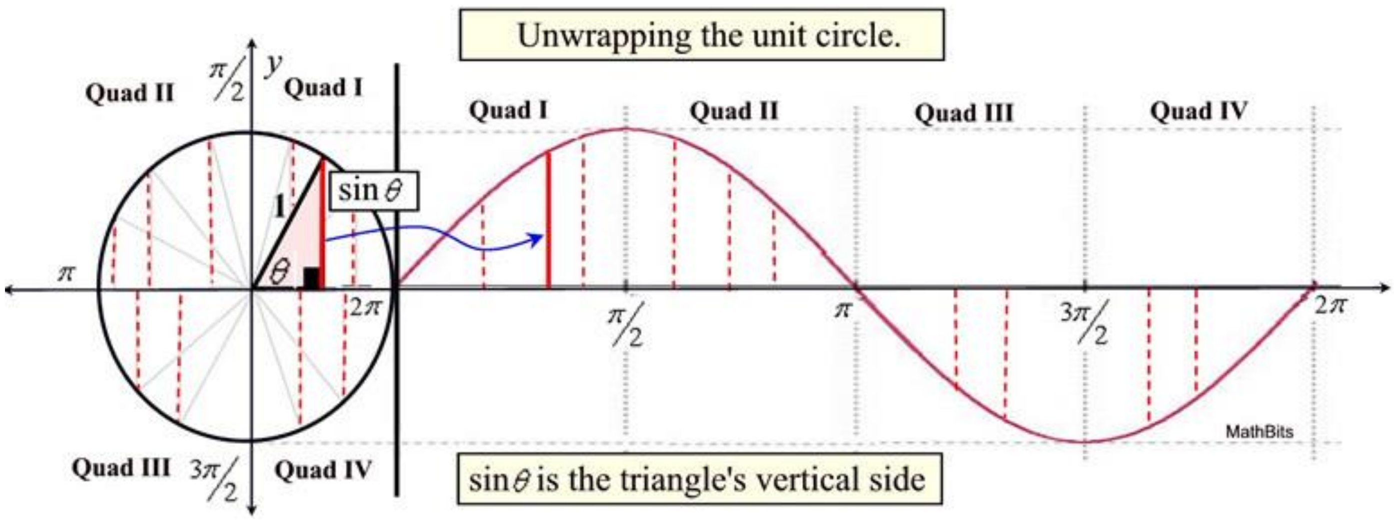
PreCalculus with TRIG – Unit 4 – Graphing Trig Functions

Day 4.5 – Intro to Graphing Sine and Cosine

Objectives: SWBAT graph Sine and cosine functions

Today, we begin graphing $\sin(x)$ and $\cos(x)$ in the $x - y$ plane. The graphs of $\sin(x)$ and $\cos(x)$ are **periodic** with an **oscillating pattern**. We call these **sinusoidal** waves.

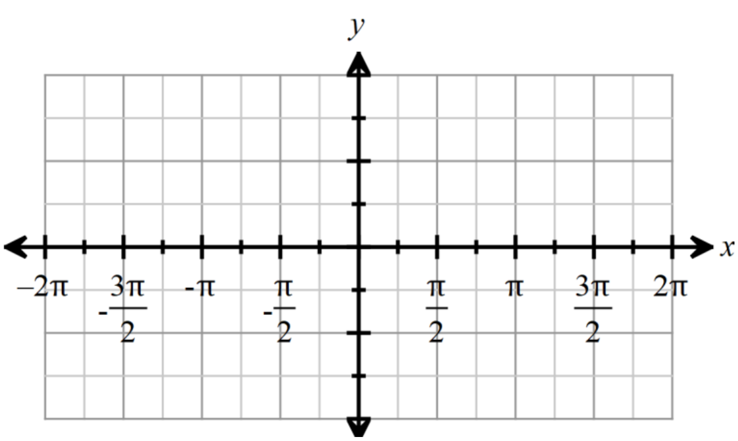


Music is composed of waves of different **frequencies and amplitudes** and these can be described using $\sin(x)$ / $\cos(x)$ waves. In fact most anything involving sound waves will rely on $\sin(x)$ / $\cos(x)$.

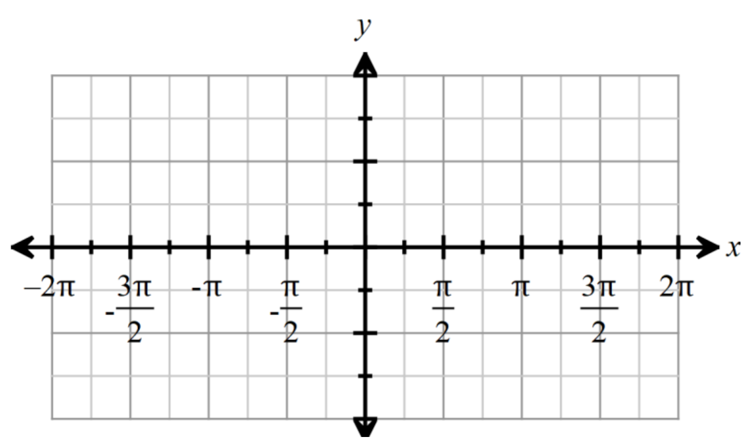
GPS and cellphones rely on triangulation and formulas involving $\sin(x)$ / $\cos(x)$

Signal transmission, such as TV and radio broadcasting, involves $\sin(x)$ / $\cos(x)$ waves.

Example 1: Graph $y = \cos(x)$, $y = -\cos(x)$, and $y = 2\cos(x)$, using three different colors.
$y = \sin(x)$, $y = -\sin(x)$, and $y = 2\sin(x)$, using three different colors.



Sine



Cosine

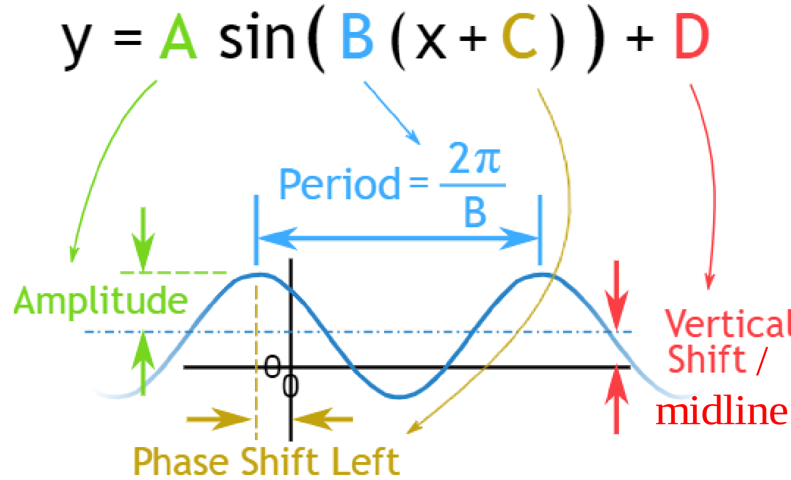
Vertical shift

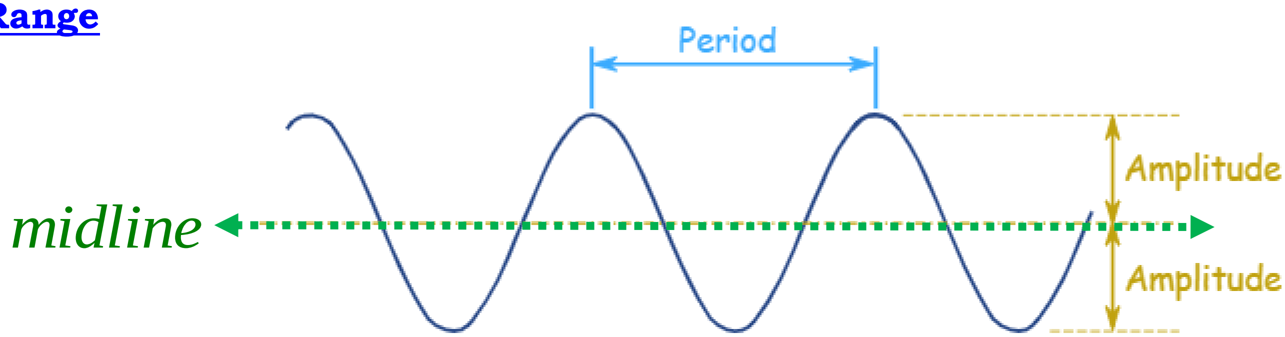
Phase Shift:

Period:

Domain

Range





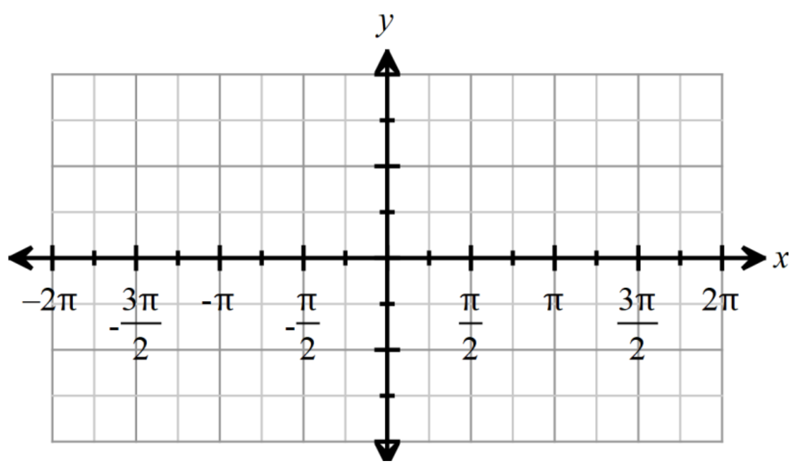
2) Graph $y = 2cos(x)$ List period, amplitude, phase shift, domain, and range.

P = ___________

A = ___________

D: ___________

R: ___________



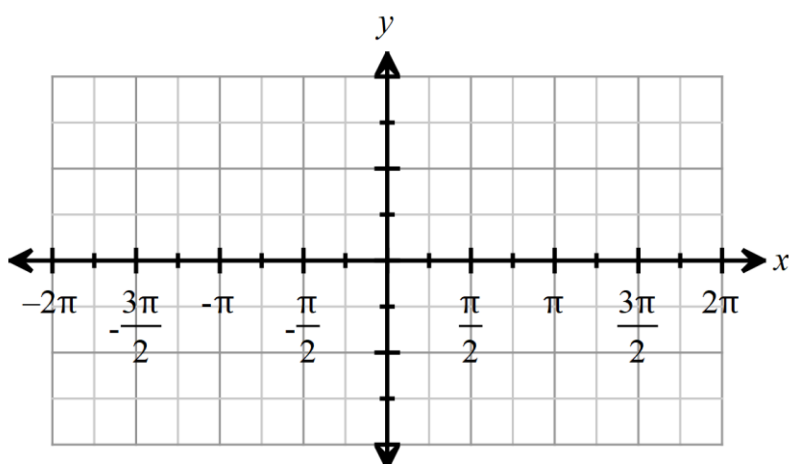
3): Graph $y = -\frac{1}{2}sin(x) + 3$

P = ___________

A = ___________

D: ___________

R: ___________



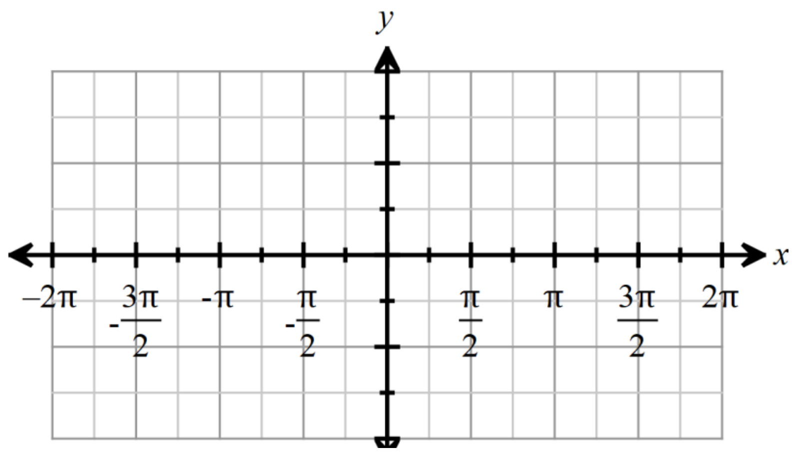
a) Graph $y = -3\cos(x) - 1$

P = ____________

A = ____________

D: ____________

R: ____________



5) Graph $y = 2cos(x - \pi)$

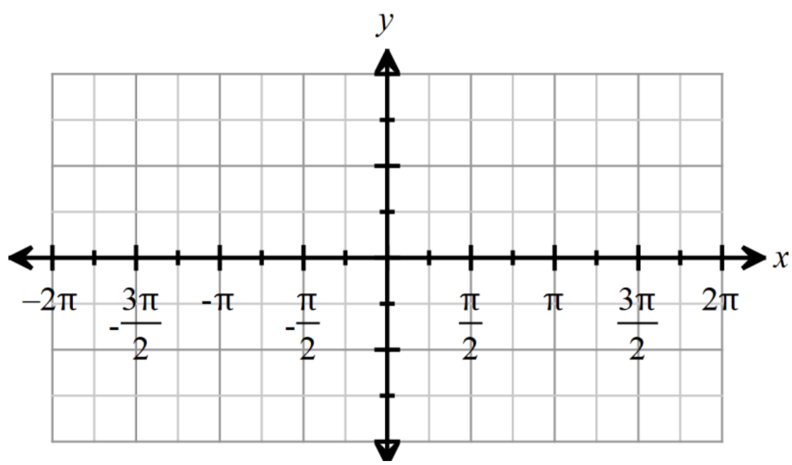
P = ____________

A = ____________

D: ____________

R: ____________

PS: ____________



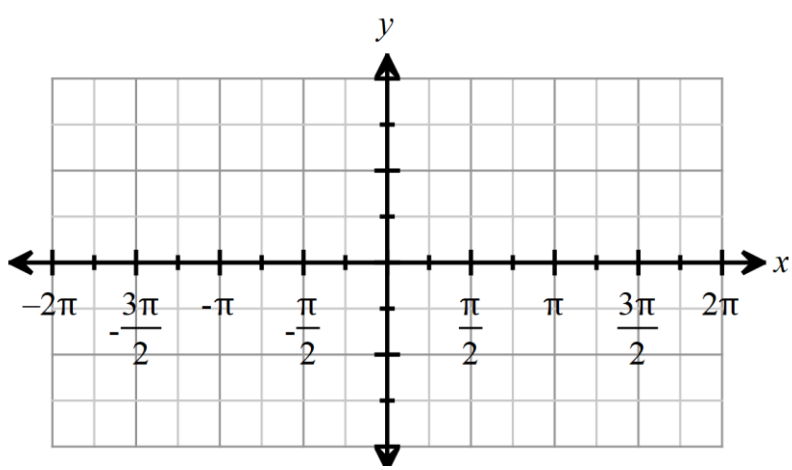
b): Graph $y = sin\left(x + \frac{\pi}{2}\right) + 3$

P = ____________

A = ____________

D: ____________

PS: ____________



State the phase shift and vertical shift of each.

