

10.3

SM3 Graphing Sine and Cosine #3

Name _____ Date _____ Period key

Fill in the blanks for each equation.

1. $f(\theta) = 6 \sin 4(\theta - \pi) + 1$

Vertical Shift (k): up 1

Amplitude (a): 6

Phase Shift (h): right π

b: 4

Period: $\frac{2\pi}{4} = \frac{\pi}{2}$

$\frac{1}{2}$ of each line
2. $f(\theta) = 2 + \cos(\theta + \frac{\pi}{5})$

Vertical Shift (k): 2 (up)

Amplitude (a): 1

Phase Shift (h): left $\pi/5$

b: 1

Period: 2π

Fill in the vertical shift, amplitude, phase shift, and period. Then graph at least 1 period or cycle. Label 5 key points or make a table of the key points.

3. $f(\theta) = 2 + \sin(\theta - 2\pi)$

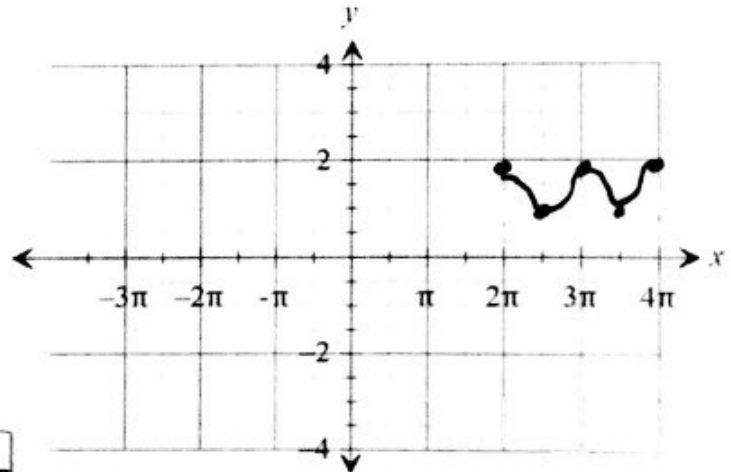
Vertical Shift (k): up 2

Amplitude (a): 1

Phase Shift (h): 2π right

Period: 2π

4pt



		$\frac{\pi + 2\pi}{2}$	$\pi + 2\pi$	$\frac{3\pi + 2\pi}{2}$	$2\pi + 2\pi$
	2π	$5\pi/2$	3π	$7\pi/2$	4π *
$\theta + 2\pi$	0	$\pi/2$	π	$3\pi/2$	2π
$y = \sin \theta$	0	1	0	-1	0
mult. by 1	2	3	2	1	2 *
add 2					

4. $f(\theta) = 2 \cos 5\theta$

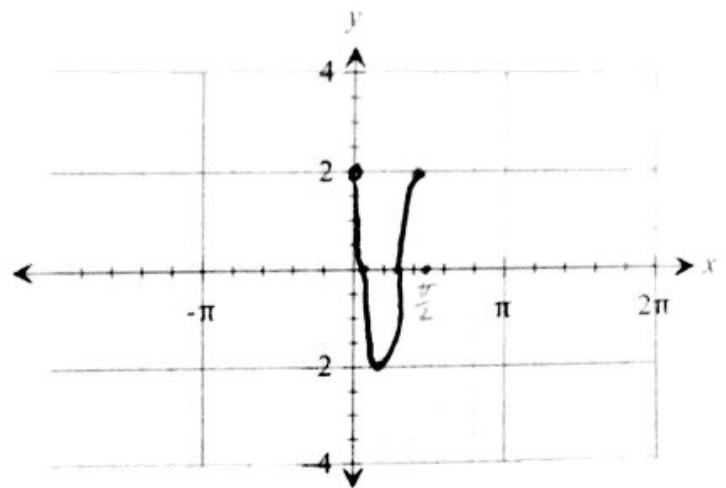
Vertical Shift (k): none

Amplitude (a): 2

Phase Shift (h): ~~$\frac{3\pi}{5}$~~ none

Period: $\frac{2\pi}{5}$

			$\frac{2\pi}{5}$	$\frac{4\pi}{5}$	
mult. by $\frac{1}{5}$	0	$\pi/5$	$2\pi/5$	$3\pi/5$	$4\pi/5$ *
$\frac{1}{5}\theta$	0	$\pi/2$	π	$3\pi/2$	2π
$y = \cos \theta$	1	0	-1	0	1
mult by 2	2	0	-2	0	2 *



