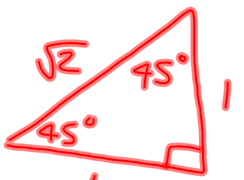
Review:

A reference angle for an angle whose inial side is on the posive x-axis and terminal side may lie in any of the four quadrants is the positive acute angle between the terminal side of the angle and the x-axis.

Evaluate the following trigonometric expressions. Give exact answers. You do not have to raonalize. Draw a picture if this helps you.

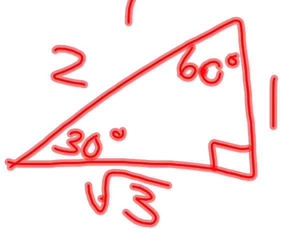
$\sin 45°$

$1/\sqrt{2}$



$\tan 60°$

$\sqrt{3}$



$\sec 45°$

$\sqrt{2}$

$\csc 30°$

2

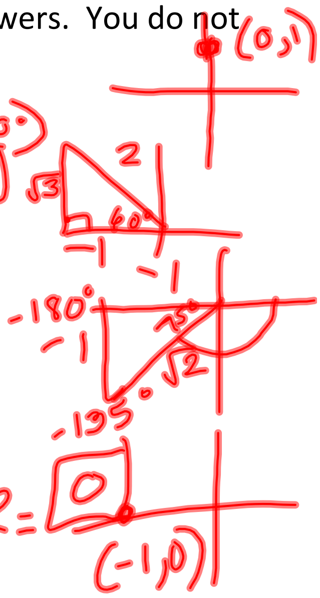
$\sec(-270°) = \frac{1}{\cos(-270°)} = \frac{1}{0} = \boxed{\text{undefined}}$

$\cot(120°)$ $\boxed{-1/\sqrt{3}}$

$\csc(-135°)$ $\frac{\sqrt{2}}{-1} = \boxed{-\sqrt{2}}$

$\tan(540°) = \frac{\sin}{\cos} = \frac{0}{-1} = \boxed{0}$

$540° - 360° = 180°$



17 total possible points; grades out of 15 points

Quiz #1 Solutions

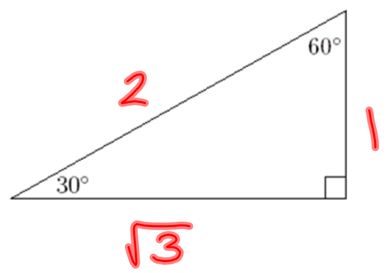
$$\frac{1}{\sec x} = \mathbf{\cos x}$$

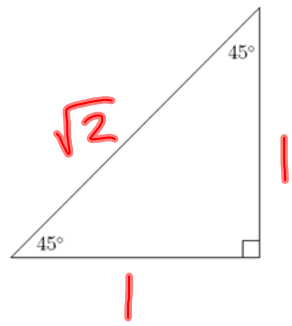
$$\frac{\sin x}{\cos x} = \mathbf{\tan x}$$

