Algebra III
Chapter 8
Trigonometric Equations & Applications

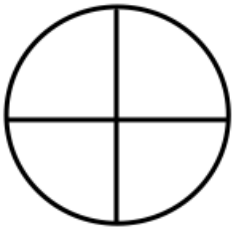
Name _____

Date _____

Section 8.1: Simple Trigonometric Equations

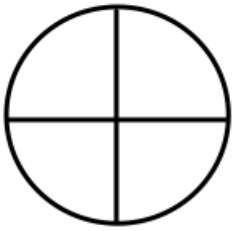
Example 1

Solve $\sin(x) = .5$ Degree Radian



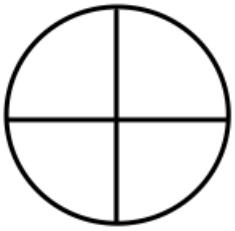
Example 2

Solve $\sin(x) = .8$ for $0 < x < 2\pi$



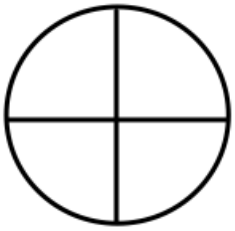
Example 3

Solve $\tan(x) = -1.2$ for $0^o < x < 360^o$



Example 4

Solve $3\cos\theta + 6 = 5$ for $0^o < x < 360^o$

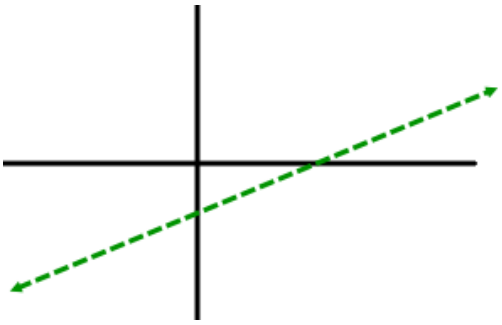


Inclination and Slope

The inclination of a line is angle α where _____
and measured from the _____ x-axis to the line.

For any nonvertical line with slope m and inclination α
m = _____ and $\alpha \neq$ _____

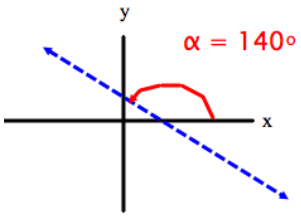
If $\alpha = 90^o$ then the line is vertical and has _____



Example 5

Given the inclination of a line is 20^o find the slope.

Example 6
Find the slope of the given line.



Example 7
To the nearest tenth of a degree find the inclination of the line with the following slope.

a) m = 2

b) m = -2

Example 8
Find the inclination of the line.

a) $3x + 4y = 8$

b) $5y = 6 + 4x$

Example 9
Find the equation of a line with inclination of 52^o and passes through (3, 7).
*your answer will contain decimals

Section 8.2: Simple Trigonometric Equations

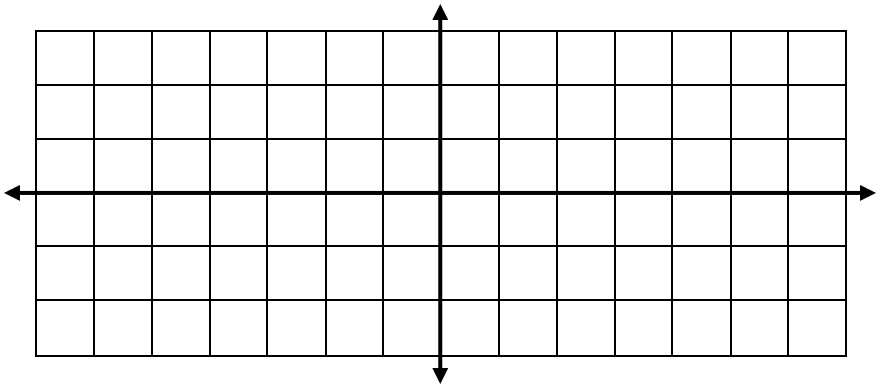
Remember: cf(x) is a _____ stretch/shrink

f(cx) is a _____ stretch/shrink

Ex 1: Graph y = sin x

P =

A =



Graph y = 2sin x

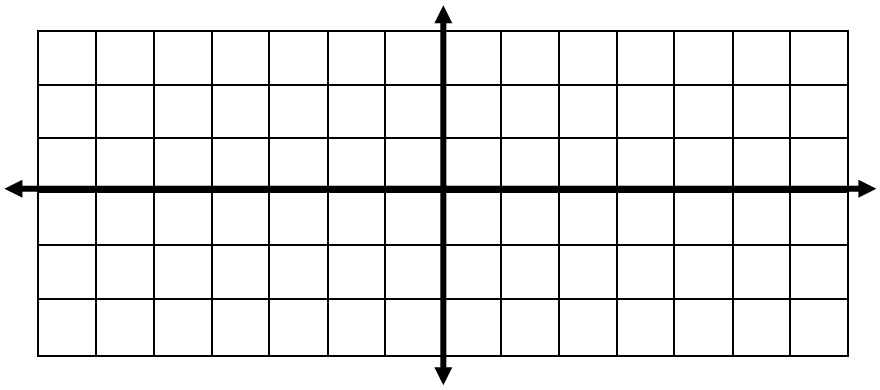
P =

A =

Ex 2:

