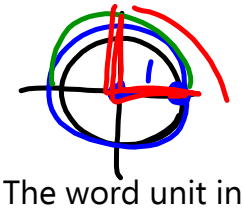
WARM UP



- **Draw a circle, centered at the origin, with radius 1.**

  Math jargon side note: We call this the "unit circle." The word unit in mathematics is used to denote the multiplicative identity, which in our case is 1.

- **Find the circumference of this circle. Keep π in your answer.**

  Don't remember the formula? Ask a friend or look it up!

$2\pi r$

2π

2

- **Find the circumference of the top half of the circle. Keep π in your answer.**

π

- **Find the circumference of the piece that is in the first quadrant. Keep π.**

$\frac{\pi}{2}$

Chapter 4 :: Trigonometry

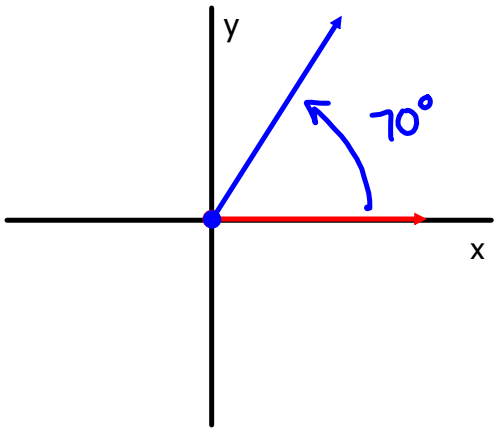
trigonometry//measurement of angles

The nitty gritty...

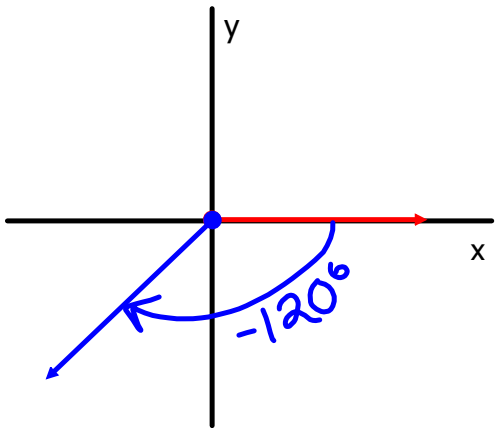
Angles in the Coordinate Plane

An angle in **standard position** has its initial side starting on the positive x-axis with its vertex at the origin. Its terminal side is the ray's position after rotation.

(+) angles rotate counterclockwise



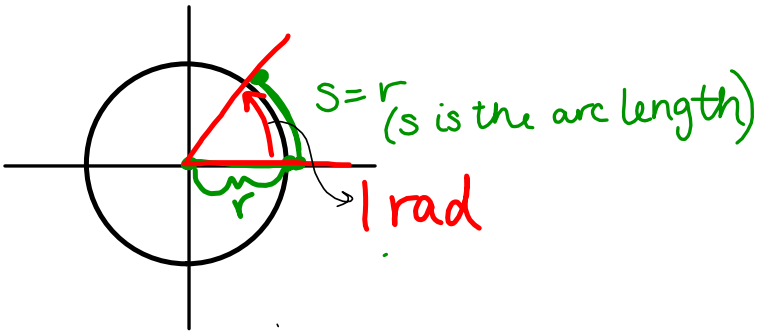
(-) angles rotate clockwise



2 ways to measure angles:

