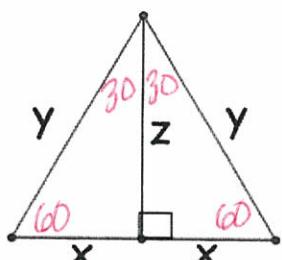


## 8.2 Special Right Triangles

**Learning Target:** *Uses Properties of 45-45-90 and 30-60-90 triangles to find missing side lengths.*

Two special kinds of right triangles are:  $45^\circ-45^\circ-90^\circ$  and  $30^\circ-60^\circ-90^\circ$

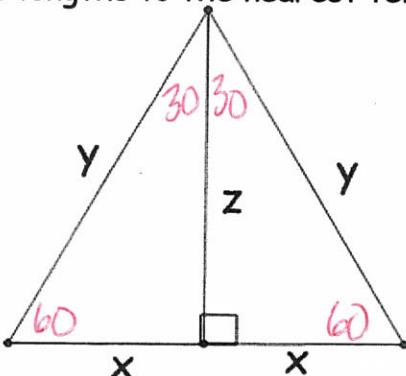
- 1) Measure the angles, side lengths to the nearest tenth of a centimeter.



$$x = \underline{1.7}$$

$$y = \underline{3.4}$$

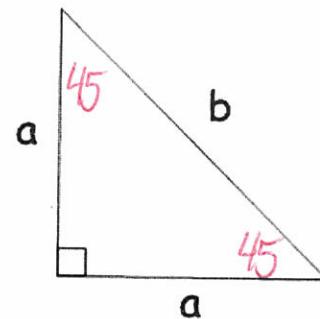
$$z = \underline{3}$$



$$x = \underline{2.6}$$

$$y = \underline{5.2}$$

$$z = \underline{4.5}$$



$$a = \underline{3.5}$$

$$b = \underline{5}$$

- 2) Describe the triangles formed by the altitudes.

*In the first two triangles, two  $30^\circ-60^\circ-90^\circ$  triangles are formed.  
Third  $\Delta$  a  $45-45-90^\circ$   $\Delta$ .*

- 3) Find the following ratios for each triangle:

$$\frac{z}{x} = \underline{1.76} \quad \frac{y}{x} = \underline{2}$$

$$\frac{z}{x} = \underline{1.731} \quad \frac{y}{x} = \underline{2}$$

$$\frac{b}{a} = \underline{1.4286}$$

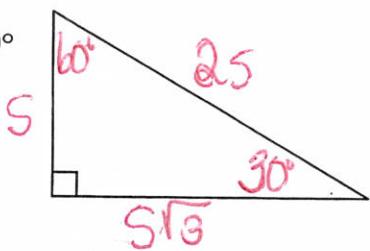
- 4) Compare the ratios from #3. Are the results similar for any of your triangles?

*The ratios for  $\frac{z}{x}$  is  $\approx 1.7$  and  $\frac{y}{x} = 2$ .*

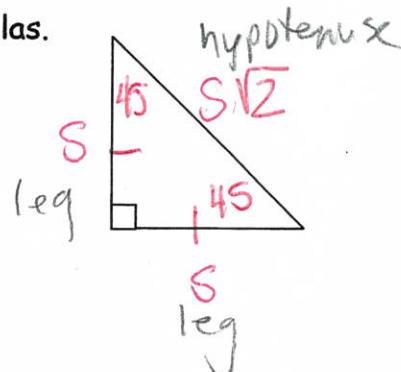
- 5) Use your calculator to find  $\sqrt{3} \approx \underline{1.7320508}$  and  $\sqrt{2} \approx \underline{1.4142136}$

Draw a picture of both triangles to demonstrate the formulas.