Graph $y = \cos x$

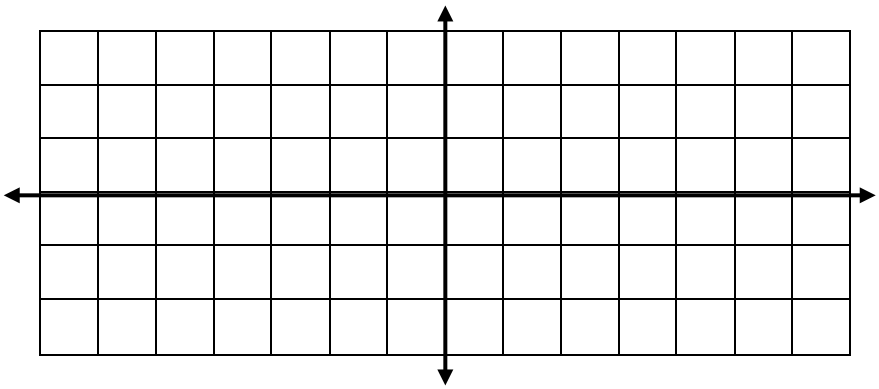
Graph $y = -\frac{1}{2}\cos x$



Ex 3:

Graph $y = \sin x$

Graph $y = \sin 2x$



PERIOD and AMPLITUDE

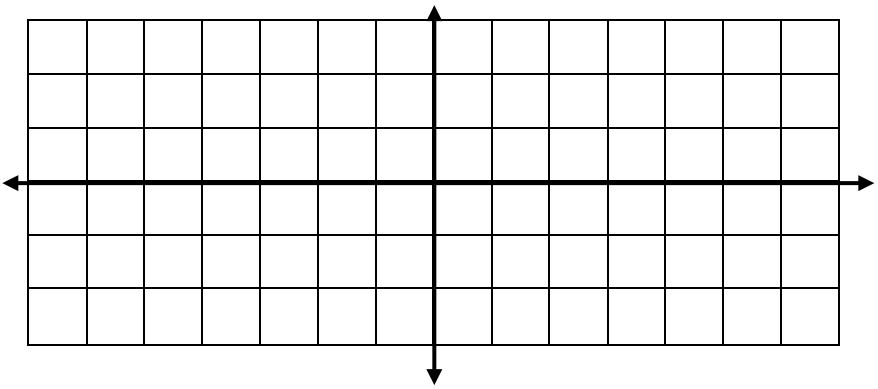
$y =$ $\quad A \neq 0$ Amplitude =

$y =$ $\quad B > 0$ Period =

Ex 4:

Find the period and amplitude. Sketch at least one period.

$y = 3 \sin(\frac{1}{2}x)$



Ex 5:

Write the equation of the trig function being described.

A sine curve varies between 3 and -3 with a period of $\frac{\pi}{6}$.

Section 8.4: Relationships Among the FUNctions

When simplifying an expression the final answer is often in terms of a trignometric function or an integer.

Here are some ***HINTS*** to help you out:

- Cancel any terms if possible
- Using trig identities, simplify
- Write in terms of sine and cosine
- Do the indicated operation (add, subtract, multiply...)
- Multiply numerator and denominator by a LCD
- Factor then cancel factors to simplify

Ex1

$\sin\theta \cdot \sec\theta \cdot \cot\theta$

Ex2

$(1 - \sin\theta)(1 + \sin\theta)$

Ex3

$\sin\theta \cdot \cot\theta$

Ex4

$$\frac{\cos\theta \cdot \sin\theta}{1 - \sin^2\theta}$$

Ex5

$$1 + \frac{\cos^2\theta}{1 - \cos^2\theta}$$

Ex6

$$\frac{\tan x + \cot x}{\sec^2 x}$$

Ex7

$\frac{\cot x - \tan x}{\sin x \cdot \cos x}$

Ex8

$\frac{1 - \sin^2\theta}{1 + \cot^2\theta}$

Ex9

$\frac{\tan^2\theta}{1 + \tan^2\theta}$

Ex10

$\frac{\tan x}{1 + \sec x} + \frac{1 + \sec x}{\tan x}$

Section 8.5: Solving Trigonometric Equations

Solve the following problems.

