# Today's Plan:

***Learning Target (standard)***: I will use the fundamental identities, the even and odd properties of trigonometric functions and the complementary angle theorem to evaluate trigonometric expressions.

***Students will***: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

***Teacher will***: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

***Assessment***: Board work, homework check and homework assignment

***Differentiation***: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

p.415 #2-42 even

$2)\ \sin\theta=\frac{3}{5}\quad \csc\theta=\frac{5}{3}$
$\cos\theta=\frac{4}{5}\quad \sec\theta=\frac{5}{4}$
$\tan\theta=\frac{3}{4}\quad \cot\theta=\frac{4}{3}$

$4)\ \sin\theta=\frac{\sqrt{2}}{2}\quad \csc\theta=\sqrt{2}$
$\cos\theta=\frac{\sqrt{2}}{2}\quad \sec\theta=\sqrt{2}$
$\tan\theta=1\quad \cot\theta=1$

$6)\ \sin\theta=\frac{3}{4}\quad \csc\theta=\frac{4}{3}$
$\cos\theta=\frac{\sqrt{7}}{4}\quad \sec\theta=\frac{4\sqrt{7}}{7}$
$\tan\theta=\frac{3\sqrt{7}}{7}\quad \cot\theta=\frac{\sqrt{7}}{3}$

$8)\ \sin\theta=\frac{2\sqrt{7}}{7}\quad \csc\theta=\frac{\sqrt{7}}{2}$
$\cos\theta=\frac{\sqrt{21}}{7}\quad \sec\theta=\frac{\sqrt{21}}{3}$
$\tan\theta=\frac{2\sqrt{3}}{3}\quad \cot\theta=\frac{\sqrt{3}}{2}$

$10)\ \sin\theta=\frac{\sqrt{5}}{5}\quad \csc\theta=\sqrt{5}$
$\cos\theta=\frac{2\sqrt{5}}{5}\quad \sec\theta=\frac{\sqrt{5}}{2}$
$\tan\theta=\frac{1}{2}\quad \cot\theta=2$