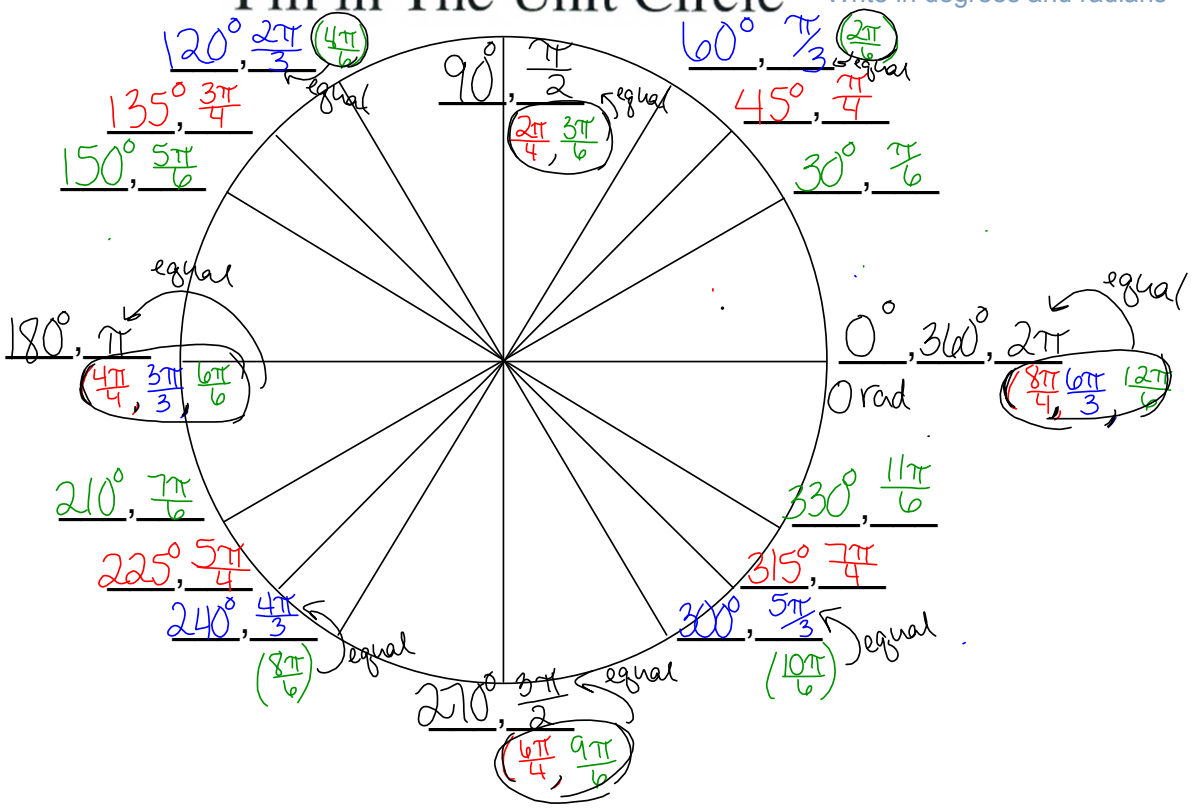
Degrees: One degree is $\frac{1}{360}$th of a full revolution.

Radians: One radian is the measure of a central angle when the arc length formed by that angle is equal to the radius of the circle.



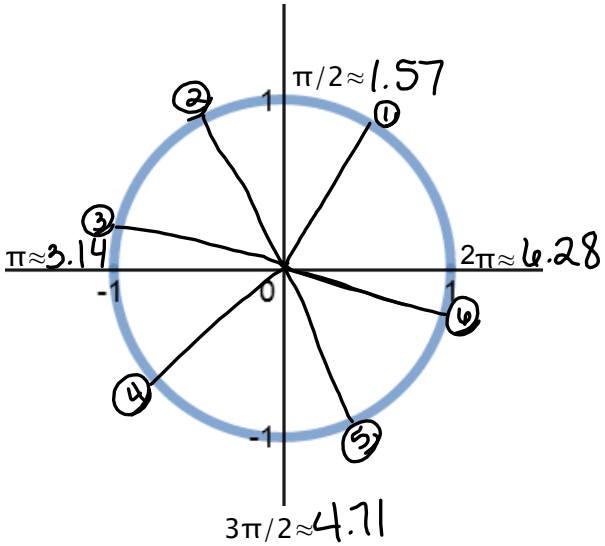
Fill in The Unit Circle

Write in degrees and radians



FINDING ONE RADIAN

1 Full Revolution = $360^{o} = 2\pi$ radians $\approx$ 6.28 radians (3.14)



One radian is formed when the arc length of that angle is equal to the radius.

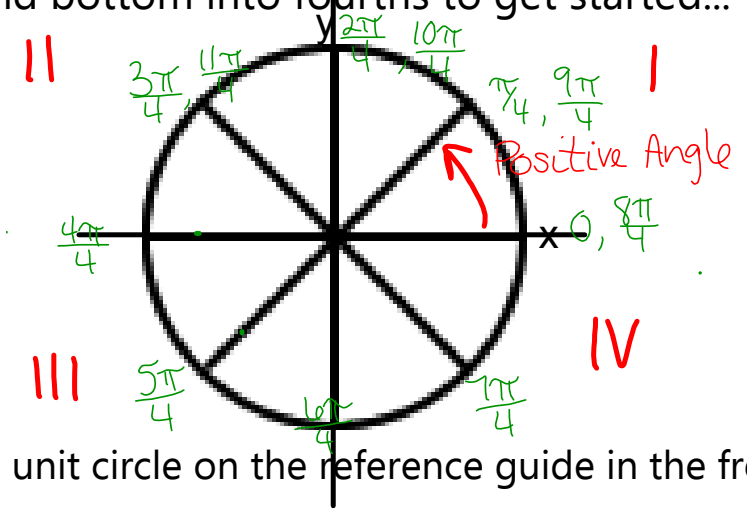
See figure 4.6, p. 259

p. 265, #1 (HW)

Try Exercise 3 (a & b) on p. 265.

