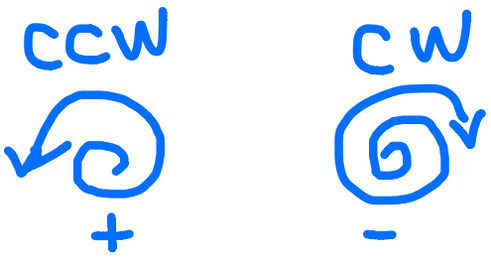

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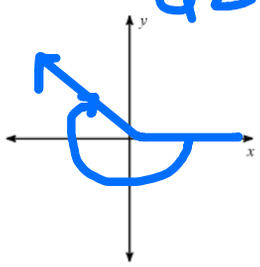
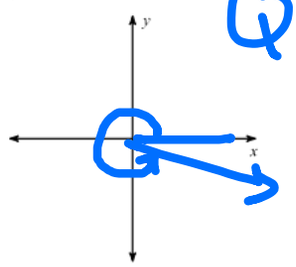
Video Review Warmup

Draw an angle with the given measure in standard position and state the quadrant.

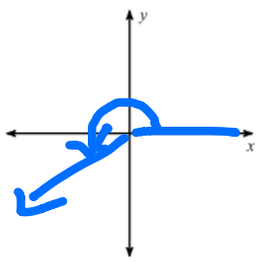
1) −250°



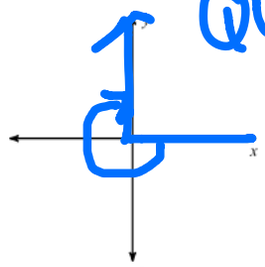
2) 330°



3) 215°



4) −270°



State one positive and one negative coterminal angle.

5) 550°

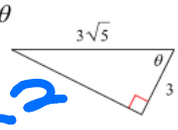
Pos: 190°
910°
Neg: −170°

6) −615°

Pos: 105°
Neg: −255°

Find the value of all six trigonometric functions.

7) sin θ



$a^2+b^2=c^2$

$a=6$

$\sin\theta = \frac{O}{H} = \frac{6}{3\sqrt{5}} = \frac{2\sqrt{5}}{\sqrt{5}\sqrt{5}} = \frac{2\sqrt{5}}{5}$

$\cos\theta = \frac{A}{H} = \frac{3}{3\sqrt{5}} = \frac{\sqrt{5}}{5}$

$\tan\theta = \frac{O}{A} = \frac{6}{3} = 2$

$\csc\theta = \frac{H}{O} = \frac{3\sqrt{5}}{6} = \frac{\sqrt{5}}{2}$

$\sec\theta = \frac{H}{A} = \frac{3\sqrt{5}}{3} = \sqrt{5}$

$\cot\theta = \frac{A}{O} = \frac{1}{2}$

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$\frac{0}{0} = \frac{1}{2}$

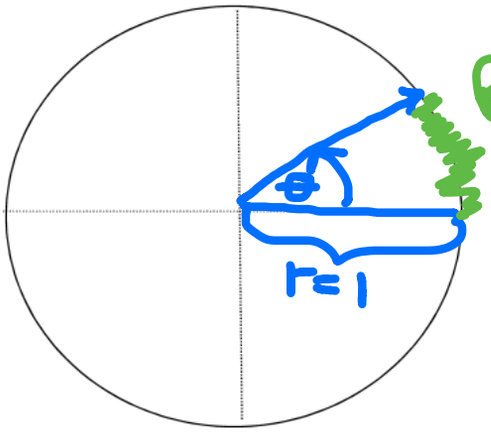
2 ways to measure an angle

1. Degrees
2. Radians

Radian Measurement

360° = circle

θ = theta



Radian length - arc length formed by angle, θ, degrees

Radian measurement is based on the length of the arc formed by each angle.