$12)\ 60^\circ$
$14)\ 60^\circ$
$16)\ 30^\circ$
$18)\ \frac{\pi}{6}$

$20)\ \frac{\pi}{4}$
$22)\ 60^\circ$
$24)\ \frac{\pi}{6}$
$26)\ 60^\circ$

28) $\cos 210^\circ = -\frac{\sqrt{3}}{2}$

30) $\sin 120^\circ = \frac{\sqrt{3}}{2}$

32) $\csc 300^\circ = -\frac{2\sqrt{3}}{3}$

34) $\tan 225^\circ = 1$

36) $\cos \frac{2\pi}{3} = -\frac{1}{2}$

38) $\csc \frac{7\pi}{4} = -\sqrt{2}$

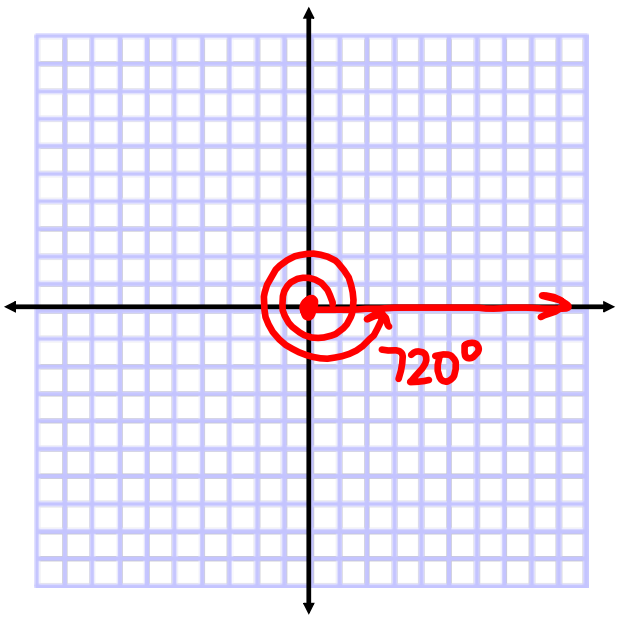
40) $\tan(-120^\circ) = \sqrt{3}$

42) $\cot\left(-\frac{\pi}{6}\right) = -\sqrt{3}$

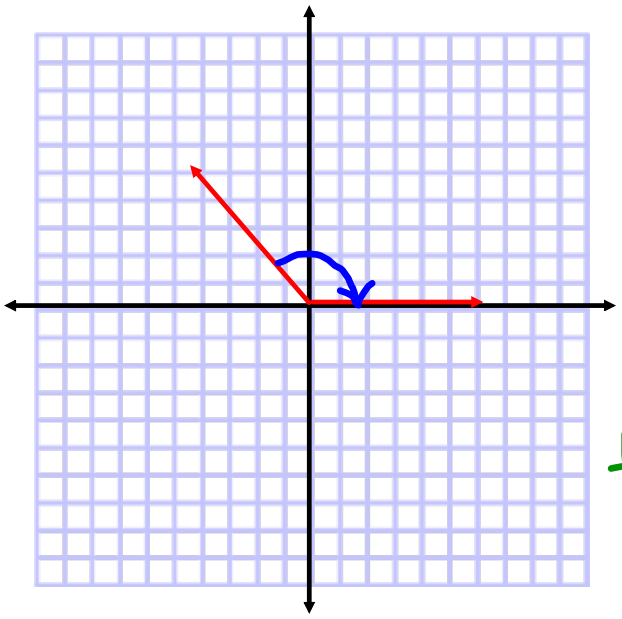
* TEST on Monday! *

Draw the angle.

$720^\circ$



Standard Position? Why?



no - the initial side is not on the positive X-axis

Find 3 positive and 3 negative angles coterminal to $70^\circ$.

$70^\circ + 360^\circ = 430^\circ$

$70^\circ + 2(360^\circ) = 790^\circ$

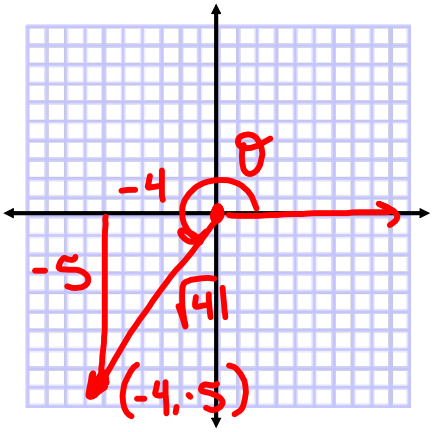
$70^\circ + 3(360^\circ) = 1150^\circ$

$70^\circ - 360^\circ = -290^\circ$

$70^\circ - 2(360^\circ) = -650^\circ$

$70^\circ - 3(360^\circ) = -1010^\circ$

If the terminal side of an angle passes through (-4,-5), find the trig values for θ.




$\sin\theta = -\frac{5\sqrt{41}}{41}$ $\csc\theta = -\frac{\sqrt{41}}{5}$

$\cos\theta = -\frac{4\sqrt{41}}{41}$ $\sec\theta = -\frac{\sqrt{41}}{4}$

$\tan\theta = \frac{5}{4}$ $\cot\theta = \frac{4}{5}$

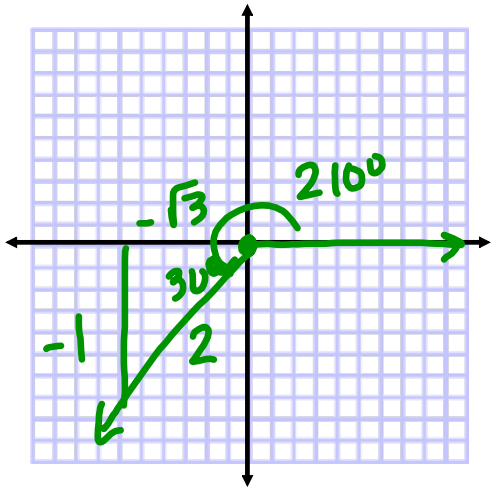
$(-4)^2+(-5)^2=r^2$

$16+25=r^2$

$\sqrt{r^2}=\pm\sqrt{41}$

$r=\sqrt{41}, -\sqrt{41}$

Find the trig values for 210°.

