

## 13.3/13.6 Exact Values using the UNIT CIRCLE

ACC Geometry Notes

The circle below is called the unit Circle because the value of the radius is one.

Review from Vectors:

Horizontal Component:  $x = r \cos\theta$

Vertical Component:  $y = r \sin\theta$

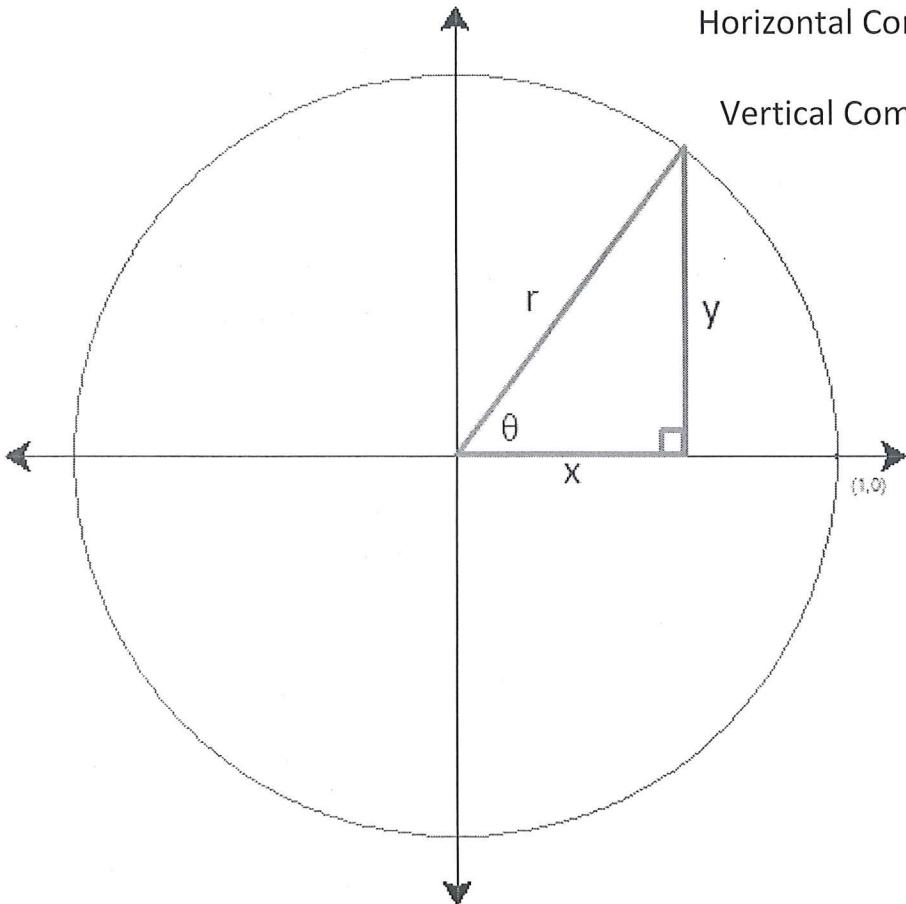
$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

With radius= 1, find:

$$\cos\theta = \underline{x}$$

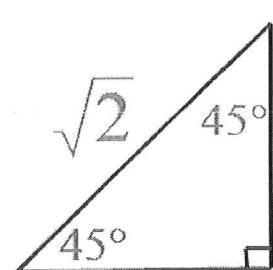
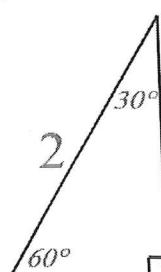
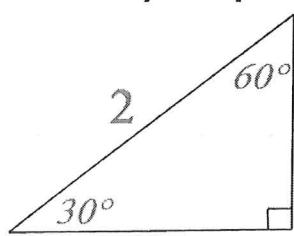
$$\sin\theta = \underline{y}$$

$$\tan\theta = \frac{y}{x} \quad \therefore$$

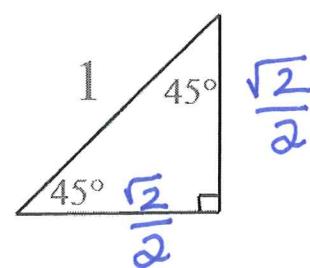
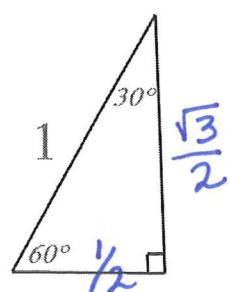
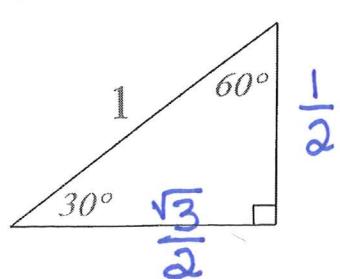


Fill in what we know about special right triangles given the hypotenuse.