$$\frac{1}{\sin x} = \mathbf{\csc x}$$

$$\csc(90° - x) = \mathbf{\sec x}$$

$$\tan(90° - x) = \mathbf{\cot x}$$

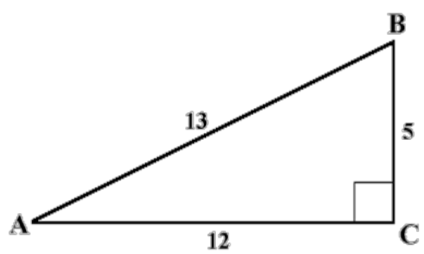




$$\sin B = \mathbf{\frac{12}{13}}$$

$$\tan A = \mathbf{\frac{5}{12}}$$

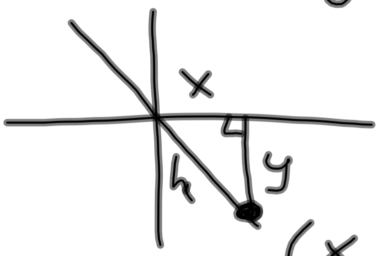
$$\csc A = \mathbf{\frac{13}{5}}$$



5.3

(#29) $Ax+By=C$; QIV

1. rewrite as $y=mx(+b)$



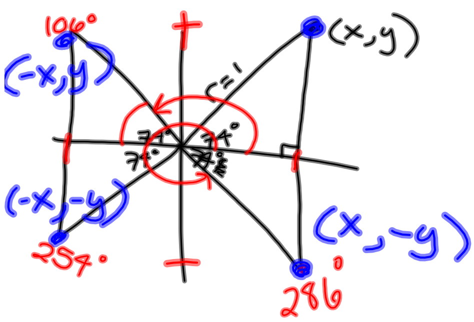
$(x,y)=(3,-2)$

$2x+3y=0$
$3y=-2x$
$y=\frac{-2}{3}x$

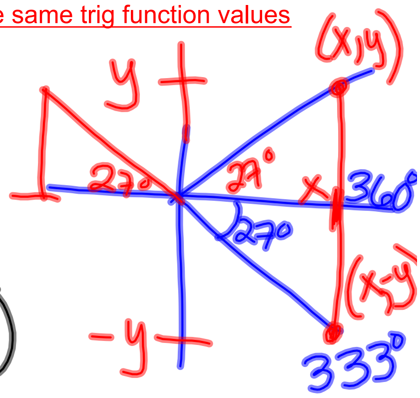
$\left(2,\left(\frac{-4}{3}\right)\right)$

5.3 Wrap-up

Angles with the same reference angles have the same trig function values (up to positive/negative values)



$\cos 153°$
$=\boxed{-\cos 27°}$



80. Given that $\sin 27° \approx 0.4540$, $\cos 27° \approx 0.8910$, and $\tan 27° \approx 0.5095$, find the trigonometric function values for $333°$.

333° has a 27° reference angle

$\sin 333° = -\sin 27° = -0.4540$
$\cos 333° = \cos 27° = 0.8910$
$\tan 333° = -\tan 27° = -0.5095$

5.4 Radians

The circumference of a circle of radius r is given by the equation:

$$C = 2\pi r$$

Therefore, the unit circle, which has radius 1, has circumference:

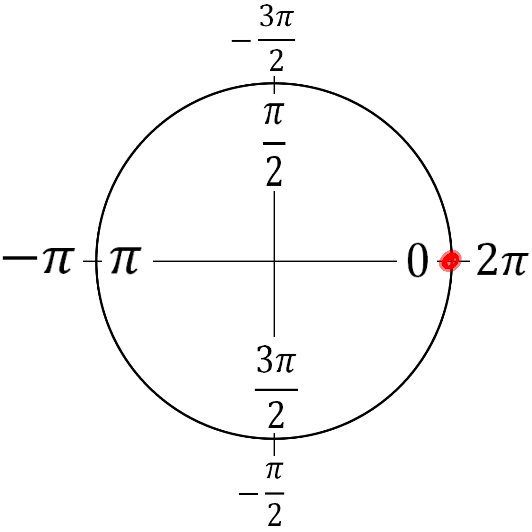
$$2\pi$$

The irrational number pi is approximately: $\pi \approx 3.14$

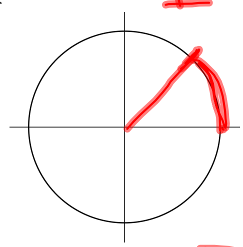
Therefore $2\pi \approx 6.28$

$4\pi \approx 12.56$

If we think about these numbers as corresponding to arc lengths around the unit circle, in which quadrant (or on which axis) do we end up?

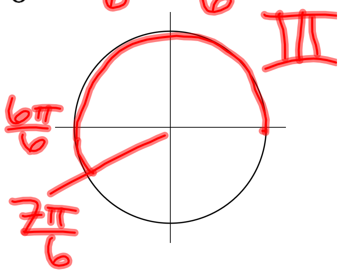


$\frac{\pi}{4} = \frac{1}{4}\pi$ I



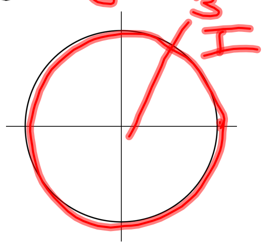
$\pi + \frac{1}{6}\pi$

$\frac{7\pi}{6} = \frac{6\pi}{6} + \frac{\pi}{6}$ III

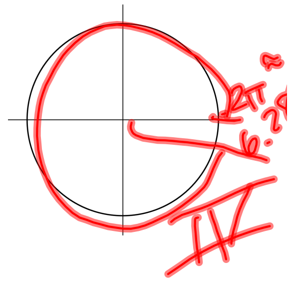


$2\pi + \frac{\pi}{3}$

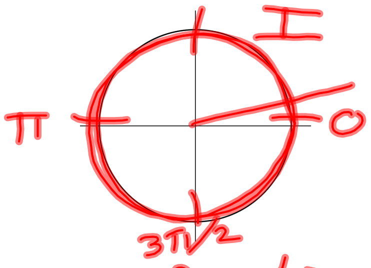
$\frac{7\pi}{3} = \frac{6\pi}{3} + \frac{\pi}{3}$ I



