

Warm Up

Prove the following identity:

$$\frac{1 + \cos 2\theta}{\sin 2\theta} = \cot \theta$$

Pythag. \rightarrow

$$\frac{1 + (\cos^2 \theta - \sin^2 \theta)}{2 \sin \theta \cos \theta}$$
$$\frac{\cos^2 \theta + \cos^2 \theta}{2 \sin \theta \cos \theta}$$
$$\frac{\cancel{2} \cos^2 \theta}{\cancel{2} \sin \theta \cancel{\cos \theta}}$$
$$\frac{\cos \theta}{\sin \theta}$$
$$\frac{\cos \theta}{\sin \theta}$$

Find an angle, θ , coterminal with -225° , where $-360^\circ \leq \theta \leq 360^\circ$.

$$A_c = A + 360k, k \in \mathbb{I}$$

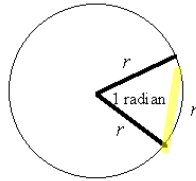
$$= -225^\circ + 360(1)$$

$$= -225^\circ + 360^\circ$$

$$= 135^\circ$$

Radian Measure

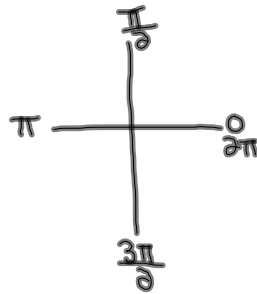
A **radian** is the angle subtended by an arc of length r (radius)



$$\theta = \frac{\alpha}{r}$$

← arc length
← radius

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



Degrees Radians

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

$$180^\circ = \pi$$

$1^\circ = \frac{\pi}{180} \text{ radians}$	$1 \text{ rad} = \frac{180}{\pi}$
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Ex. Convert the following angles from degrees to radians:

a) $60^\circ \cdot \frac{\pi}{180}$

$$\frac{60\pi}{180}$$

$$\frac{\pi}{3}$$

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

b) $728^\circ \cdot \frac{\pi}{180}$

$$\frac{728\pi}{180}$$

$$\boxed{\frac{182\pi}{45}}$$

c) $-270^\circ \cdot \frac{\pi}{180}$

$$\frac{-270\pi}{180}$$

$$-\frac{3\pi}{2} + \frac{2\pi}{1}$$

$$-\frac{3\pi}{2} + \frac{4\pi}{2}$$

$$\boxed{\frac{\pi}{2}}$$

Ex. Convert the following angles from radians to degrees:

a) $\pi/6$

$$\frac{\pi}{6} \cdot \frac{180}{\pi}$$

$$\frac{180\cancel{\pi}}{6\cancel{\pi}}$$

$$\boxed{30^\circ}$$

b) $-2\pi/5$

$$\frac{-2\pi}{5} \cdot \frac{180}{\pi}$$

$$\frac{-360\cancel{\pi}}{5\cancel{\pi}}$$

$$-72^\circ + 360^\circ$$

$$\boxed{288^\circ}$$

c) 6.485

$$6.485 \cdot \frac{180}{\pi}$$

$$\frac{1167.3}{\pi}$$

$$372^\circ - 360^\circ$$

$$\boxed{12^\circ}$$

Ex. Find the coterminal angle, θ , of $\frac{\pi}{4}$ where
 $-2\pi \leq \theta \leq 2\pi$

Remember: Coterminal angles share the same terminal arm!

$$A_c = A + 2\pi k, k \in \mathbb{I}$$

$$= \frac{\pi}{4} + 2\pi(-1)$$

$$= \frac{\pi}{4} - \frac{2\pi}{1}$$

$$= \frac{\pi}{4} - \frac{8\pi}{4}$$

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

Homework

Omit #7

- Ex. (a) If the large wheel rotates $2\pi/3$ radians, how many radians does the smaller wheel rotate?
- (b) If the large wheel completes three revolutions, how much does the small wheel rotate in radians?

