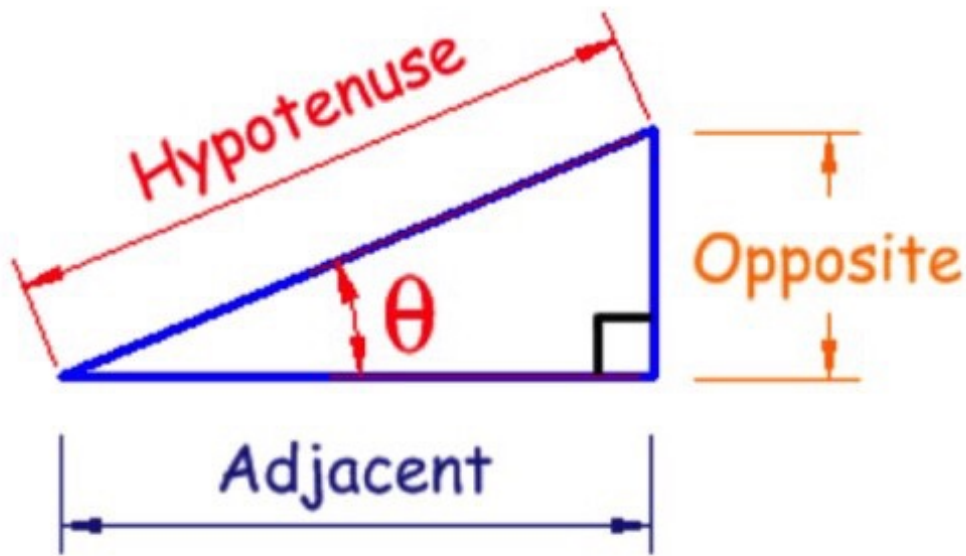


# 9.1 Right Triangle Trigonometry



SOH CAH TOA

$\theta = \text{theta} \rightarrow \text{angles}$

$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

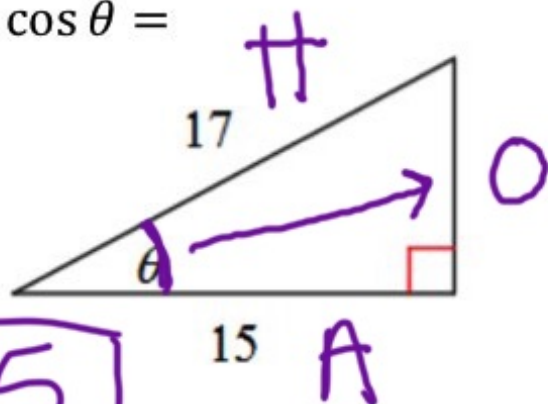
$$\cos \theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan \theta = \frac{\text{opposite}}{\text{adjacent}}$$

# EXAMPLE

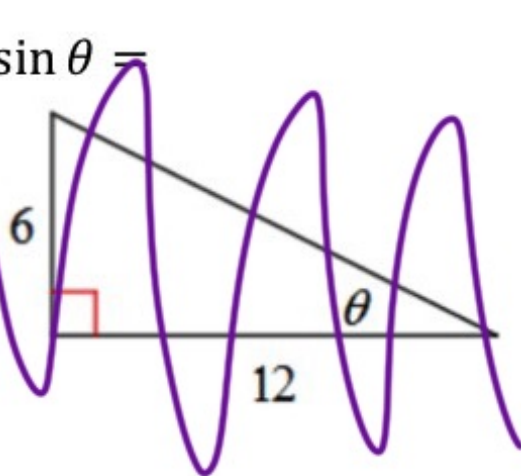
Find each trig ratio.

