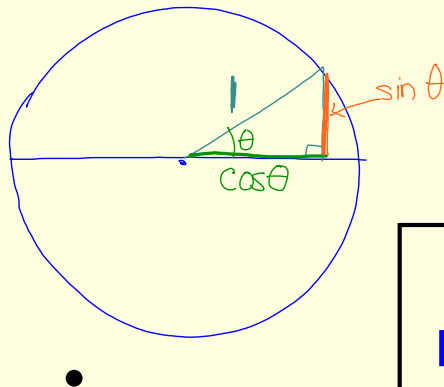


Write the following in your notes

tangent of  $\theta$  is the slope =  $\frac{\text{rise}}{\text{run}}$



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

Then  
Pick Up the Warm Up

1) Evaluate (without using a calculator) each of the following expressions:

(hint: you already know the coordinates of these points created by these rotation angles!)

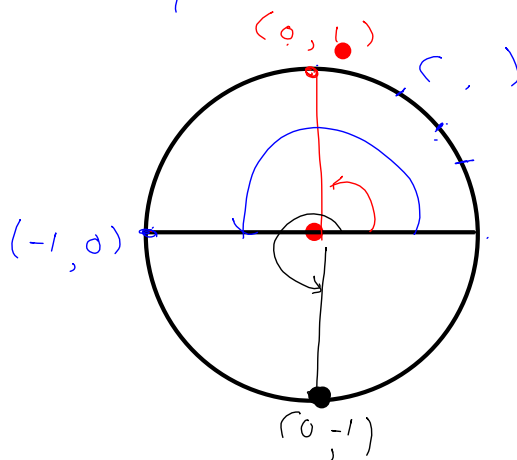
$$\sin(90^\circ) = 1$$

$$\cos(270^\circ) = 0$$

$$\tan 180^\circ = \frac{\sin(180^\circ)}{\cos(180^\circ)}$$

$$= \frac{0}{-1}$$

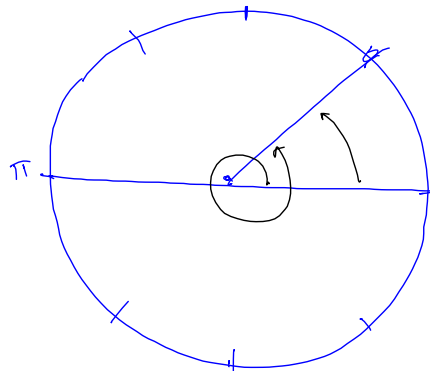
$$= 0$$



$$\sin(\text{angle}) = \text{ratio}$$

- 2) What rotation angle (in radians) corresponds to an angle around the unit circle of  $\frac{9\pi}{4}$ ?  
Draw a unit circle to illustrate.

What other angle will take you to the same point on the circle?

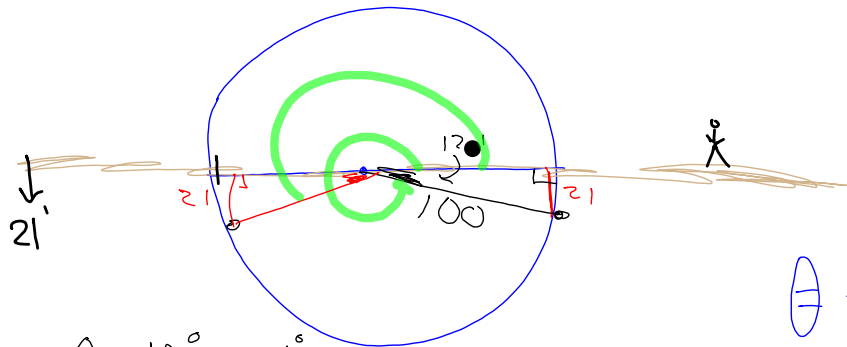


$$\frac{\pi}{4}$$

$$-\frac{7\pi}{4}$$

$$\frac{\pi}{4}$$

3) You are riding the Ferris Wheel (100 foot radius) and it breaks down yet again. You are stuck 21 feet below the ground. What is the angle of rotation to your position?



