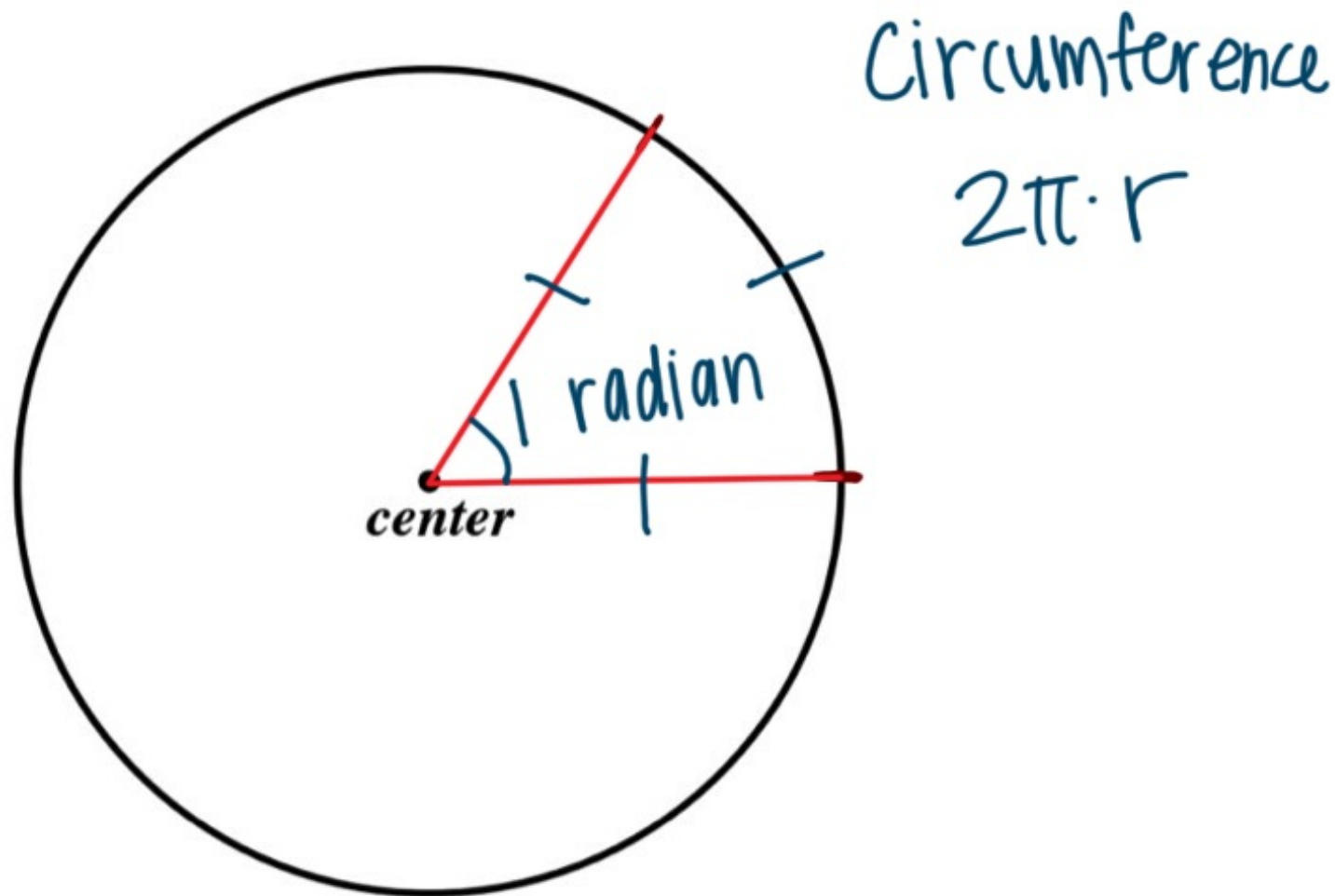


## 9.3 Radians



Take a piece of string and cut it so that it is the length of 1 radius. Mark a starting point and measure how many radii it takes to go the full circumference. Record your answer below.