(perimeter) Circumference = $2\pi r$, r = radius

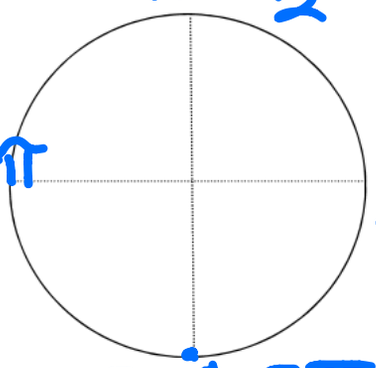
Find the circumference of the unit circle. ← * r = 1

C = $2\pi \cdot 1 = \boxed{2\pi}$

What would be the measure in radians of an angle that measures:

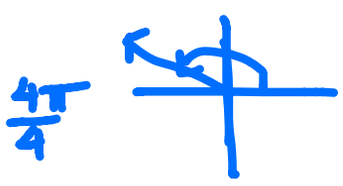
Quadrantals

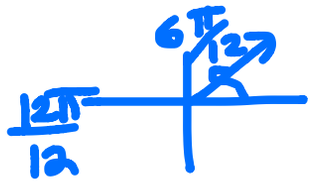
1. $180° = \pi$
2. $90° = \frac{\pi}{2}$
3. $270° = \frac{3\pi}{2}$



In what quadrant would the terminal side of each angle lie? (hint: sketch it!)

1. $\frac{3\pi}{4}$ = Q2
2. $\frac{5\pi}{12}$ = Q1
3. $\frac{15\pi}{12}$ = Q3





4. $\frac{10\pi}{3}$ = Q3
5. $\frac{5\pi}{3}$ = Q4
6. $\frac{15\pi}{4}$ = Q4

$\frac{10\pi}{3} \rightarrow \frac{6\pi}{3}$ 2π

Coterminal angle

$\frac{6\pi}{4} = \frac{3\pi}{2}$

$\frac{15\pi}{4} - \frac{8\pi}{4} = \frac{7\pi}{4}$

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Radians and Quadrants

Sketch each angle in the appropriate quadrant.

1) $\frac{5\pi}{9}$

2) $\frac{10\pi}{9}$

3) $-\frac{11\pi}{12}$

4) $\frac{5\pi}{4}$

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

6) $\frac{17\pi}{18}$

7) $\frac{17\pi}{9}$

8) $\frac{17\pi}{12}$

Reference Angles – acute angle "fastest way to the X-axis"

Q1	Q2	Q3	Q4
30°	150°	210°	330°
45°	135°	225°	315°
60°	120°	240°	300°

Unit Circle – Working with Degrees

Which angles are exactly 30° away from the x-axis?

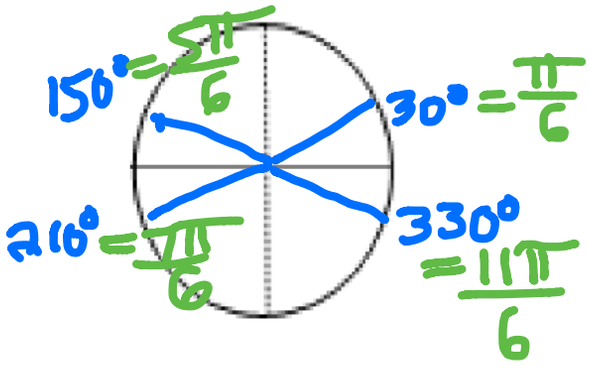
Which angles are exactly 45° away from the x-axis?

Which angles are exactly 60° away from the x-axis?

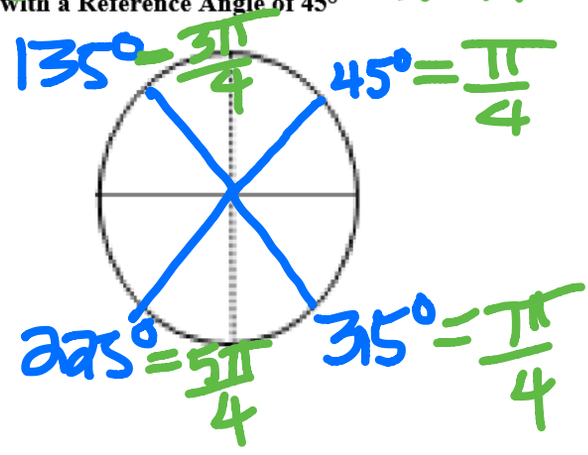
Unit Circle – Working with Radians

If $180° = \pi$ ... then ...

