarrow \boxed{a = \frac{3\sqrt{3}}{10}}$$