Angles and Degree Measure
§1.1

Degree measure of an angle – is the number of degrees in the intercepted arc of a circle centered at the vertex. The degree measure is positive if the rotation is counterclockwise and negative if the rotation is clockwise.

Coterminal Angles – angles α and β are coterminal if and only if there is an angle k such that:
$m(\beta) = m(\alpha) + k(360)$

coterminal angles differ by a multiply of 360

Example 1
Find the degree measures of two positive and two negative angles that are coterminal with each given angle.

a. 50° b. -120°

Example 2
Determine whether the given pair of angles are coterminal.

a. 190°, -170° b. 150°, 880°

Example 3
Name the quadrant in which the angles lies.

a. 740° b. -510°

Pg 49, 1-44

Angles and Degree Measure
§1.1 (Day 2)

1 Degree = 60 minutes
1 Minute = 60 seconds

1 Minute = $\frac{1}{60}$ degree
1 second = $\frac{1}{60}$ minute or $\frac{1}{3600}$ degree

Example 1
Convert into decimal degrees.

67º16’40”

Graphing Calculator:
Type 67 2nd APPS 1
16 2nd APPS 2
40 ALPHA +
ENTER

Example 2
Convert the angle to degree-minute-seconds.

54.125

Graphing Calculator:
Type 54.125
2nd APPS
4 (DMS)
ENTER

Example 3
Perform the indicated operations.

a. $23^\circ 42' 27''$ $+ 91^\circ 36' 50''$

b. $58^\circ - 7^\circ 23' 48''$

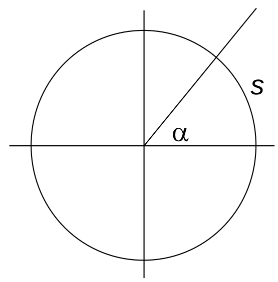
c. $85^\circ 31' 27'' \div 3$

Pg 49, 45-78

Radian Measure, Arc Length, and Area
§1.2

<u>Unit Circle</u>
r = 1
$C = 2\pi r$

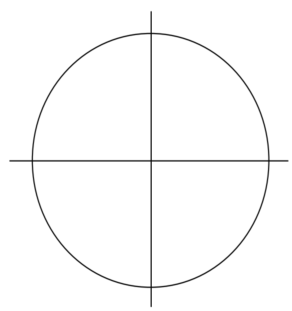
Therefore, $C = 2\pi$



α = angle in degrees
s = radian measure of α

s = α on the unit circle

<u>Radian Measure</u> – of the angle α in standard position is the directed length of the intercepted arc on the unit circle.



<u>Convert Degrees to Radians</u>

Use $\frac{\pi}{180}$ for conversion factor

<u>Example 1</u>
Convert each degree measure to radian measure.

a. 360

b. 90

c. 45

d. 30

Convert Radians to Degrees

Use $\frac{180}{\pi}$ for conversion factor

Example 2
Convert each radian measure to degree measure.

a. $\frac{2\pi}{3}$ b. $\frac{5\pi}{4}$ c. $\frac{3\pi}{2}$

Example 3
Find two positive and two negative angles using radian measure that are coterminal to each.

a. $\frac{\pi}{4}$ b. $\frac{5\pi}{6}$

Pg 59, 2-58 even

Radian Measure, Arc Length, and Area
§1.2 (Day 2)

Arc Length: $s = \alpha r$

Example 1
Find the arc length intercepted by the given central α in a circle of radius *r*.

a. $\alpha = \frac{\pi}{3}$, $r = 6$ ft

b. $\alpha = 120^{\circ}$, $r = 90$ in

Example 2
The wagon wheel below has a diameter of 28 inches and an angle of 30º between the spokes. What is the length of the arc *s* between 2 adjacent spokes?

Example 3
Find the central angle.

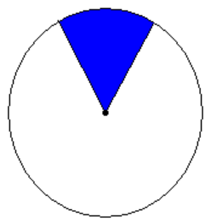
4505

Radius of earth = 3950 mi

Area of a circle

$A = \pi r^2$

Sector – part of circle



<u>Example 4</u>

Find the area of the sector for the following circle.

$\alpha = \dfrac{2\pi}{3}$, $r = 6$ ft

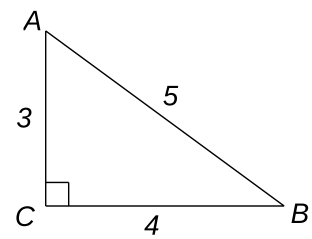
Pg 59, 60-78 even, 79-88 all

The Trigonometric Functions
§1.4

SOH CAH TOA

sin A =
cos A =
tan A =

sin B =
cos B =
tan B =



<u>Inverses</u>

$$\sin = \frac{\text{opposite}}{\text{hypotenuse}} \qquad \csc = \frac{\text{hypotenuse}}{\text{opposite}} \qquad \csc = \frac{1}{\sin}$$

$$\cos = \frac{\text{adjacent}}{\text{hypotenuse}} \qquad \sec = \frac{\text{hypotenuse}}{\text{adjacent}} \qquad \sec = \frac{1}{\cos}$$

$$\tan = \frac{\text{opposite}}{\text{adjacent}} \qquad \cot = \frac{\text{adjacent}}{\text{opposite}} \qquad \cot = \frac{1}{\tan}$$

