

Radians

Review: What is the circumference for any circle?

$$C = 2\pi r$$

How many degrees are in a circle?

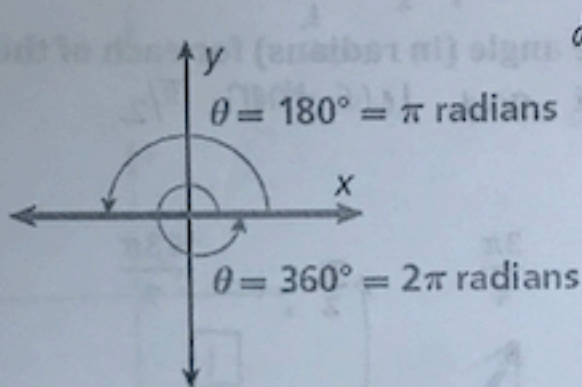
$$360^\circ$$

Let's suppose that our circle has a radius of 1. This would mean that the circumference is 2π . Travelling all along the circle would then be a distance of 2π , but it would also mean that we have travelled 360° .

This means $2\pi = 360^\circ$ where 2π is called a "Radian" measurement.

Radian conversion: $2\pi = 360^\circ$

$$\pi \text{ radians} = 180^\circ$$



$$\text{degrees} \cdot \frac{\pi \text{ rads}}{180^\circ} = \text{rads}$$

$$\text{rads} \cdot \frac{180^\circ}{\pi \text{ rads}} = \text{degrees}$$

Convert each measure from degrees to radians or from radians to degrees.

$$1. 60^\circ \cdot \frac{\pi \text{ rads}}{180^\circ} = \frac{\pi}{3} \text{ rads}$$

$$2. \frac{2\pi}{3} \text{ radians} \cdot \frac{180^\circ}{\pi \text{ rads}} = 120^\circ$$

$$3. \frac{\pi}{90} \text{ radians} \cdot \frac{180^\circ}{\pi \text{ rads}} = 2^\circ$$

$$4. 20^\circ = \frac{\pi}{9} \text{ rads}$$

$$5. -80^\circ = -\frac{4\pi}{9} \text{ rads}$$

\ast Add/subtract 2π radians
 Identify an angle (in radians) that is coterminal with each of the following:

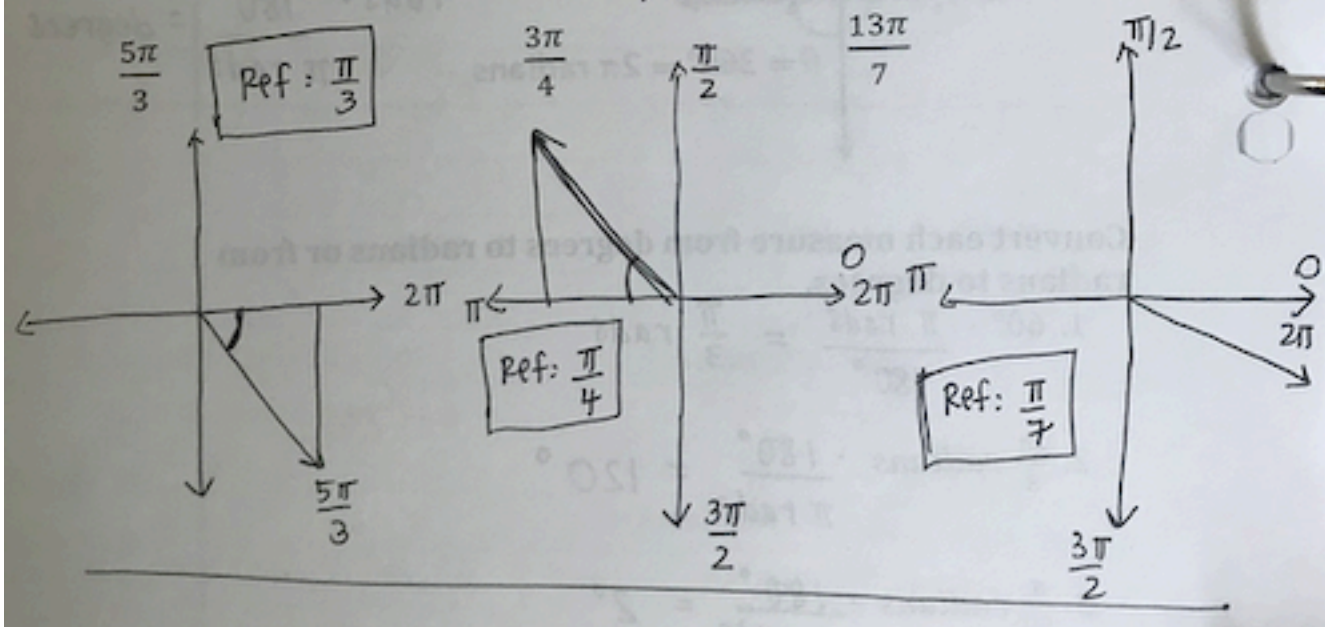
$$\frac{2\pi}{3} + \frac{6\pi}{3} = \boxed{\frac{8\pi}{3}}$$

$$\frac{\pi}{4} + \frac{8\pi}{4} = \boxed{\frac{9\pi}{4}}$$

$$\frac{2\pi}{7} + \frac{14\pi}{7} = \boxed{\frac{16\pi}{7}}$$

These are all examples of positive coterminal angles, but we also could subtract 2π from each angle to obtain examples of negative coterminal angles.

Identify the reference angle (in radians) for each of the following: \ast positive and less than $\frac{\pi}{2}$



**** Remember again that the reference angle always connects to the x-axis**