A.  $\cos \theta =$

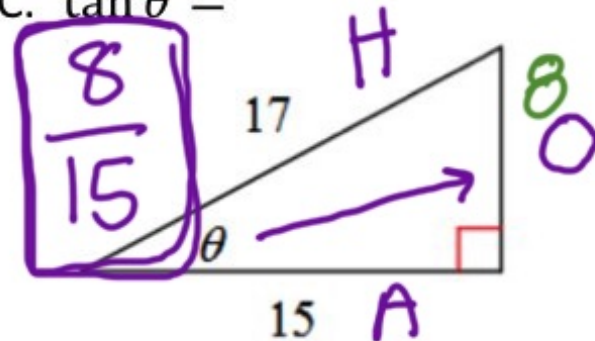


$$\frac{15}{17}$$

B.  $\sin \theta =$



C.  $\tan \theta =$

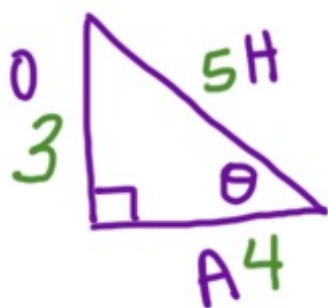


$$\frac{8}{15}$$

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

↑  
hypotenuse

D. Find  $\cos \theta$  if  $\tan \theta = \frac{3}{4}$



$$3^2 + 4^2 = c^2$$

$$25 = c^2$$

$$c = 5$$

$$\cos \theta = \frac{4}{5}$$

E. Find  $\sin \theta$  if  $\cos \theta = \frac{8}{17}$

$$15^2 + b^2 = 17^2$$

$$-15^2$$

$$-15^2$$

$$\sqrt{b^2} = \sqrt{64}$$

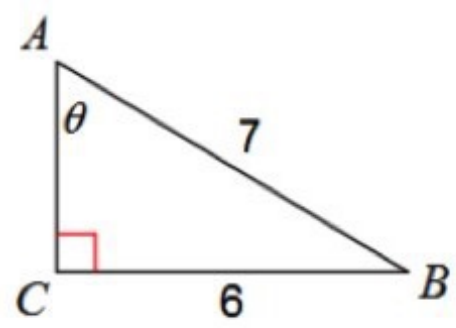
$$b = 8$$

Missing Side (only know one side)	Missing Angle (know 2 sides)
<b>SKIP!!!</b>	

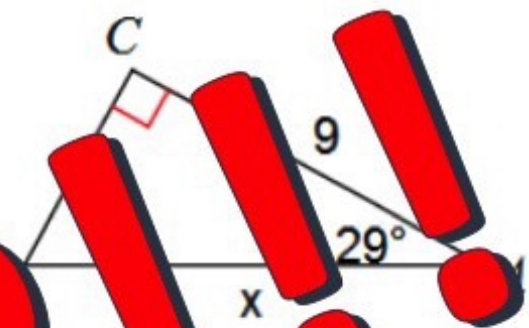
**EXAMPLE**

Use trigonometry to find missing sides and angles.

F.



G.