Coordinate Plane

sin α =

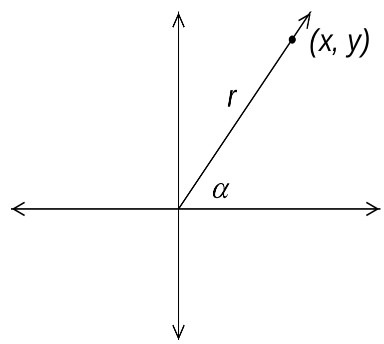
cos α =

tan α =

csc α =

sec α =

cot α =



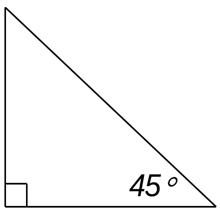
<u>Example 1</u>
Find the values of the six trigonometric functions of the angle α in standard position whose terminal side passes through (2, 1).

Example 2
Find the exact values of each (notice multiples of 90, UNIT CIRCLE).

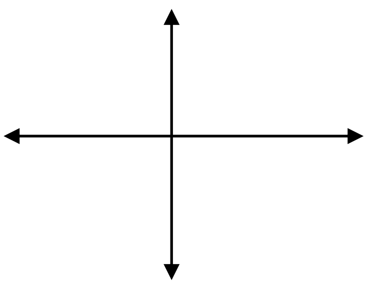
a. sin 90 b. cos 180 c. tan 90

d. sec 180 e. cot 270

45-45-90



Coordinate Plane



Example 3
Find the exact values (notice multiples of 45).

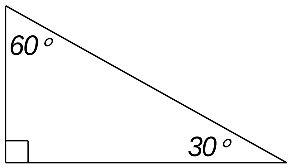
a. sin 45 b. tan 45 c. sec 45

d. cos 135 e. csc $\frac{5\pi}{4}$ f. tan $-\frac{9\pi}{4}$

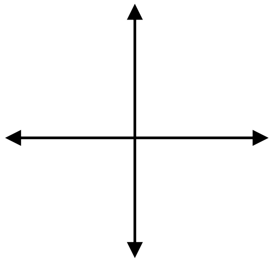
Pg 79, 1-30

The Trigonometric Functions
§1.4 (Day 2)

30-60-90



Coordinate Plane



Example 1
Find the exact value of each function.

a. sin 60

b. tan 150

c. cos -30

d. $\sin \dfrac{8\pi}{3}$

Example 2
Find each with a calculator

a. cos 3.17

b. sin -25.67°

c. $\sin \dfrac{3\pi}{4}$

d. csc 2.73

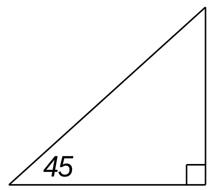
e. sec 37.42 °

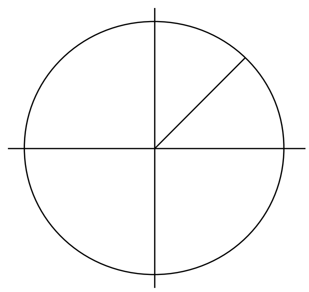
f. $\cot \dfrac{5\pi}{6}$

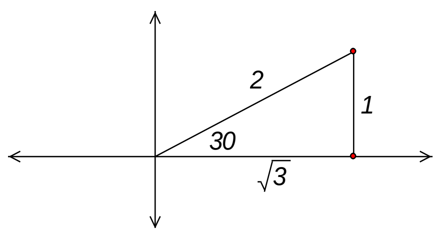
Pg 79, 31-48, 59-70

The Unit Circle
§1.4 (Extend)

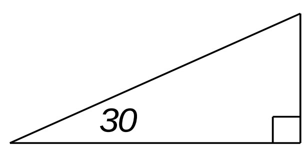
However, the unit circle has r = 1. Therefore,

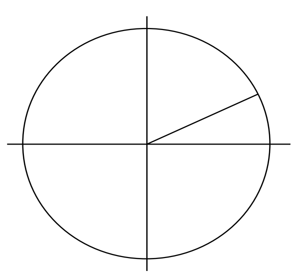


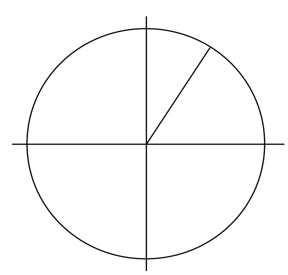




However, the unit circle has r = 1. Therefore,







Unit Circle Worksheet

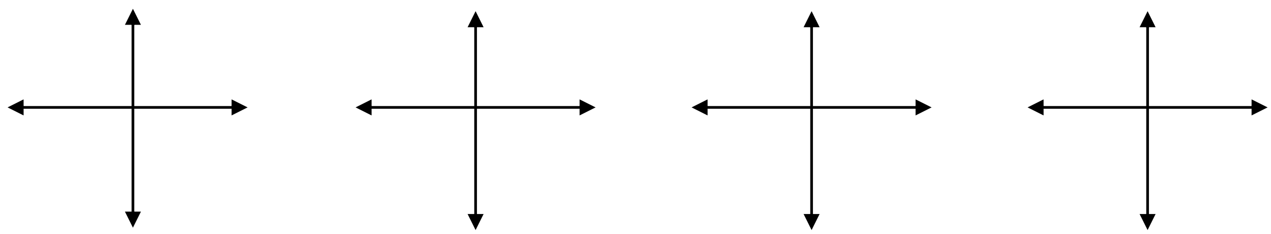
The Fundamental Identity and Reference Angles
§1.5