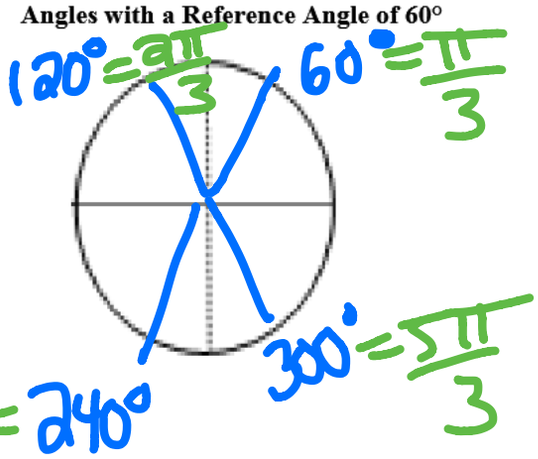
Angles with a Reference Angle of 30°



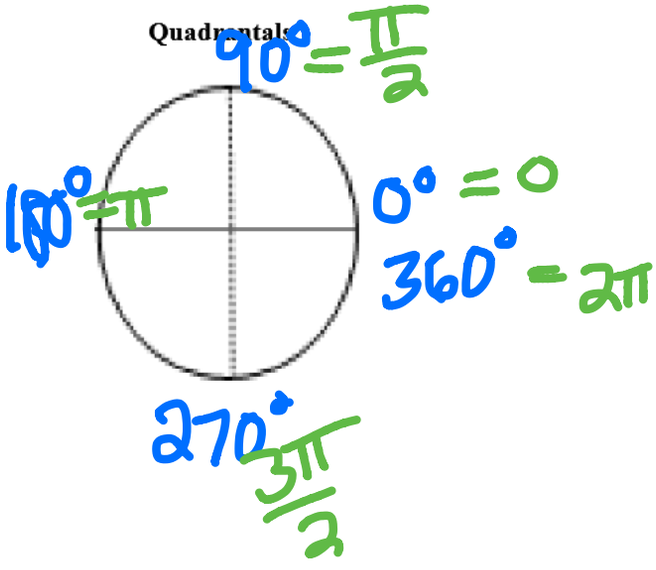
Angles with a Reference Angle of 45°



Angles with a Reference Angle of 60°



Quadrantals



HW

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Degrees and Radian Conversions (Unit Circle!)

Convert each degree measure into radians.

1) 330° $= \frac{11\pi}{6}$

ref angle → 30°
Quad → Q4

2) 300° $= \frac{5\pi}{3}$

60°
Q4

3) 120°

4) 150°

5) 240°

6) 210°

7) 315°

8) 45°

9) -210°

10) -240°

Convert each radian measure into degrees.

11) $\frac{3\pi}{2}$

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

13) $\frac{4\pi}{3}$

14) $-\frac{\pi}{2}$

15) $-\frac{2\pi}{3}$

16) $\frac{5\pi}{4}$

17) $\frac{7\pi}{4}$

18) $\frac{5\pi}{3}$

Equation of circle

$(x-h)^2+(y-k)^2=r^2$

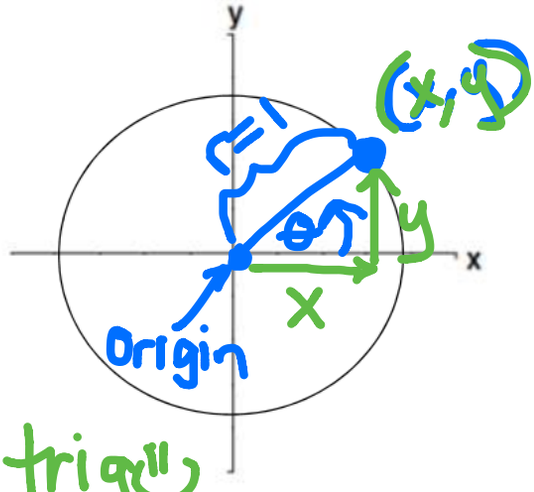
(h,k) Center

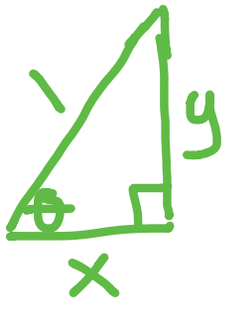
THE Unit Circle ☺ - Let's build it

$x^2+y^2=1$

Center (0, 0)