6) $y = -5cos\left(x + \frac{\pi}{4}\right) + 3$ **7)** $y = -5sin\left(x + \frac{\pi}{7}\right) - 19$ **c)** $y = 3cos2(x - 3\pi) + 11$

Day 4.5A – Graphing $sin(x)$ & $cos(x)$ with Compressing and Stretching

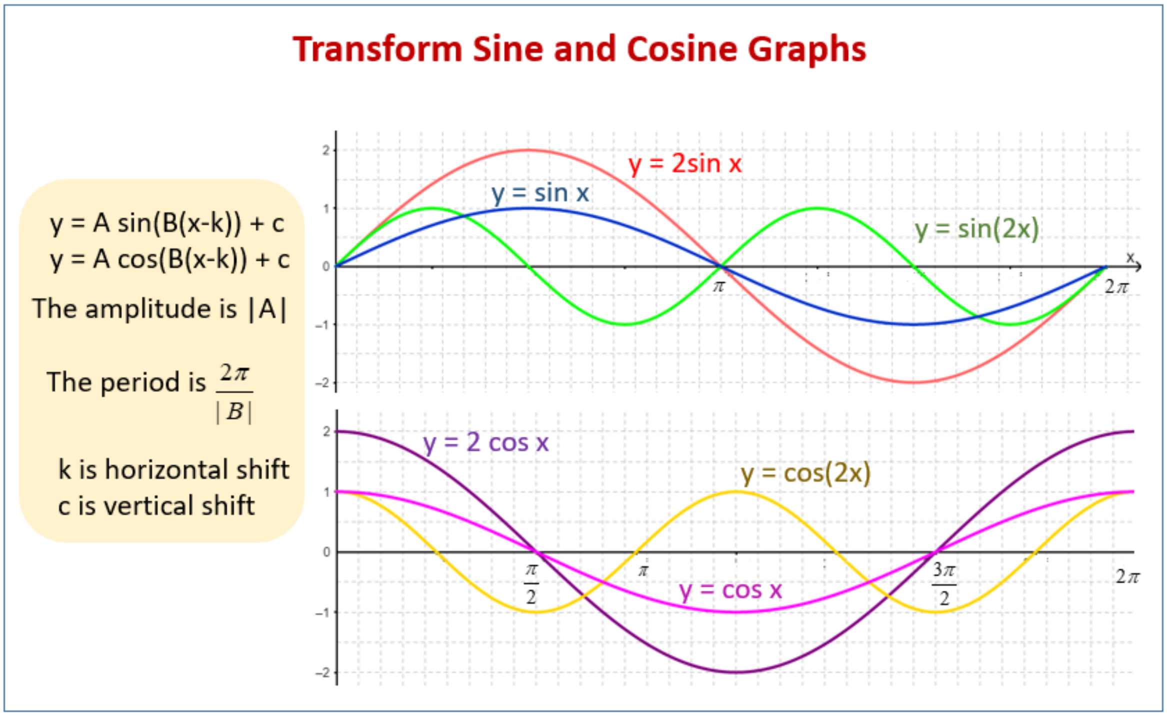
Objectives: SWBAT graph $sin(x)$ and $cos(x)$ waves with periods other than 2π as well as prepare to incorporate phase shift into the graph

Review Questions of the day:

1) State the amplitude, period, and phase shift of $y = -2cos\left(x + \frac{\pi}{4}\right)$.

2) State the domain and range of the above function.

3) What effect does the 4 have on the graph of $y = (x+3)^2 + 4$?



GAP Amount = ____________________________ This will help you find the max, min, and zeros quickly. To find the **GAP** amount, always divide the period by _______________ for $sin(x)$ and $cos(x)$. Look at the base graph.

From this example, we conclude the following:

1) The period of $y = A \cdot cos(Bx)$ is always ______________________. The **value of B represents the number of waves completed in a normal period of 2π**

2) The period of $y = A \cdot sin(Bx)$ is always _______________________. The **value of B represents the number of waves completed in a normal period of 2π**

3) When the value of **B is greater than 1** ____.

4) When the value of **B is between 0 and 1** ______________________________________.

5) When the value of **B is 1** ____.

6) When B is inside the parenthesis you should always _____________________________ it out first.

Find the period of each of the following, then state if it is a stretch or shrink.

1) $y = 2sin(0.5x)$

2) $y = -4cos(5x)$

a) $y = -3cos\left(\frac{x}{3}\right)$

3) $y = -3sin(\pi x) + 7$

b) $y = 55sin\left(\frac{\pi}{3}x\right) - 5$

4) $y = -sin\left(\frac{x}{2}\right) + 2$

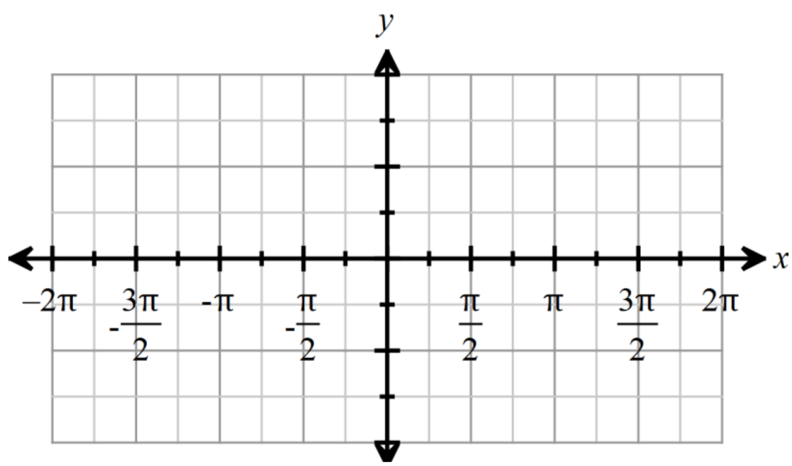
P = ____________

A = ____________

D: ____________

R: ____________

GAP: ____________



5) $y = 3sin(2x)$

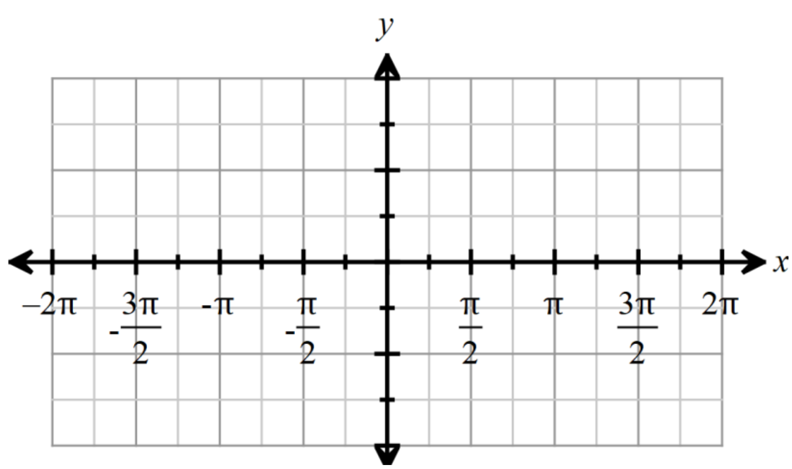
P = ____________

A = ____________

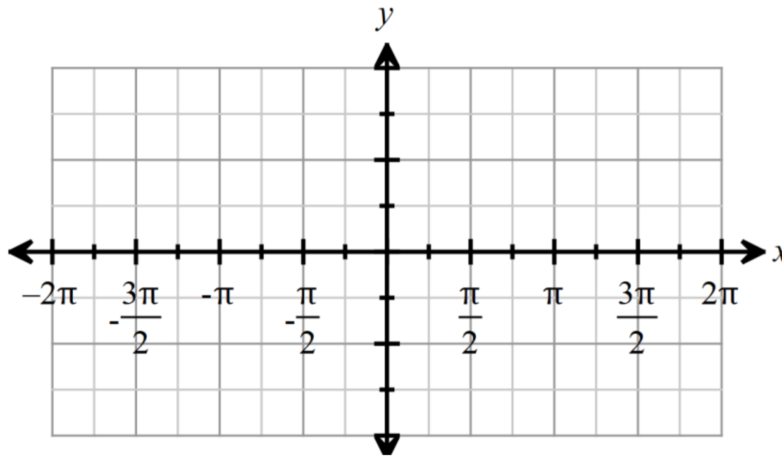
D: ____________

R: ____________

GAP: ____________



6) $y = -2cos\left(\frac{x}{3}\right) - 1$



P = ____________

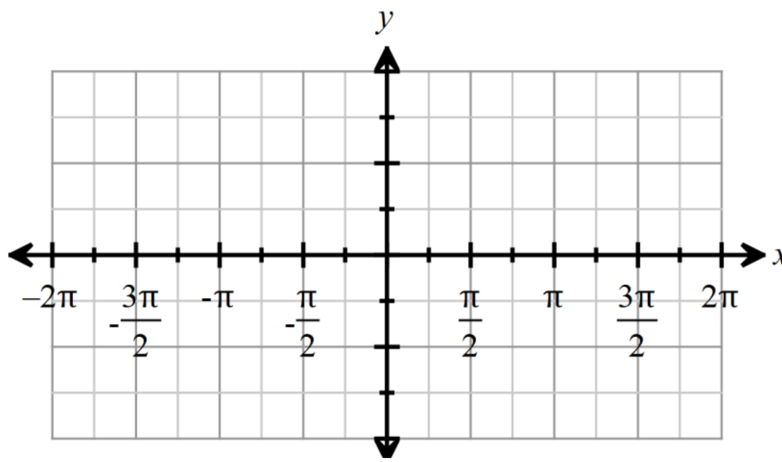
A = ____________

D: ____________

R: ____________

GAP: ____________

c) $y = cos(3x) + 2$



P = ____________

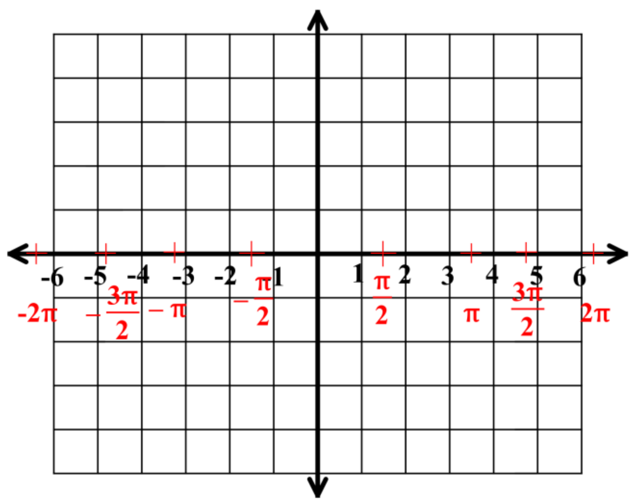
A = ____________

D: ____________

R: ____________

GAP: ____________

7) $y = -2cos(-0.5\pi x)$



P = ____________

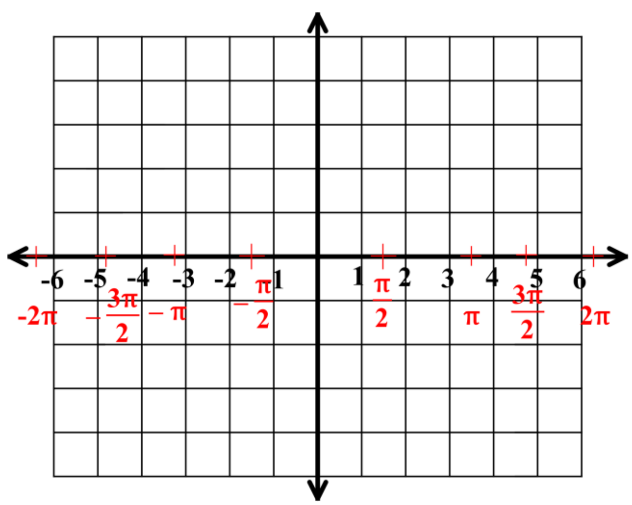
A = ____________

D: ____________

R: ____________

GAP: ____________

7) $y = -2\sin\left(\frac{\pi}{4}x\right)$



P = ____________

A = ____________

D: ____________

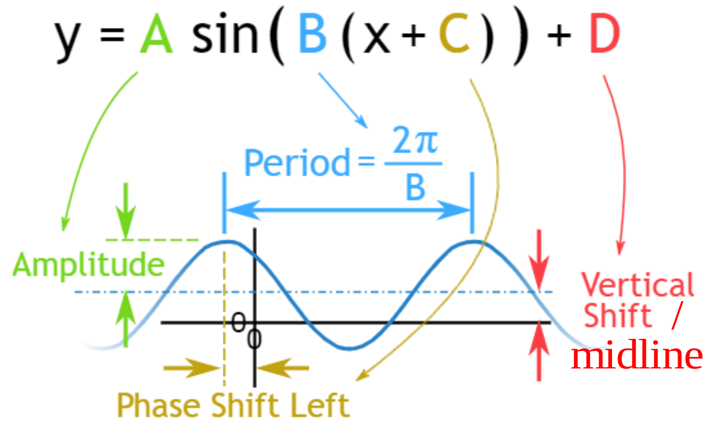
R: ____________

GAP: ____________

Day 4.5C – Graphing $sin(x)$ & $cos(x)$ with All Transformations

Objectives: SWBAT graph $sin(x)$ and $cos(x)$ with all transformations

Review Questions of the day:



1) Find the period of $y = 2sin(8x)$.