6

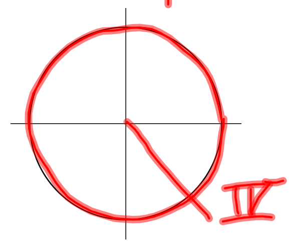


13



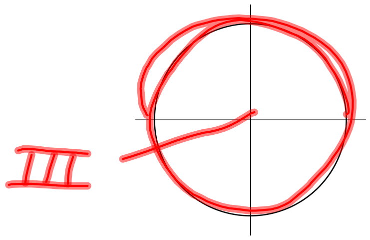
$-\frac{9\pi}{4} = -\frac{8\pi}{4} - \frac{\pi}{4}$

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

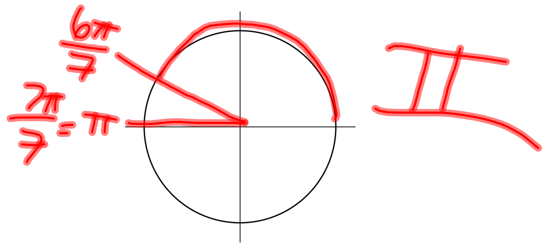


$\frac{19\pi}{6} = \frac{18\pi}{6} + \frac{\pi}{6}$

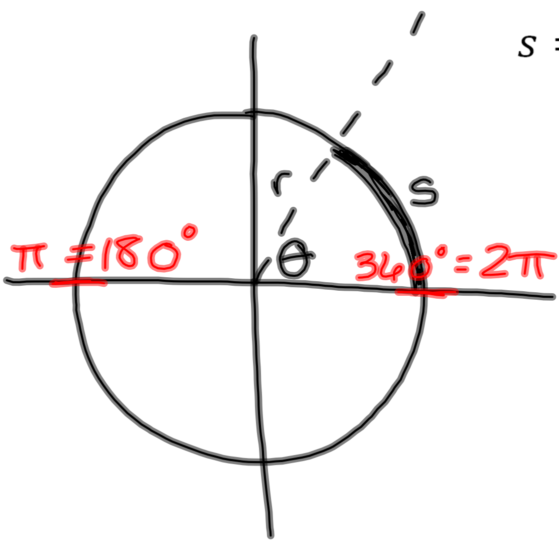
$3\pi + \frac{1}{6}\pi$



$\frac{6\pi}{7} = \frac{6}{7}\pi$



What is a <u>radian</u>?



r = radius length

s = arc length

When $s = r$, we say that the corresponding angle θ which is subtended by arc s has measure 1 radian.

1 radian $\approx 57.3°$

$\pi = 180°$

$2\pi = 360°$

Note that θ is independent of the radius length and any unit of measurement. Therefore radians have no associated units, and any angle measure without a degree symbol is assumed to be in radians.

Converting between radians and degrees

$$\pi = 180^\circ \quad \therefore \quad \frac{\pi}{180^\circ} = 1 = \frac{180^\circ}{\pi}$$

Convert 225° to radians.

$$\frac{\cancel{225}^{\cancel{45}\,5}}{1} \cdot \frac{\pi}{\cancel{180}_{\cancel{36}\,4}} = \boxed{\frac{5\pi}{4}}$$

Convert $\frac{5\pi}{6}$ to degrees.

$$\frac{5\cancel{\pi}}{6} \cdot \frac{\cancel{180}^{30}{}^\circ}{\cancel{\pi}} = \boxed{150^\circ}$$

Convert 120° to radians.

$$120^\circ \cdot \frac{\pi}{180^\circ} = \frac{2\pi}{3}$$

Convert $\frac{7\pi}{4}$ to degrees.

$$\frac{7\cancel{\pi}}{4} \cdot \frac{180^\circ}{\cancel{\pi}} = 315^\circ$$

Two angles in radians are:

90°

complementary if they sum to $\frac{\pi}{2}$.

180°

supplementary if they sum to π.

360°

coterminal if they differ by integer multiples of 2π.

