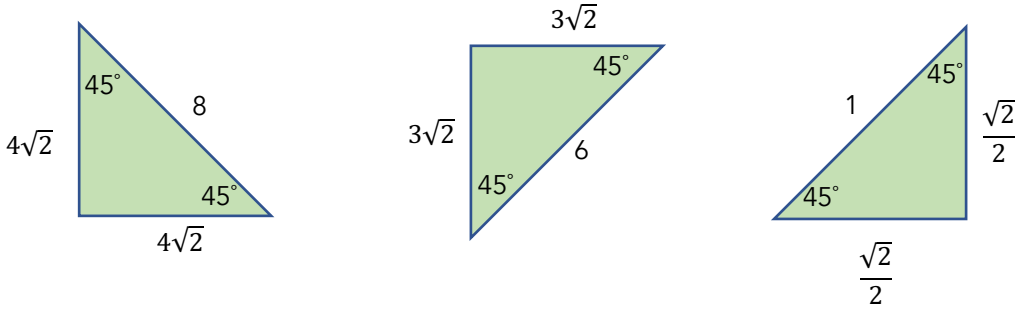
Coming Full Circle

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 find coordinates on the unit circle.

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

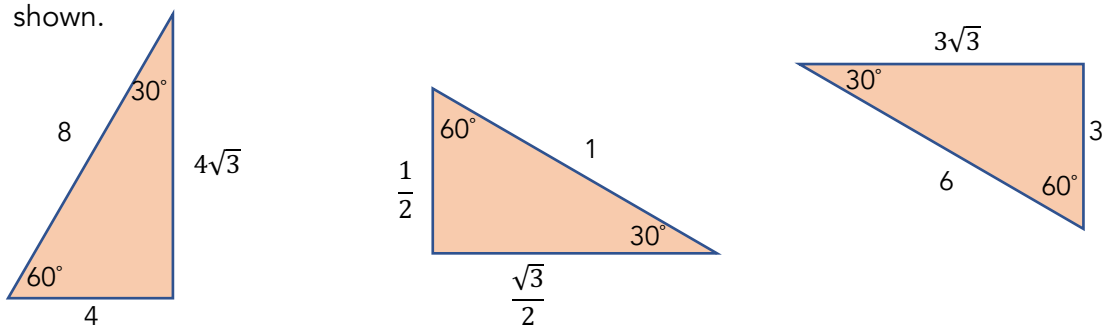


a. What relationships do you notice between the side lengths?

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

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.

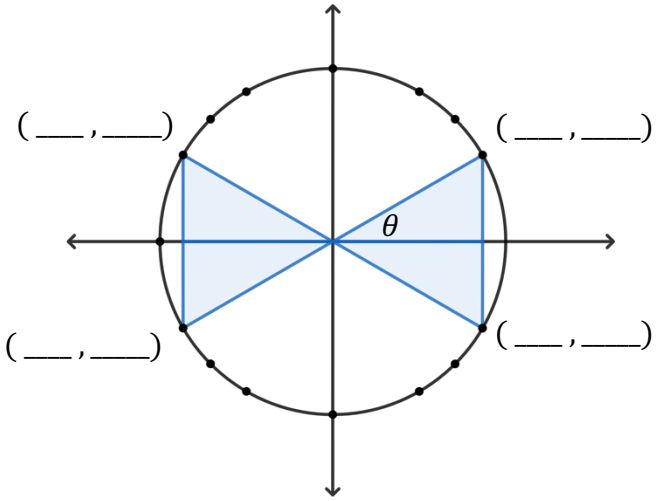


a. What is the relationship between the short leg and the hypotenuse?

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

c. Now find $\sin 60°$ and $\cos 60°$. What patterns do you notice?

Let's see how these triangles can help us find coordinates on the unit circle.



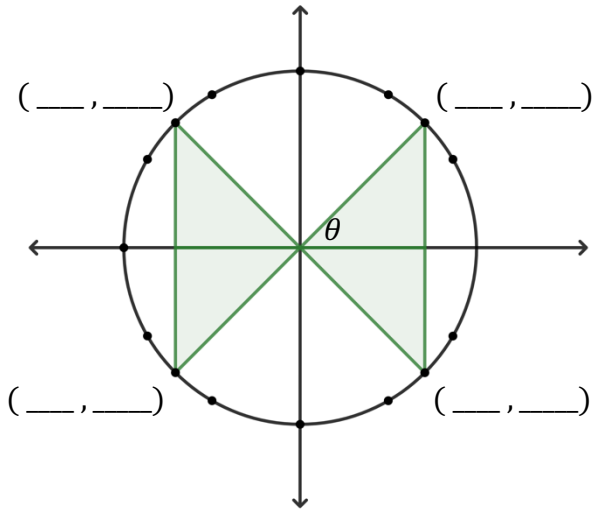
3. Four 30°, 60°, 90° triangles are shown.

   a. What is the value of θ, in radians?

   b. Find the x and y coordinate of the points shown.

   c. Evaluate $\sin\left(\frac{7\pi}{6}\right)$.

   d. Evaluate $\cos\left(\frac{11\pi}{6}\right)$.



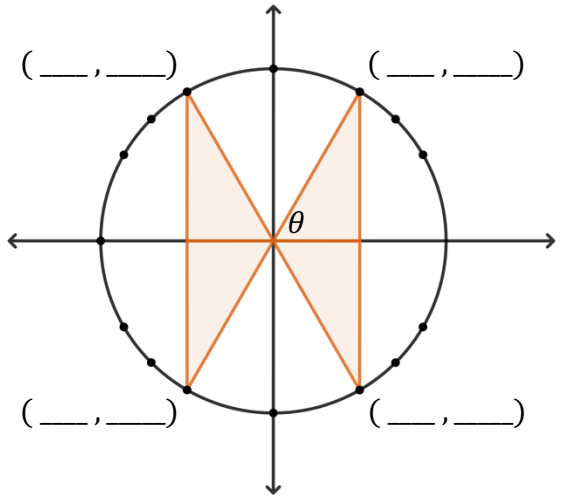
4. In the figure shown, $\theta = \frac{\pi}{4}$.

   a. What kind of triangles are these? How do you know?

   b. Find the x and y coordinate of the points shown.

   c. Evaluate $\sin\left(\frac{3\pi}{4}\right)$.

   d. Evaluate $\tan\left(\frac{7\pi}{4}\right)$.



5. In the figure shown $\theta = \frac{\pi}{3}$.

   a. What kinds of triangles are these?

   b. Find the x and y coordinate of the points shown.

   c. Evaluate $\cos\left(\frac{2\pi}{3}\right)$.

   d. Evaluate $\tan\left(\frac{2\pi}{3}\right)$.

Lesson 6.4 – Coordinates on the Unit Circle

QuickNotes

Check Your Understanding

1. Evaluate. Give an exact answer.

a. $\cos\left(\frac{4\pi}{3}\right)$

b. $\sin\left(\frac{7\pi}{4}\right)$

c. $\tan\left(\frac{5\pi}{6}\right)$

d. $\cos(7\pi)$

2. Which one doesn't belong? Give a convincing argument for each answer choice.

$\sin\left(\frac{2\pi}{3}\right)$	$\cos\left(\frac{5\pi}{6}\right)$
$\sin\left(\frac{-\pi}{3}\right)$	$\sin\left(\frac{11\pi}{6}\right)$

3. An angle in standard position is shown. Find the exact coordinates of points A, B, and C.