2) Find $sec(0)$.

3) What is the cofunction of $csc(6)$?

Follow these simple steps and you will be a GRAPHER!

1) **Start at the phase shift and show your midline**.
2) Begin at a max or min for $cos(x)$ or at the midline for $sin(x)$.
3) Check your direction (positive / negative)
4) "Go" the GAP amount to get to the next "important" point on the graph.

$$GAP = \frac{Period}{4}$$

5) Graph each on the trig grid

1) $y = 2cos\frac{1}{2}\left(x + \frac{\pi}{4}\right)$

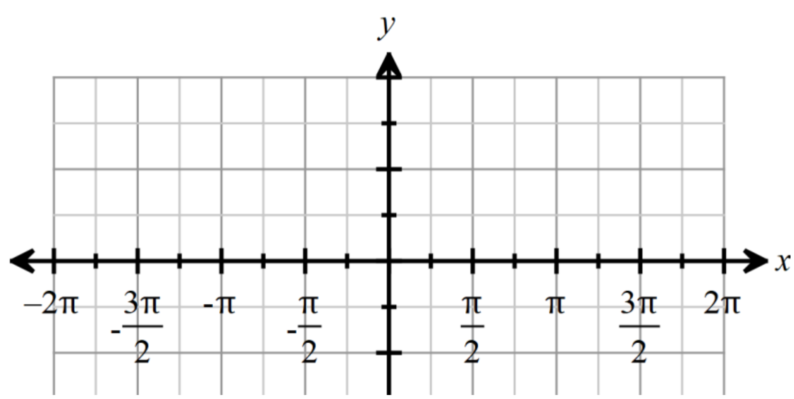
A = ___________

P = ___________

PS: ___________

R: ___________

GAP: ___________



2) $y = -sin(2x - \pi) + 1$

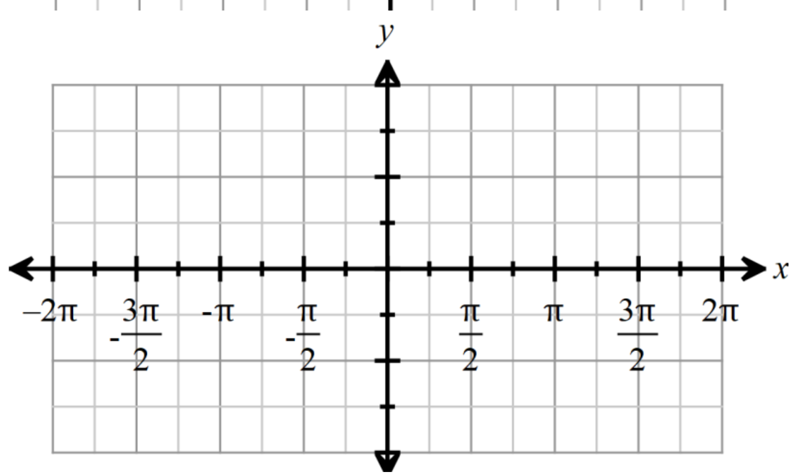
A = ___________

P = ___________

PS: ___________

R: ___________

GAP: ___________



a) $y = 3sin\left(\frac{x}{2} - \frac{\pi}{2}\right)$

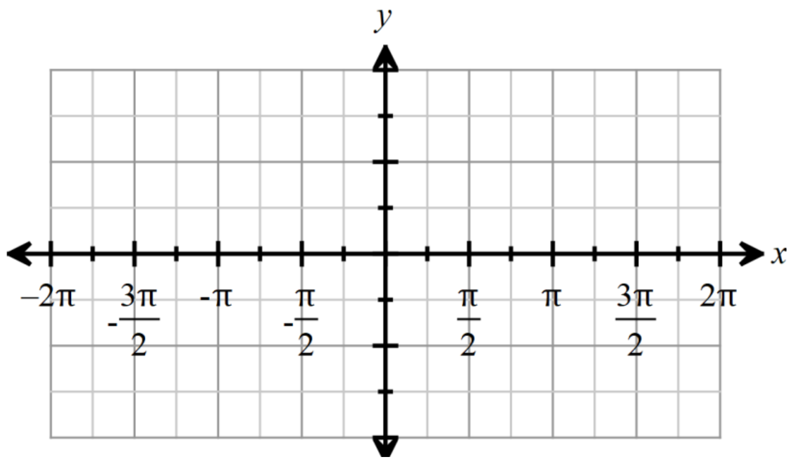
A = ____________

P = ____________

PS: ____________

R: ____________

GAP: ____________



3) $y = -0.5cos(\pi x - \pi) + 2$

A = ____________

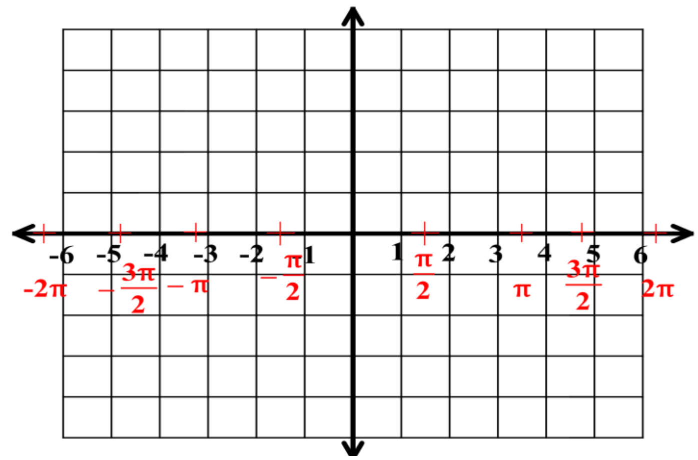
P = ____________

PS: ____________

R: ____________

GAP: ____________

VS: ____________



4) $y = -2cos2\left(x + \frac{\pi}{6}\right)$

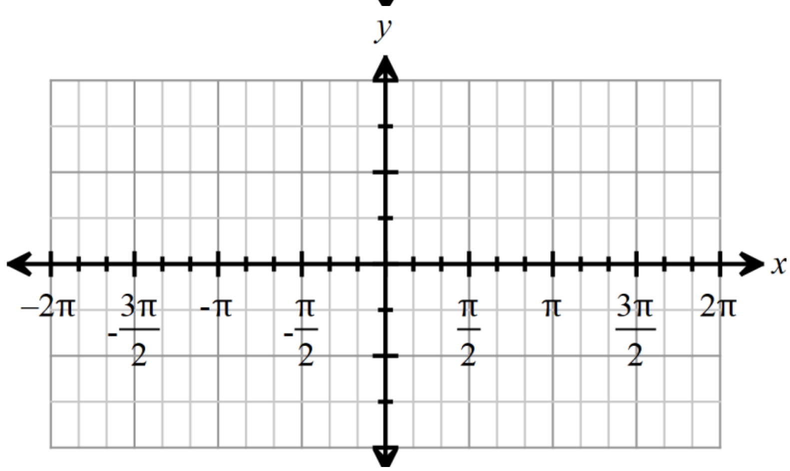
A = ____________

P = ____________

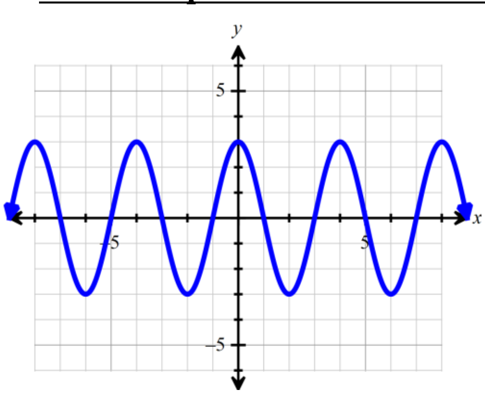
PS: ____________

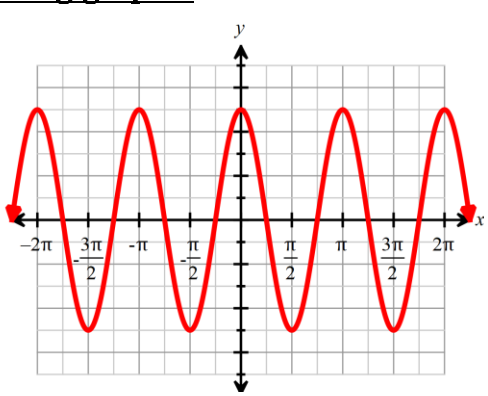
R: ____________

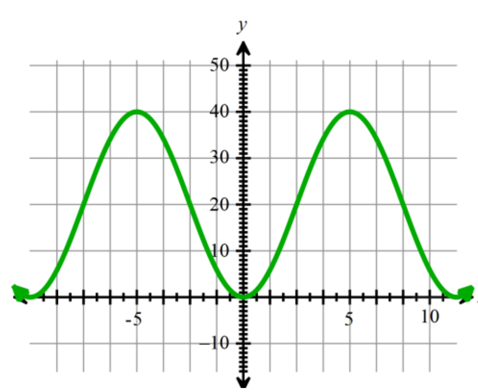
GAP: ____________



<u>Write 2 equations for the following graphs:</u>







____
____

____
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____
____

Day 4.8 – Simple Harmonic Motion

Objectives: SWBAT graph $sin(x)$ and $cos(x)$ with all transformations

Review Questions of the day:

1) Find a coterminal angle for 11,345 degrees.

2) Find $cos\left(\frac{7\pi}{3}\right)$

3) Find the range of $y = 4\cos(x) + 2$

SIMPLE HARMONIC MOTION: any motion that follows an up and down oscillating pattern:

Examples Include: radio waves, TV waves, the motion of a vibrating guitar string, an object that bobs up and down, for example a spring or a buoy, basically anything that follows the sine or cosine wave.

Basic Equations: $d = A \cdot cos(B)t$ or $d = A \cdot sin(B)t$

$A = Amplitude$

$d = Distance\ or\ Displacement$

$t = time$

$Period = \frac{2\pi}{B}$ where $B > 0$. The period represents the time it takes for the motion to go through one complete cycle.

$Frequency = \frac{1}{Period}$ The **frequency** represents the number of complete cycles per unit of time.

When the object is at rest at $t = 0$, use sine

When the object is at a max or min at $t = 0$, use cosine.

1) Find an equation that represents the position of a ball attached to a spring hung from a ceiling. It is pulled down 7 inches and then released. If we ignore friction, the ball will continue oscillating on the end of the spring, and has a period of 8 seconds. The rest position for this ball is called the equilibrium position, $d = 0$ before you pull it down.

For Examples 2 – a find each of the following:

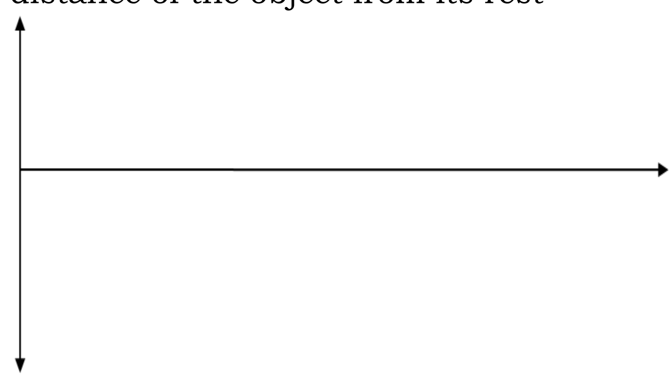
- **a)** the maximum displacement (amplitude)
- **b)** the frequency
- **c)** the time required for one cycle
- **d)** its distance at time = 0

2) $d = 8cos(\pi)t$

3) $d = 12sin\left(\frac{\pi}{4}\right)(t)$

a) $d = -9cos2t$

4) An object is attached to a coiled spring. It is pulled down and then released. The distance from the rest position at time 0 is 10 cm. The amplitude is 10 cm and the period is 6 seconds. Write an equation for the distance of the object from its rest position after t seconds.



b) A buoy is at rest at time 0. Then it begins to bob up and down, with a maximum displacement of 11 inches. The time to complete one cycle is 1.5 seconds. Write an equation for the simple harmonic motion of the buoy, assuming at time 0 that the buoy is on its way down from equilibrium.

