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 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.

$\sin 45°$

$1/\sqrt{2}$

$\tan 60°$

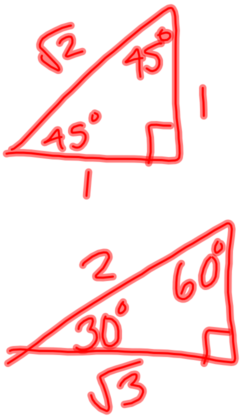
$\sqrt{3}$

$\sec 45°$

$\sqrt{2}$

$\csc 30°$

2



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

$\cot(120°)$

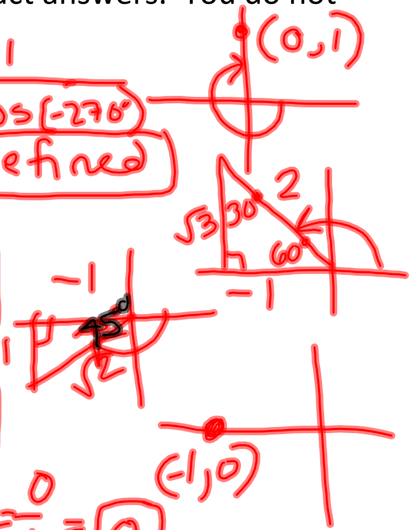
$\boxed{-1/\sqrt{3}}$

$\csc(-135°)$

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

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

$\frac{-360}{180}$



T sc C cs
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17 total possible points; grades out of 15 points

Quiz #1 Solutions

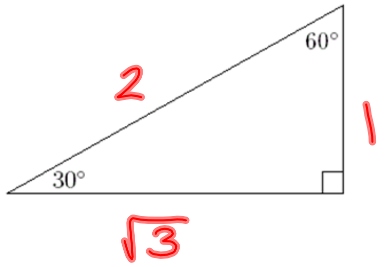
$$\frac{1}{\sec x} = \mathbf{\cos x}$$

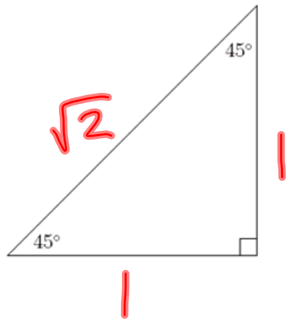
$$\frac{\sin x}{\cos x} = \mathbf{\tan x}$$

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

$$\csc(90° - x) = \mathbf{\sec x}$$

$$\tan(90° - x) = \mathbf{\cot x}$$

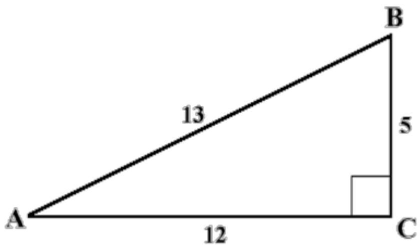




$$\sin B = \frac{12}{13}$$

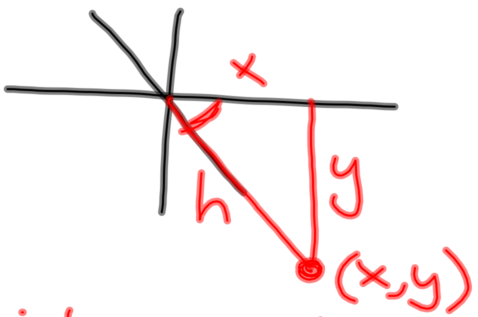
$$\tan A = \frac{5}{12}$$

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



$ax + by = c$ QIV

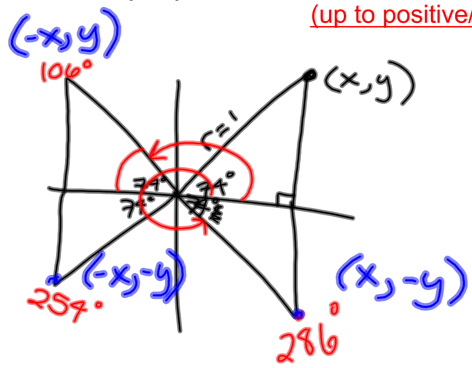
1. rewrite as $y = mx + b$

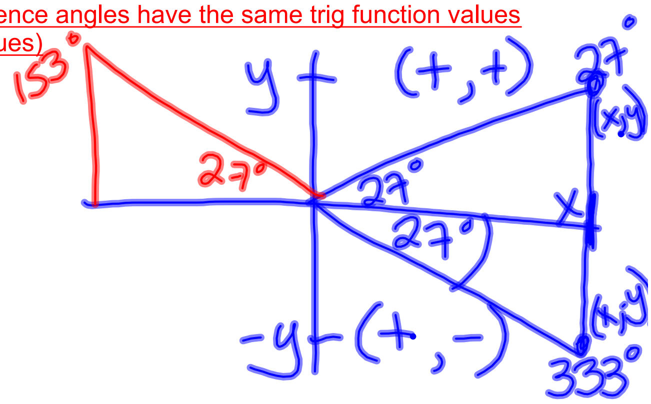


2. pick a point on line

5.3 Wrap-up

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





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 $333°$.