Determine the quadrant in which a) $\frac{7\pi}{4}$ and b) $\frac{11\pi}{4}$ lie in.

Divide top and bottom into fourths to get started...



a) IV

b) II

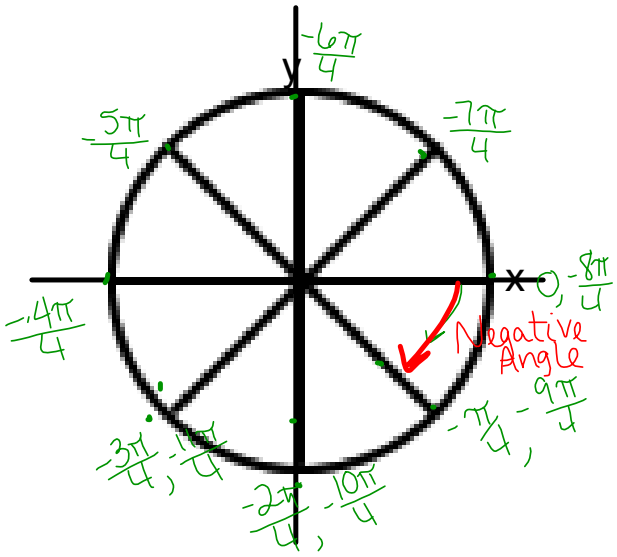
Check out the unit circle on the reference guide in the front of yourbook!

Q: What if those angles were negative, instead of positive?
Which quadrants would $-\frac{7\pi}{4}$ (a) and $-\frac{11\pi}{4}$ (b) lie in?

A:

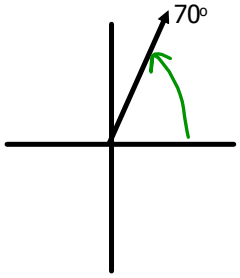
a) I

b) III

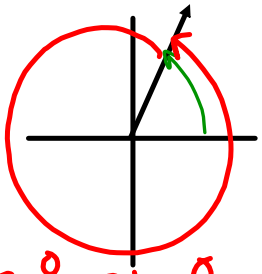


Coterminal Angles:
Two angles with the same terminal side.
They differ only by the # of full revolutions it takes to get to the terminal side.

EX.

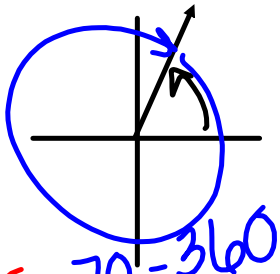


(Positive)



$70° + 360° = 430°$

(Negative)



$70 - 360 = -290°$

*All three angles are coterminal.

COTERMINAL ANGLES

Degrees: $\pm 360^\circ \cdot n$ n = # of revolutions

Radians: $\pm 2\pi \cdot n$ radians

p. 265, #11 (HW)

Complements

Two positive angles are **complementary** if their sum is 90 ° or $\pi/2$ radians.

EX: Find the complement of $\frac{\pi}{6}$ $\frac{\pi}{6} + x = \frac{\pi}{2}$

$x = \frac{\pi}{2} - \frac{\pi}{6}$

$= \frac{3\pi}{6} - \frac{\pi}{6} = \frac{2\pi}{6} = \frac{\pi}{3}$

EX: Find the complement of 100° $100 + x = 90^\circ$

$x = 90^\circ - 100^\circ$

$= -10^\circ$

Supplements

Two positive angles are **supplementary** if their sum is 180 ° or π radians. ≈ 3.14

EX: Find the supplement of $\frac{\pi}{6}$

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

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

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

EX: Find the supplement of 4.52

$4.52 + x = 3.14$

$x = 3.14 - 4.52 = -1.38$

EX: Find the supplement of 3

$3 + x = 3.14$

$x = 3.14 - 3 = 0.14$

HOMEWORK

4.1a (p.265): 1-37 (odds only, skip #25)