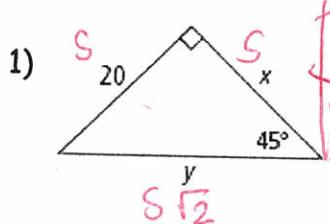
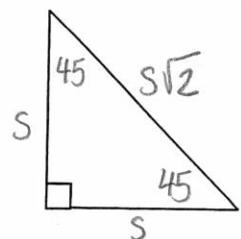
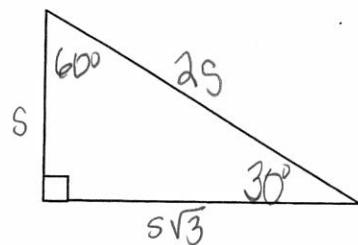
$30^\circ-60^\circ-90^\circ$



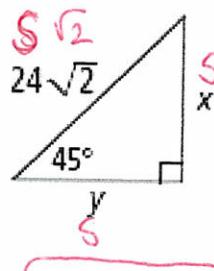
$45^\circ-45^\circ-90^\circ$



Find the missing sides using your formulas.



$$\begin{aligned} x &= 20 \\ y &= 20\sqrt{2} \end{aligned}$$



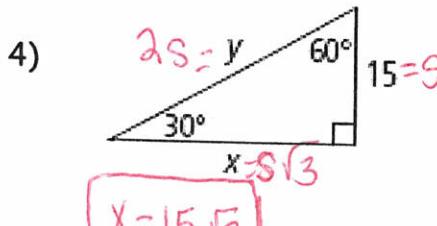
$$\begin{aligned} x &= y = 24 \\ s &= 24 \end{aligned}$$

$$\begin{aligned} s\sqrt{2} &= 24\sqrt{2} \\ \frac{s}{\sqrt{2}} &= \frac{24\sqrt{2}}{\sqrt{2}} \\ s &= 24 \end{aligned}$$

rotational symmetry

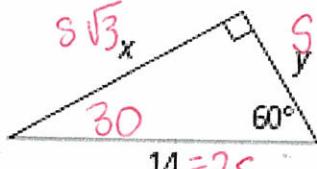
$$\begin{aligned} s\sqrt{2} &= 16 \\ \frac{s\sqrt{2}}{\sqrt{2}} &= \frac{16\sqrt{2}}{\sqrt{2}} \\ s &= 16 \end{aligned}$$

$$x = 8\sqrt{2} \approx 11.3$$



$$\begin{aligned} x &= s\sqrt{3} \\ x &= 15\sqrt{3} \\ y &= 30 \end{aligned}$$

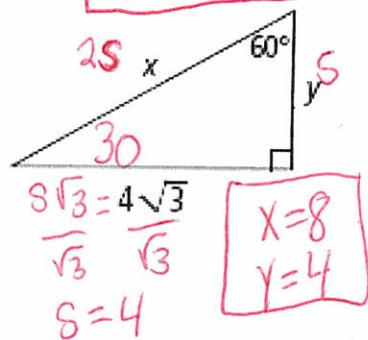
5)



$$\begin{aligned} 14 &= 2s \\ \frac{14}{2} &= \frac{2s}{2} \\ 7 &= s \end{aligned}$$

$$\begin{aligned} x &= 7\sqrt{3} \\ y &= 7 \end{aligned}$$

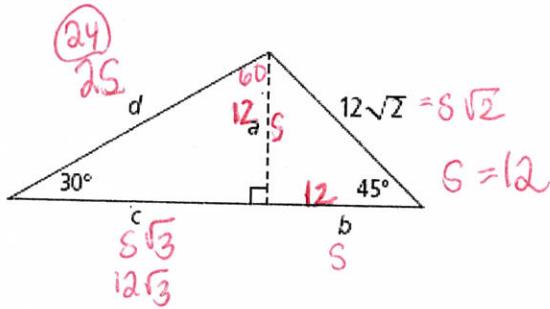
6)



$$\begin{aligned} s\sqrt{3} &= 4\sqrt{3} \\ \frac{s\sqrt{3}}{\sqrt{3}} &= \frac{4\sqrt{3}}{\sqrt{3}} \\ s &= 4 \end{aligned}$$

$$\begin{aligned} x &= 8 \\ y &= 4 \end{aligned}$$

7)



$$12\sqrt{2} = 8\sqrt{2}$$

$$s = 12$$

$$\begin{aligned} a &= 12 \\ b &= 12 \\ c &= 12\sqrt{3} \\ d &= 24 \end{aligned}$$