**SKIP!!!**

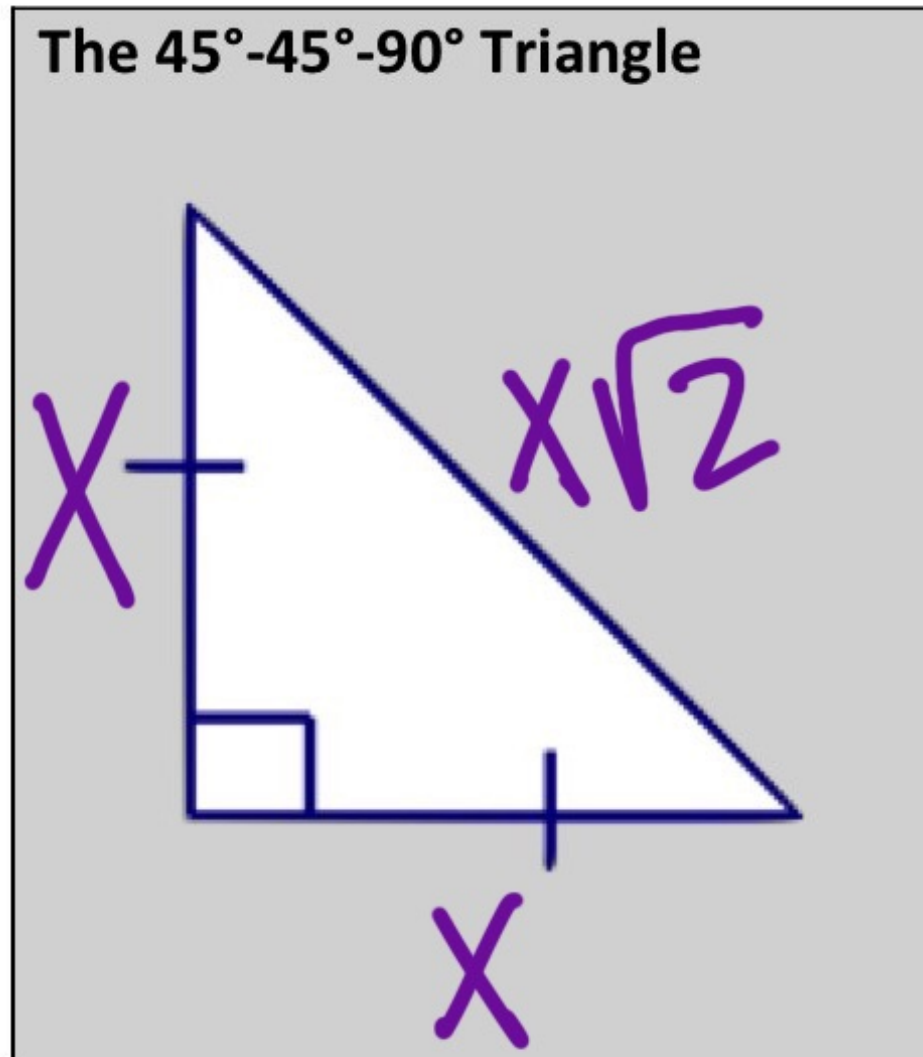
## Special Right Triangles

There are two kinds of triangles where the side lengths have a special relationship based on the angle measures of the triangle.

Use the Pythagorean Theorem to help you fill out the information in the table below. Then using the information in the table, answer the questions that follow.

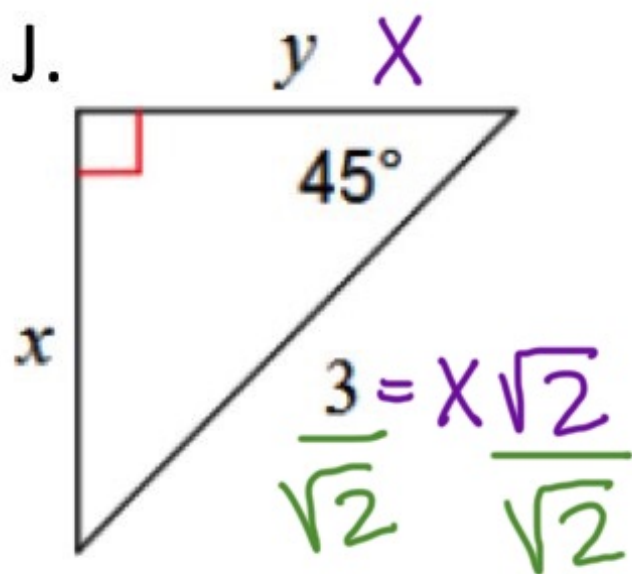
Side length opposite $45^\circ$ angle	Side length opposite $45^\circ$ angle	Hypotenuse length
1		
2		
3		
4		

What are the patterns you notice with the  $45^\circ$ - $45^\circ$ - $90^\circ$  triangle?



Find the missing sides indicated.

J.

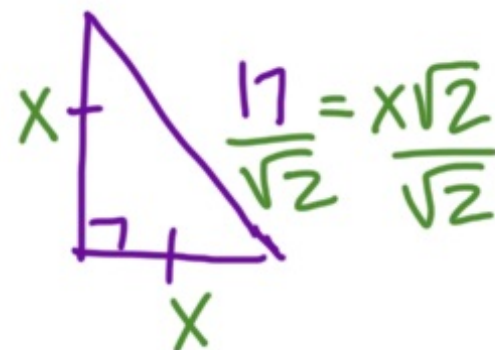
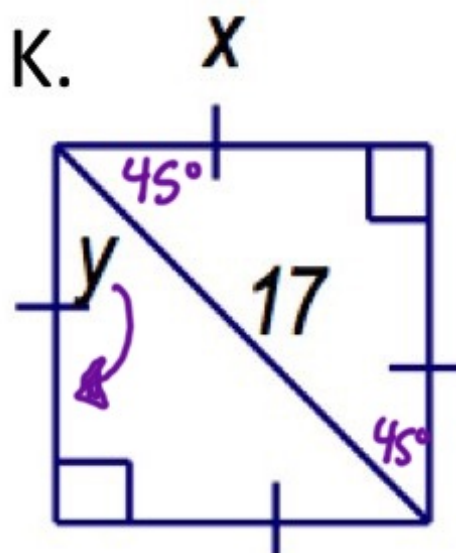


$$\frac{3}{\sqrt{2}} = \frac{X\sqrt{2}}{\sqrt{2}}$$

$$X = \frac{3}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

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

K.

