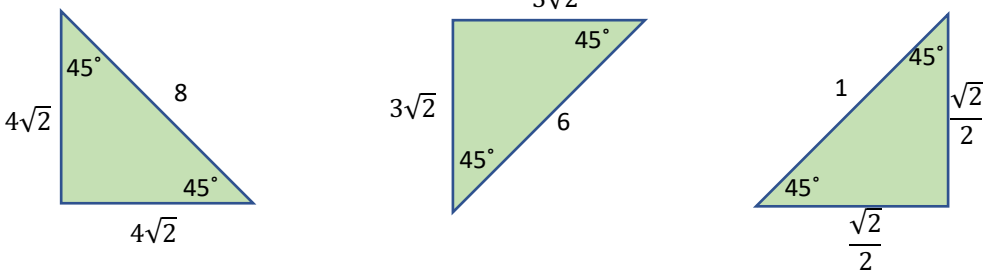
Coming Full Circle Name:_____

In Geometry you learned about two special right triangles. They are considered "special" because there are simple relationships between the sides that are worth knowing. Today we will see how these triangles can help us understand the unit circle and trigonometry.

1. Three 45, 45, 90˚ triangles are shown below.

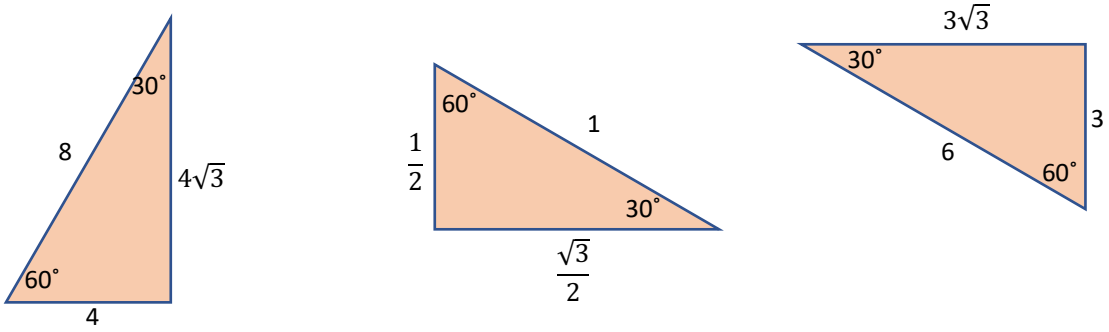


a. What relationships do you notice between the side lengths?

b. Show how you can use any of the above triangles to find $\sin 45^\circ$ and $\cos 45^\circ$.

c. In which triangle is the sine and cosine ratio most obvious? Why?

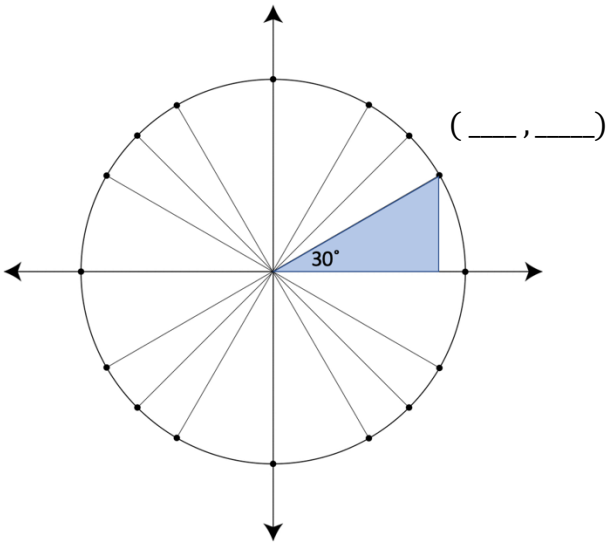
2. Another special right triangle is the 30˚, 60˚, 90˚ triangle. Three of such triangles are shown.



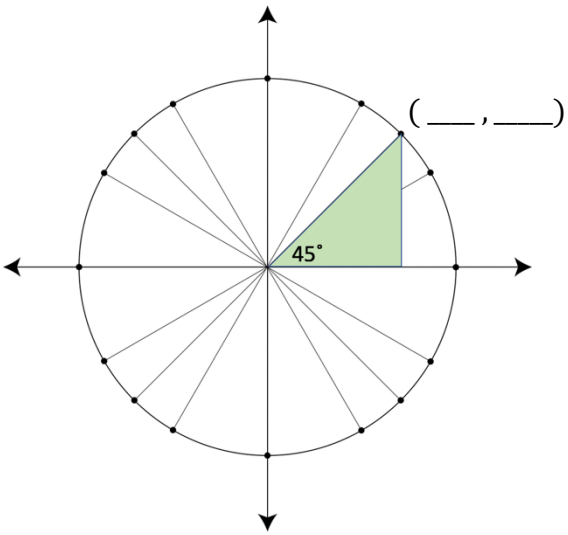
a. Choose one of the triangles above to find the $\sin 30^\circ$ and the $\cos 30^\circ$. Which triangle did you choose and why?

b. Now find $\sin 60^\circ$ and $\cos 60^\circ$. What patterns do you notice?

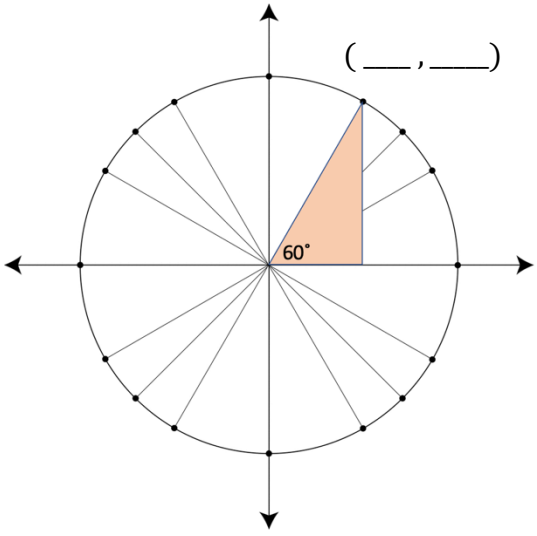
3. We're going to look at circles of radius 1 that are centered at the origin. These are called unit circles.



a. Label the three side lengths of the triangle. Then find the x and y coordinate of the point on the circle.



b. Find the x and y coordinate of the point on the circle.



c. Explain how you can use the ordered pair to find $\sin 60^\circ$ and $\cos 60^\circ$.

d. Find $\tan 60^\circ$.

Section 4.3 Day 1—The Unit Circle

Important Ideas:

Check Your Understanding!

1. For $0 < \theta < \frac{\pi}{2}$, describe how the cosine and sine ratios change as the angle increases.

2. Evaluate:
   a) $\sin\left(\frac{\pi}{3}\right)$ b) $\cos\left(\frac{\pi}{2}\right)$ c) $\tan\left(\frac{\pi}{4}\right)$

3. Find $\tan\left(\frac{\pi}{6}\right)$.

4. At which angle is $\sin\theta = 1$? Give your answer in degrees and radians.

5. Use the unit circle to explain why $\sin\theta$ and $\cos\theta$ are always less than or equal to 1.

6. There is a mathematical identity that states: $\sin^2\theta + \cos^2\theta = 1$. Use the unit circle to explain why this is true.