<u>Day 4.6 – Graphing $csc(x)$ & $sec(x)$</u>

Objectives: SWBAT graph $csc(x)$ and $sec(x)$

<u>Review Questions of the day:</u>

1) State the period and phase shift of $y = -2cos2(x + 45°)$.

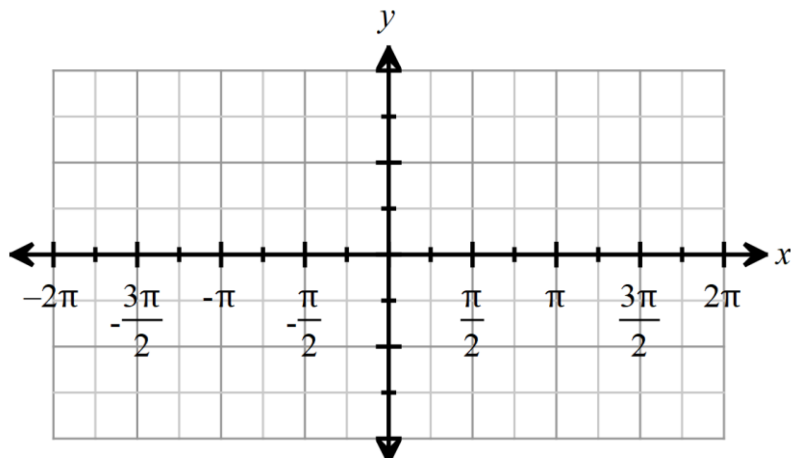
2) State the domain and range of the above function.

3) Describe the transformation of the parabola $y = (2x + 3)^2 + 2$??

4) How will $y = cos(3x)$ compare with $y = cos(x)$?

<u>Graph each on the trig grid and state the amplitude, period, domain, and range.</u>

$y = cos(2x)$ and $y = sec(2x)$



A = ___________

P = ___________

D: ___________

R: ___________

GAP: ___________

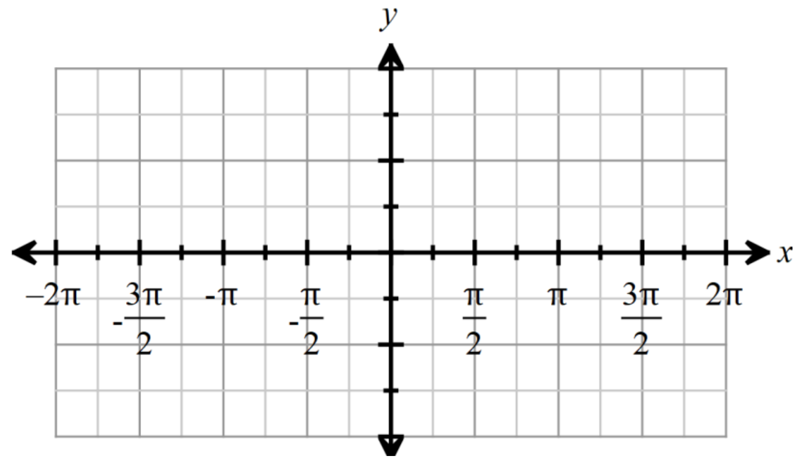
The **GAP amount** will help you find the max, min, and zeros quickly. Therefore, this helps you find the vertices of the parabolas and the vertical asymptotes. To find the GAP amount, always divide the **period by** _____________ for $sec(x)$ and $csc(x)$. From this example, we conclude the following:

1) The period of $y = Asec(Bx - C)$ is always ____________. The value **of B represents the number of waves completed in a normal period of 2π.** The phase shift is ____________________. **Graph $cos(x)$ first and touch and flip.**

2) The period of $y = Acsc(Bx - C)$ is always ____________. The value of **B represents the number of waves completed in a normal period of 2π** . The phase shift is ____________________. **Graph $sin(x)$ first and touch and flip.**

3) **B > 1** ________________________________ **0 < B < 1** ________________________________

Example 2: $y = sin(.5x)$ and $y = csc(.5x)$



A = ____________

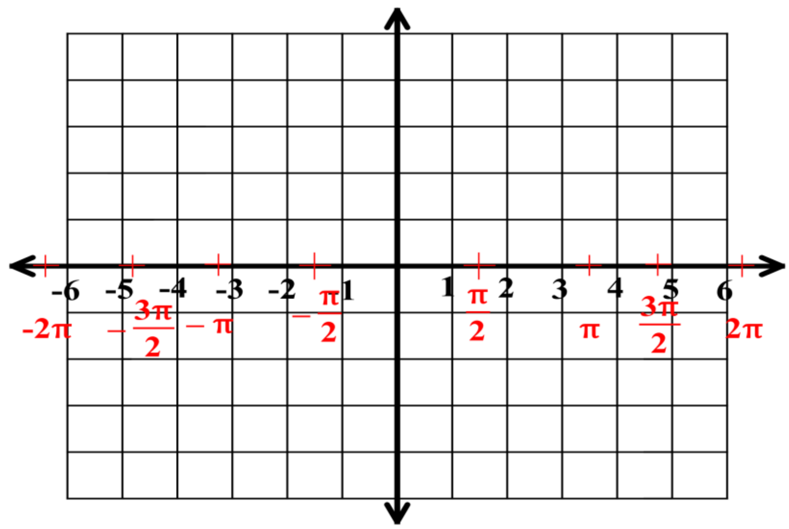
P = ____________

D: ____________

R: ____________

GAP: ____________

Example 3: $y = -2sec\left(\frac{\pi}{2}x\right)+1$



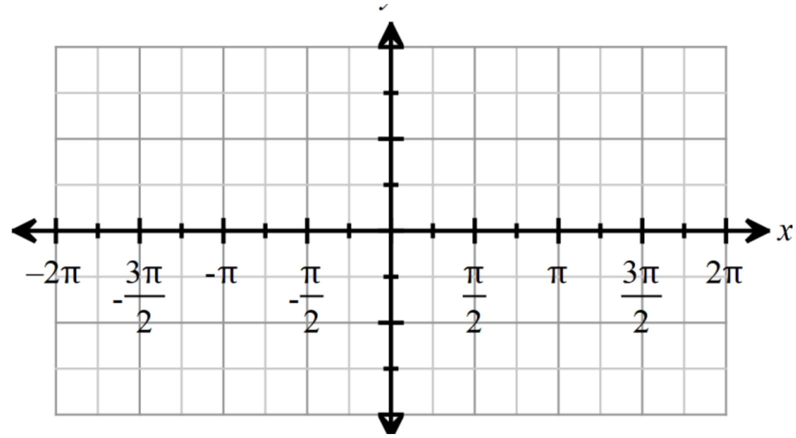
P = ____________

D: ____________

R: ____________

GAP: ____________

Example 4: $y = csc\left(\frac{2}{3}x\right)$



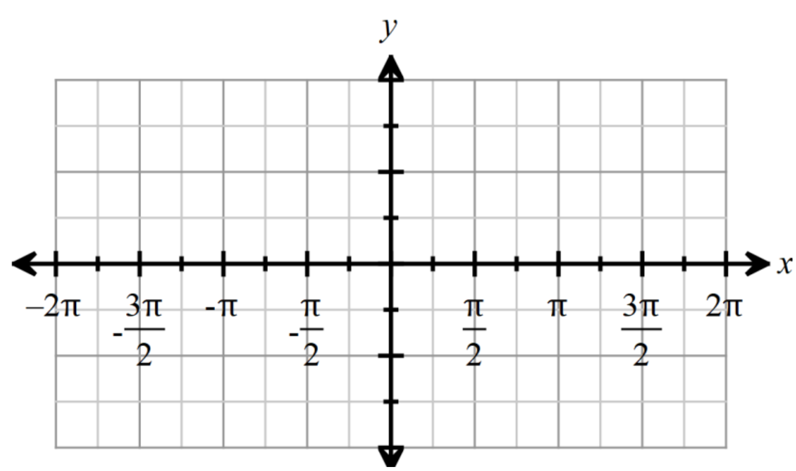
P = ____________

D: ____________

R: ____________

GAP: ____________

Example 5: $y = -2sec2\left(x - \frac{\pi}{4}\right)$



A = ____________

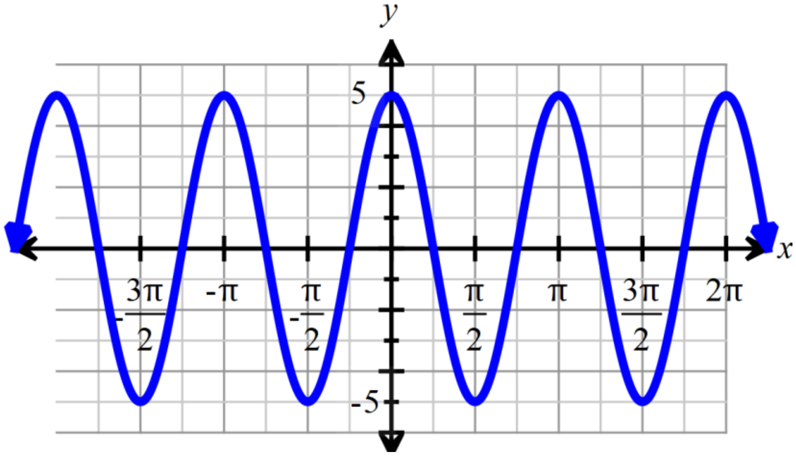
P = ____________

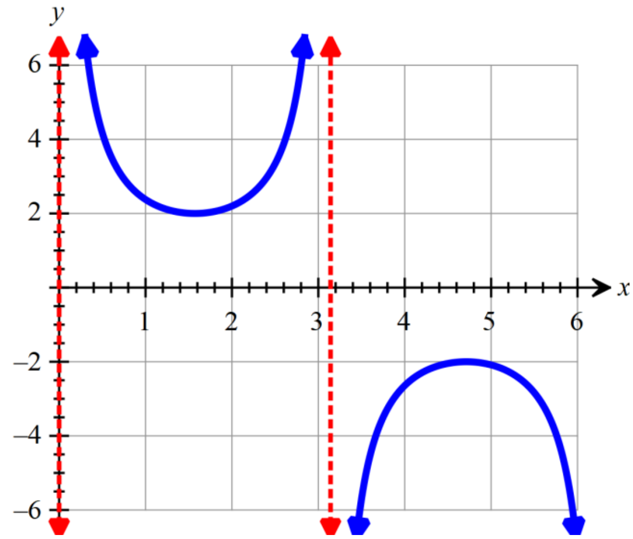
D: ____________

R: ____________

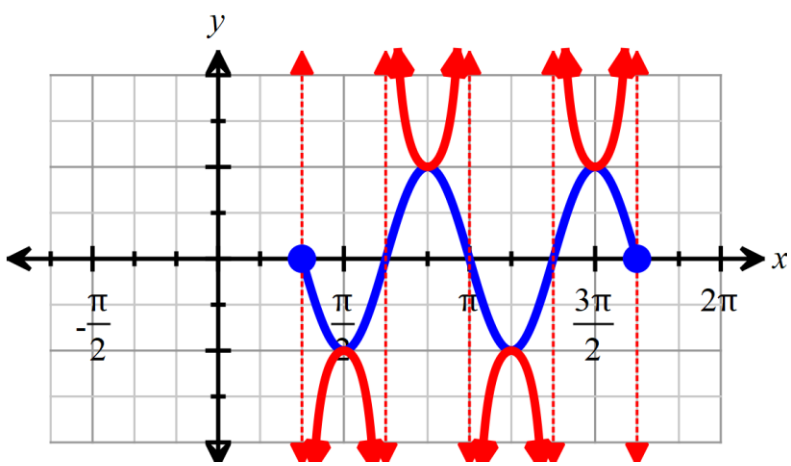
GAP: ____________

Write an equation for each graph.





What is the graph of the blue and red lines below?