Example 1

$2\cos^2 x - 1 = 0$ for $0 \leq x \leq 360°$

Example 2

$\sin^2 x + 3\sin x + 2 = 0$ for $0 \leq x \leq 360°$

Example 3

$\cos x \cdot \tan x = 3\cos x$ for $0 \le x \le 2\pi$

Example 4

$2\cos x = \sin x$ for $0 \le x \le 360°$

Example 5

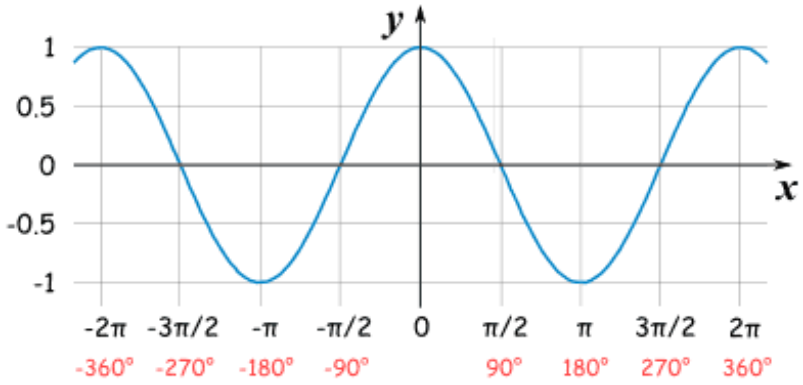
$2\sin x - \csc x = 1$ for $0 \le x \le 360°$

Example 6

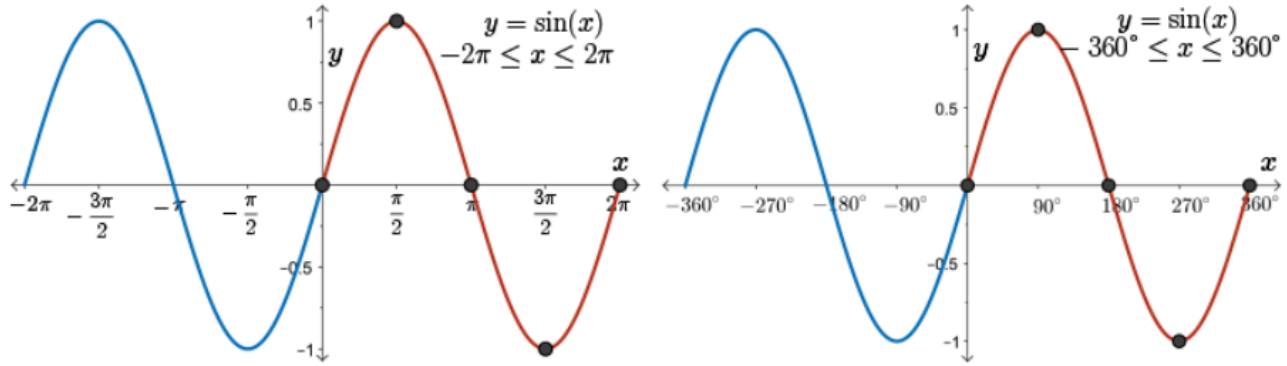
$2\cot^2 x + 3\csc x = 1$ for $0 \le x \le 2\pi$

Graphs of the Sine and Cosine FUNctions

y = cosθ



y = sinθ



Trigonometric Identities

Reciprocal Identities

$\sin\theta = {}^{1}/_{\csc\theta}$ $\cos\theta = {}^{1}/_{\sec\theta}$ $\tan\theta = {}^{1}/_{\cot\theta}$

$\csc\theta = {}^{1}/_{\sin\theta}$ $\sec\theta = {}^{1}/_{\cos\theta}$ $\cot\theta = {}^{1}/_{\tan\theta}$

Relationships with Negatives

$\sin(-\theta) = -\sin\theta$ $\cos(-\theta) = \cos\theta$ $\tan(-\theta) = -\tan\theta$

$\csc(-\theta) = -\csc\theta$ $\sec(-\theta) = \sec\theta$ $\cot(-\theta) = -\cot\theta$

Pythagorean Identities

$x^2 + y^2 = 1$ *on the unit circle so...*

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

$\cos^2\theta = 1 - \sin^2\theta$ $\cot^2\theta + 1 = \csc^2\theta$ $1 + \tan^2\theta = \sec^2\theta$

$\sin^2\theta = 1 - \cos^2\theta$ $\cot^2\theta = \csc^2\theta - 1$ $\tan^2\theta = \sec^2\theta - 1$

Sine/Cosine Relationships

$\tan\theta = {}^{\sin\theta}/_{\cos\theta}$ $\cot\theta = {}^{\cos\theta}/_{\sin\theta}$