# of radii 6.28

The exact number of radii is  $2\pi$



**Arc length:** The distance between 2 pts on the circumference of a circle.

**Radian:** a unit for measuring angles

$$\theta = \frac{\text{arc length}}{\text{radius}}$$

← angle in radians

\* Put the unit where you want to end up on the top

Convert radians to degrees

multiply by  
 $180^\circ$   

---

 $\pi$  radians

Convert degrees to radians

multiply by  
 $\pi$  radians  

---

 $180^\circ$

# EXAMPLE

Convert each degree measure to radians. Leave your answer in reduced fraction form.

A.  $\frac{225^\circ}{1} \cdot \frac{\pi \text{ radians}}{180^\circ}$

$$\frac{225\pi}{180} = \boxed{\frac{5\pi}{4}}$$

B.  $315^\circ \cdot \frac{\pi}{180^\circ}$

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

C.  $300^\circ \cdot \frac{\pi}{180}$

$$\boxed{\frac{5\pi}{3}}$$

TI-83/84

$225 \div 180$  **MATH** **ENTER** **ENTER**

# EXAMPLE

Convert each radian measure to degrees.

$$D. \frac{3\pi}{4} \cdot \frac{180^\circ}{\pi}$$

$$\frac{3 \cdot 180^\circ}{4} = \boxed{135^\circ}$$

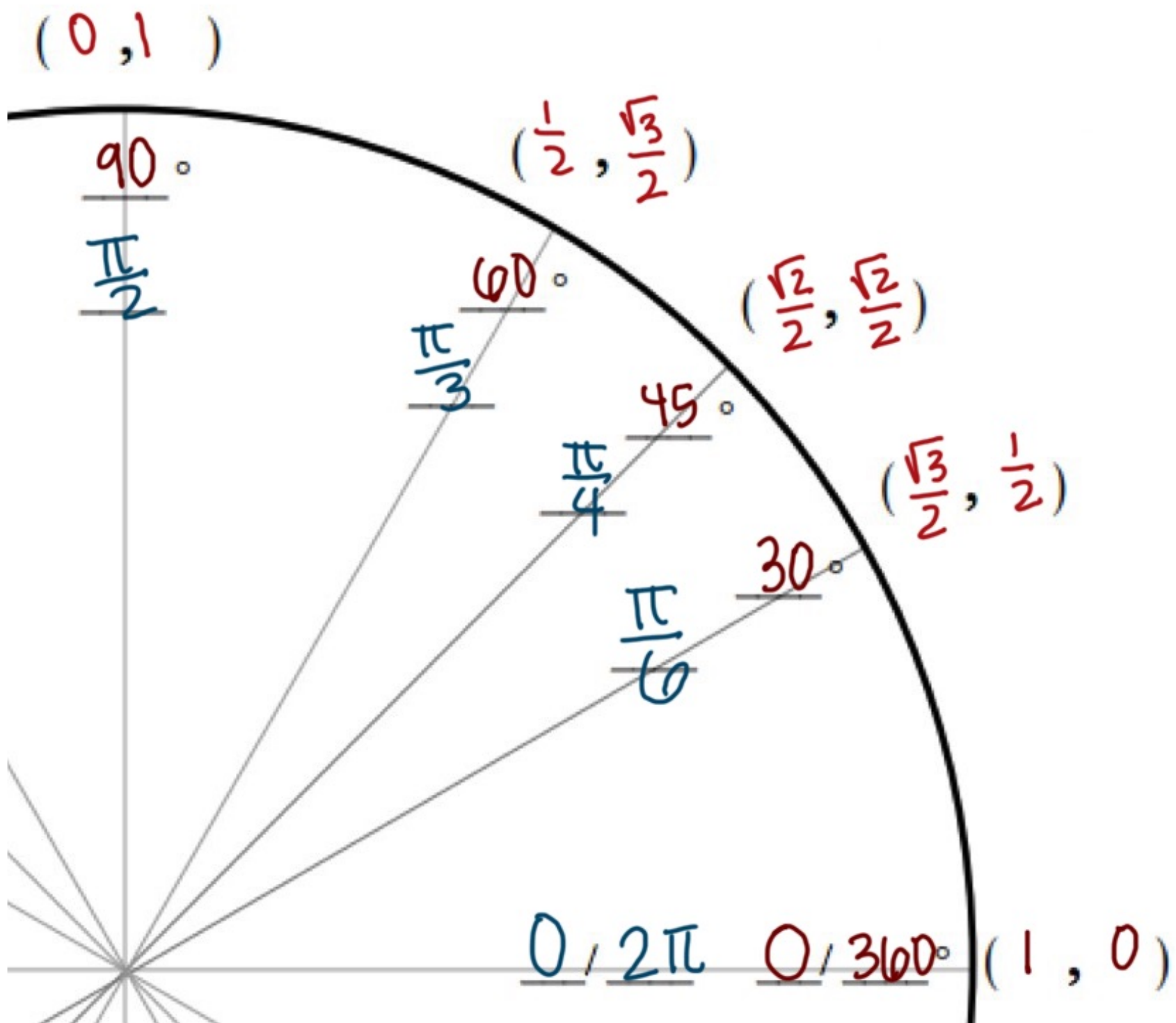
$$E. \frac{7\pi}{6} \cdot \frac{180}{\pi}$$

