

The Start of Trig!!!

Conversion of Radians to Degrees
(radians) $\left(\frac{180}{\pi}\right) = \#^\circ$

(cancel the π 's)

Ex 1 $\frac{4\pi}{3}$

Ex 2 $\frac{7\pi}{12}$

Ex 3 $\frac{-14\pi}{9}$

Degrees (deg) $^\circ$ $\left(\frac{\pi}{180}\right)$ = Radians

(leave π in your answer)

Ex 1 220°

Ex 2 -150°

Ex 3 270°

Arc Length

$$s = r \theta$$

arc length radius angle

angle must be
in radians

Ex1 Find r if $s = \frac{7\pi}{3}$ and $\theta = 150^\circ$

Ex2 Find θ if $s = \frac{2\pi}{5}$ and $r = 8$

Ex3 Find s if $r = 6$ and $\theta = 105^\circ$

Draw

Terminal: where \angle ends up
(Q1, Q2, Q3, Q4)

+ : Counter clock wise

- : Clockwise

$$\boxed{\text{Ex 1}} \quad 120^\circ$$

$$\boxed{\text{Ex 4}} \quad -\frac{11\pi}{6}$$

$$\boxed{\text{Ex 2}} \quad -45^\circ$$

$$\boxed{\text{Ex 5}} \quad 405^\circ$$

$$\boxed{\text{Ex 3}} \quad -\frac{4\pi}{3}$$

$$\boxed{\text{Ex 6}} \quad 3\pi$$

Homework: worksheet page 504 1-44

Trig Ratios

opp = opposite, adj = adjacent, hyp = hypotenuse

$$\sin \theta = \frac{\text{opp}}{\text{hyp}}$$

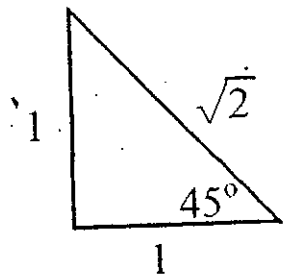
$$\csc \theta =$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\sec \theta =$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\cot \theta =$$



$$\sin 45^\circ =$$

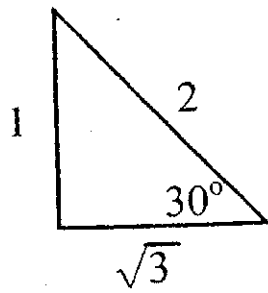
$$\csc 45^\circ =$$

$$\cos 45^\circ =$$

$$\sec 45^\circ =$$

$$\tan 45^\circ =$$

$$\cot 45^\circ =$$



$$\sin 30^\circ =$$

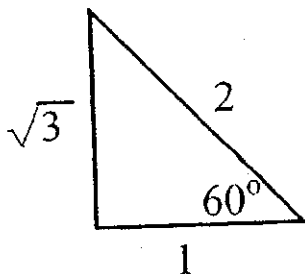
$$\csc 30^\circ =$$

$$\cos 30^\circ =$$

$$\sec 30^\circ =$$

$$\tan 30^\circ =$$

$$\cot 30^\circ =$$



$$\sin 60^\circ =$$

$$\csc 60^\circ =$$

$$\cos 60^\circ =$$

$$\sec 60^\circ =$$

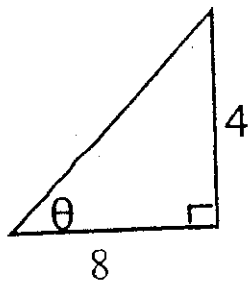
$$\tan 60^\circ =$$

$$\cot 60^\circ =$$

Fill in these 3 in your chart

Solving Right Triangles

- 1) Find missing side: $a^2 + b^2 = c^2$
- 2) Write ratios
- 3) Rationalize Denominator
- 4) Find θ : 2nd (trig ratio)
Check mode in your calculator for degree



$$\sin \theta =$$

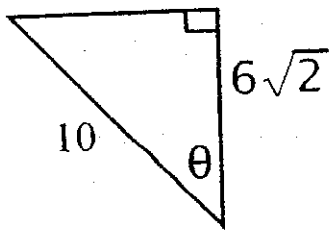
$$\csc \theta =$$

$$\cos \theta =$$

$$\sec \theta =$$

$$\tan \theta =$$

$$\cot \theta =$$



$$\sin \theta =$$

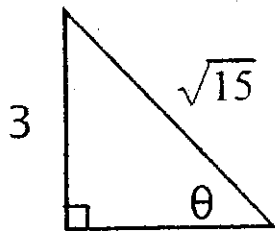
$$\csc \theta =$$

$$\cos \theta =$$

$$\sec \theta =$$

$$\tan \theta =$$

$$\cot \theta =$$



$$\sin \theta =$$

$$\csc \theta =$$

$$\cos \theta =$$

$$\sec \theta =$$

$$\tan \theta =$$

$$\cot \theta =$$

Trig Identities

To find remaining trig ratios from the given info

- 1) Draw right triangle, place θ
- 2) Label triangle from given
- 3) Write missing ratios
- 4) Find θ