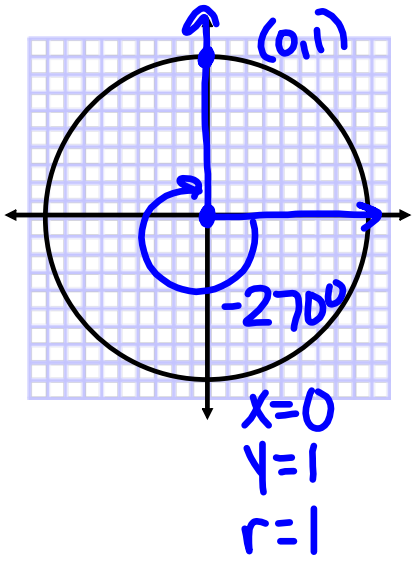



$\sin 210° = -\frac{1}{2}$ $\csc 210° = -2$

$\cos 210° = -\frac{\sqrt{3}}{2}$ $\sec 210° = -\frac{2\sqrt{3}}{3}$

$\tan 210° = \frac{\sqrt{3}}{3}$ $\cot 210° = \sqrt{3}$

Find the trig values for -270°.

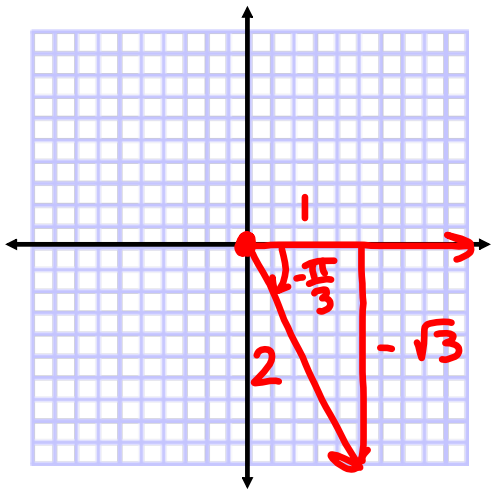



$\sin(-270°) = 1$ $\csc(-270°) = 1$

$\cos(-270°) = 0$ $\sec(-270°) = —$

$\tan(-270°) = —$ $\cot(-270°) = 0$

Find the trig values for $-\frac{\pi}{3}$.



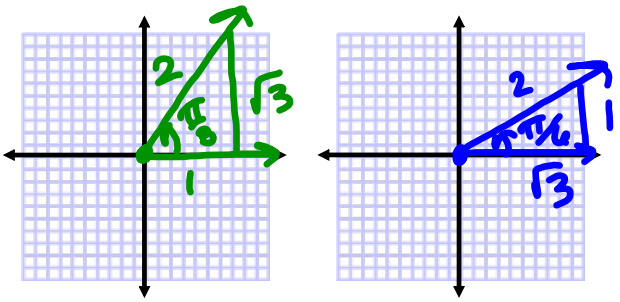

$\sin\left(-\frac{\pi}{3}\right) = -\frac{\sqrt{3}}{2}$ $\csc\left(-\frac{\pi}{3}\right) = -\frac{2\sqrt{3}}{3}$

$\cos\left(-\frac{\pi}{3}\right) = \frac{1}{2}$ $\sec\left(-\frac{\pi}{3}\right) = 2$

$\tan\left(-\frac{\pi}{3}\right) = -\sqrt{3}$ $\cot\left(-\frac{\pi}{3}\right) = -\frac{\sqrt{3}}{3}$

Find the exact value.