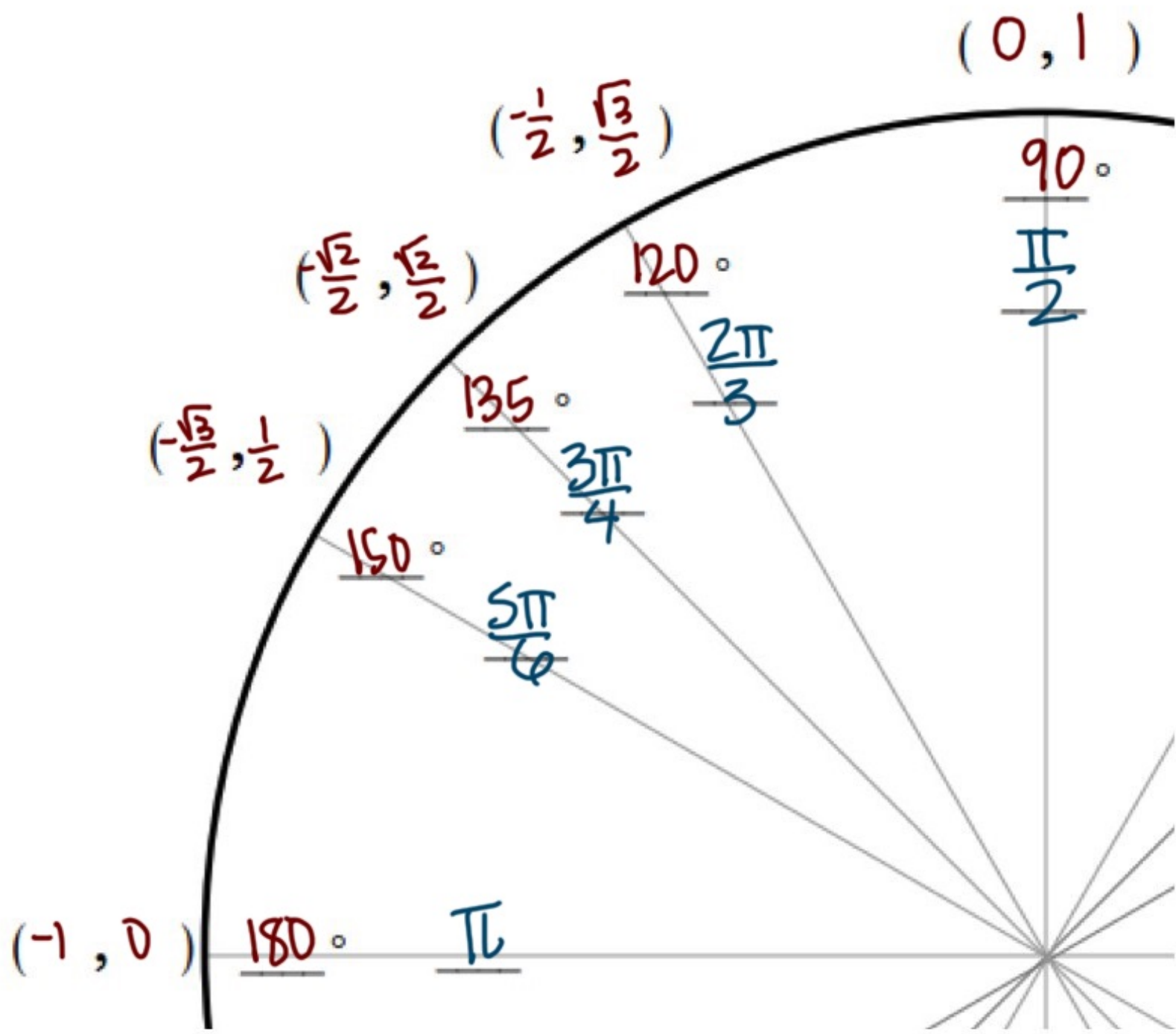
$$\boxed{210^\circ}$$

$$F. \frac{5\pi}{3} \cdot \frac{180}{\pi}$$

