Section 4.1

Degrees/Minutes/Seconds vs Decimal Degrees

1. Convert to DMS

37.425° $\quad 37^\circ 25' 30''$

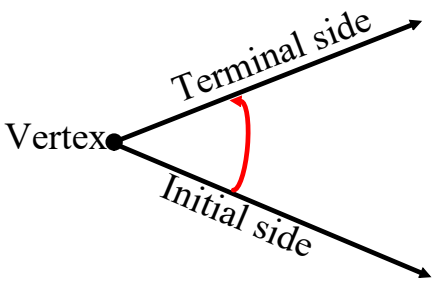
$.425^\circ \left(\frac{60'}{1^\circ}\right) = 25.5$

$.5' \left(\frac{60''}{1'}\right) = 30$

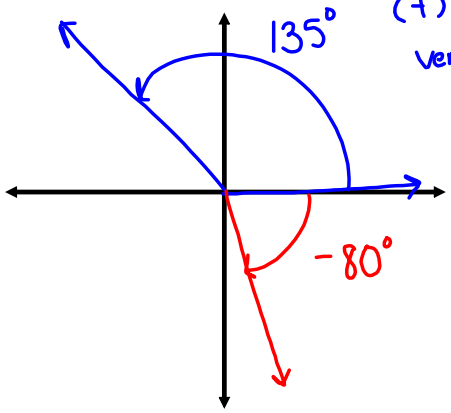
2. Convert to decimal degrees

$42^\circ 24' 36''$

$42^\circ + \left(\frac{24}{60}\right)^\circ + \left(\frac{36}{3600}\right)^\circ = 42.41^\circ$



Standard position initial side (+) x-axis vertex @ origin



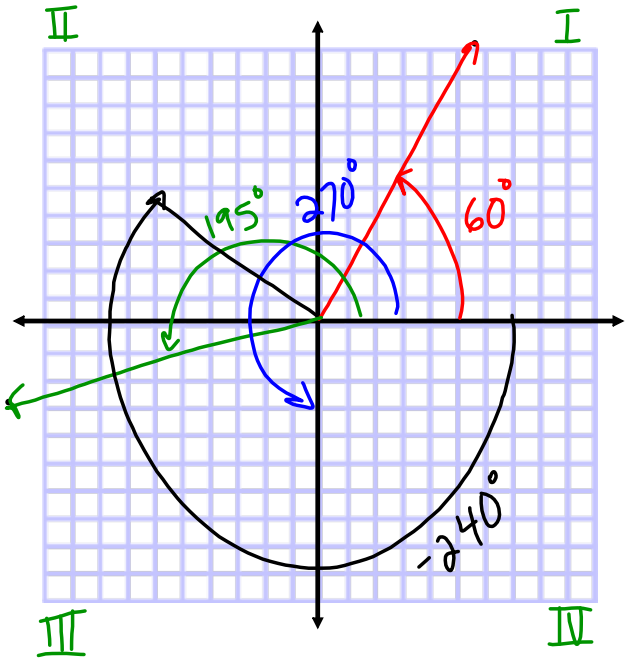
positive angle (counter clockwise)

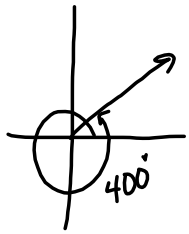
negative angle (clockwise)

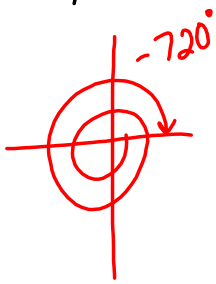
Graph the following angles in standard position.

60°
195°
270°
-240°

400°
-720°







Find to 2 angles (1 positive and 1 negative) that are coterminal with the given angles.

-150° $+360° = 210°$

$-150° - 360° = -510°$

75° $+360° = 435°$

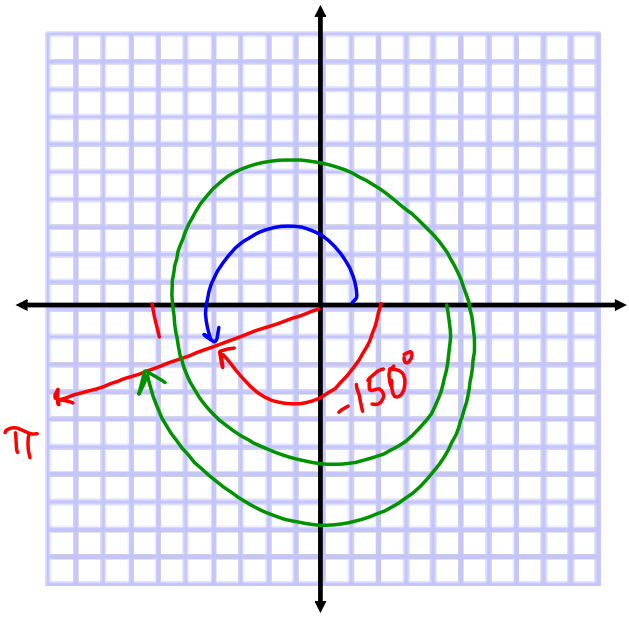
$75° - 360° = -285°$

$3\pi + 2\pi = 5\pi$

$3\pi - 2\pi = \pi - 2\pi \neq -\pi$

$\frac{2\pi}{3} + \frac{2\pi \cdot 3}{3} = \frac{8\pi}{3}$

$\frac{2\pi}{3} - \frac{2\pi \cdot 3}{3} = \frac{4\pi}{3}$



Complementary and Supplementary Angles

$\frac{5\pi}{10} - \frac{4\pi}{10} = \boxed{\frac{\pi}{10}}$

Find the complement of: $\frac{2\pi}{5}$ $\quad \frac{\pi}{2} - \frac{2\pi}{5}$ $\qquad \frac{4\pi}{5}$ $\quad$ None

