Trig 6.1

$6\frac{1}{4}$ in $\approx$ 16cm

https://www.youtube.com/watch?v=So9gSIDT6Kg

- Change from radian to degree measure
- Change from degree to radian measure
- Find the length of an arc given the measure of the central angle
- Find the area of a sector

unit

reference angles

proportion

unit circle

handy angles

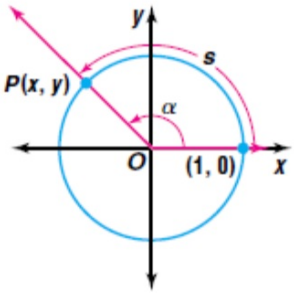
**radian (new)

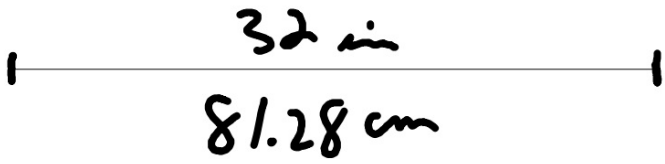
circular arc

central angle

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

$\pi = 180^\circ$





measure in inches
measure in cm

circles and radii

1 complete circle = $360^\circ = 2\pi$ rad

d $\frac{180^\circ}{\pi \text{ rad}}$

r

$$\frac{180^\circ}{\pi \text{ rad}}$$

proportion: radians

degrees

Proportion

1 a. Change 330° to radian measure in terms of π.

$$\frac{180^\circ}{\pi \text{ rad}} = \frac{330^\circ}{x \text{ rad}}$$

$$\frac{180x}{180} = \left(\frac{330\pi}{180}\right)$$

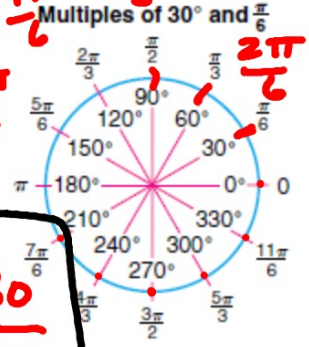
$$x = \frac{11}{6}\pi$$

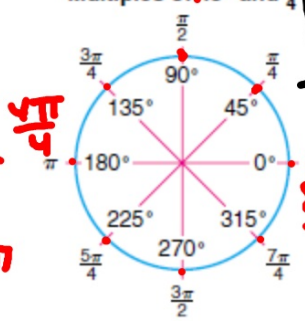
b. Change $\frac{2\pi}{3}$ radians to degree measure.

$$\frac{180^\circ}{\pi \text{ rad}} = \frac{x^\circ}{\frac{2\pi}{3} \text{ rad}}$$

$$x \cdot \pi = 180 \cdot \frac{2\pi}{3}$$

$$x = 120^\circ$$





$\frac{45^\circ}{x} = \frac{180^\circ}{\pi}$

$x \cdot 180 = 45\pi$

$\frac{180}{180} \quad \frac{180}{180}$

$x = \frac{45}{180} \cdot \pi = \frac{1}{4}\pi = \frac{\pi}{4}$

Patterns?

$\frac{180}{\pi} = \frac{30}{x}$

$30\pi = 180x$

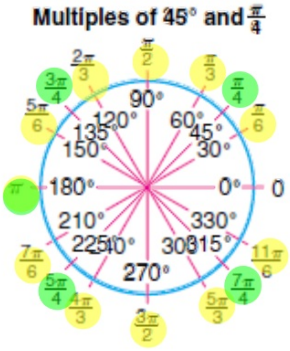
$\frac{30\pi}{180} = \frac{180x}{180}$

$\therefore x = \frac{30}{180}\pi = \frac{1}{6}\pi = \frac{\pi}{6}$

p. 344

Degrees	0	30	45	60	90	120	135	150	180	210	225	240	270	300	315	330
Radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$

Handy angles


Multiples of 45° and $\frac{\pi}{4}$
90°
60°
45°
30°
0°
0
330°
315°
300°
270°
240°
225°
210°
180°
150°
135°
120°
$\frac{\pi}{2}$
$\frac{\pi}{3}$
$\frac{\pi}{4}$
$\frac{\pi}{6}$
π
$\frac{11\pi}{6}$
$\frac{7\pi}{4}$
$\frac{5\pi}{3}$
$\frac{4\pi}{3}$
$\frac{5\pi}{4}$
$\frac{7\pi}{6}$
$\frac{3\pi}{2}$
$\frac{2\pi}{3}$
$\frac{3\pi}{4}$
$\frac{5\pi}{6}$

Proportion

Change each degree measure to radian measure in terms of π.

