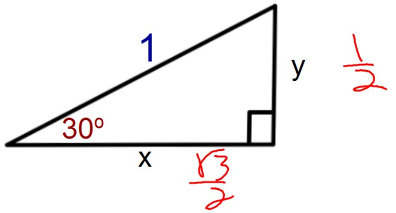
Find the exact length of each leg

SOHCAHTOA



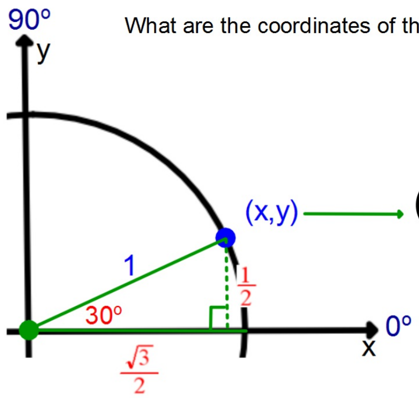
Use this triangle to find the exact value of each:

$\cos 30° = \frac{\frac{\sqrt{3}}{2}}{1} = \frac{\sqrt{3}}{2}$

$\sin 30° = \frac{\frac{1}{2}}{1} = \frac{1}{2}$

$\tan 30° = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

Using the triangle from the previous problem answer the following:



What are the coordinates of the blue point?

Keep in mind the x-coordinate of a point is the horizontal distance from the origin and the y-coordinate is the vertical distance from the origin.

$(x,y) \rightarrow \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

From the 30-60-90 right triangle we found the following:

$\text{Cos } 30° = \frac{\sqrt{3}}{2}$ $\quad$ $\text{Sin } 30° = \frac{1}{2}$

From the unit circle we found the coordinates of the point on the Unit Circle at 30° is:

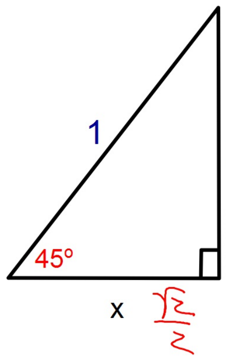
$$\left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$$

Coordinates on the Unit Circle:

$$(x, y) \longrightarrow (\cos\theta, \sin\theta)$$

This means that the x and y coordinates for points on the Unit Circle are related to the Sin and Cos of angles from 30-60-90 and 45-45-90 triangles.

Find the exact length of each leg



$\frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

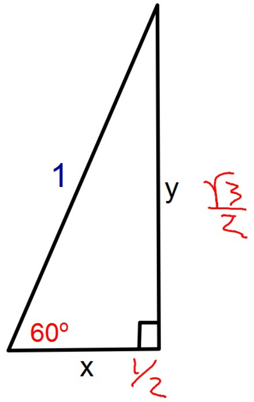
Use this triangle to find the exact value of each:

$\cos 45° = \frac{\frac{\sqrt{2}}{2}}{1} = \frac{\sqrt{2}}{2}$

$\sin 45° = \frac{\sqrt{2}}{2}$

$\tan 45° = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1$

Find the exact length of each leg



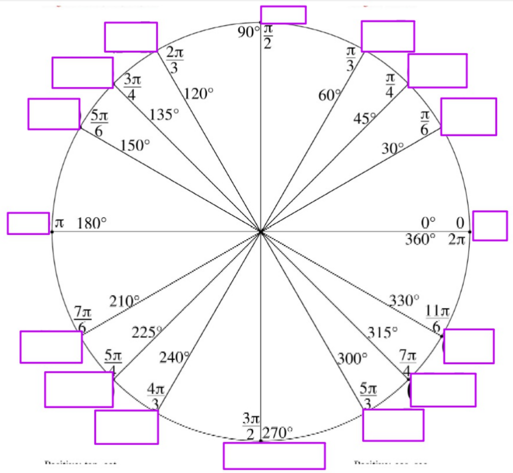
Use this triangle to find the exact value of each:

$\text{Cos}60° = \dfrac{\frac{1}{2}}{1} = \frac{1}{2}$ $\text{Sin}60° = \dfrac{\frac{\sqrt{3}}{2}}{1} = \frac{\sqrt{3}}{2}$

$\text{Tan}60° = \dfrac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \frac{\sqrt{3}}{2} \cdot \frac{2}{1} = \sqrt{3}$