Day 4.6A – Graphing $tan(x)$ & $cot(x)$

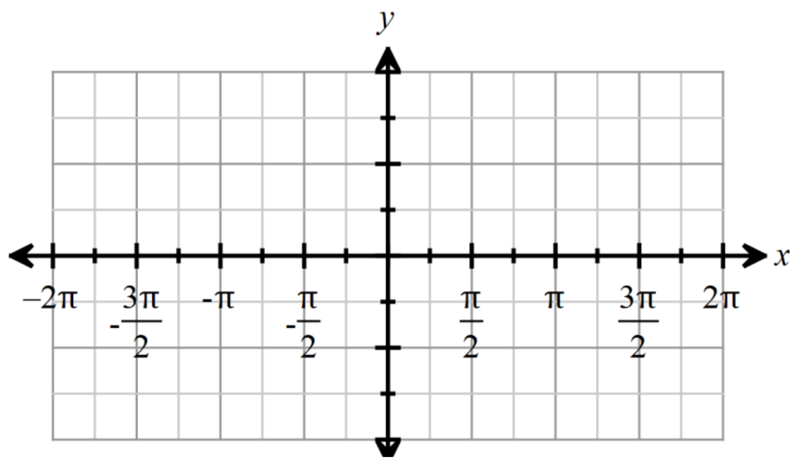
Objectives: SWBAT Graph $cot(x)$ and $tan(x)$ base graphs as well as graphs with phase shifts

Review Questions of the day:

1. Find the amplitude, period, and phase shift of $y = -2cos2(x - \pi)$
2. What is $csc\left(\frac{\pi}{4}\right)$?
3. If $cos(x) = \frac{3}{5}$ and x is in Quadrant IV, find $sin(x)$.

Graph the following using 2 different colors.

Example 1: $y = tan(x)$ and $y = -tan(x)$



A = ___________

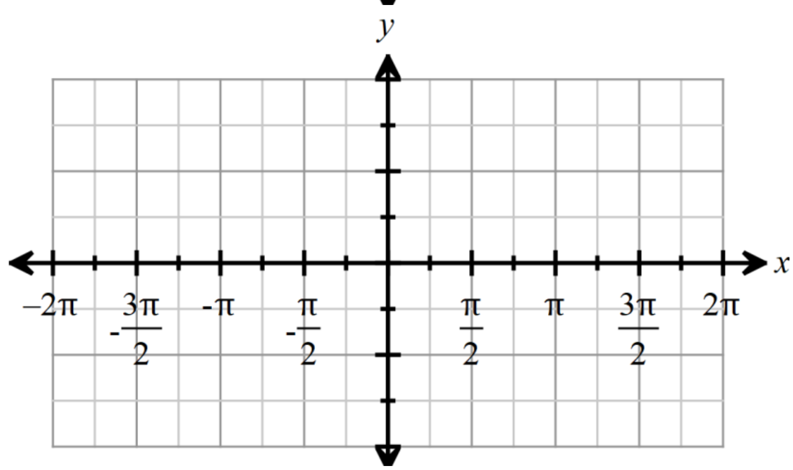
P = ___________

D: ___________

R: ___________

GAP: ___________

Example 2: $y = cot(x)$ and $y = -cot(x)$



A = ___________

P = ___________

D: ___________

R: ___________

GAP: ___________

The **Period** for $tan(x)$ and $cot(x)$ is __________________. **This will also be the distance between the asymptotes.**

The **Range** is always ______________________

The **Domain** can be found by selecting a **Vertical Asymptote** on the graph and adding the ____________________ amount times n, where n is an integer … keep in mind that the graphs of $tan(x)$ and $cot(x)$ do **not have Amplitudes**

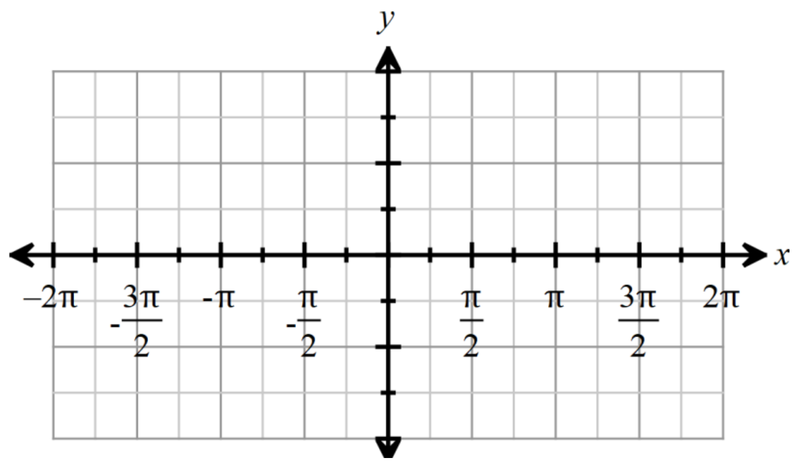
GAP amount will be the __________________ divided by _____________. This is the amount from a vertical asymptote to the center of the graph.

When applying your Phase Shift.... know the patterns:

$y = tan(x)$ $\qquad\qquad$ $y = cot(x)$

<u>Graph the following using 2 different colors.</u>

Example 3: $y = 2\tan(x)$ and $y = 2tan(x) + 2$



P = ___________

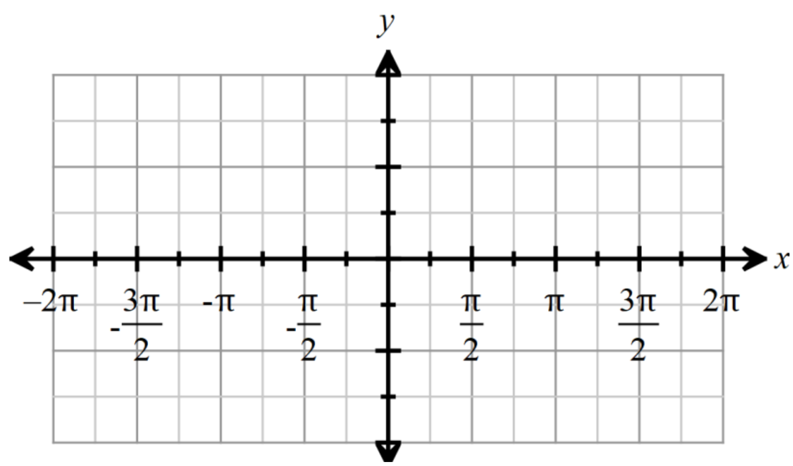
D = ___________

R: ___________

VS: ___________

GAP: ___________

Example 4: $y = -cot(x - \pi)$



P = ___________

D = ___________

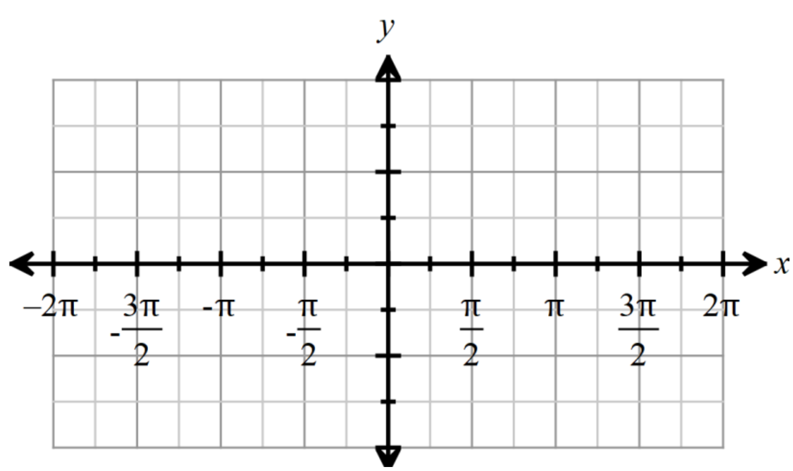
R: ___________

PS: ___________

GAP: ___________

What is another equation of this graph?

Example 5: $y = tan\left(x + \frac{\pi}{4}\right)$



P = ___________

D = ___________

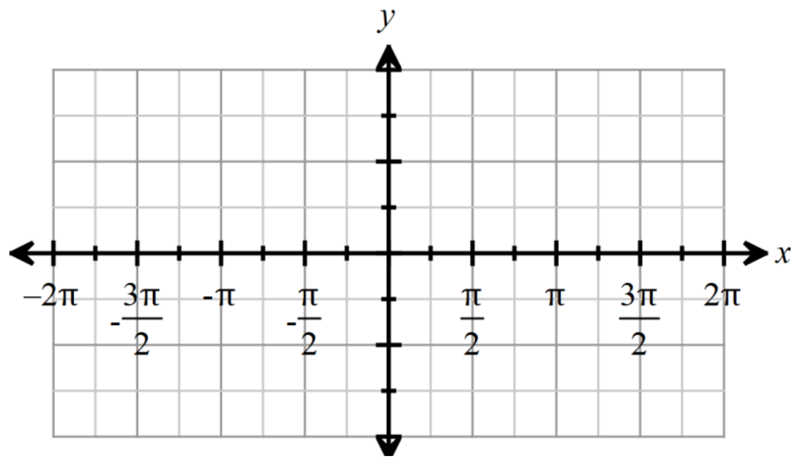
R: ___________

PS: ___________

GAP: ___________

What is another equation of this graph?

Example 6: $y = -2cot\left(x - \frac{\pi}{2}\right) - 1$



P = ____________

D = ____________

R: ____________

PS: ____________

GAP: ____________

VS: ____________

<u>Day 4.6B – Graphing $tan(x)$ & $cot(x)$ with Compressions and Stretches</u>

Objectives: SWBAT Graph $cot(x)$ and $tan(x)$ with compressions and stretches

<u>Review Questions of the day:</u>

1) Find the amplitude, period, and phase shift of $y = -2sin3(x - \pi)$

2) What is $sec\left(\frac{\pi}{4}\right)$?

3) If $\cos(x) = \frac{12}{13}$ and x is in Quadrant IV, find $sin(x)$.

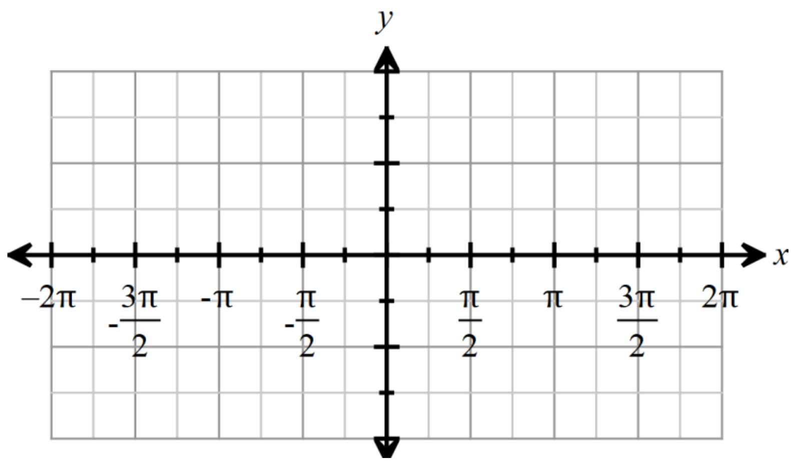
Example 1: $y = tan(2x)$ Lightly with pencil or in a light color, graph $y = \tan(x)$

P = ____________

D = ____________

R: ____________

GAP: ____________



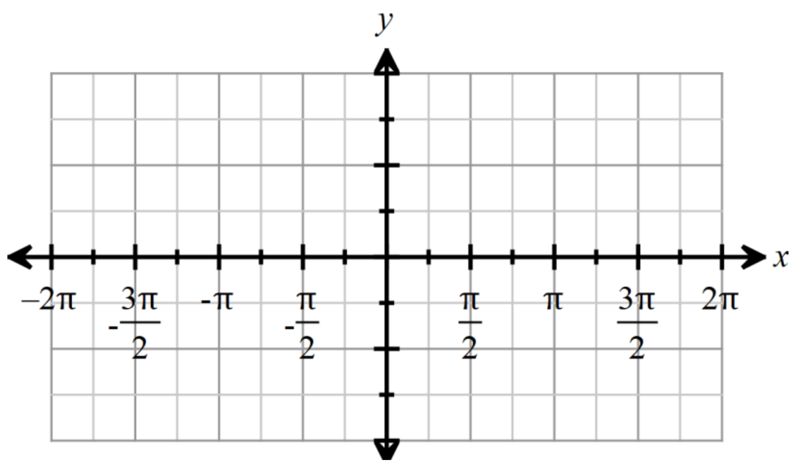
Example 2: Graph $y = cot(3x)$ (Lightly with pencil or in a light color, graph $y = cot(x)$

P = ____________

D = ____________

R: ____________

GAP: ____________



<u>GUIDELINES:</u>

Domain: $\boldsymbol{x \neq}$ **V.A. + period** $\boldsymbol{n}$ where n is an integer Use this for both $tan(x)$ and $cot(x)$. GAP amount will be the ____________ divided by ____________. This is the amount from a vertical asymptote to the center of the graph. Use this for both $tan(x)$ and $cot(x)$.