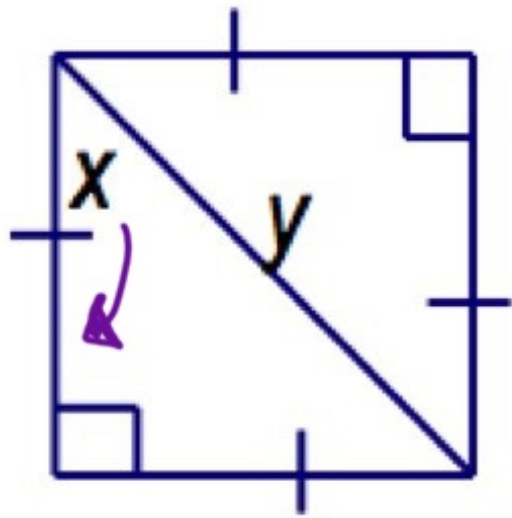


$$\frac{17}{\sqrt{2}} = \frac{X\sqrt{2}}{\sqrt{2}}$$

$$X = y = \frac{17\sqrt{2}}{2}$$

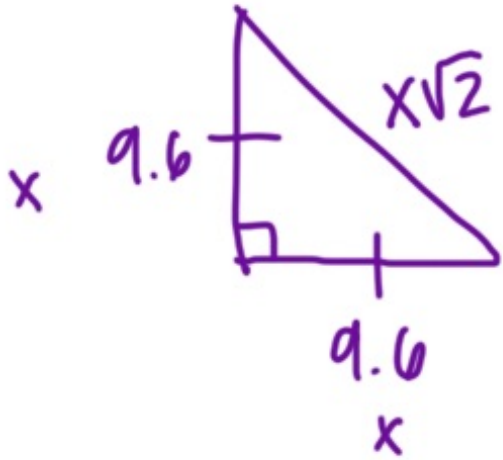


L.