$$\sin(\theta) = \frac{21}{100}$$

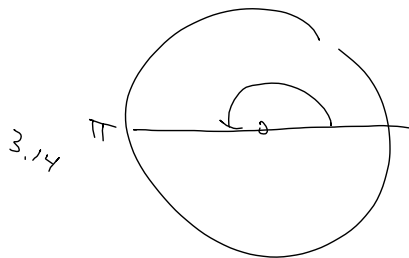
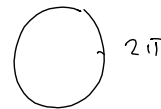
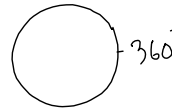
$$\theta = \sin^{-1}\left(\frac{21}{100}\right) = 12.1^\circ$$

$$\Theta = 360 - 12.1 = 347.9^\circ$$

$$\Theta = 180 + 12.1 = 192.1^\circ$$

4)  $171.32^\circ \times \frac{2\pi}{360^\circ}$

$2.99 \text{ rad}$



$$\frac{41\pi}{12}$$

$$\frac{360^\circ}{2\pi}$$

$$615^\circ$$

 $4\pi$ 

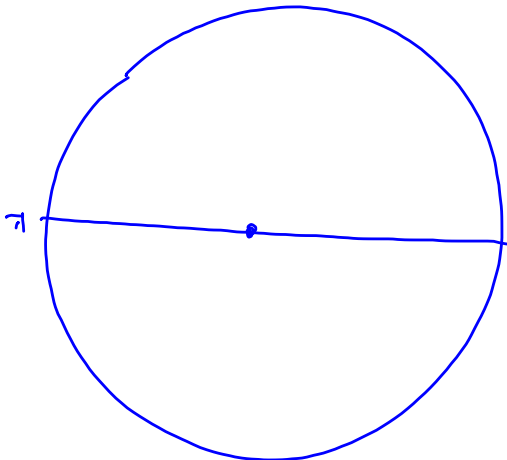
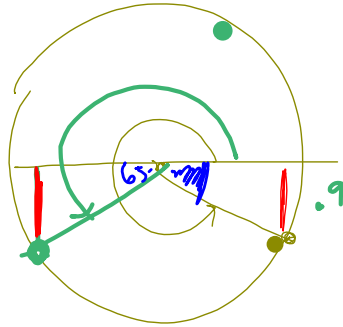
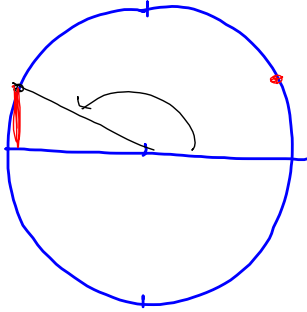
$$\frac{41\pi}{12}$$

$$\frac{360^\circ}{2\pi}$$

HW

①

$161^\circ$



$\frac{7}{6}\pi$

quick

B.B.

## NOTES •

Calculate exact values of sine and cosine for single (benchmark) angles.

### Strategy

For each angle, draw a small unit circle with as little information as possible on it.

$$\sin(\theta) = \text{ratio}$$

↑  
angle

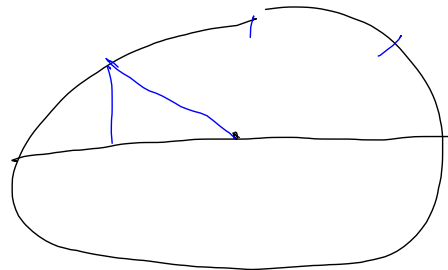
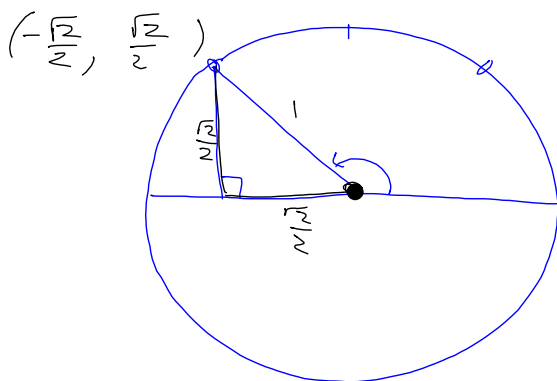
↑ vertical  
dist. on  
a unit circle

