

Special Triangles

There are two ways to determine the sides of a **right** triangle if you have only one given side and an angle measure:

1. Trigonometry
2. Special Triangles

The two kinds of **special triangles** are **30-60-90** triangles and **45-45-90** triangles. These triangles are special, because the relationship of the angles creates a specific and easy to follow relationship between the sides, which means you can bypass trig and go straight to the side lengths. The boxes below show those relationships.

30-60-90	
	opp30°: x
	opp60°: $x\sqrt{3}$
	hyp: $2x$

45-45-90	
opp45°: x	
opp45°: x	
hyp: $x\sqrt{2}$	

Label the sides of the triangle, then fill in the relationships (as seen in the boxes above)

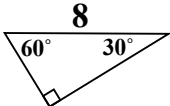
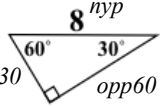
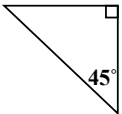
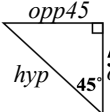
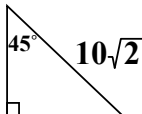
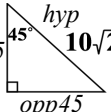
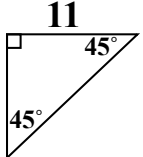
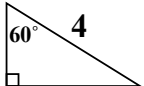
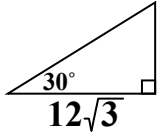

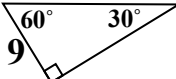
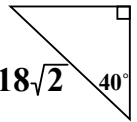
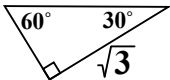
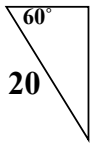
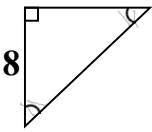
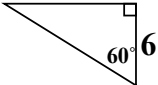
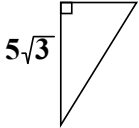
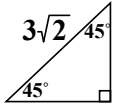
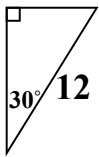
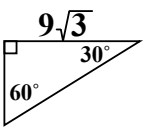
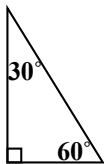
<p>1.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>2.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>3.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>4.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>
<p>5.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>6.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>7.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>8.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>
<p>9.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>10.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>11.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>	<p>12.</p> <p>opp ____: ____ opp ____: ____ hyp: ____</p>

Once you label the sides, you can use that information to determine sides. **EXAMPLE:** Determine the missing sides.

	\rightarrow	$\begin{aligned} \text{opp}30: x &= 4 \\ \text{opp}60: x\sqrt{3} &=? \\ \text{hyp}: 2x &=? \end{aligned}$	\rightarrow	$\begin{aligned} x &= 4, \text{ so} \\ \text{opp}60: x\sqrt{3} &=? \\ (4)\sqrt{3} &=? \\ \text{opp}60 \text{ is } &\boxed{4\sqrt{3}} \end{aligned}$	$\&$	$\begin{aligned} \text{hyp}: 2x &=? \\ 2(4) &=? \\ \text{hyp is } &\boxed{8} \end{aligned}$	\rightarrow	<div style="border: 2px solid black; padding: 5px; display: inline-block;"> </div>
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Use special triangles to determine the measure of each unmarked side.

Beware: there are three triangles below that you cannot solve.

<p>EXAMPLE</p>  <p>8</p>  <p>8^{hyp} opp30: $x = ?$ opp60: $x\sqrt{3} = ?$ hyp: $2x = 8$</p> <p>Solve: $2x = 8$ $x = 4$ Plug that in: opp30: $x = \boxed{4}$ & opp60: $x\sqrt{3} = \boxed{4\sqrt{3}}$</p>	<p>EXAMPLE</p>  <p>5</p>  <p>opp45 opp45: $x = 5$ opp45: $x = ?$ hyp: $x\sqrt{2} = ?$</p> <p>Solve: $x = 5$ Plug that in: opp45: $x = \boxed{5}$ & hyp: $x\sqrt{2} = \boxed{5\sqrt{2}}$</p>	<p>EXAMPLE</p>  <p>45° 10√2</p>  <p>hyp opp45: $x = ?$ opp45: $x = ?$ hyp: $x\sqrt{2} = 10\sqrt{2}$</p> <p>Solve: $x\sqrt{2} = 10\sqrt{2}$ $x = 10$ Plug that in: opp45: $x = \boxed{10}$ & opp45: $x = \boxed{10}$</p>
<p>13.</p>  <p>11</p>	<p>14.</p>  <p>60° 4</p>	<p>15.</p>  <p>30° 12√3</p>
<p>16.</p>  <p>15√2</p>	<p>17.</p>  <p>60° 9</p>	<p>18.</p>  <p>18√2 40°</p>
<p>19.</p>  <p>60° 30° √3</p>	<p>20.</p>  <p>60° 20</p>	<p>21.</p>  <p>8</p>
<p>22.</p>  <p>60° 6</p>	<p>23.</p>  <p>5√3</p>	<p>24.</p>  <p>3√2 45°</p>
<p>25.</p>  <p>30° 12</p>	<p>26.</p>  <p>9√3 30°</p>	<p>27.</p>  <p>30° 60°</p> <p>7</p>