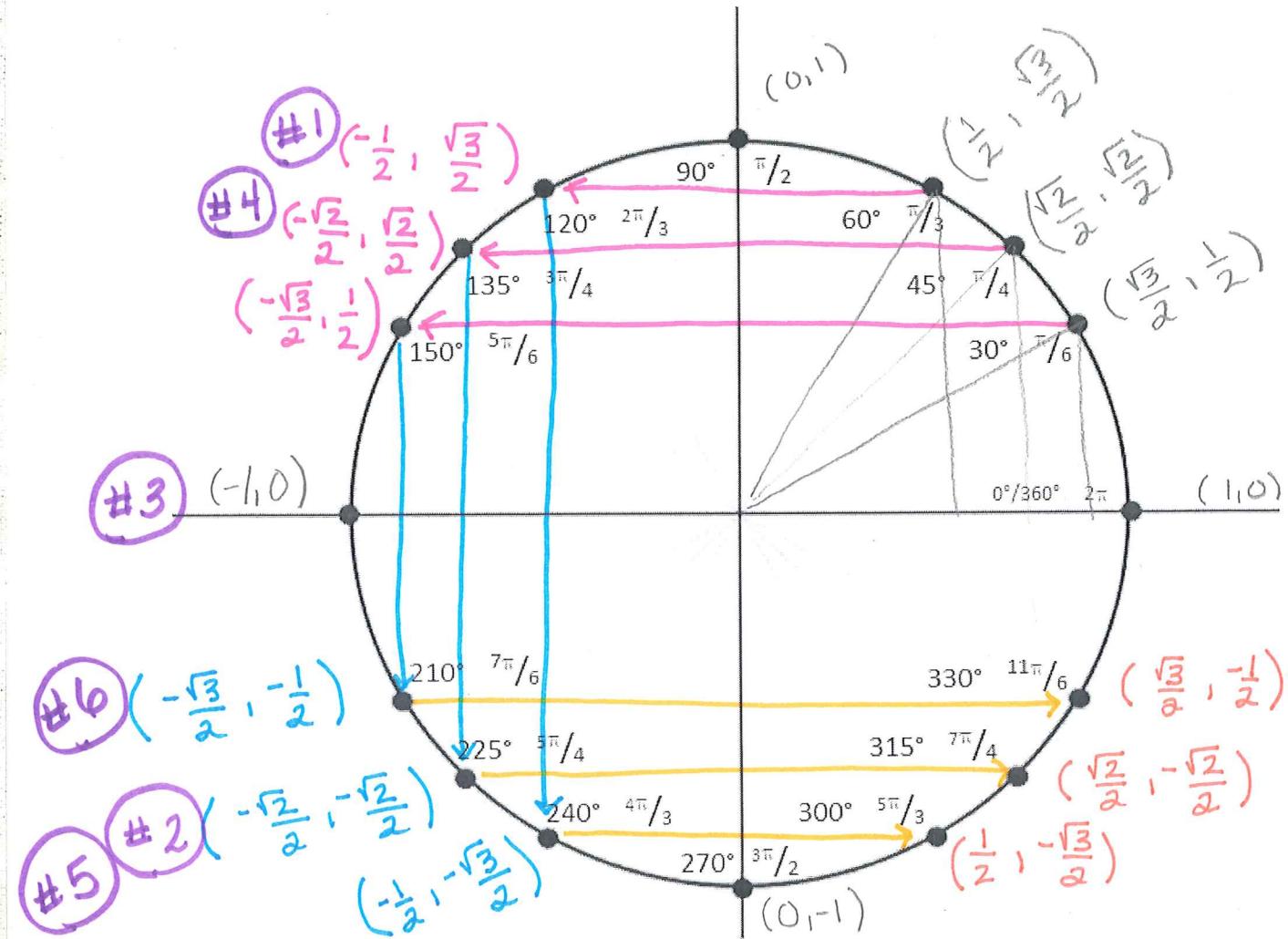
Normal way of special right triangles



Unit Circle



Find all points on the unit circle using special right triangles.



Find the exact value of each function by using the unit circle. Place the question # by the coordinates that correspond to the answer of the question.

← in purple on unit circle.

$$1. \cos(-240^\circ) = x$$

$$-\frac{1}{2}$$

$$2. \tan \frac{5\pi}{4} = \frac{y}{x}$$

$$\left(\frac{-\sqrt{2}}{2}\right) / \left(\frac{-\sqrt{2}}{2}\right) = 1$$

$$3. \sin 5\pi = y$$

$$0$$

Notice  
 $\frac{3\pi}{4}$

$$4. \csc \frac{11\pi}{4} = \text{recip. of } y$$

$$y = \frac{\sqrt{2}}{2} \quad \text{recip.} = \frac{2}{\sqrt{2}}$$

$$\csc \frac{11\pi}{4} = \sqrt{2}$$

$$5. \sec \frac{-3\pi}{4} = \text{recip. of } x$$

$$-\frac{2}{\sqrt{2}} = \boxed{-\sqrt{2}}$$

$$6. \cot \frac{7\pi}{6} = \frac{x}{y}$$

$$\frac{\left(-\frac{\sqrt{3}}{2}\right)}{\left(-\frac{1}{2}\right)} = \frac{-\sqrt{3} \cdot -1}{2} = \boxed{\sqrt{3}}$$

7. Given an angle  $\theta$  in standard position, if  $P\left(\frac{\sqrt{6}}{5}, \frac{\sqrt{19}}{5}\right)$  lies on the terminal side and on the unit circle, find  $\sin \theta$  and  $\cos \theta$ .

$$\sin \theta = \frac{\sqrt{19}}{5}$$

$$\cos \theta = \frac{\sqrt{6}}{5}$$

$$8.) 2(\sin 45^\circ) - 3(\cos 135^\circ)$$

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

$$\sqrt{2} + 3\sqrt{2} = 4\sqrt{2}$$