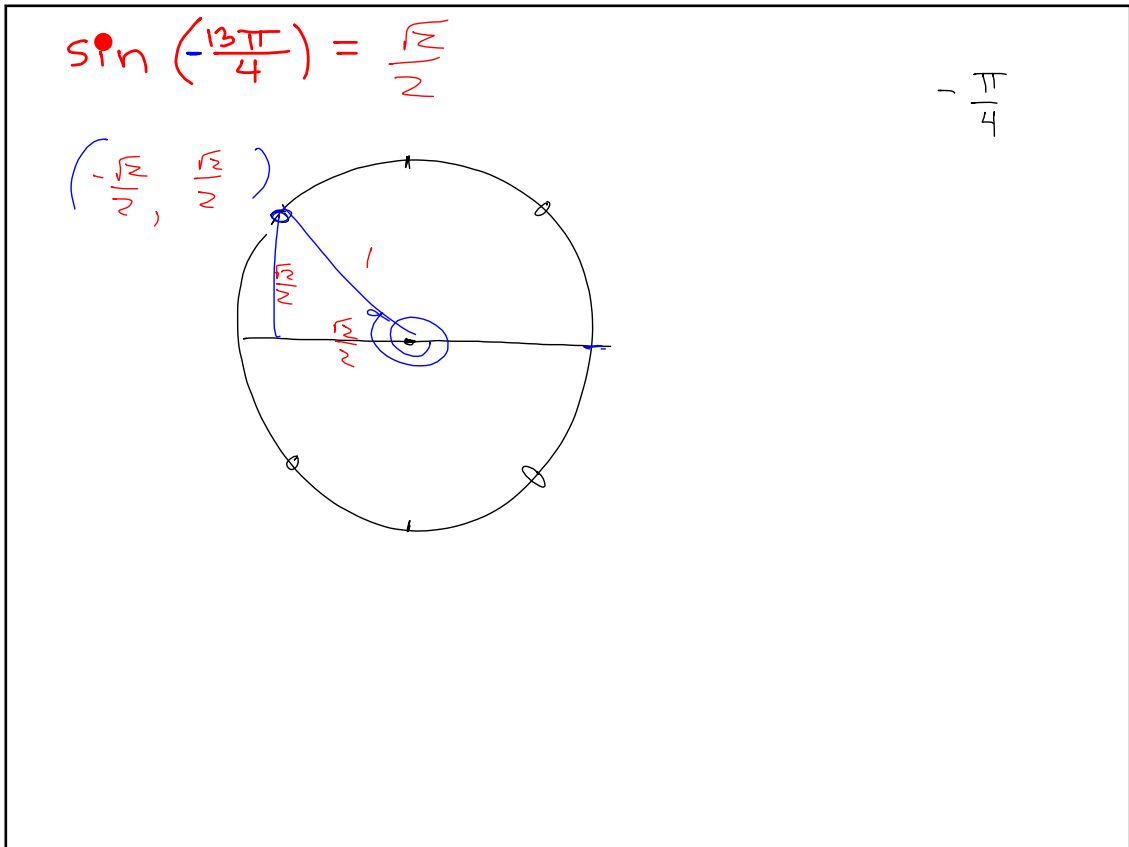
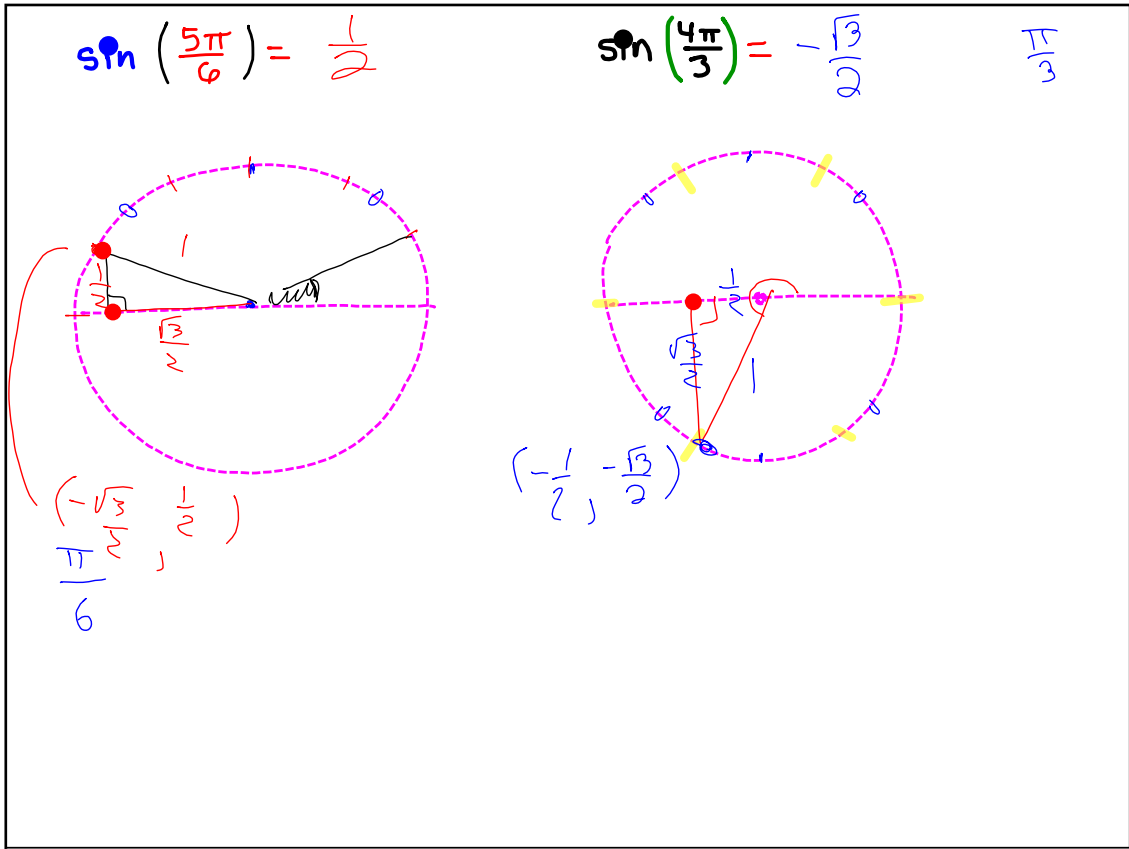
$$\cos(\theta) = \text{horiz. dist.}$$