$\cos 153° = -\cos 27°$
$\sin 153° = \sin 27°$

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:

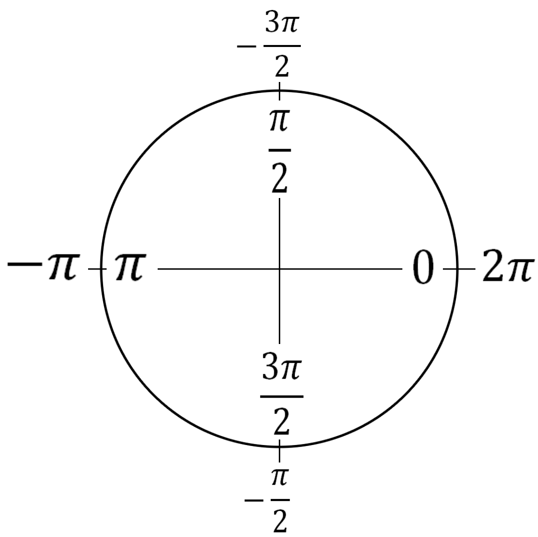
2π

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

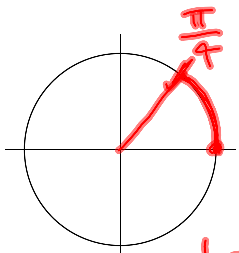
Therefore $2\pi \approx 6.28$

$4\pi \approx 12.56$

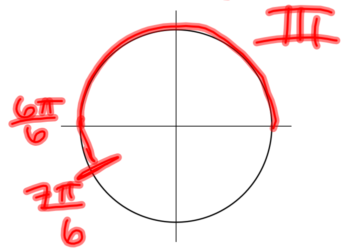
If we think about these numbers as corresponding to arc lengths around the unit circle, in which quadrant (or on which axis) do we end up? $\pi + \frac{1}{6}\pi$



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

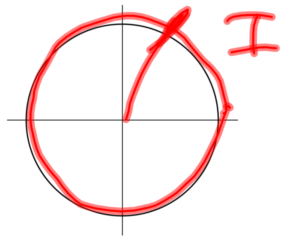


$\frac{7\pi}{6} = \frac{6\pi}{6} + \frac{\pi}{6}$



$2\pi + \frac{1}{3}\pi$

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



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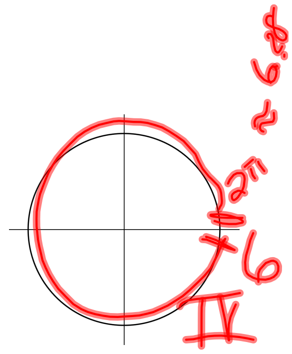

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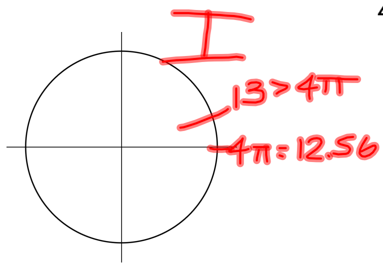
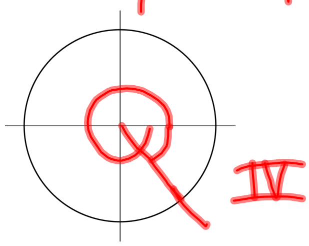


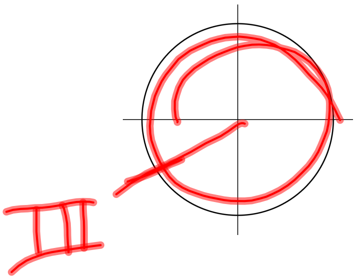
$-\frac{9\pi}{4} = -\frac{8\pi}{4} - \frac{\pi}{4}$