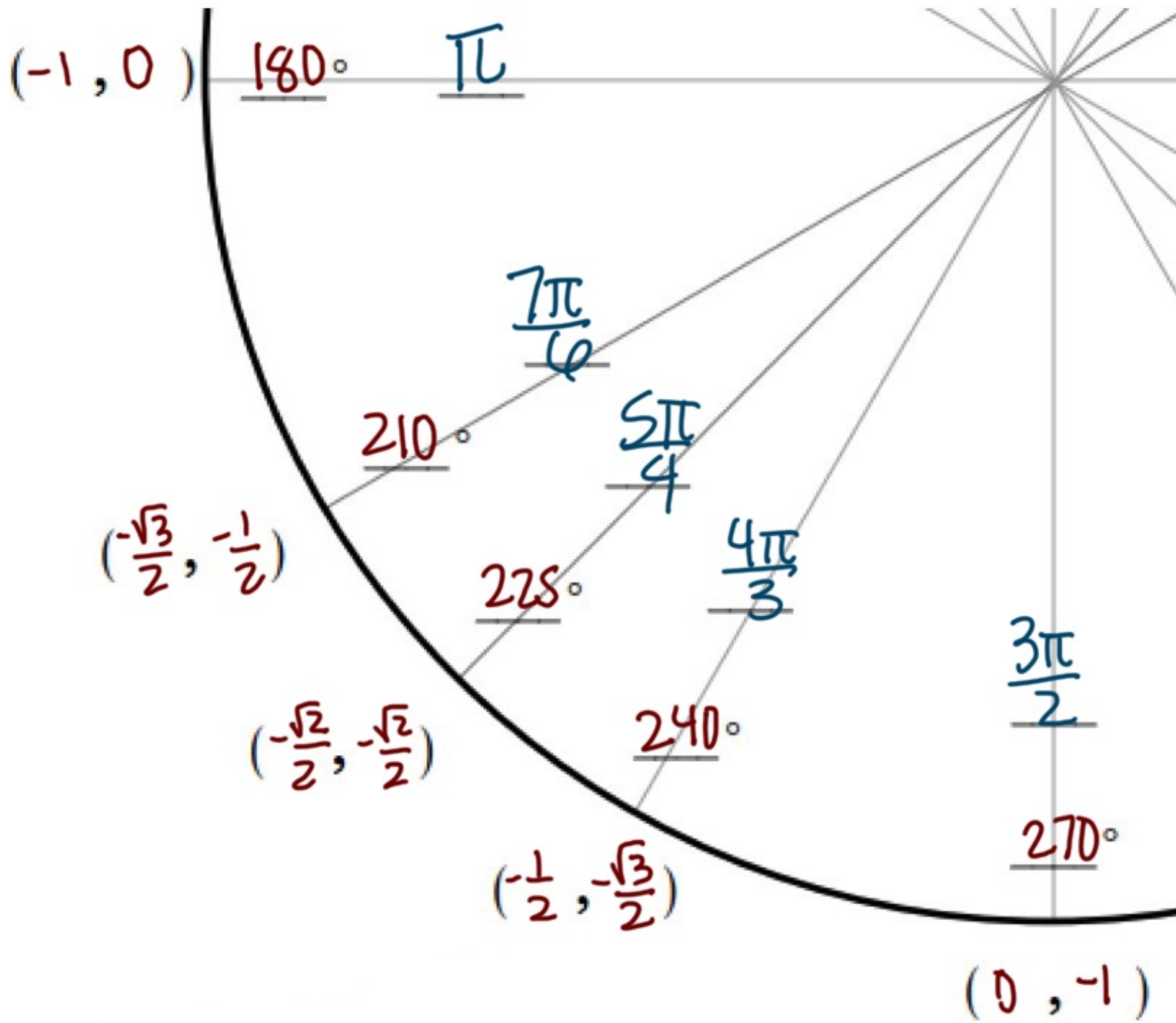
$$\boxed{300^\circ}$$