$$\sin\left(\frac{3\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

$$\cos\left(\frac{3\pi}{4}\right) = -\frac{\sqrt{2}}{2}$$

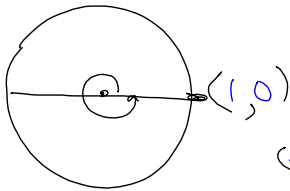
$$\frac{\pi}{4}$$



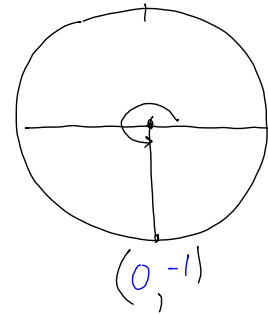
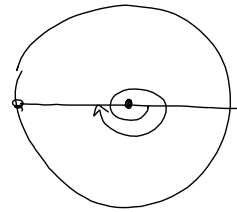




$$\sin(2\pi) = 0 \quad \cos(-3\pi) = -1 \quad \cos\left(\frac{3\pi}{2}\right) = 0$$

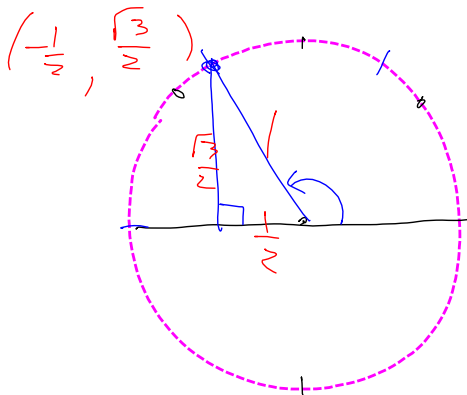


$(1, 0)$



$(0, -1)$

$$\tan\left(\frac{2\pi}{3}\right) = \frac{\sin\left(\frac{2\pi}{3}\right)}{\cos\left(\frac{2\pi}{3}\right)} = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}}$$



$$= \frac{\sqrt{3}}{2} \div \frac{-1}{2}$$

$$= -\sqrt{3}$$

Find exact values of the angles that are solutions to the equation:

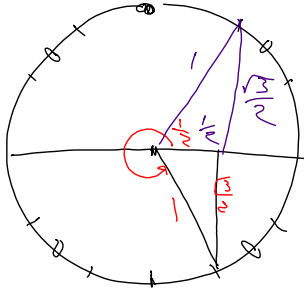
$$\cos(\theta) = 0.5$$

$$0 \leq \theta < 2\pi$$

$$\cos(\theta) = \frac{1}{2}$$

$$\theta = \frac{5\pi}{3}$$

$$\theta = \frac{\pi}{3}$$



### Assignment

7....90, 91, 93, 94<sup>abc</sup>, 95-98

