More Graphing!

Sine and Cosine Graphs

Graphs from Yesterday

#1 $y = -2\sin(\theta + 120^\circ) + 1$

#2 $y = \cos(\theta - 30^\circ) - 4$

#3 $y = 5\cos(\theta + 45^\circ) - 2$

	Amplitude	Eq'n Central Axis	Period Length	Phase Shift
#1	2	$y = 1$	360°	Left 120°
#2	1	$y = -4$	360°	right 30°
#3	5	$y = -2$	360°	Left 45°

MORE TRIG GRAPHS

this means $y = \sin\theta$ or $y = \cos\theta$

Graph each of the following sinusoidal functions and determine the amplitude, the period length, the phase shift, the equation of the central axis and any reflections.

Example #1 $y = 2\sin(2\theta - 90) + 3$

* FACTOR * $\rightarrow y = 2\sin(\underbrace{2}_{\text{"k"}}(\theta - 45)) + 3$

$(\theta, y) \rightarrow (\frac{1}{2}\theta + 45, 2y + 3)$

θ	y
0	0
90	1
180	0
270	-1
360	0

$\rightarrow$

θ	y
45	3
90	5
135	3
180	1
225	3

Amp: 2

PL: 180°

CA: $y = 3$

P.S. right 45°

No reflection

$PL = \frac{360}{k} = \frac{360}{2} = 180^\circ$

Example #2

$$y = -\cos(3\theta - 45) - 2$$

FACTOR → $y = -\cos(3(\theta - 15)) - 2$

$(\theta, y) \to (\frac{1}{3}\theta + 15, -y - 2)$ "k"

Graph: $-360^\circ \le \theta \le 360^\circ$

θ	y
0	1
90	0
180	-1
270	0
360	1

→

θ	y
15	-3
45	-2
75	-1
105	-2
135	-3

Amp: 1

PL: 120°

C.A. $y = -2$

P.S. right 15°

reflect over x-axis

$PL = \frac{360}{k} = \frac{360}{3} = 120^\circ$

Example #3

$$y = -2\cos(\frac{1}{2}\theta + 30) + 4$$

FACTOR → $y = -2\cos(\frac{1}{2}(\theta + 60^\circ)) + 4$

$(\theta, y) \to (2\theta - 60, -2y + 4)$ "k"

θ	y
0	1
90	0
180	-1
270	0
360	1

→

θ	y
-60	2
120	4
300	6
480	4
660	2

Amp: 2

PL: 720°

C.A. $y = 4$

PS Left 60°

reflect over x-axis

$PL = \frac{360}{k} = \frac{360}{\frac{1}{2}} = 720$

Homework

Understanding Period Length, Phase Shift and Amplitude

Fill in the following table:

reflection?	FUNCTION	Vertical Shift/Central axis	Phase Shift	Amplitude	Period Length	Range
none	y= 3 sinθ	y=0	none	3	360°	-3≤y≤3
none	y= 2 cosθ - 3	y=-3	none	2	360°	-5≤y≤-1
none	y=2cos(θ-60°)	y=0	right 60°	2	360°	-2≤y≤2
none	y=sin(θ+45°)-1	y=-1	left 45°	1	360°	-2≤y≤0
over x-axis	y=-5cos3θ - 2 (θ,y)→(⅓θ, -5y-2)	y=-2	none	5	120°	-7≤y≤3
over y-axis	y=4sin(-θ-30°) -1 y=4sin(-(θ+30)) -1 (θ,y)→(-θ-30, 4y-1)	y=-1	right 30°	4	360°	-5≤y≤3
none	y= sin(2θ – 180°) + 3 y=sin(2(θ-90)) +3 (θ,y)→(½θ+90, y+3)	y=3	none 90°	1	180°	2≤y≤4
over x-axis	y= -2cos(4θ – 90°) -1 y=-2cos(4(θ-22.5)) -1 (θ,y)→(¼θ+22.5, -2y-1)	y=-1	right 22.5°	2	90°	-3≤y≤1