$$\sin \theta = \frac{2}{5}$$

$$\cos \theta = \frac{\sqrt{21}}{5}$$

$$\sin \theta = \frac{3}{8}$$

$$\cos \theta = \frac{\sqrt{55}}{8}$$

$$\sec \theta = 5$$

$$\cot \theta = \frac{10}{7}$$

$$\cos \theta = \frac{4\sqrt{2}}{15}$$

HW: Back of last night's worksheet
pg 514 #6-19, 24, 25
(#6-14 find all 6 trig functions
and find θ to the nearest tenth)

AND finish chart

Rounded Angle measures (2 deci please)

Degrees to Radians ($\frac{\pi}{180}$)

① 35°

② 140°

③ -70°

④ -190°

Radians to Degrees ($\frac{180}{\pi}$)

① 4.62

② .72

③ 14.36

④ 8

Find each trig ratio, use chart for exact or use calculator and round to 4 decimal places.

$$\text{Ex) } \sin 70^\circ =$$

$$\text{Ex) } \tan 64^\circ =$$

$$\text{Ex) } \cos 24^\circ =$$

$$\text{Ex) } \csc 28^\circ =$$

$$\text{Ex) } \sec 85^\circ =$$

$$\text{Ex) } \sec \frac{2\pi}{9} =$$

$$\text{Ex) } \cot 8^\circ =$$

$$\text{Ex) } \cot \frac{3\pi}{2} =$$

$$\text{Ex) } \sec \frac{3\pi}{4} =$$

Homework: Worksheet page 372
23-50

Worksheet page 504
45-59 omit 52

Quiz tomorrow

Reference Angles: Positive

ϕ = reference angle

quad I: $\phi = \theta$

quad II: $\phi = 180 - \theta$

quad III: $\phi = \theta - 180$

quad IV: $\phi = 360 - \theta$

Reference angles:

Inside triangle by the origin
Reference angles are always **POSITIVE**

- ① Draw angle
- ② Drop/Raise perpendicular to X-AXIS
- ③ Label ϕ , label θ

a) Find the quad containing the terminal side of θ and find the reference angle ϕ

b) Find the coterminal angle that is between 0° and 360°

Coterminal hints

angle: Given: Positive
ans: -360° and 0°
Subtract 360
until b/w -360° to 0°

Given: Negative
 0° and 360°
Add 360
until b/w 0° to 360°

Ex 1) $\frac{31\pi}{6}$

Ex 2) 142°

Ex 3) 1005°

Ex 4) -160°

Ex 5) $\frac{-2\pi}{15}$

Ex 6) $\frac{-19\pi}{12}$

HW: pg 372 #1-12

Trig Ratios θ and ϕ from point

- 1) Plot Point
- 2) drop / raise perpendicular: label triangle
- 3) find hypotenuse
(always positive: distance from origin to point)
- 4) write ratios
- 5) find reference angle ϕ
(use positive numbers only)
- 6) use formula to find θ

$(-4, -2)$

$(5, -15)$

$(-3, 0)$

$(-6, 9)$

(0, 4)

(8, 4)

Quadrants

$$QI \quad 0^\circ < \theta < 90^\circ$$

$$QII \quad 90^\circ < \theta < 180^\circ$$

$$QIII \quad 180^\circ < \theta < 270^\circ$$

$$QIV \quad 270^\circ < \theta < 360^\circ$$

Where is this triangle?

$\sin > 0$: where is sin positive? _____

$\tan < 0$: where is tan negative? _____

Given two pieces of information:

Then USE your CHART

- 1) Find quadrants for 1st piece of information:
Write it down
- 2) Find quadrants for 2nd piece of information:
Write it down
- 3) Triangle is in the quadrant you wrote **twice!**

$$\tan > 0, \sec < 0$$

$$\cos > 0, \csc < 0$$

$$\cot > 0, \sin > 0$$

$$\cos < 0, \csc > 0$$

- 1) Draw and label triangle in correct quadrant
- 2) Find missing side
- 3) Write ratios
- 4) Find ϕ (ref angle); Find θ

$$\tan \theta = \frac{4}{3}, \cos \theta < 0$$

$$\sec \theta = \frac{8\sqrt{3}}{5}, \cot \theta < 0$$

$$\csc \theta = \frac{7}{2}, \tan \theta < 0$$