$$4\sin\frac{\pi}{3}-\cos\frac{\pi}{6}$$



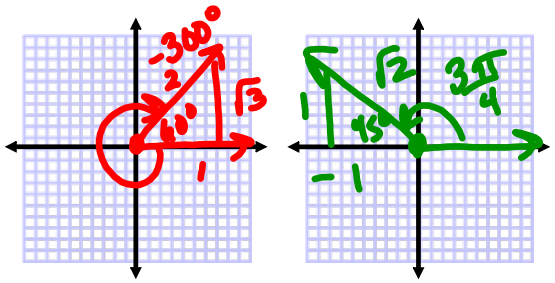

$= 4\left(\frac{\sqrt{3}}{2}\right) - \frac{\sqrt{3}}{2}$

$= \frac{4\sqrt{3}}{2} - \frac{\sqrt{3}}{2}$

$= \frac{3\sqrt{3}}{2}$

Find the exact value.

$$-4\sec(-300°)+2\sin\frac{3\pi}{4}$$




$= -4(2) + 2\left(\frac{\sqrt{2}}{2}\right)$

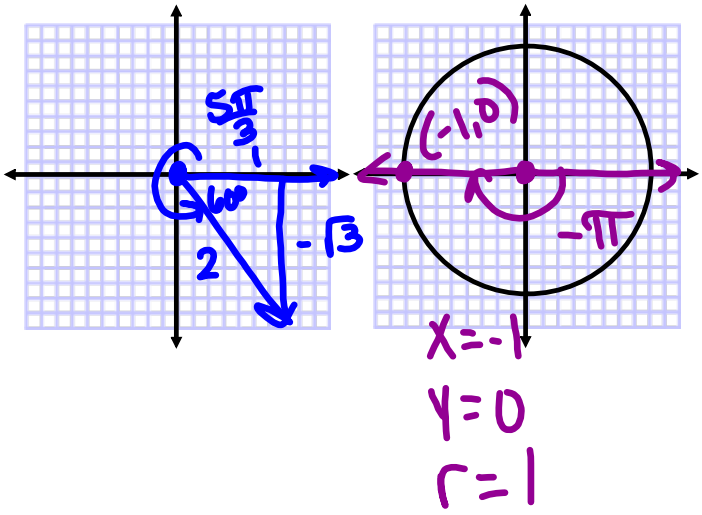
$= -8 + \sqrt{2}$

Find the exact value.

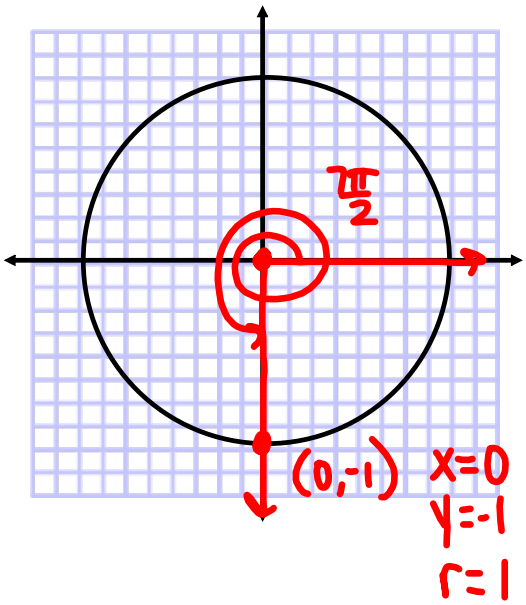
$$\tan\frac{5\pi}{3} - 2\cos^2(-\pi)$$

$= -\sqrt{3} - 2(-1)^2$

$= -\sqrt{3} - 2$




Find the trigonometric values for $\frac{7\pi}{2}$




$\sin\frac{7\pi}{2} = -1$ $\quad \csc\frac{7\pi}{2} = -1$

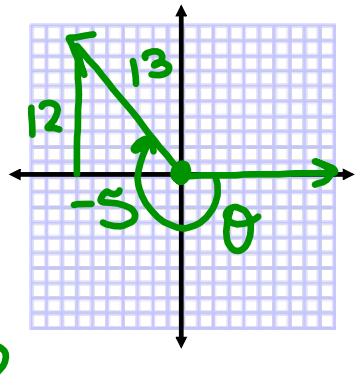
$\cos\frac{7\pi}{2} = 0$ $\quad \sec\frac{7\pi}{2} =$ —

$\tan\frac{7\pi}{2} =$ — $\quad \cot\frac{7\pi}{2} = 0$

Find the exact value of the remaining trig functions.