4pt

5. $f(\theta) = \cos\left(\frac{\theta}{4}\right) - 3$

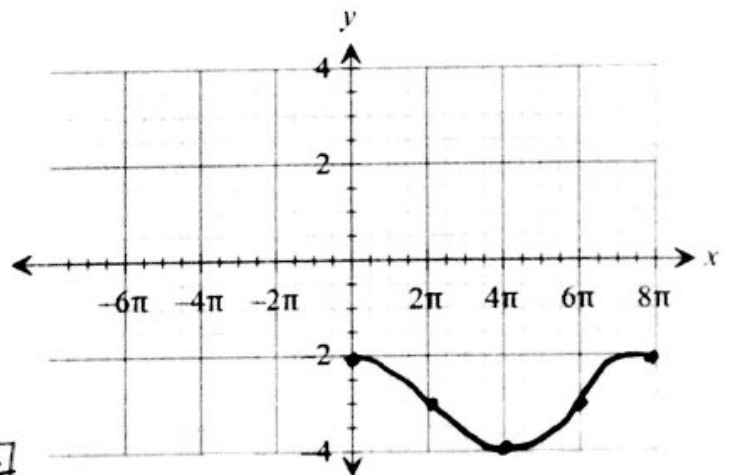
Vertical Shift (k): down 3

Amplitude (a): 1

Phase Shift (h): none

Period: $4 \cdot 2\pi = 8\pi$

		$\frac{\pi}{2} \cdot 4$	$4 \cdot \pi$	$\frac{3\pi}{2} \cdot 4$	$2\pi \cdot 4$
mult by 4	0	2π	4π	6π	8π *
$4 \cdot \theta$	0	$\pi/2$	π	$3\pi/2$	2π
$y = \cos \theta$	1	0	-1	0	1
subtract 3	-2	-3	-4	-3	-2 *



4pt

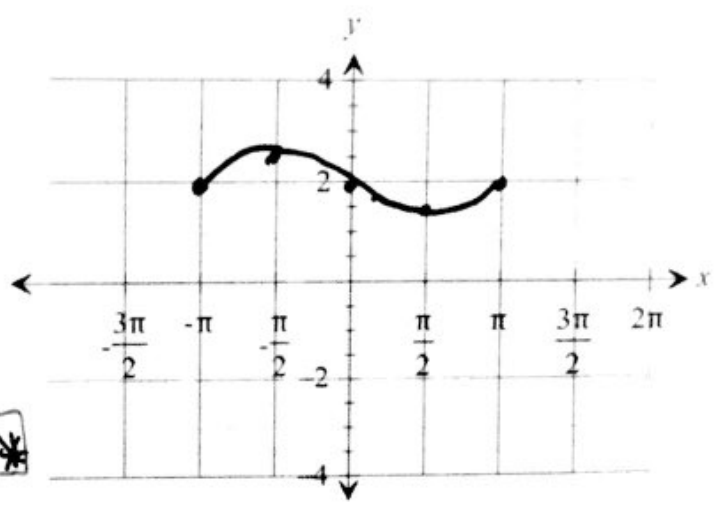
6. $f(\theta) = 2 + \frac{1}{2} \sin(\theta + \pi)$

Vertical Shift (k): up 2

Amplitude (a): $\frac{1}{2}$

Phase Shift (h): left π

Period: 2π



	$-\pi$	$-\pi/2$	0	$\pi/2$	π	*
$\theta - \pi$	0	$\pi/2$	π	$3\pi/2$	2π	
$y = \sin \theta$	0	1	0	-1	0	
mult. by 1/2 and add 2	2	$5/2$	2	$3/2$	2	*