Example 3: Graph $y = -tan(.5x) + 1$

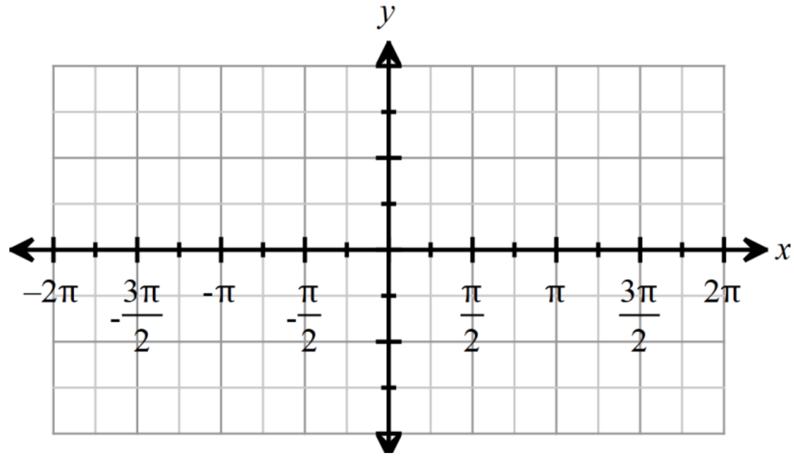
P = ___________

D = ___________

R: ___________

VS: ___________

GAP: ___________



STEPS for Graphing when there is a phase shift and a compression or stretch

- Start at the **phase shift**
- Go the **GAP amount (period/2)** to get to a VA for $tan(x)$ and to the "center" for $cot(x)$
- Draw the increasing or decreasing function…look at coefficient and function to decide

REMEMBER THE PATTERNS AND SIMPLY MAKE THE TRANSFORMATIONS

$y = tan(x)$ (starts at center of snake then go to VA)
$y = cot(x)$ (starts at VA then go to center of snake)

Example 4: $y = -cot(2x - 2\pi)$

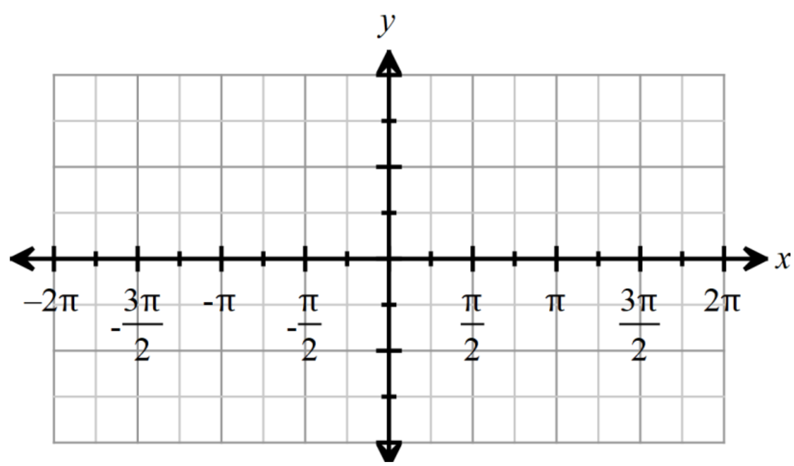
P = ___________

D = ___________

R: ___________

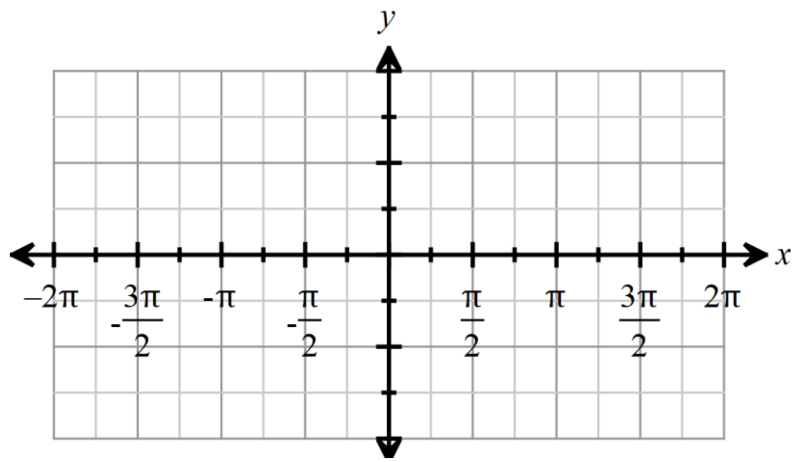
VS: ___________

GAP: ___________



Another Equation for this graph?

Example 5: $y = tan\frac{1}{2}\left(x + \frac{\pi}{4}\right)$



P = ____________

D = ____________

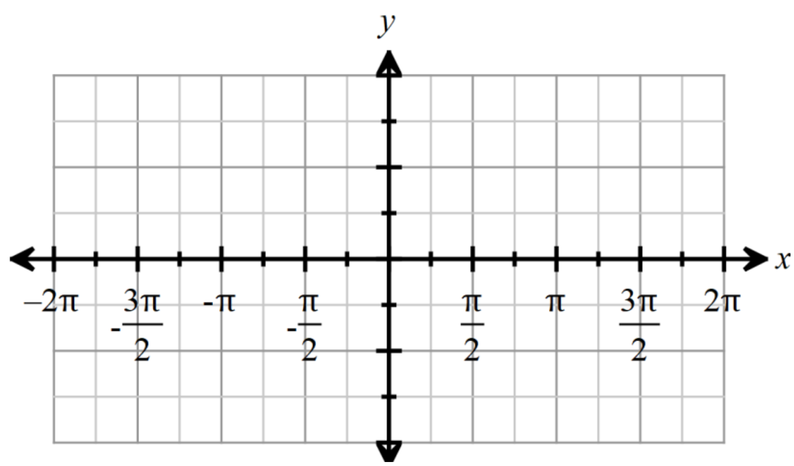
R: ____________

PS: ____________

GAP: ____________

Another Equation for this graph?

Example 6: $y = -cot4\left(x - \frac{\pi}{2}\right)$



P = ____________

D = ____________

R: ____________

VS: ____________

GAP: ____________

Day 4.6C – Graphing $tan(x)$ & $cot(x)$ with all Transformations

Objectives: SWBAT Graph $cot(x)$ and $tan(x)$ with all Transformations

Review Questions of the day:

1) What is the period of $cos(3x)$?

2) What is the period of $cot(4x)$?

Graph each of the following and include the following information.

1) $y = tan(2x) + 1$

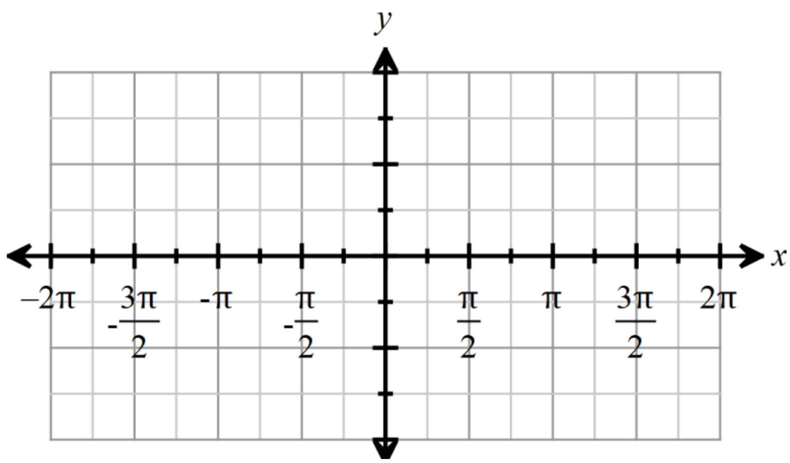
P = ____________

PS = ____________

D: ____________

R: ____________

GAP: ____________



2) $y = cot.5(x + \pi)$

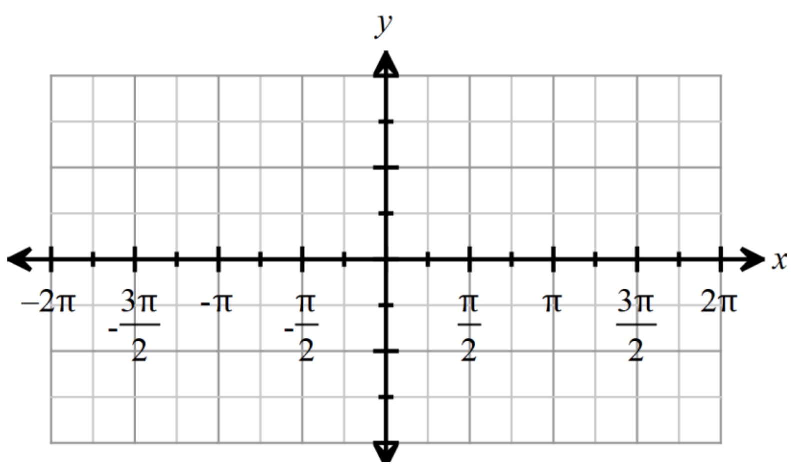
P = ____________

PS = ____________

D: ____________

R: ____________

GAP: ____________



3) $y = tan2(x - \pi/4)$

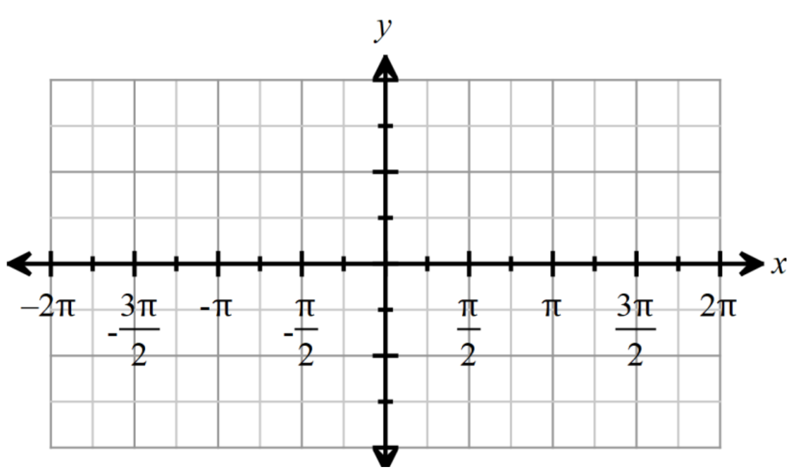
P = ____________

PS = ____________

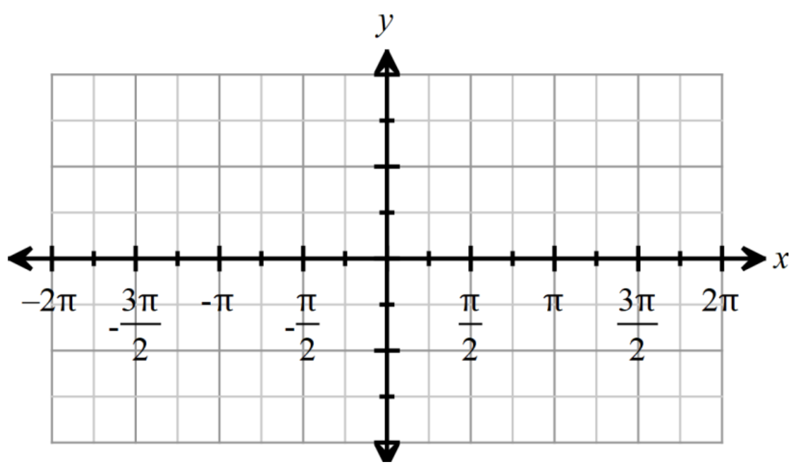
D: ____________

R: ____________

GAP: ____________



4) $y = -cot.5\left(x - \frac{\pi}{4}\right)$



P = ____________

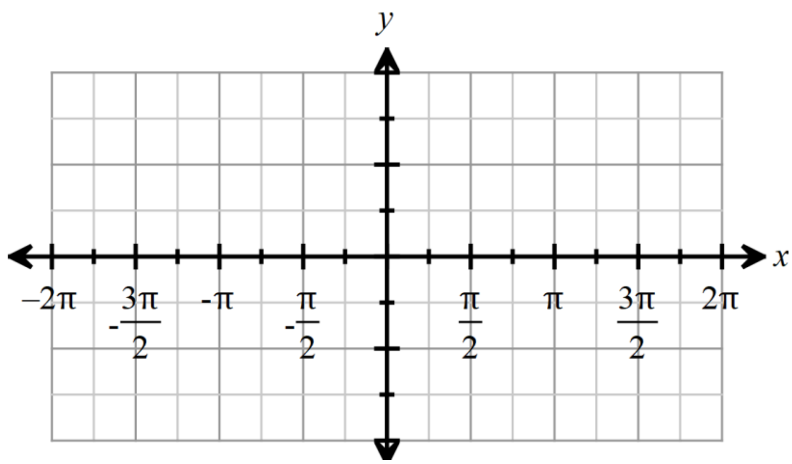
PS = ____________

D: ____________

R: ____________

GAP: ____________

5) $y = -2cot(2x + \pi) + 1$



P = ____________

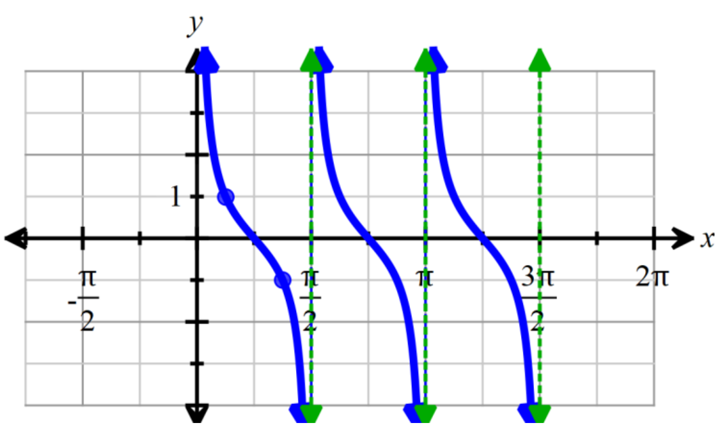
PS = ____________

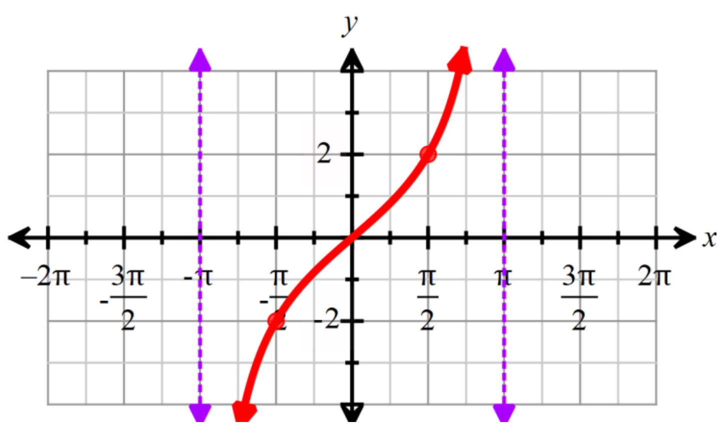
D: ____________

R: ____________

GAP: ____________

<u>Given the following graphs below, write the equation, domain, and range for each.</u>