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

$$-\pi < \theta < -\frac{3\pi}{2}$$




$\sin\theta = \frac{12}{13}$ $\quad \csc\theta = \frac{13}{12}$

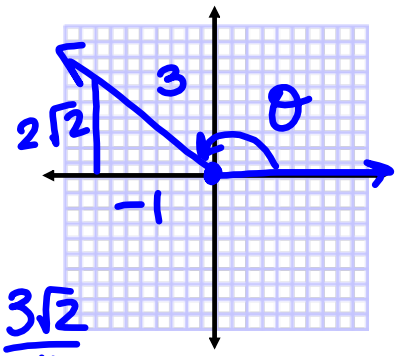
$\cos\theta = -\frac{5}{13}$ $\quad \sec\theta = -\frac{13}{5}$

$\tan\theta = -\frac{12}{5}$ $\quad \cot\theta = -\frac{5}{12}$

Find the exact value of the remaining trig functions.

$$\cos\theta = -\frac{1}{3}$$

$$\frac{\pi}{2} < \theta < \pi$$




$\sin\theta = \frac{2\sqrt{2}}{3}$ $\quad \csc\theta = \frac{3\sqrt{2}}{4}$

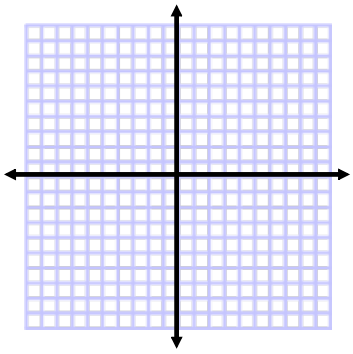
$\cos\theta = -\frac{1}{3}$ $\quad \sec\theta = -3$

$\tan\theta = -2\sqrt{2}$ $\quad \cot\theta = -\frac{\sqrt{2}}{4}$

Find the exact value of the remaining trig functions.

$\tan\theta = \frac{3}{4}$

$\sin\theta < 0$



$\sin\theta =$ $\csc\theta =$

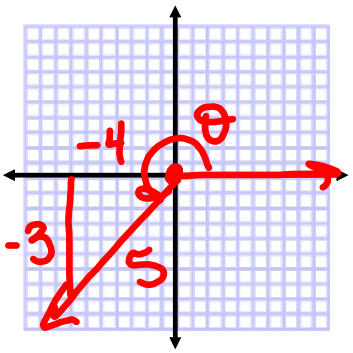
$\cos\theta =$ $\sec\theta =$

$\tan\theta =$ $\cot\theta =$

Find the exact value of the remaining trig functions.

$\tan\theta = \frac{3}{4}$ $= \frac{y}{x} = \frac{(-)}{(-)}$

$\sin\theta < 0$ $= \frac{y}{r}$ $y(-)$




$\sin\theta = -\frac{3}{5}$ $\csc\theta = -\frac{5}{3}$

$\cos\theta = -\frac{4}{5}$ $\sec\theta = -\frac{5}{4}$

$\tan\theta = \frac{3}{4}$ $\cot\theta = \frac{4}{3}$

List the Fundamental Identities.