5. $240°$

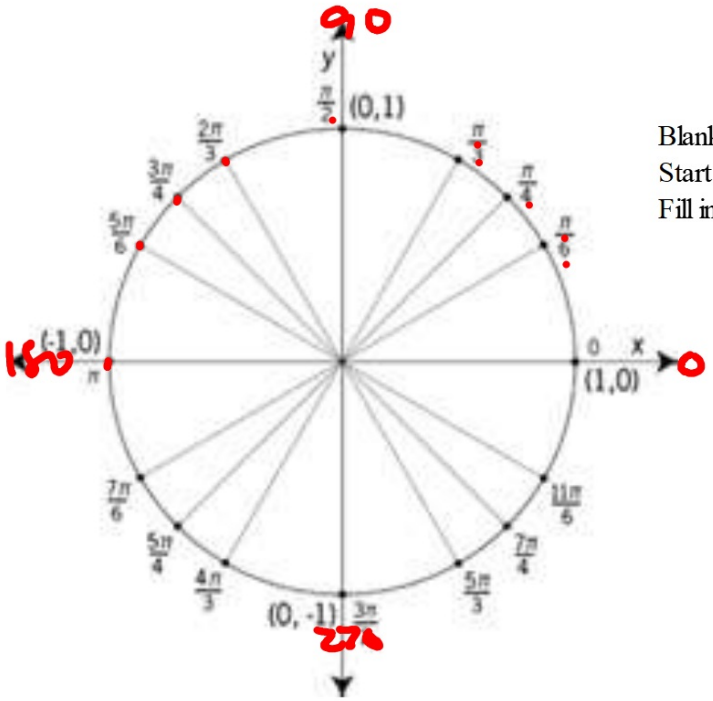
$$\frac{240°}{x} = \frac{180°}{\pi}$$

$$x = \frac{4}{3}\pi$$

6. $570°$

$$\frac{180°}{\pi} = \frac{570°}{x}$$

$$x = \frac{19}{6}\pi$$



Blank unit circle
Start by adding landmarks (x,y)
Fill in with radian measurements

Change each radian measure to degree measure. Round to the nearest tenth, if necessary.

7. $\frac{3\pi}{2}$

8. -1.75

$$\frac{180^\circ}{\pi} = \frac{x}{\frac{3\pi}{2}}$$

$$X = 270^\circ$$

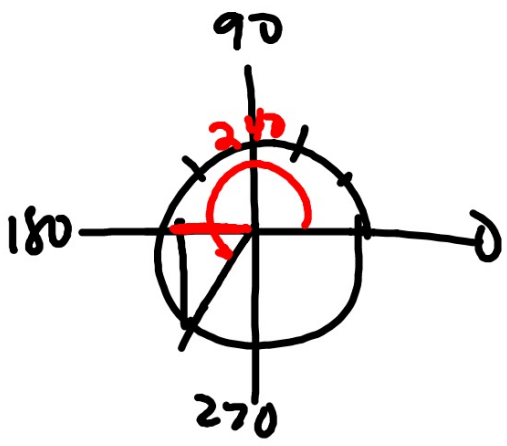
$$\frac{180^\circ}{\pi} = \frac{x}{1.75}$$

$$\frac{x \cdot \pi}{3.14} = \frac{180(1.75)}{3.14}$$

$$= -100.3$$

Example 2 Evaluate $\cos\frac{4\pi}{3}$.

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



$\frac{180}{\pi} = \frac{x}{\frac{4\pi}{3}}$

$\pi \cdot x = 180 \cdot \frac{4\pi}{3}$

$x = 240$

$x = 60°$

reference angle?

~~17-51~~ 0

16.27 are

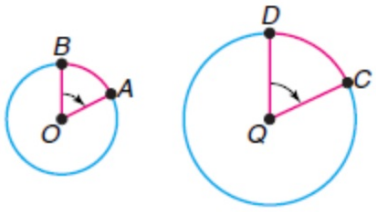
reference angle?

Evaluate each expression.

9. $\sin \frac{3\pi}{4}$

10. $\tan \frac{11\pi}{6}$

Radian measure can be used to find the length of a **circular arc.** A circular arc is a part of a circle. The arc is often defined by the **central angle** that intercepts it. A central angle of a circle is an angle whose vertex lies at the center of the circle.



What fraction of the circle is it?

What is the circumference? What fraction of the circle is it?

Length of an Arc	The length of any circular arc s is equal to the product of the measure of the radius of the circle r and the radian measure of the central angle θ that it subtends. $s = r\theta$

3 Given a central angle of 128°, find the length of its intercepted arc in a circle of radius 5 centimeters. Round to the nearest tenth.

Given the measurement of a central angle, find the length of its intercepted arc in a circle of radius 15 inches. Round to the nearest tenth.

11. $\frac{5\pi}{6}$

12. 77°