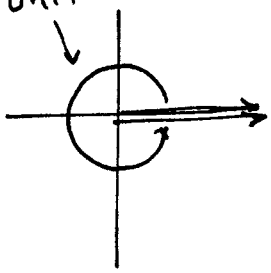
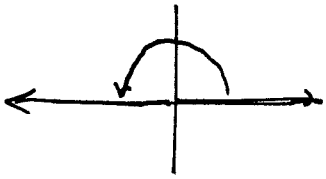
3.1 Radian measure

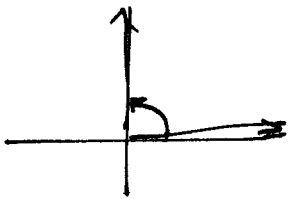
Radian measure of some famous angles



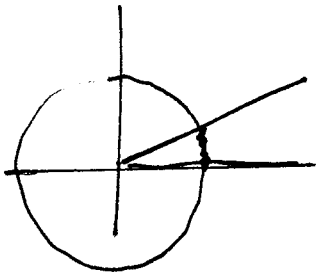
360 degrees = 2π radians



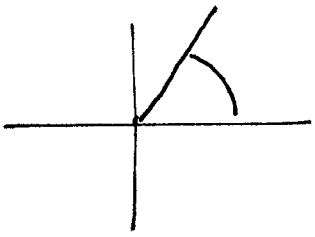
180 degrees = π radians



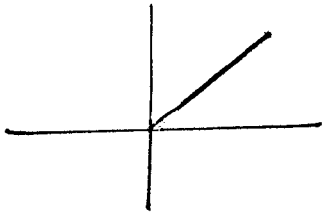
90 degrees = $\frac{\pi}{2}$ radians



30 degrees = $\frac{\pi}{6}$ radians

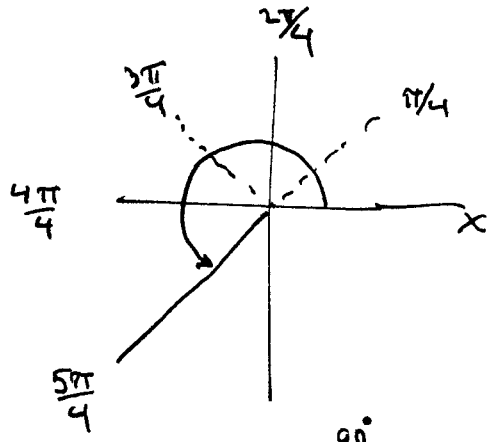


60 degrees = $\frac{\pi}{3}$ radians



45 degrees = $\frac{\pi}{4}$ radians

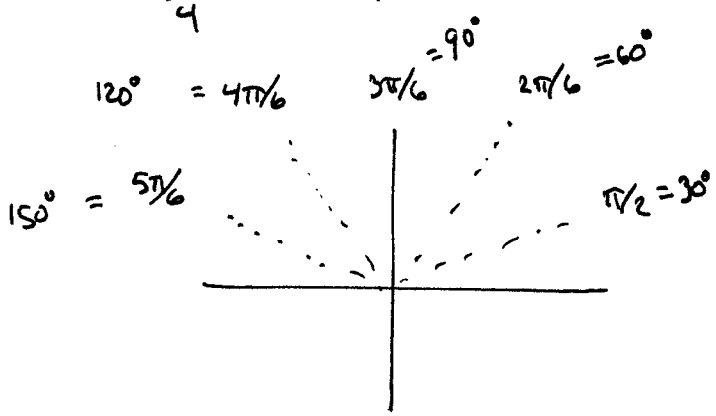
Ex.



225° is how many radians?

5 times 45° = 225°

5 times $\frac{\pi}{4}$ = $\frac{5\pi}{4}$



$\frac{5\pi}{6}$ radians is how many degrees?

150 degrees.

46) Convert 74° to radians.

$$74 \text{ degrees} \cdot \frac{\pi \text{ radians}}{180 \text{ degrees}} = \frac{74\pi}{180} \text{ radians}$$

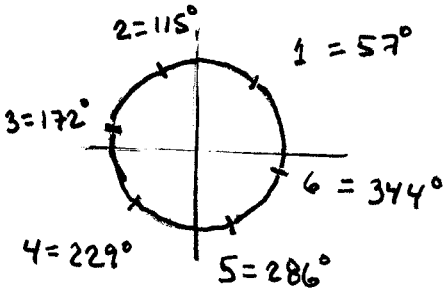
$$= \boxed{\frac{37\pi}{90} \text{ radians}} \approx 1.29 \text{ radians}$$

58) Convert 5 radians to degrees.

$$5 \text{ radians} \cdot \frac{180 \text{ degrees}}{\pi \text{ radians}} = \boxed{\frac{900}{\pi} \text{ degrees}}$$

$$\approx 286.5°$$

Remark: 1 radian = $\frac{180}{\pi}$ degrees = 57.3°



examples: If angles are measured in radians, find these values

$$\sin \frac{\pi}{6} = \frac{1}{2}$$

angle = θ	sin θ	cos θ	tan θ
$0 = 0^\circ$	$\frac{\sqrt{0}}{2} = 0$	1	0
$\pi/6 = 30^\circ$	$\frac{\sqrt{1}}{2} = \frac{1}{2}$	$\sqrt{3}/2$	$\frac{1}{\sqrt{3}}$
$\pi/4 = 45^\circ$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
$\pi/3 = 60^\circ$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
$\pi/2 = 90^\circ$	$\frac{\sqrt{4}}{2} = 1$	0	undefined

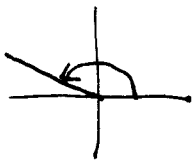
$$\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} \qquad \tan \frac{\pi}{3} = \sqrt{3}$$

$$\sin \frac{\pi}{2} = 1 \qquad \cos \frac{\pi}{3} = \frac{1}{2}$$

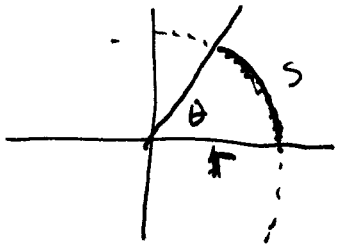
Now, how about

sine is positive in Q II.

$$\sin \frac{5\pi}{6} = +\sin \frac{\pi}{6}.$$



3.2 Arc length, and area of a sector



$\frac{s}{r} = \theta$ so

$\boxed{s = r\theta}$ provided θ is measured in radians

ex: A circle has radius $r = 25.60$ cm

a) Find the length of the arc intercepted by the central angle having measure $\theta = \frac{7\pi}{8}$ radians.

$$s = r\theta = (25.60 \text{ cm})\left(\frac{7\pi}{8}\right)$$
$$= 70.37167544 \text{ cm}$$
$$\approx 70.37 \text{ cm}$$

b) Same question, but $\theta = 54°$.

First, $54 \text{ degrees} \cdot \frac{\pi \text{ radians}}{180 \text{ degrees}} = \frac{54\pi}{180} = \frac{3\pi}{10}$

$$s = r\theta = (25.60 \text{ cm})\left(\frac{3\pi}{10}\right) = 24.13 \text{ cm}$$
$$\approx 24 \text{ cm}$$

Area of a sector? To be continued...