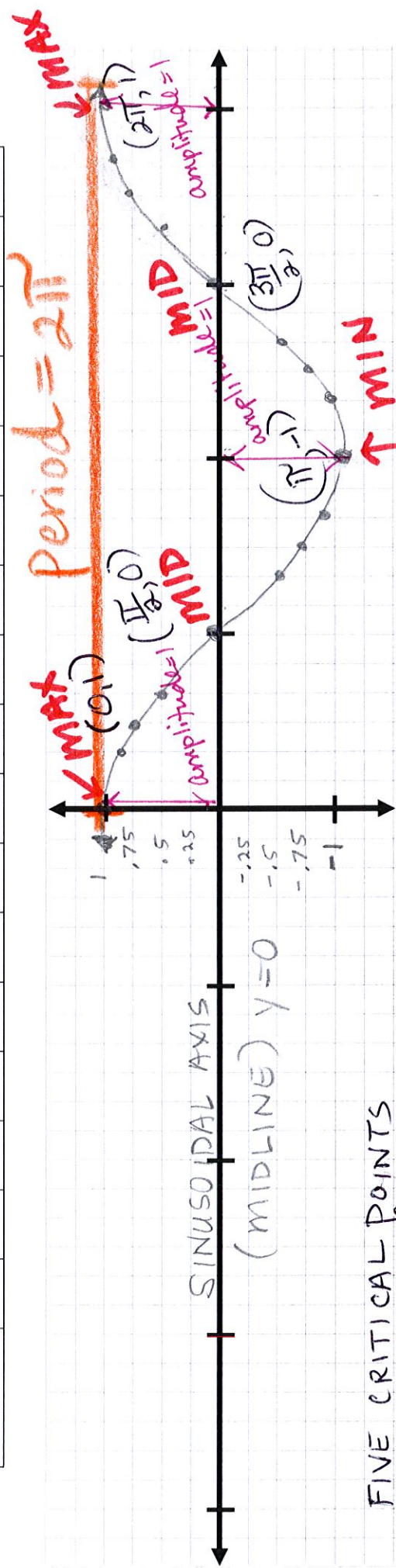


- period: the distance required before the graph pattern repeats (measure from peak to peak)
- divide period by 4 to determine interval spacing

$$y = \cos(x)$$

Degrees	0	30	45	60	90	120	135	150	180	210	225	240	270	300	315	330	360
Radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
Exact	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
Approx.	1	.87	.71	.5	0	-.5	-.71	-.87	-1	-.87	-.71	-.5	0	.5	.71	.87	1



FIVE CRITICAL POINTS
FOR COSINE

X	y	
0	1	MAXIMUM
$\frac{\pi}{2}$	0	MIDLIN
π	-1	MINIMUM
$\frac{3\pi}{2}$	0	MIDLIN
2π	1	MAXIMUM

x Scale 1 box = 15 degrees ($\frac{\pi}{12}$)

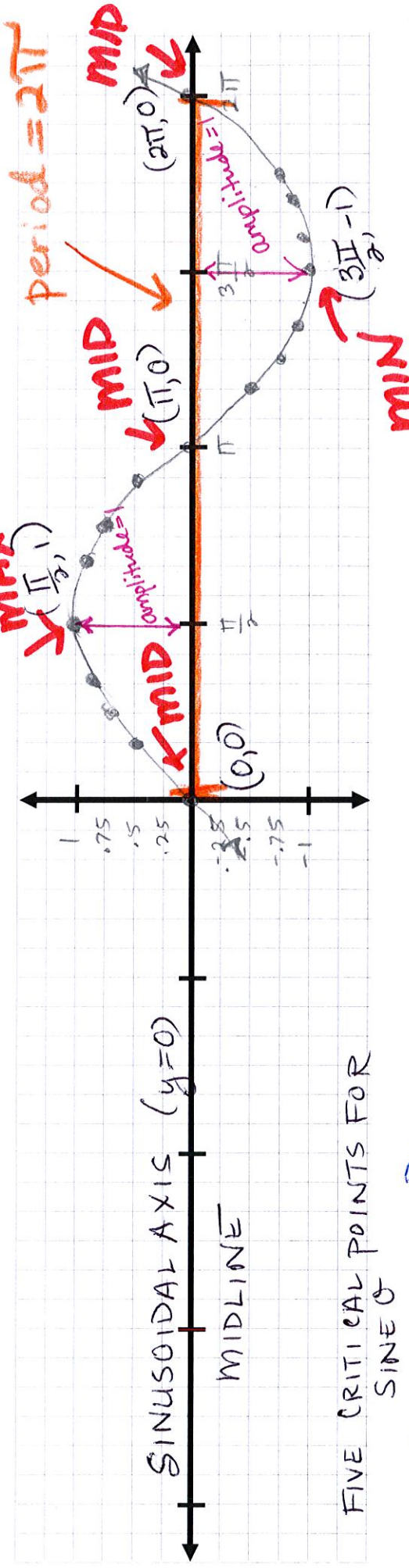
MEMORIZE THIS!