9.6

$$x = 9.6$$
$$y = 9.6\sqrt{2}$$

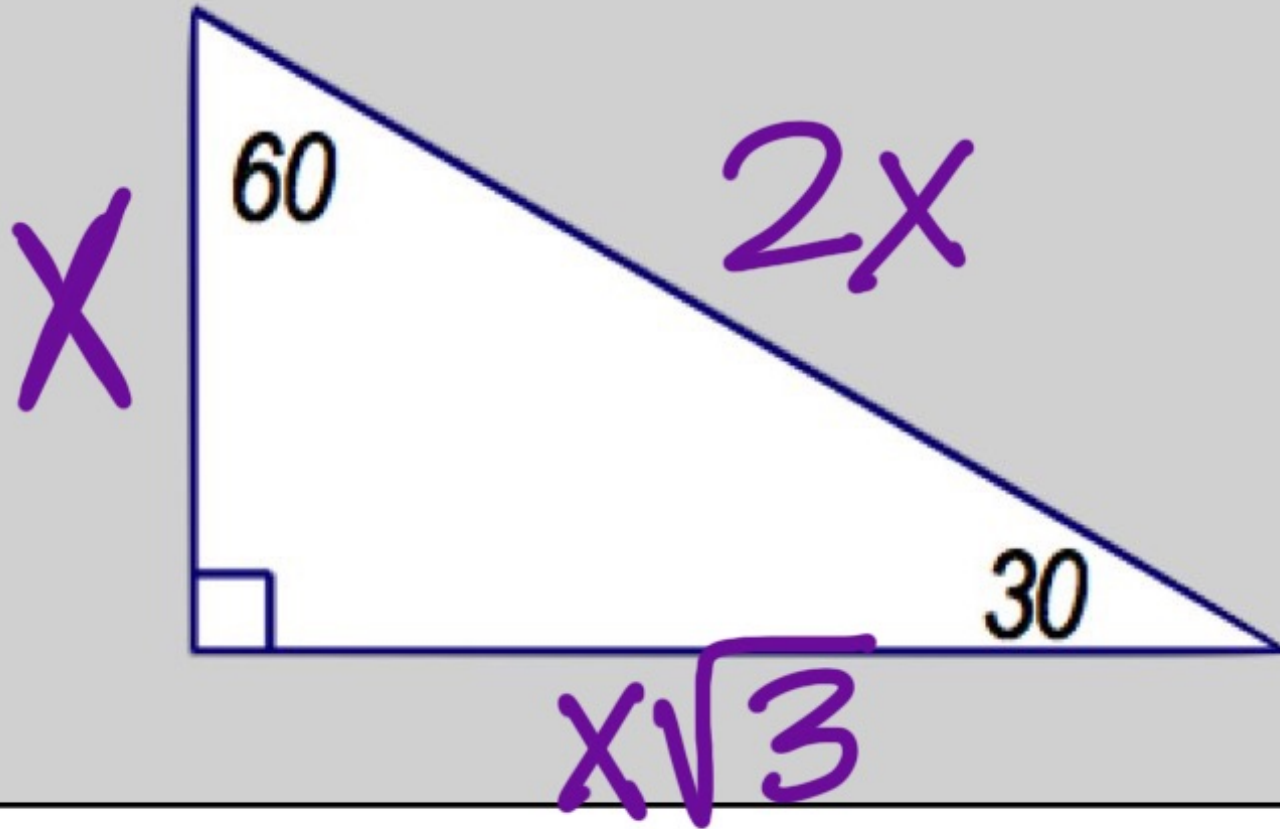


Use the same process with a  $30^\circ$ - $60^\circ$ - $90^\circ$  triangle:

Side length opposite $30^\circ$ angle	Side length opposite $60^\circ$ angle	Hypotenuse length
1		
2		
3		
4		

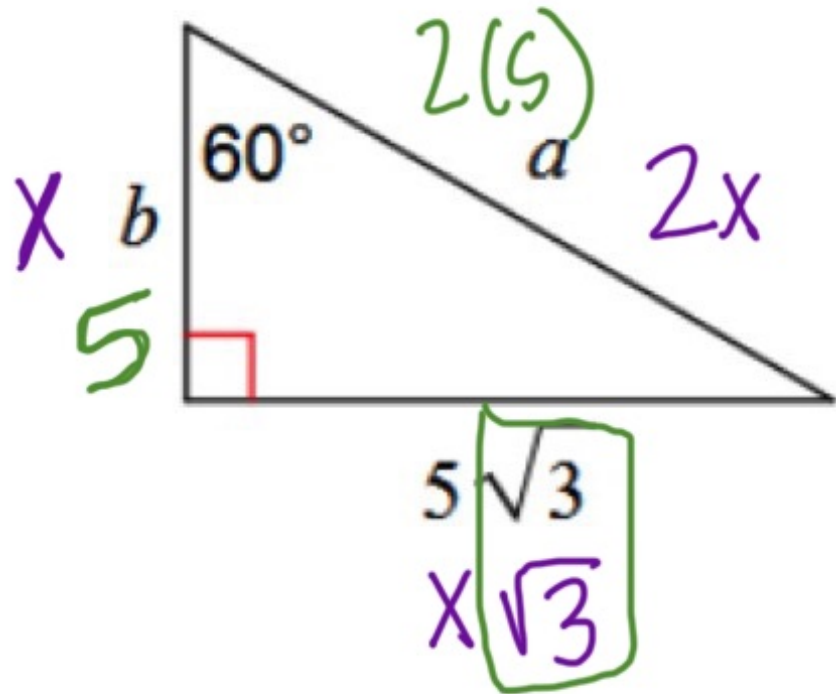
What are the patterns you notice with the  $45^\circ$ - $45^\circ$ - $90^\circ$  triangle?

# The 30°-60°-90° Triangle



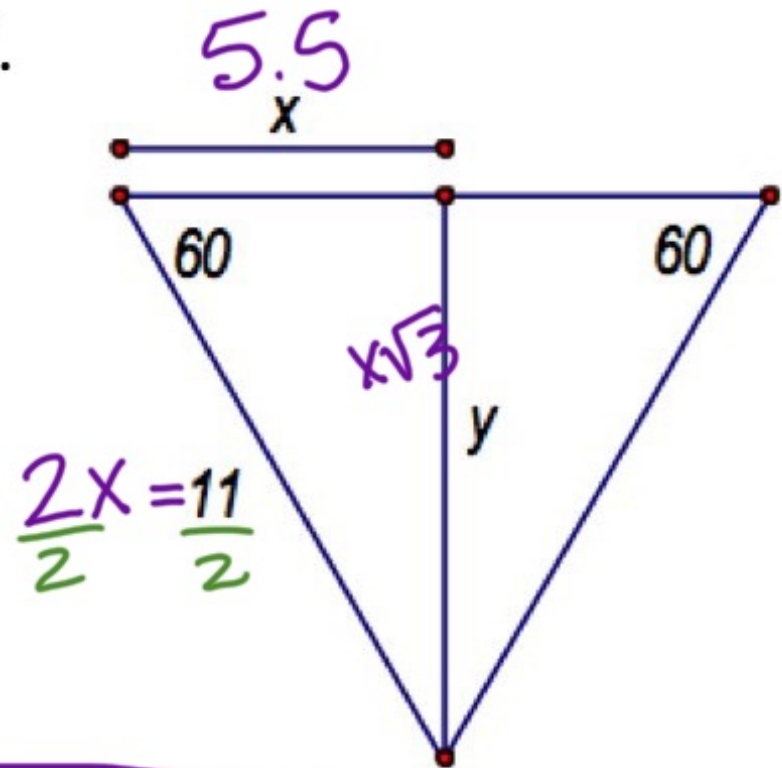
Find the missing sides indicated.