Reciprocal:

1) $\csc\theta = \frac{1}{\sin\theta}$

2) $\sec\theta = \frac{1}{\cos\theta}$

3) $\cot\theta = \frac{1}{\tan\theta}$

Quotient:

4) $\tan\theta = \frac{\sin\theta}{\cos\theta}$

5) $\cot\theta = \frac{\cos\theta}{\sin\theta}$

Pythagorean:

6) $\sin^2\theta + \cos^2\theta = 1$

7) $1 + \cot^2\theta = \csc^2\theta$

8) $\tan^2\theta + 1 = \sec^2\theta$

Find the exact value.

$$\cos 20^\circ \sin 70^\circ + \sin 20^\circ \cos 70^\circ$$

$(\sin(90^\circ - 20^\circ))\sin 70^\circ + (\cos(90^\circ - 20^\circ))\cos 70^\circ$

$\sin 70^\circ \sin 70^\circ + \cos 70^\circ \cos 70^\circ$

$\sin^2 70^\circ + \cos^2 70^\circ$

$(1)$

$1$

Find the exact value.

$$\tan 50° - \frac{\cos 40°}{\cos 50°}$$

$$\tan 50° - \frac{(\sin(90°-40°))}{\cos 50°}$$

$$\tan 50° - \frac{\sin 50°}{\cos 50°}$$

$$\tan 50° - (\tan 50°)$$

$$0$$

Find the exact value.

$$\frac{\cos 42°}{\cos 48°} - \cot 42°$$

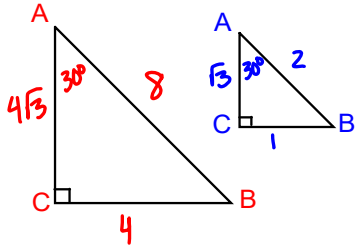
$$\frac{\cos 42°}{(\sin(90°-48°))} - \cot 42°$$

$$\frac{\cos 42°}{\sin 42°} - \cot 42°$$

$$(\cot 42°) - \cot 42°$$

$$0$$

Why are the trigonometric values for a 30° (or 45° or 60°) angle within a right triangle the same regardless of the lengths of the sides of the triangle that the angle is in?




$\sin A = \frac{4}{8} = \frac{1}{2}$ $\sin A = \frac{1}{2}$

$\cos A = \frac{4\sqrt{3}}{8} = \frac{\sqrt{3}}{2}$ $\cos A = \frac{\sqrt{3}}{2}$

$\tan A = \frac{4}{4\sqrt{3}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$ $\tan A = \frac{\sqrt{3}}{3}$

Similar triangles (AAA)

- the triangles have the same angle measures
- corresponding sides of the triangles are proportional to one another
  - the ratio of two sides within one triangle is equal to the ratio of corresponding sides in the other triangle
- the trigonometric values of an angle are the ratios of 2 sides in the triangle

$\therefore$ the trigonometric values of corresponding angles have to be equal

What does it mean for an angle to be in standard position? Why is this important?

Standard Position:

- angle on x-y coordinate plane
- vertex at the origin
- initial side on the positive x-axis

* This is important so that every trigonometric angle looks the same if it has the same value as another

## Compare and contrast geometric and trigonometric angles.

Geometric:

- measures the "distance" between the sides of a polygon or between lines
- measurements can be $0^o \leq x \leq 180^o$
- units of measure are degrees
- used to find the trig values for ALL angles

Trigonometric:

- measures rotation, direction & magnitude
- measurements can be from negative infinity to infinity
- units of measure can be degrees, degrees-minutes-seconds & radians
- always in standard position
  - on x-y coordinate plane
  - vertex at the origin
  - initial side on positive x-axis

## Write the Complementary Angle Theorem.

$$\sin\theta = \cos\left(90^\circ - \theta\right)$$

$$\cos\theta = \sin\left(90^\circ - \theta\right)$$

$$\tan\theta = \cot\left(90^\circ - \theta\right)$$

$$\csc\theta = \sec\left(90^\circ - \theta\right)$$

$$\sec\theta = \csc\left(90^\circ - \theta\right)$$

$$\cot\theta = \tan\left(90^\circ - \theta\right)$$

# Assignment:

Study for TEST on Monday!