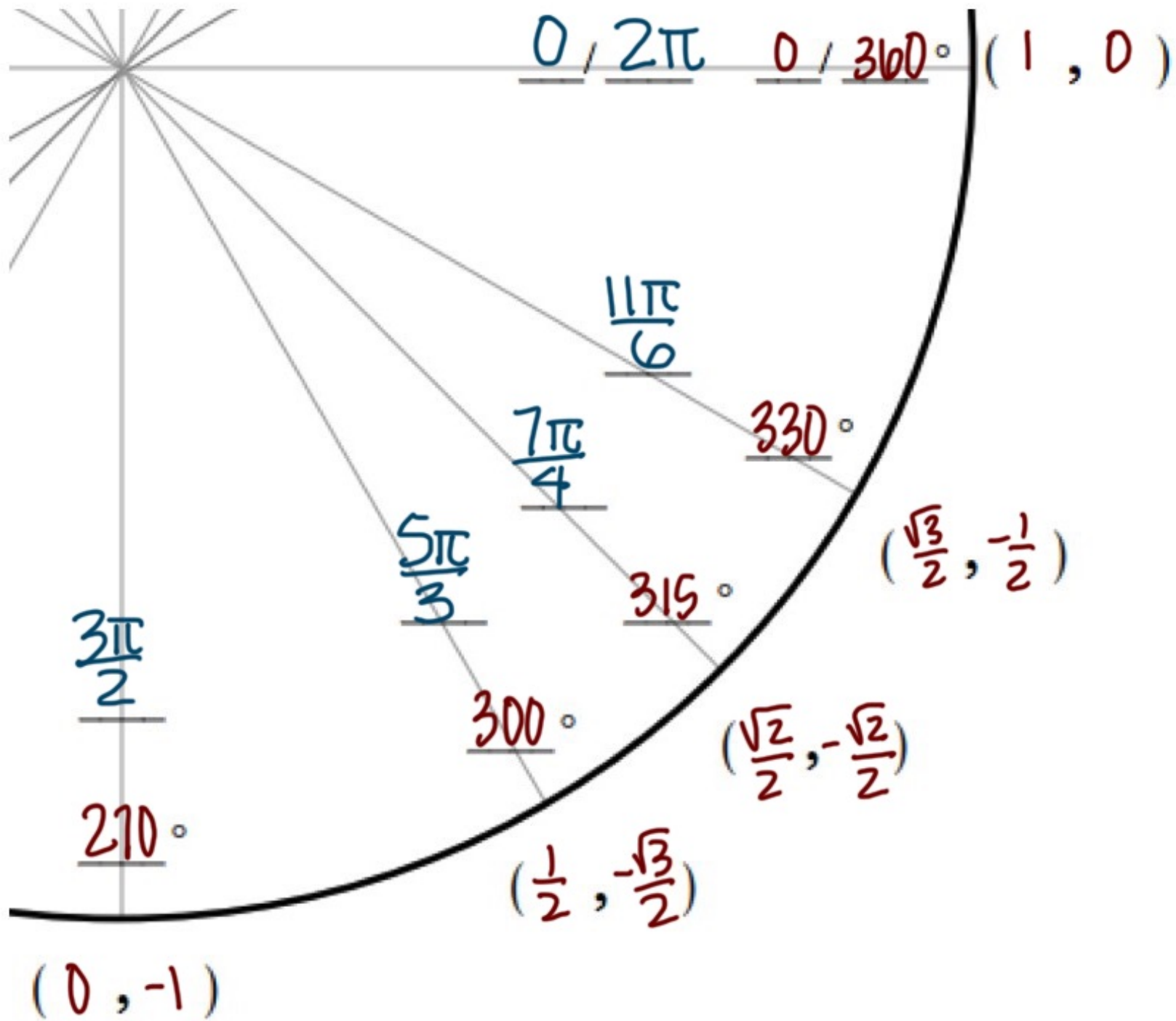
\*\*\* Go back to 9.2 notes and fill in the radian measure for each angle