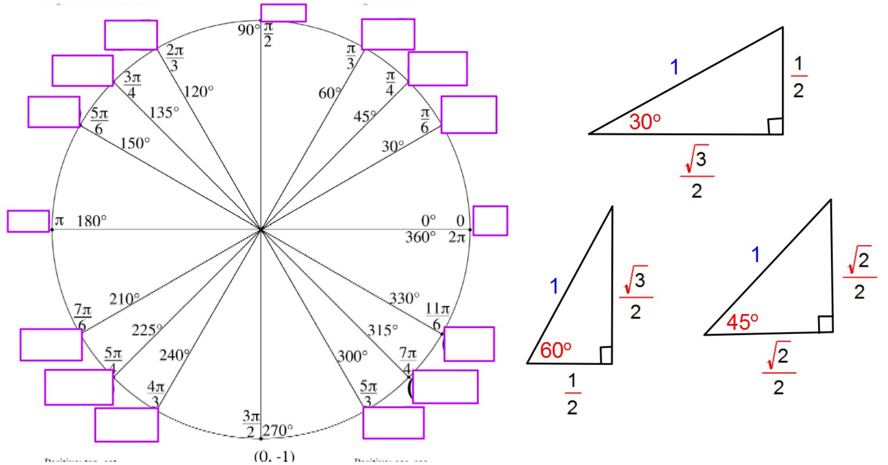
Coordinates of the points on the Unit Circle:

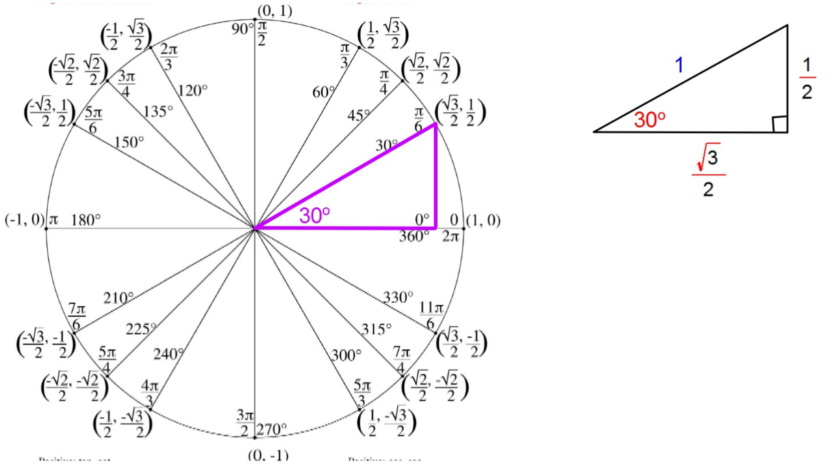
For the coordinates of the points on the x and y axes all you need to know is that the radius of the circle is 1.



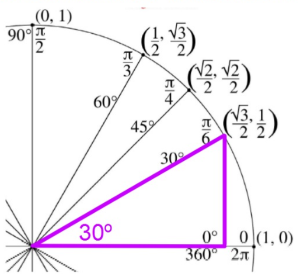
You can use the relationships in the special right triangles to fill out the other coordinates of the points on the Unit Circle $(x,y) \longrightarrow (\cos\theta, \sin\theta)$

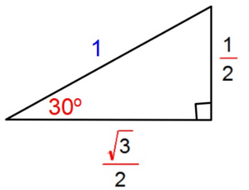
Just create a triangle by drawing a vertical line from the point on the Unit Circle to the x-axis to create a right triangle.   See the following example.





You can use the unit circle to find the exact value of Sinθ, Cosθ, and Tanθ



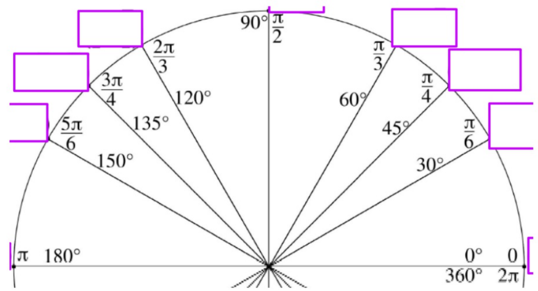


Cosθ = the x-coordinate

Sinθ = the y-coordinate

$\tan\theta = \dfrac{y}{x}$

To find the coordinates of the point at 120° draw a line down to the x-axis to create a 30-60-90 triangle.



To find the coordinates of the point at 120° draw a line down to the x-axis to create a 30-60-90 triangle.