M.



$$\begin{aligned} b &= 5 \\ a &= 10 \end{aligned}$$

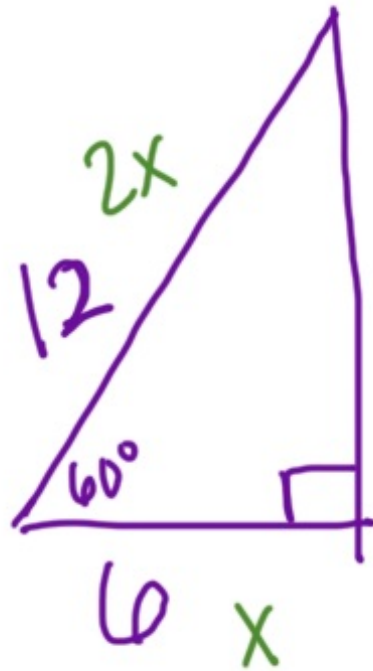
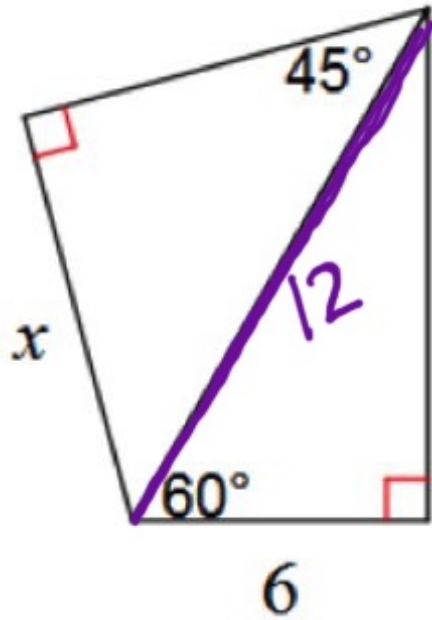
N.



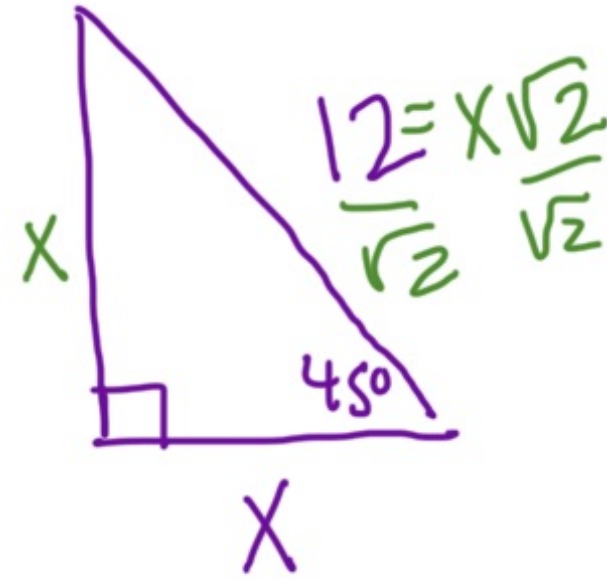
$$\frac{2x}{2} = \frac{11}{2}$$

$$\begin{aligned} x &= 5.5 \\ y &= 5.5\sqrt{3} \end{aligned}$$

0.



$$x\sqrt{3}$$



$$x = \frac{12}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$$

$$x = \frac{12\sqrt{2}}{2} = \boxed{6\sqrt{2}}$$