$90° \rightarrow \frac{\pi}{2}$

Find the supplement of: $\frac{2\pi}{5}$ $\quad \boxed{\frac{3\pi}{5}}$ $\qquad \frac{4\pi}{5} = \frac{\pi}{5}$

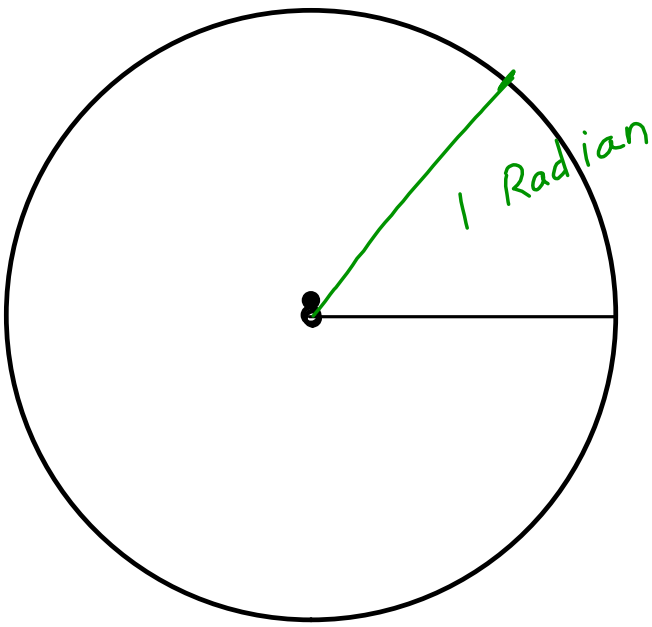
$180° \rightarrow \pi$

$\pi - \frac{2\pi}{5}$ $\qquad \pi - \frac{4\pi}{5}$

$\frac{5\pi}{5} - \frac{2\pi}{5}$ $\qquad \frac{5\pi}{5} - \frac{4\pi}{5}$

What is a radian?

A central angle of a circle has measure 1 radian if it intercepts an arc with the same length as the radius.



$3.14 \approx \pi$

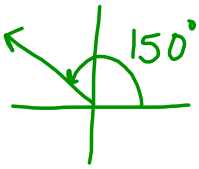
$6.28 \approx 2\pi$ Radians

Converting between radians and degrees

Key: $180^\circ = \pi$ radians

Convert to Radians

$150^\circ \left(\frac{\pi}{180^\circ}\right)$



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

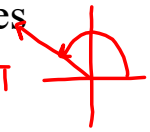
$75^\circ 30'$

$75.5^\circ\left(\frac{\pi}{180^\circ}\right) = \frac{151\pi}{360}$

$\frac{75.5}{180}$

Convert to Degrees

$3.14 \approx \pi$



$\frac{3\pi}{4}\,\frac{180^\circ}{\pi} = 135^\circ$

$1.3\left(\frac{180^\circ}{\pi}\right) \approx 74.5^\circ$

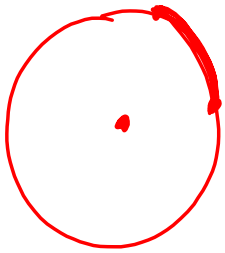
Arc Length Formula (Radian Measure)

radius

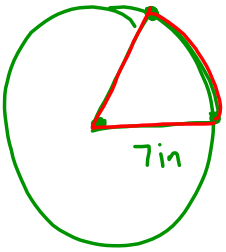
$s = r\theta$ → central angle

has to be in radians

arc length



Find the perimeter of a 60° slice of a large (7in. radius) pizza.



$S = 7\left(\frac{\pi}{3}\right) = 7.33\text{in}$

$60^\circ\left(\frac{\pi}{180^\circ}\right) = \frac{\pi}{3}$

$P = 21.33\text{in}$

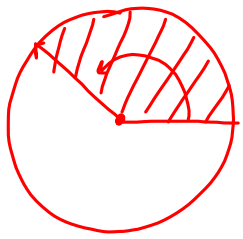
Area of a Sector of a Circle (Radian Measure)

radius

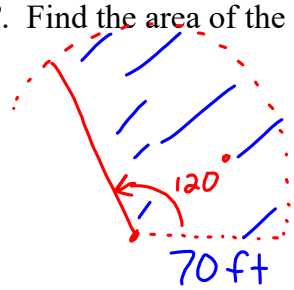
$A = \frac{1}{2}r^2\theta$ → central angle

has to be in radians

area of sector



A sprinkler on a golf course fairway sprays water over a distance of 70 feet and rotates through and angle of 120°. Find the area of the fairway watered by the sprinkler.



$A = \frac{1}{2}r^2\theta$

$A = \frac{1}{2}(70)^2\left(\frac{2\pi}{3}\right)$

$A = 5131.27 \text{ ft}^2$

$\cancel{120}^{2}\cancel{0}^{0}\left(\frac{\pi}{\cancel{180}_{3}}\right)$

Convert from miles per hour to feet per second.

75 mph

Ford Taurus has a wheel diameter of 26.16 inches. What is the speed in mph when the wheels are turning at 800 revolutions per minute? 1 rev = 1 circumference tire

$C = d\pi$

$$800\,\frac{rev}{min}\left(\frac{60\,min}{1\,hr}\right)\left(\frac{26.16\,\pi\,in}{1\,rev}\right)\left(\frac{1\,ft}{12\,in}\right)\left(\frac{1\,mi}{5280\,ft}\right) = \frac{mi}{hr}\ 62.26$$

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Problems #: 1-4, 7-49 odd, 51-58, 61, 69, 70, 76