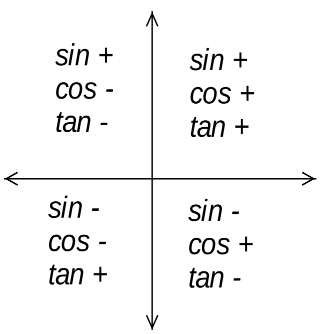
$$\sin\alpha = \frac{y}{r} \qquad \cos\alpha = \frac{x}{r} \qquad r = \sqrt{x^2 + y^2}$$

Example 1

Find cos α if $\sin\alpha = \frac{3}{5}$, and α is an angle in Quadrant II.

Reference Angles





"All Students Take Calculus"

Example 2

Find each using reference angles.

a. sin 150

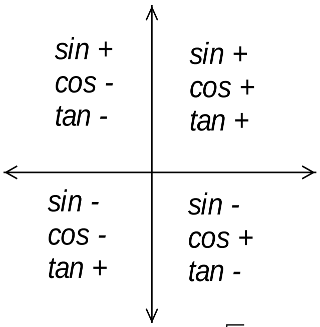
b. cos 150

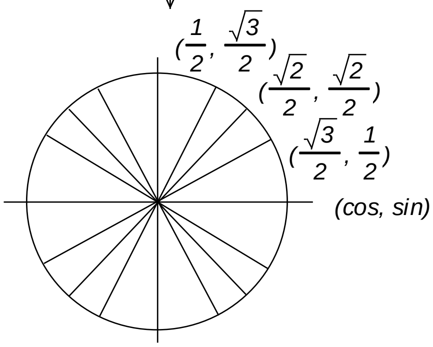
c. tan 240

d. $\sin -\frac{\pi}{6}$

Pg 88, 1-20,
21-32 (change directions to find exact)

Right Triangle Trigonometry
§1.6





Example 1

Find $\sin \alpha = \dfrac{1}{2}$

Example 2

Find angle α where $0 \leq \alpha \leq 90$.

a. $\cos \alpha = \dfrac{\sqrt{3}}{2}$

b. tan = 1

c. $\sin \alpha = 0$

d. $\cos \alpha = \dfrac{1}{\sqrt{2}}$

Example 3

The following problems are exactly the same as the previous example.

a. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) =$

b. $\tan^{-1}(45)$

c. $\sin^{-1}(0) =$

d. $\cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$

Inverses

$\sin^{-1}(x) = \alpha$ provided $\sin\alpha = x$ and $-90° \le \alpha \le 90°$

$\cos^{-1}(x) = \alpha$ provided $\cos\alpha = x$ and $0° \le \alpha \le 180°$

$\tan^{-1}(x) = \alpha$ provided $\tan\alpha = x$ and $-90° \le \alpha \le 90°$

Example 4

Evaluate each expression in degrees, may use calculator.

a. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$

b. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

c. $\tan^{-1}\sqrt{3}$

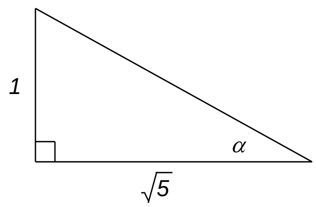
d. $\cos^{-1}\left(-\frac{3}{7}\right)$

e. $\tan^{-1}6.1$

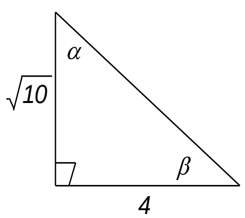
Pg 98, 1-16

Right Triangle Trigonometry
§1.6 (Day 2)

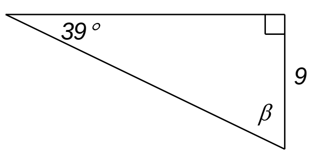
Example 1
Find all 6 trig functions of α.



Example 2
Solve each triangle for the remaining parts.



Example 3



Angle of Elevation – the angle between the line of sight and the horizontal when the observer looks *upward*.

Angle of Depression – the angle between the line of sight when an observer looks downward.

Example 4
If you are lying down on the top of the roof at APHS looking at your trig book with an angle of depression of 57.4º, how tall is the high school if you book is lying 41 feet away.

Example 5
If one side of a drawbridge rises with an angle of elevation of 35º at its fullest height, how far has the drawbridge risen, given its length to be 68 feet?

Pg 98, 17-30, 33-37