Find the complement and supplement of $\frac{5\pi}{12}$.

comp: supp:

$$\frac{6}{6}\cdot\frac{\pi}{2} - \frac{5\pi}{12} = \frac{6\pi}{12} - \frac{5\pi}{12} = \boxed{\frac{\pi}{12}} \; ; \; \frac{12}{12}\pi - \frac{5\pi}{12} = \boxed{\frac{7\pi}{12}}$$

Find one positive and one negative angle coterminal with $-\frac{3\pi}{4}$.

$$\frac{-3\pi}{4} + 2\pi\cdot\frac{4}{4} = \frac{-3\pi}{4} + \frac{8\pi}{4} = \boxed{\frac{5\pi}{4}} \; ; \; \frac{-3\pi}{4} - \frac{8\pi}{4} = \boxed{\frac{-11\pi}{4}}$$

Common angles:
(memorize!)

$\frac{\pi}{6} = 30°$

$\frac{\pi}{4} = 45°$

$\frac{\pi}{3} = 60°$

Note:

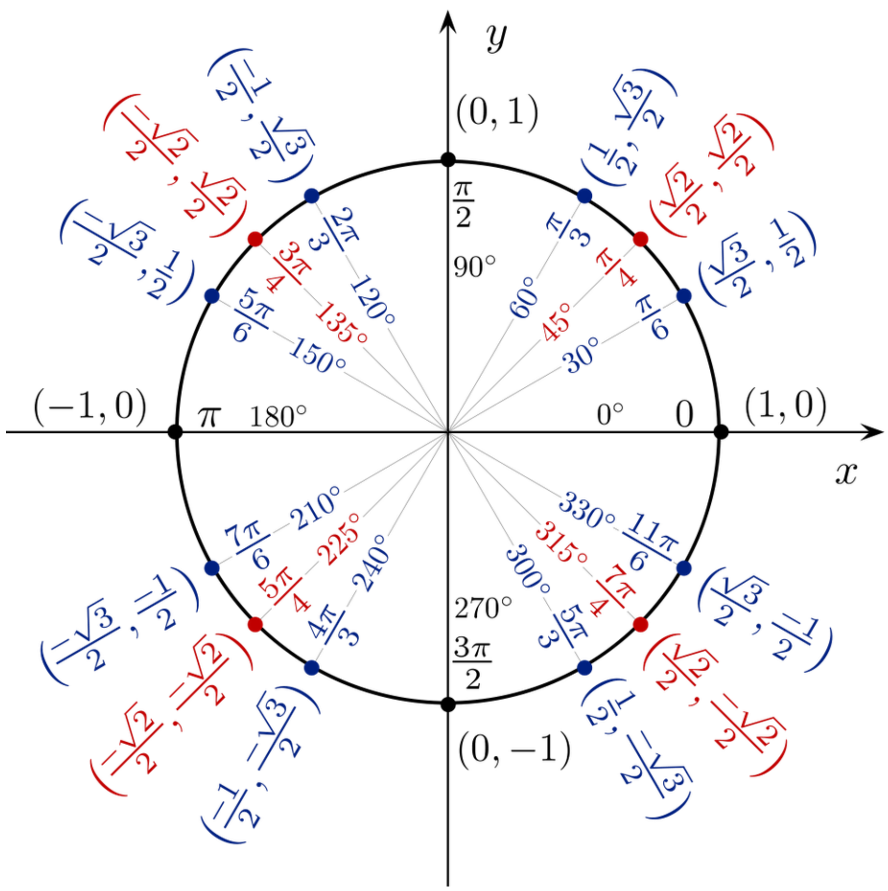
$\frac{k\pi}{6} \rightarrow 30°\ ref.\angle$

$\frac{k\pi}{4} \rightarrow 45°\ ref.\angle$

$\frac{k\pi}{3} \rightarrow 60°\ ref.\angle$

$\frac{k\pi}{2} \rightarrow 90°\ or\ 270°$

$k\pi \rightarrow 0°\ for\ k\ even;$
$180°\ for\ k\ odd$



Homework:
Assigned Friday: 5.1 #83-97 odd

Assigned Monday: 5.3 #29-37 odd; 39-70 all;

Assigned Tuesday:

5.3 #79-82 all - applying concept of same reference angle
5.4
#1-7 odd - determining quadrant/location of angles in radians
#9-19 odd - compliment/supplement/coterminal angles
#21,23,27,31,45,47,53 - convert between radians and degrees

Next time:
- determine trigonometric function value of angles given in radians
- arc length/linear speed/angular speed problems