amplitude: distance from midline to each max/min value. to determine, find absolute value of coefficient

Name _____

$y = \sin(x)$

Degrees	0	30	45	60	90	120	135	150	180	210	225	240	270	300	315	330	360
Radians	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{5\pi}{4}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{7\pi}{4}$	$\frac{11\pi}{6}$	2π
Exact	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{1}{2}$	0
Approx.	0	.5	.71	.87	1	.87	.71	.5	0	-.5	-.71	-.87	-1	-.87	-.71	-.5	0



X scale : 1 box = 15 degrees ($\frac{\pi}{12}$)

FIVE CRITICAL POINTS FOR SINE 0

MEMORIZE THIS!

x	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
y	0	1	0	-1	0
	MIDLINE	MAXIMUM	MIDLINE	MINIMUM	MIDLINE

parent graph critical values:

θ	$\sin \theta$
0	0 MIDLINE
$\pi/2$	1 MAX
π	0 MIDLINE
$3\pi/2$	-1 MIN
2π	0 MIDLINE

θ	$\cos \theta$
0	1 MAX
$\pi/2$	0 MIDLINE
π	-1 MIN
$3\pi/2$	0 MIDLINE
2π	1 MAX

Sin/Cos Classwork

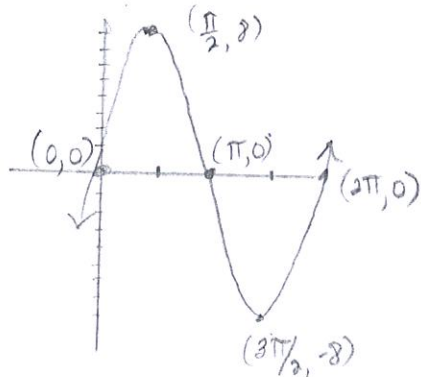
KNOW THESE VALUES!

Name _____

For each function, state the amplitude, period, intervals, and sinusoidal axis. Then graph one period.

1. $y = 8 \sin \theta$

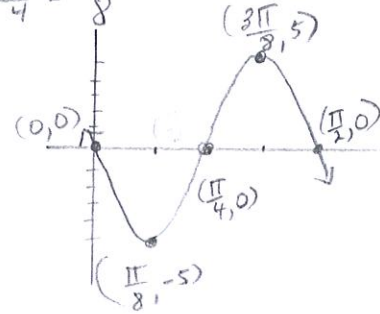
- A. amplitude = 8
- B. period = 2π
- C. intervals $\frac{2\pi}{4} = \frac{\pi}{2}$



2. $y = -5 \sin 4\theta$

- A. amplitude = $|-5| = 5$
- B. period = $\frac{2\pi}{4} = \frac{\pi}{2}$
- C. intervals occur $\frac{\pi}{4} = \frac{\pi}{8}$

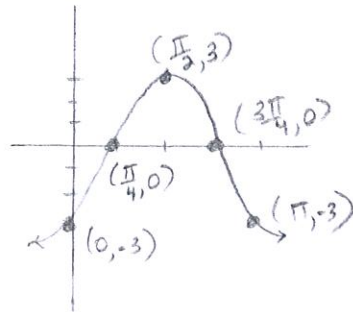
θ	$\sin \theta$
0	$0 \rightarrow 0$
$\frac{\pi}{8}$	$1 \rightarrow -5$
$\frac{\pi}{4}$	$0 \rightarrow 0$
$\frac{3\pi}{8}$	$-1 \rightarrow 5$
$\frac{\pi}{2}$	$0 \rightarrow 0$



θ	$\sin \theta$	multiply all by 8
0	$0 \rightarrow 0$	
$\pi/2$	$1 \rightarrow 8$	
π	$0 \rightarrow 0$	
$3\pi/2$	$-1 \rightarrow -8$	
2π	$0 \rightarrow 0$	