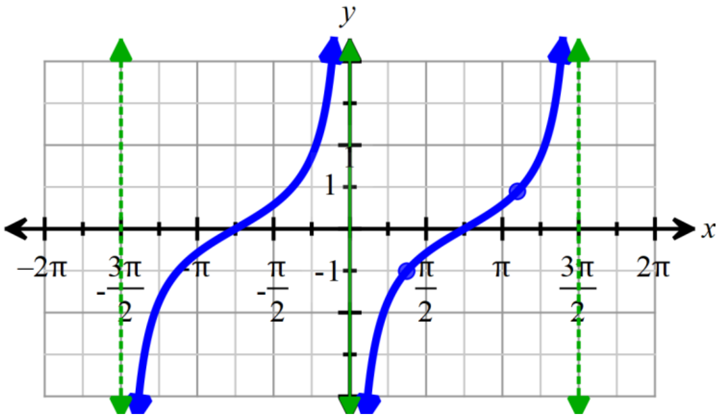
6) Equation: ____________________________

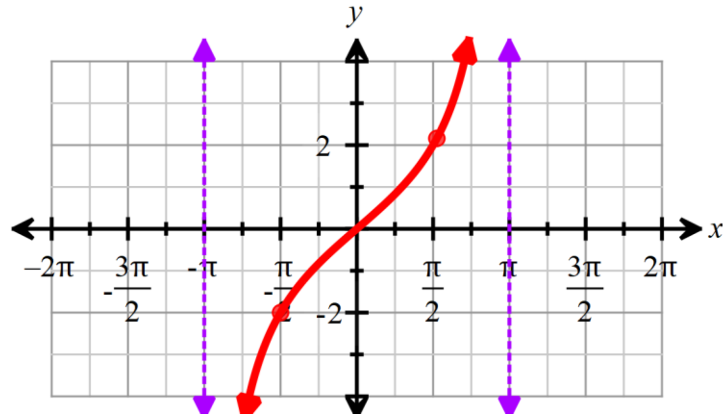
D: ________________ **R:** ________________

7) Equation: ____________________________

D: ________________ **R:** ________________

Given the following graphs below, write the equation, domain, and range for each.



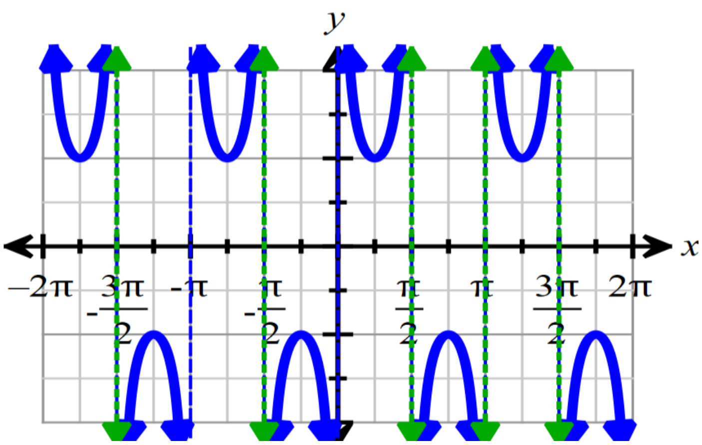


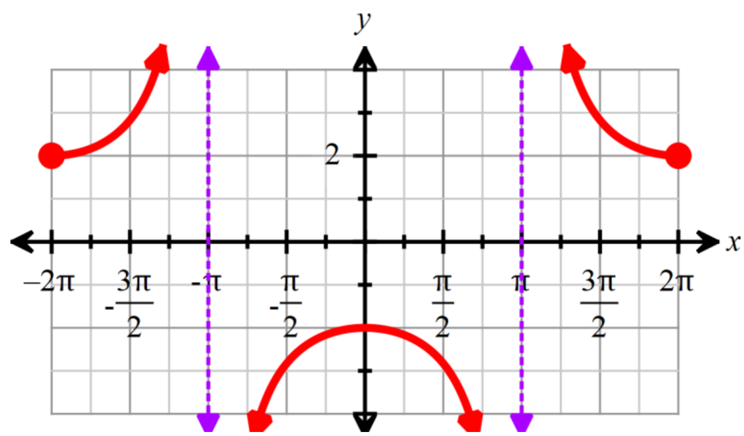
8) Equation: ___________________________

D: ________________ **R:** ________________

9) Equation: ________________________________

D: ________________ **R:** ________________





10) Equation: ___________________________

D: ________________ **R:** ________________

11) Equation: ________________________________

D: ________________ **R:** ________________

Day 4.7 – Inverses and Principal Values

Objectives: SWBAT Find the value of inverse trig functions, both without and with a calculator. Sketch inverse trig functions. State the domain and range of inverse trig functions.

Review Questions of the day:

1) What is the range for the graph of $y = -7cos(x)$?

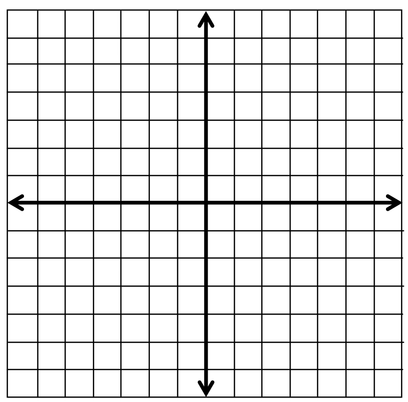
2) What is the range for the graph of $y = 2csc(x)$?

3) If $\tan(A) = \frac{3}{7}$, what are the possible values of angle A within $[0, 360^0)$?

4) From Algebra, what are the 2 steps we take to find an inverse?

Let's use these to find the inverse of $y = x^2$ and sketch their graphs in the same $x - y$ plane.

$y = x^2$	
x	y



$y = \pm\sqrt{x}$	
x	y

Is this inverse a function?

Vertical Line Test:

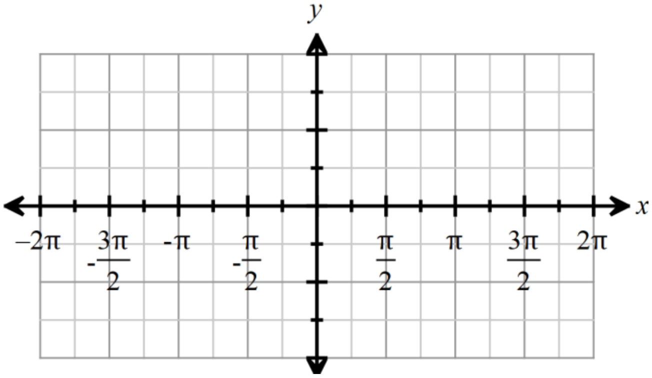
Horizontal Line Test:

Why does the calculator only give us 5 when we type in $\sqrt{25}$ when $(-5)^2$ also equals 25?

Trig Inverses work in the same exact way. An inverse of a trig function is NOT a function unless we restrict its domain. When we restrict their domain, the values are called ________________________________ values.

Consider the base graphs for $cos(x)$, $sin(x)$, and $tan(x)$. Sketch them here:

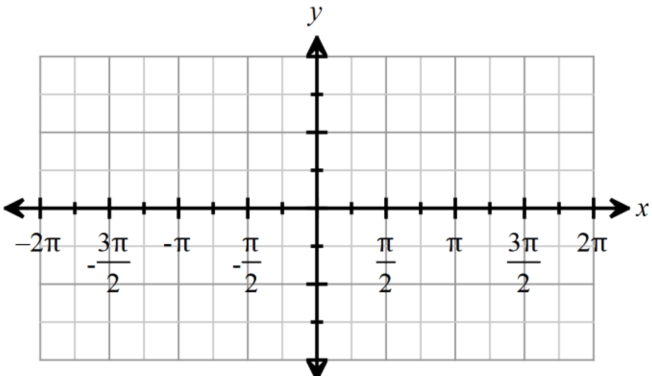
$y = \cos(x)$



For what x values does y = 1?

For what x values does y = $\frac{-1}{2}$?

$y = sin(x)$



For which x values does y = 1?

For what x values does y = $\frac{-1}{2}$?

Discovering principal values for cosine…

Evaluate each by using your calculator. Get in degree mode so it is easier for you to recognize the angles.

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

Ex.4 $cos^{-1}\left(-\frac{2}{3}\right)$ **Ex.5** $cos^{-1}\left(-\frac{3}{4}\right)$ **Ex. 6** $cos^{-1}\left(-\frac{7}{8}\right)$

So for cosines, the principal values are in Quadrants _____________ or ______________.

PRINCIPAL VALUES FOR $y = \cos(x)$

Quadrants _____________ or ______________.

Repeat for sine.

Ex.7 $sin^{-1}\left(\frac{1}{2}\right)$

Ex. 8 $sin^{-1}\left(\frac{\sqrt{2}}{2}\right)$

Ex. 9 $sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

Ex.10 $sin^{-1}\left(-\frac{2}{3}\right)$

Ex.11 $sin^{-1}\left(-\frac{3}{4}\right)$

Ex. 12 $sin^{-1}\left(-\frac{7}{8}\right)$

So for sine, the principal values are in Quadrants ____________ or _____________.

PRINCIPAL VALUES FOR $y = sin(x)$

[,]

Now investigate tangent.

Ex. 13 $tan^{-1}(1))$

Ex.14 $tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$

Ex.15 $tan^{-1}(-\sqrt{3})$

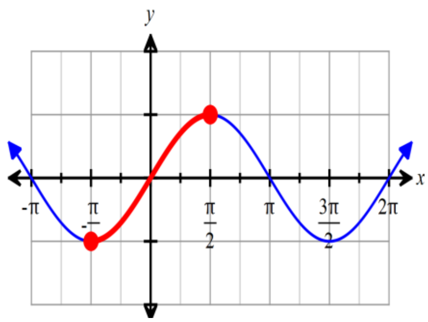
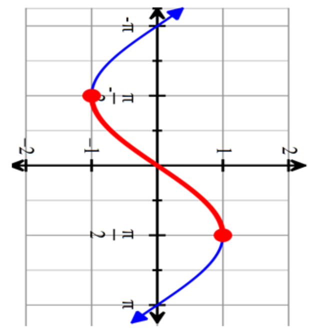
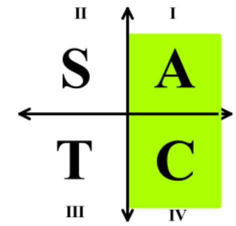
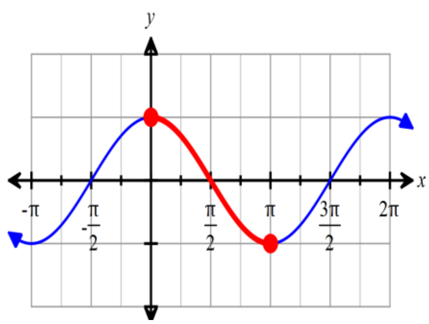
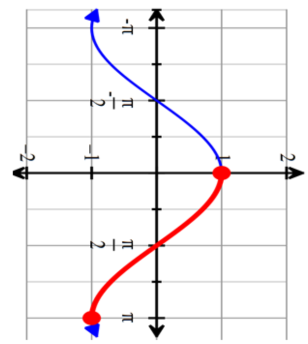
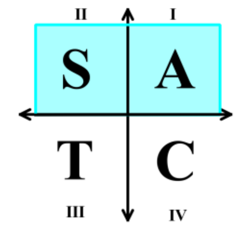
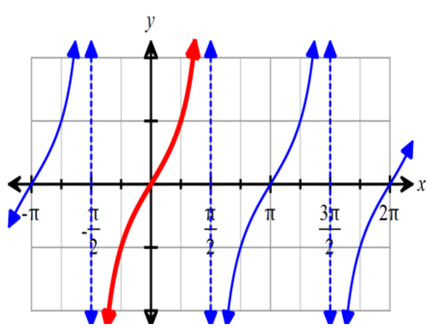
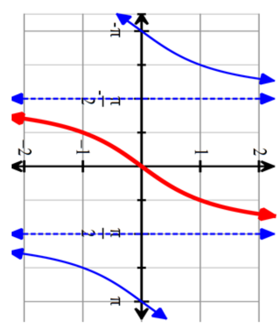
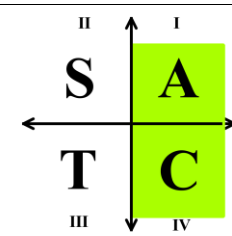
Ex. 16 $tan^{-1}(-2)$

So for tangent, the principal values are in Quadrants ____________ or _____________.