Radius = 1





Pythagorean Thm

$x^2+y^2=1$

all trig'n

UNIT CIRCLE DEFINITIONS

Sketch θ in standard position and then find:

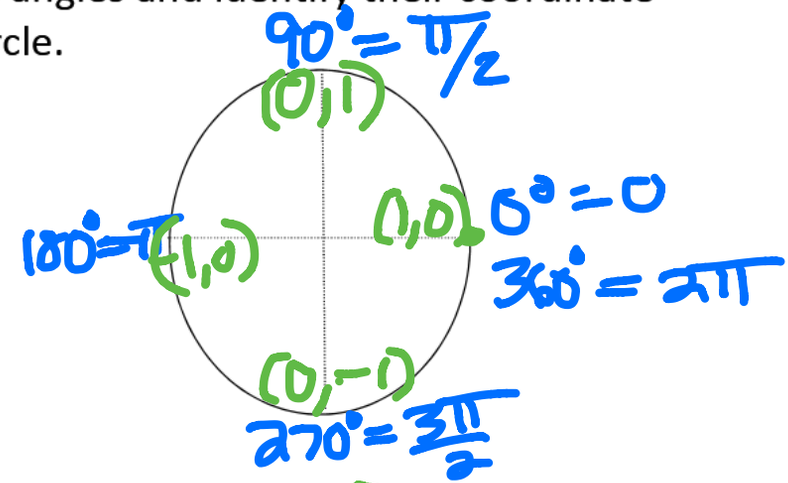
$\sin\theta = \frac{Opp}{Hyp} = \frac{y}{1} = y$ $\quad \csc\theta = \frac{Hyp}{Opp} = \frac{1}{y}$

$\cos\theta = \frac{Adj}{Hyp} = \frac{x}{1} = x$ $\quad \sec\theta = \frac{Hyp}{Adj} = \frac{1}{x}$

$\tan\theta = \frac{Opp}{Adj} = \frac{y}{x}$ $\quad \cot\theta = \frac{Adj}{Opp} = \frac{x}{y}$

$(x, y) \Rightarrow (\underset{x}{\cos\theta}, \underset{y}{\sin\theta})$

Label the quadrantal angles and identify their coordinate points on the unit circle.



1. $\cos 0° = 1$ (x)
2. $\sin 0° = 0$ (y)
3. $\cos 90° = 0$ (x)
4. $\sin 90° = 1$ (y)
5. $\cos 180° = -1$ (x)
6. $\sin 180° = 0$ (y)
7. $\cos 270° = 0$ (x)
8. $\sin 270° = -1$ (y)
9. $\cos 360° = 1$ (x)
10. $\sin 360° = 0$ (y)
11. $\sin 450° \Rightarrow$ coterm. angle $\Rightarrow \sin 90 = 1$
12. $\cos 540° \Rightarrow$ coterm. angle $\Rightarrow \cos 180 = -1$

Now….what about the other four trig functions?

11. $csc\,(180°)$ $= \frac{1}{y} = \frac{1}{0} =$ undefined
12. $sec\,(2\pi)$ $= 1$
13. $cot\left(\frac{\pi}{2}\right) = 0$

Unit Circle Practice

Quadrantal Angles and the Six Trig Functions

1. $\cos(270°) =$
2. $\csc(180°) =$
3. $\sec(0°) =$

4. $\cot\left(\frac{\pi}{2}\right) =$
5. $\tan(180°) =$
6. $\sin\left(\frac{3\pi}{2}\right) =$

7. $\csc(0°) =$
8. $\tan\left(\frac{3\pi}{2}\right) =$
9. $\cot\left(\frac{3\pi}{2}\right) =$

10. $\sec(90°) =$
11. $\csc(90°) =$
12. $\sec(0) =$

13. $\sin\left(\frac{\pi}{2}\right) =$
14. $\cos(\pi) =$
15. $\cot(\pi) =$