3. $y = -3 \cos 2\theta$

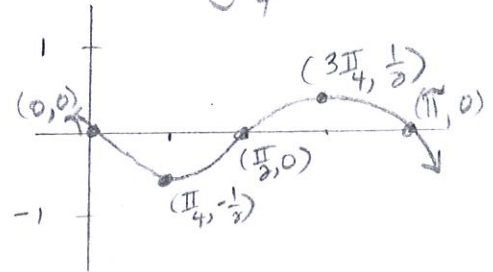
- A. amplitude = $|-3| = 3$
- B. period = $\frac{2\pi}{2} = \pi$
- C. intervals occur every $\frac{\pi}{4}$



4. $y = -\frac{1}{2} \sin 2\theta$

- A. amplitude = $|\frac{-1}{2}| = \frac{1}{2}$
- B. period = $\frac{2\pi}{2} = \pi$
- C. intervals occur every $\frac{\pi}{4}$

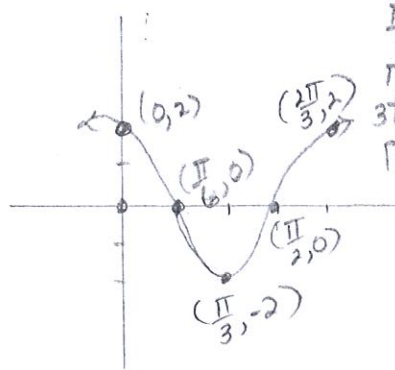
x	y
0	$0 \rightarrow 0$
$\frac{\pi}{4}$	$1 \rightarrow \frac{-1}{2}$
$\frac{\pi}{2}$	$0 \rightarrow 0$
$\frac{3\pi}{4}$	$-1 \rightarrow \frac{1}{2}$
π	$0 \rightarrow 0$



x	y
0	$1 \rightarrow -3$
$\pi/4$	$0 \rightarrow 0$
$\pi/2$	$-1 \rightarrow 3$
$3\pi/4$	$0 \rightarrow 0$
π	$1 \rightarrow -3$

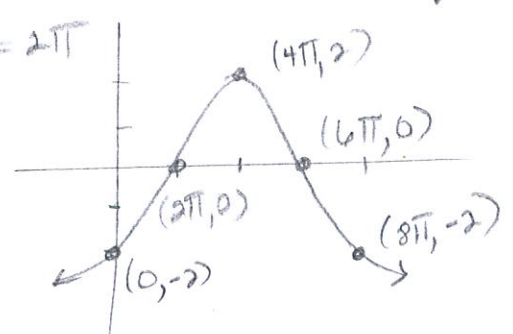
5. $y = 2 \cos 3\theta$

- A. amplitude = 2
- B. period = $\frac{2\pi}{3}$
- C. intervals occur every $\frac{2\pi}{3} \rightarrow \frac{2\pi}{12} = \frac{\pi}{6}$



6. $y = -2 \cos (\frac{1}{4} \theta)$

- A. amplitude = $|-2| = 2$
- B. period = $\frac{2\pi}{1/4} = 2\pi \cdot 4 = 8\pi$
- C. intervals occur every $\frac{8\pi}{4} = 2\pi$



x	y
0	$1 \rightarrow 2$
$\frac{\pi}{6}$	$0 \rightarrow 0$
$\frac{\pi}{3}$	$-1 \rightarrow -2$
$\frac{\pi}{2}$	$0 \rightarrow 0$
$\frac{2\pi}{3}$	$1 \rightarrow 2$

x	y
0	$1 \rightarrow -2$
2π	$0 \rightarrow 0$
4π	$-1 \rightarrow 2$
6π	$0 \rightarrow 0$
8π	$1 \rightarrow -2$

Sin/Cos Homework

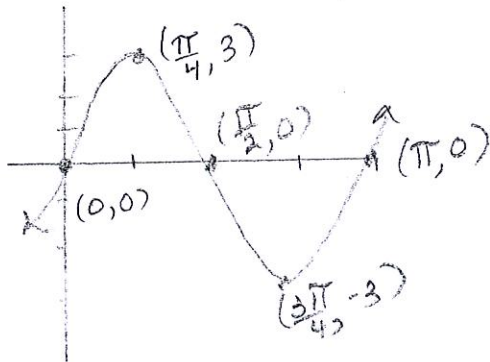
For each function, state the amplitude, period, intervals, and Midline. Then graph one period.