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

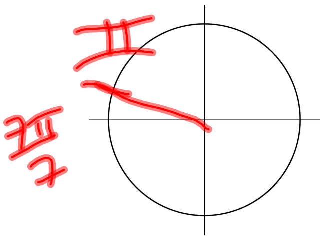


$3\pi + \frac{1}{6}\pi$

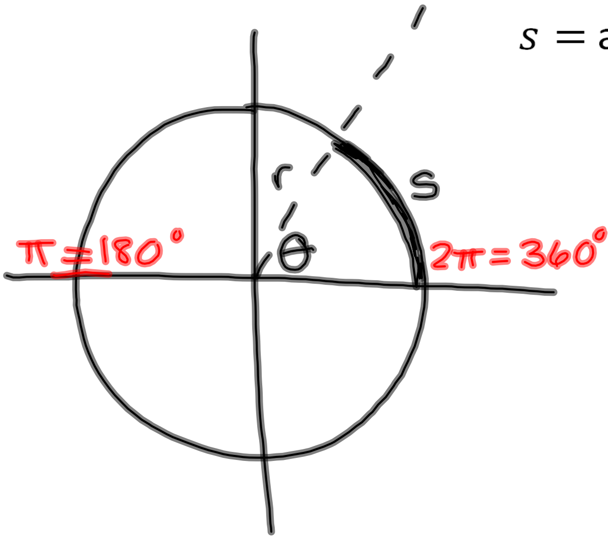
$\frac{19\pi}{6} = \frac{18\pi}{6} + \frac{\pi}{6}$



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



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.

<u>Converting between radians and degrees</u>

$$\pi = 180° \quad \therefore \quad \frac{\pi}{180°} = 1 = \frac{180°}{\pi}$$

Convert 225° to radians.

$$\cancel{225}^{5}° \cdot \frac{\pi}{\cancel{180}_{4}°} = \boxed{\frac{5\pi}{4}}$$

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

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

Convert $120°$ to radians.

$$120° \cdot \frac{\pi}{180°} = \boxed{\frac{2\pi}{3}}$$

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

$$\frac{7\pi}{4} \cdot \frac{180°}{\pi} = \boxed{315°}$$

Two angles in radians are:

complementary if they sum to $\frac{\pi}{2}$. $90°$

supplementary if they sum to π. $180°$

coterminal if they differ by integer multiples of 2π. $360°$

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

complement:

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

supplement:

$$\frac{12}{12}\pi - \frac{5\pi}{12} = \boxed{\frac{7\pi}{12}}$$

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:

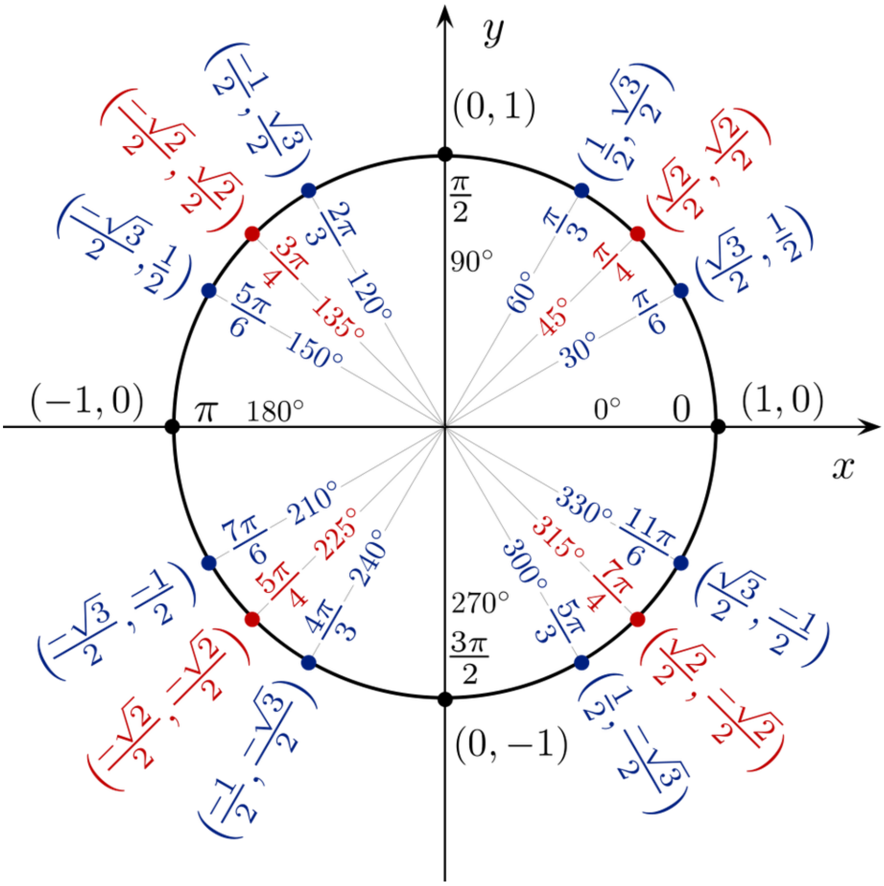
$\frac{k\pi}{6} \to 30°\ ref.\angle$

$\frac{k\pi}{4} \to 45°\ ref.\angle$

$\frac{k\pi}{3} \to 60°\ ref.\angle$

$\frac{k\pi}{2} \to 90°\ or\ 270°$

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



Homework:
Assigned Friday: 5.1 #

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