

Algebra 2YD

13-2 Notes (Day 1): Angles in Radians

Name:

Date:

Objective:

- To understand a radian angle measure & convert angles into degrees and/or radians
- To find coterminal angles in radians

Angles can be measured in degrees. Degrees indicate how wide an angle opens.

Another unit of measure for an angle is a **radian**. A radian angle measure is the **length** of the arc of a circle, which is just part of the circumference.  $\Rightarrow C = 2\pi r$  "unit circle" radius=1

We can convert from degrees to radians & radians to degrees by using a conversion factor, just like 5280 feet = 1 mile or 3 feet = 1 yard. Let's look at the conversion factor for degrees and radians.

$$C = 2\pi r = 2\pi(1)$$

$$2\pi = 360^\circ$$

$$C = 2\pi \Rightarrow \text{distance around circle}$$

$$1\pi = 180^\circ$$

Degrees to Radians: Mult. by  $\frac{\pi}{180^\circ}$

Radians to Degrees: Mult. by  $\frac{180^\circ}{\pi}$

**Example 1:** Rewrite the degree measure in radians and the radian measure in degrees.

a.  $45^\circ \quad D \Rightarrow R$

b.  $-220^\circ \quad D \Rightarrow R$

c.  $\frac{5\pi}{3} \quad R \Rightarrow D$

$$\frac{45^\circ}{1} \cdot \frac{\pi}{180^\circ}$$

$$\frac{45\pi}{180} = \boxed{\frac{1\pi}{4} \text{ or } \frac{\pi}{4}}$$

$$\frac{-220^\circ}{1} \cdot \frac{\pi}{180^\circ}$$

$$\frac{-220\pi}{180} = \boxed{\frac{-11\pi}{9}}$$

$$\frac{5\pi}{3} \cdot \frac{180^\circ}{\pi}$$

$$\frac{5 \cdot 180^\circ}{3} = \frac{900^\circ}{3}$$

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

**Example 2:** Finding coterminal angles in radians.  $\pm 360^\circ \Rightarrow \boxed{\pm 2\pi}$  \* make common denominators

a.  $\frac{3\pi}{8} \pm \frac{2\pi \cdot 8}{1 \cdot 8} = \boxed{\frac{16\pi}{8}}$

b.  $\frac{-13\pi}{6} \pm \frac{2\pi \cdot 6}{1 \cdot 6} = \frac{12\pi}{6}$

$$\frac{3\pi}{8} + \frac{16\pi}{8} = \boxed{\frac{19\pi}{8}}$$

$$\frac{-13\pi}{6} + \frac{12\pi}{6} = \boxed{\frac{-1\pi}{6}} \text{ neg.}$$

$$\frac{3\pi}{8} - \frac{16\pi}{8} = \boxed{\frac{-13\pi}{8}}$$

$$\frac{-\pi}{6} + \frac{12\pi}{6} = \boxed{\frac{11\pi}{6}} \text{ pos.}$$