1. $y = 3 \sin 2\theta$

amplitude = 3

period = $\frac{2\pi}{2} = \pi$ ∴ intervals are $\frac{\pi}{4}$

x	y
0	0 → 0
$\frac{\pi}{4}$	1 → 3
$\frac{\pi}{2}$	0 → 0
$\frac{3\pi}{4}$	-1 → -3
π	0 → 0



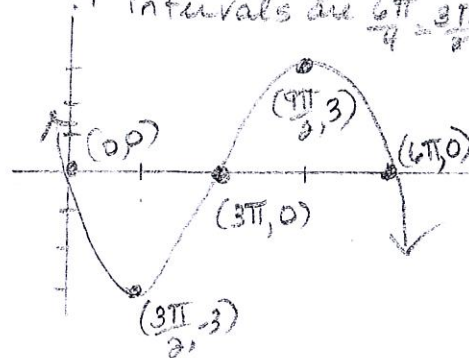
2. $y = -3 \sin \frac{1}{3}\theta$

amplitude = 3

period = $\frac{2\pi}{\frac{1}{3}} = 6\pi$

∴ intervals are $\frac{6\pi}{4} = \frac{3\pi}{2}$

x	y
0	0 → 0
$\frac{3\pi}{2}$	1 → -3
3π	0 → 0
$\frac{9\pi}{2}$	-1 → 3
6π	0 → 0



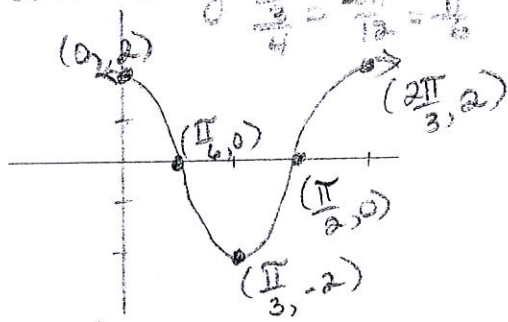
3. $y = 2 \cos 3\theta$

amplitude = 2

period = $\frac{2\pi}{3}$

intervals occur every $\frac{2\pi}{3} \times \frac{1}{4} = \frac{2\pi}{12} = \frac{\pi}{6}$

x	y
0	1 → 2
$\frac{\pi}{6}$	0 → 0
$\frac{\pi}{3}$	-1 → -2
$\frac{\pi}{2}$	0 → 0
$\frac{2\pi}{3}$	1 → 2



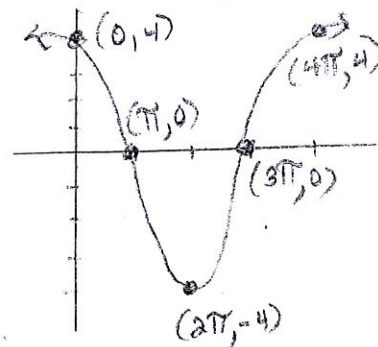
4. $y = 4 \cos \frac{1}{2}\theta$

amplitude = 4

period = $\frac{2\pi}{\frac{1}{2}} = 4\pi$

intervals occur every $\frac{4\pi}{4} = \pi$

x	y
0	1 → 4
π	0 → 0
2π	-1 → -4
3π	0 → 0
4π	1 → 4



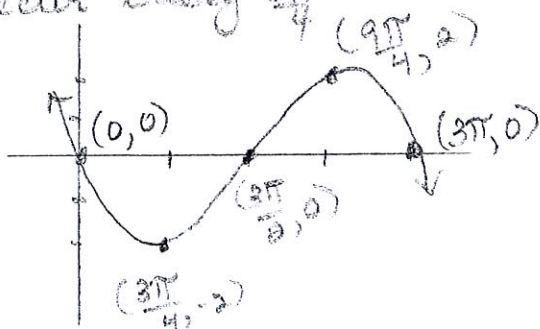
5. $y = -2 \sin \frac{2}{3}\theta$

amplitude = 2

period = $\frac{2\pi}{\frac{2}{3}} = 2\pi \times \frac{3}{2} = 3\pi$

intervals occur every $\frac{3\pi}{4}$

x	y
0	0 → 0
$\frac{3\pi}{4}$	1 → -2
$\frac{3\pi}{2}$	0 → 0
$\frac{9\pi}{4}$	-1 → 2
3π	0 → 0



6. $y = -5 \cos \frac{1}{10}\theta$

amplitude = 5

period = $\frac{2\pi}{\frac{1}{10}} = 2\pi \times 10 = 20\pi$

intervals occur every $\frac{20\pi}{4} = 5\pi$

x	y
0	1 → -5
5π	0 → 0
10π	-1 → 5
15π	0 → 0
20π	1 → -5