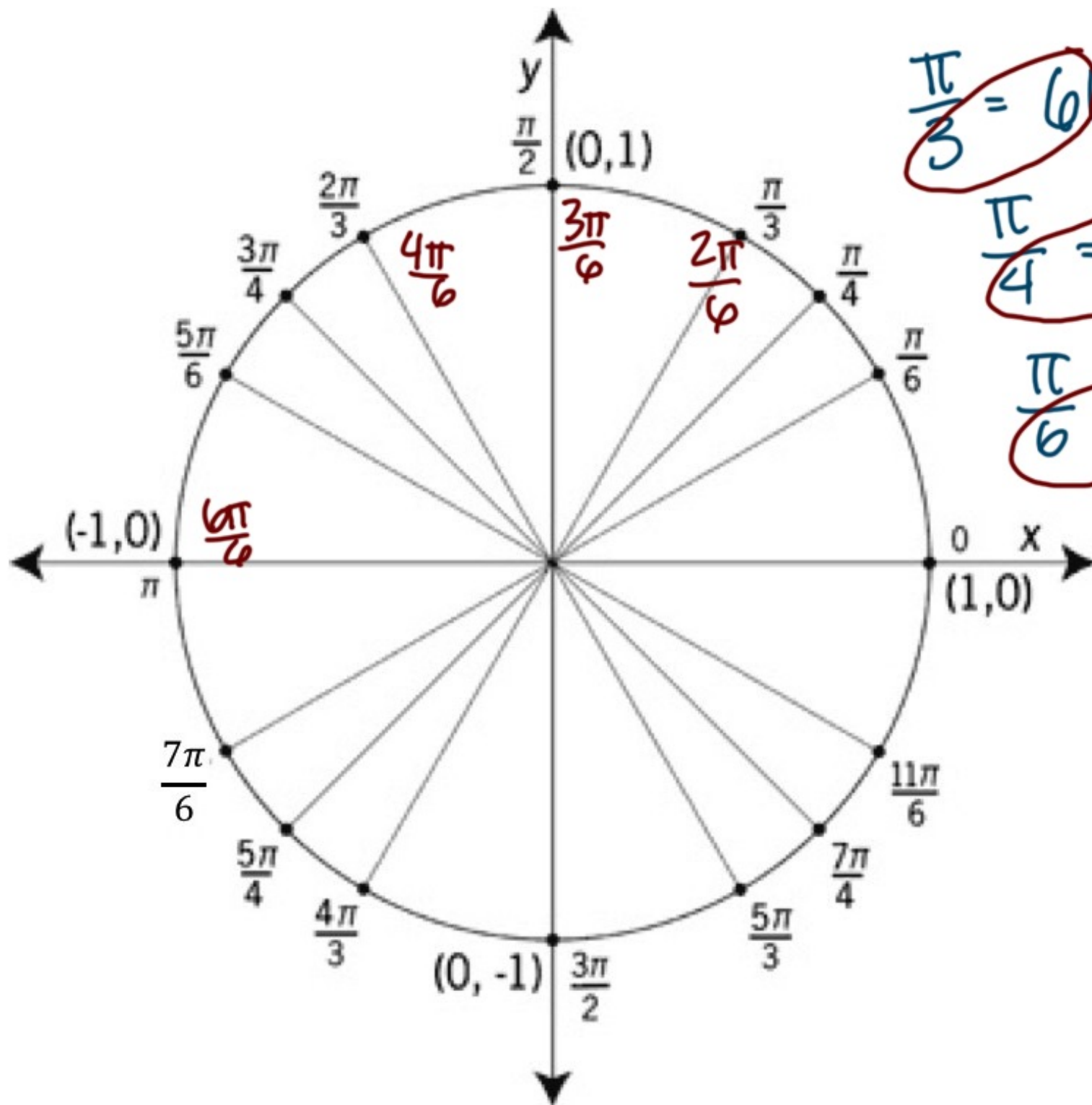












$$\theta = \frac{\text{arc length}}{\text{radius}}$$

### Length of an intercepted arc:

For a circle with radius  $r$  and a central angle  $\theta$  (in radians), the length  $s$  of the intercepted arc is:

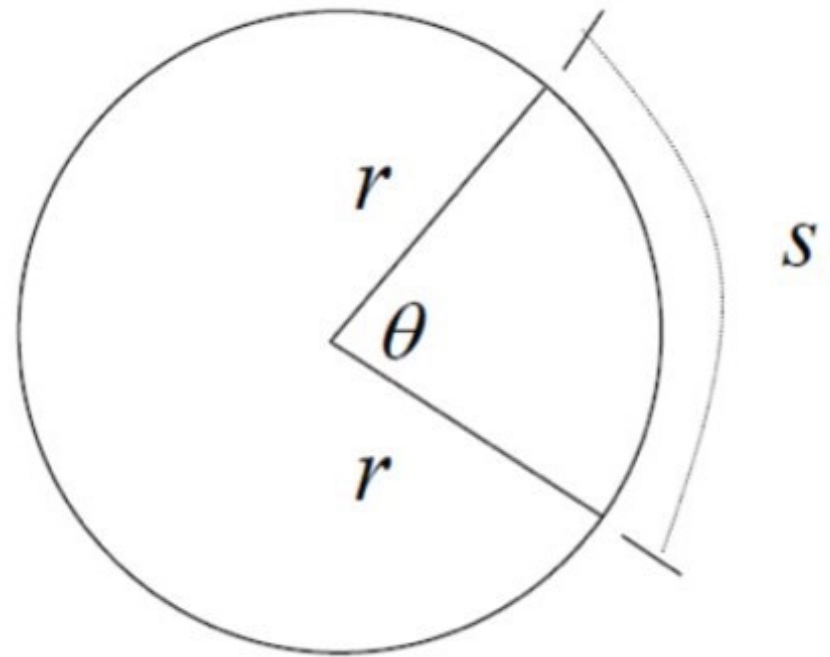
$$s = r \cdot \theta$$



arc  
length

radius

angle  
in radians



\*if it gives you  
degrees, convert  
to radians

# EXAMPLE

G. Find the length of  $s$ .

$$s = 3 \left( \frac{5\pi}{6} \right) = \frac{15\pi}{6} \approx 7.85$$

H. Find the length of  $b$ .

$$b = 3 \left( \frac{2\pi}{3} \right) = 2\pi \approx 6.28$$

I. Find the length of the missing piece of the circumference.