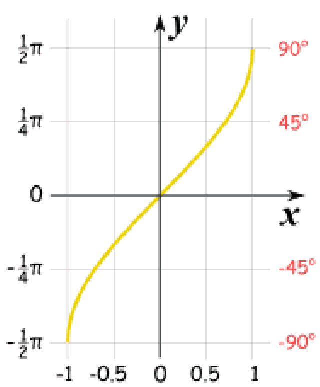
PRINCIPAL VALUES FOR $y = tan(x)$

(,)

Why does the interval need to be open for $tan(x)$?

Graph	Function	Inverse	Principal Values
Sin			
Cos			
Tan			

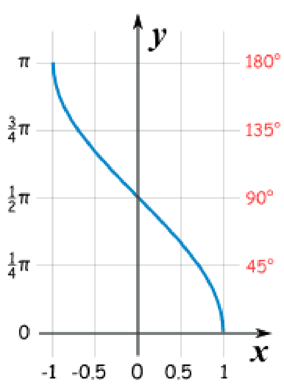
<u>Label each one as $y = sin^{-1}(x)$, $y = cos^{-1}(x)$, or $y = tan^{-1}(x)$and write the domain and range for each.</u>



y = ___________

Domain:

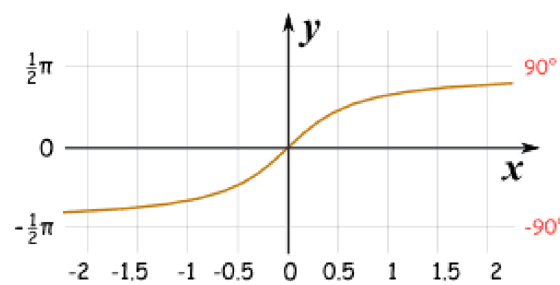
Range:



y = ____________

Domain:

Range:



y = _______________

Domain:

Range:

Calculator Examples: Round degree measures to the nearest minute.

$csc^{-1}(7)$ $sec^{-1}(3)$ $cot^{-1}(-2.4)$

Explain why $cos^{-1}(-9)$ doesn't work: ____

Day 4.7A – More Inverses and $x - y - r$

Objectives: SWBAT use inverse trig functions to find principal values. Know the principal values for each trig function. Use Pythagorean Theorem to find specific trig ratios.

Review Questions of the day:

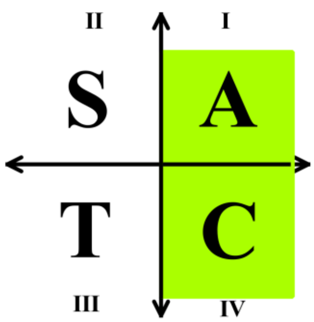
1) When $cot(x) = 0$, what is $cos(x)$?

2) When $sin(x) = \frac{\sqrt{2}}{2}$, then $cos(x)$ = ________ or ________.

3) When $\tan(x) = 1$ then $sin(x)$ = __________ or __________.

Principal Values

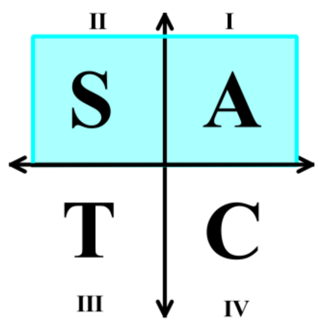
Sine



Degrees: _____________

Radians: _____________

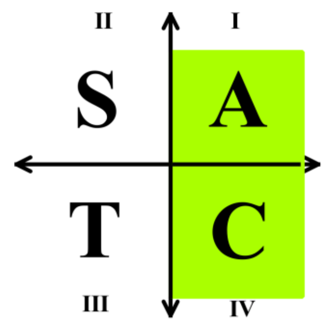
Cosine



Degrees: _____________

Radians: _____________

Tangent



Degrees: _____________

Radians: _____________

Find the value of each.

Ex. 1 $cos[sin^{-1}(1)]$

Ex. 2 $sin\left[cos^{-1}\left(\frac{\sqrt{2}}{2}\right)\right]$

Ex. 3 $tan[csc^{-1}(2)]$

Ex. 4 $cos\left[sin^{-1}\left(-\frac{1}{2}\right)\right]$

Ex. 5 $cot[sec^{-1}(-1)]$

Ex. 6 $sin[sin^{-1}(-1)]$

Ex. 7 $cos\left[cos^{-1}\left(\frac{\pi}{6}\right)\right]$

Ex. 8 $cos^{-1}\left[cos\left(\frac{7\pi}{6}\right)\right]$

Ex. 9 $sin^{-1}\left[sin\left(\frac{-\pi}{4}\right)\right]$

Ex. 10 $sin^{-1}\left[sin\left(\frac{7\pi}{4}\right)\right]$

When will $cos^{-1}[cos(x)] = x$? ____

When will $sin^{-1}[sin(x)] = x$? ____

When will $tan^{-1}[tan(x)] = x$? ____

Other way…

$\boldsymbol{sin^{-1}[sin(y)]} =$ __________ $\boldsymbol{cos^{-1}[cos(y)]} =$ __________ $\boldsymbol{tan^{-1}[tan(y)]} =$ __________

Find the exact value of each without using a calculator. Use $\boldsymbol{x^2 + y^2} =$ __________

Ex. 11 $cos\left[sin^{-1}\left(\frac{4}{5}\right)\right]$

Ex. 12 $sin\left[cos^{-1}\left(\frac{-12}{13}\right)\right]$

Ex. 13 $tan[csc^{-1}(-3)]$

Ex. 14 $csc\left[sin^{-1}\left(\frac{-1}{5}\right)\right]$

Check each of the above on your calculator.

Day 4.7B – Inverses with SOH-CAH-TOA, and Domain & Range of Inverses

Objectives: SWBAT rewrite trig expressions using SOH-CAH-TOA and $a^2 + b^2 = c^2$. Discuss the domain and range of inverse trig graphs. Use inverse trig functions..

Review Questions of the day:

1) Find $cos^{-1}\left(\frac{1}{2}\right) + sin^{-1}\left(\frac{1}{2}\right)$

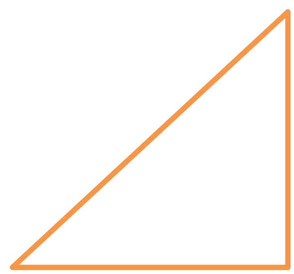
2) Find $cos[sin^{-1}(1)] + \cos(0)$

3) If $tan(x) = -1$ then $sec(x)$ = _____ or _____.

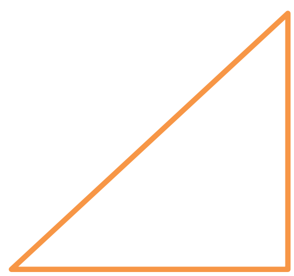
4) Explain what SOH−CAH−TOA means.

Write each expression as an algebraic expression of *x*. Assume *x* is positive.

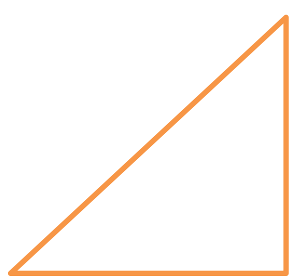
Ex. 1 $sin[cos^{-1}(x)]$



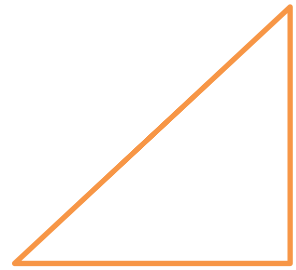
Ex. 2 $csc\left[sin^{-1}\left(\frac{x}{3}\right)\right]$



Ex. 3 $sin[cos^{-1}(3x)]$



Ex. 4 $cos[tan^{-1}(x)]$

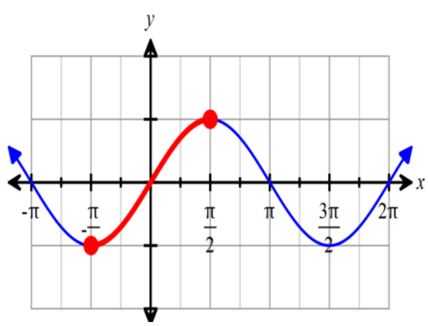
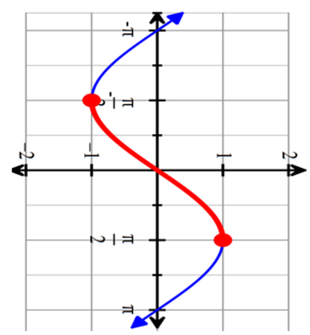
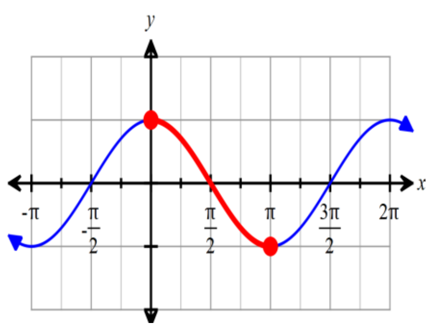
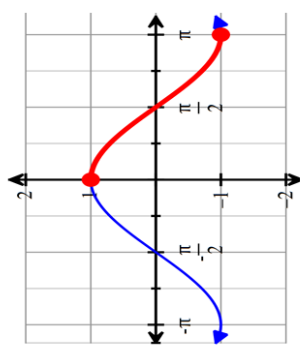
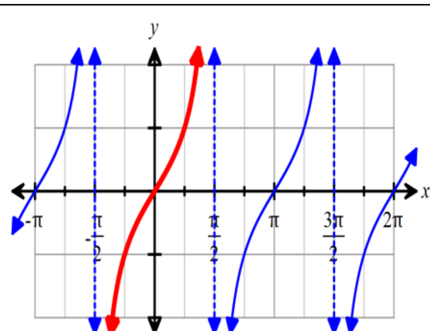
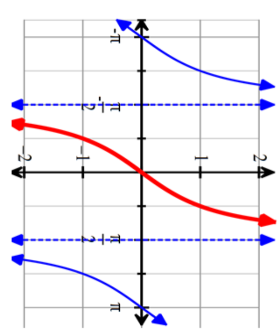


Domain or Input:

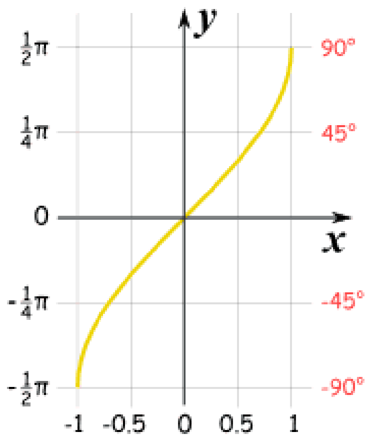
Range or Output:

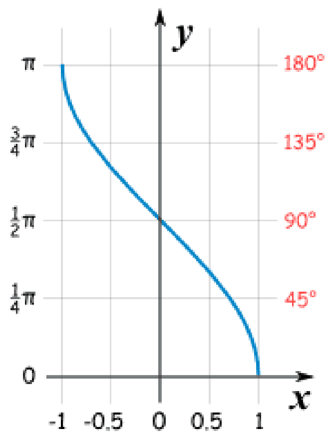
Vertical Line Test:

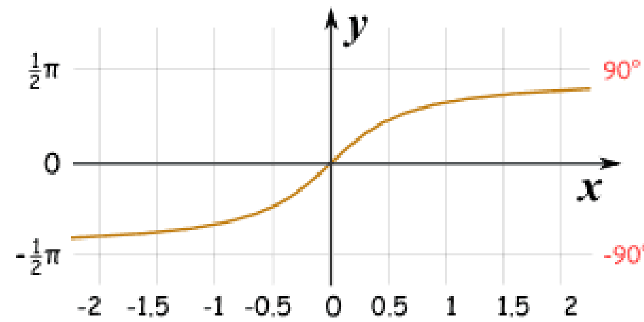
Horizontal Line Test:

Graph	Function	Inverse	Domain / Range of Inverses	
Sin			D:	
			R:	
Cos			D:	
			R:	
Tan			D:	
			R:	

Label each one as either $y = sin^{-1}(x)$, $y = cos^{-1}(x)$, or $y = tan^{-1}(x)$. Then write the domain and range for each.







y = ____________ y = _____________ y = ________________

Domain: ___________ Domain: ___________ Domain: ___________

Range: ___________ Range: ___________ Range: ___________

When working with compositional trig functions, always start with the ____________________________ and then work __________________________.

Find the domain and range of each trig expression by using the above inverse graphs as a guide.

Ex. 5 $y = cos[sin^{-1}(x)]$

Ex. 6 $y = sin[cos^{-1}(x)]$

Ex. 7 $y = tan[tan^{-1}(x)]$

Domain: ___________ Domain: ___________ Domain: ___________

Range: ___________ Range: ___________ Range: ___________

Simplify each trig expression. Do NOT use a calculator.

Ex. 8 $sin(0) + cos^{-1}(1) + 2\tan(0) - cos^{-1}\left(\frac{1}{2}\right)$

Ex. 9 $cos\left[tan^{-1}\left(\frac{8}{7}\right)\right]$))