4pt each problem

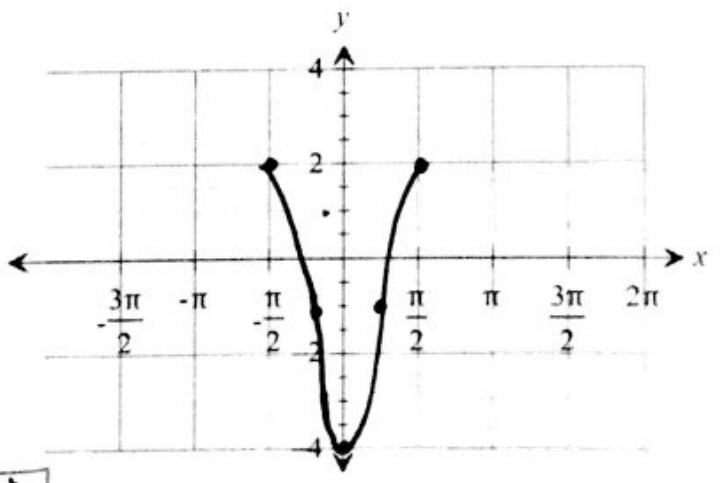
7. $f(\theta) = -1 + 3 \cos 2(\theta + \frac{\pi}{2})$

Vertical Shift (k): down 1

Amplitude (a): 3

Phase Shift (h): left $\pi/2$

Period: $\frac{2\pi}{2} = \pi$



	$-\pi/2$	$-\pi/4$	0	$\pi/4$	$\pi/2$	*
$\frac{\theta}{2} - \frac{\pi}{2}$	0	$\pi/2$	π	$3\pi/2$	2π	
$y = \cos \theta$	1	0	-1	0	1	
mult. 3	2	-1	-4	-1	2	*
Subtract 1						

$$\frac{1}{2} \cdot \frac{\pi}{2} - \frac{\pi}{2} \cdot 2 \quad \frac{1}{2} \cdot \frac{3\pi}{2} - \frac{\pi}{2} \cdot 2$$

$$\frac{\pi}{4} - \frac{2\pi}{4} \quad \frac{3\pi}{4} - \frac{2\pi}{4}$$

$$\frac{2\pi}{2} - \frac{\pi}{2}$$

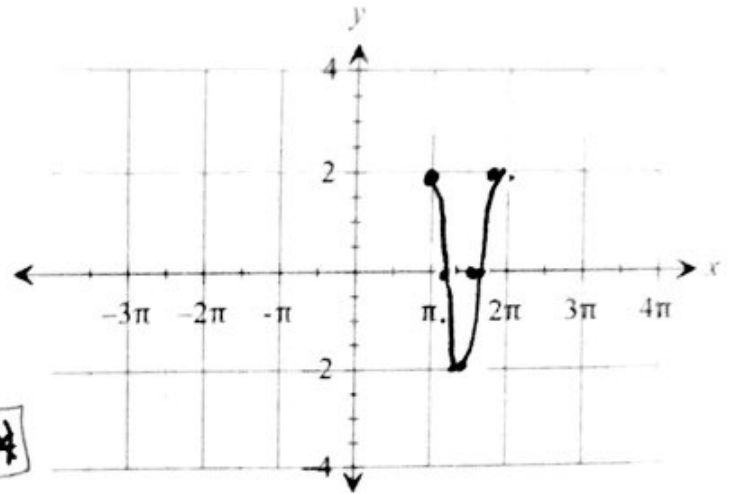
8. $f(\theta) = 2 \cos 3(\theta - \pi)$

Vertical Shift (k): none

Amplitude (a): 2

Phase Shift (h): right π

Period: $\frac{2\pi}{3}$



add π					
Divide 3	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$ *
$\frac{\theta}{3} + \pi$	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
$y = \cos \theta$	1	0	-1	0	1
mult. by 2	2	0	-2	0	2 *

$$\frac{1}{3} \cdot \frac{\pi}{2} + \pi = \frac{\pi}{6} + \frac{6\pi}{6} = \frac{7\pi}{6}$$

$$\frac{\pi}{3} + \frac{3\pi}{3} = \frac{4\pi}{3}$$

$$\frac{1}{3} \cdot \frac{3\pi}{2} + \frac{6\pi}{6} = \frac{\pi}{2} + \frac{6\pi}{6} = \frac{7\pi}{6}$$

$$\frac{3\pi}{6} + \frac{6\pi}{6} = \frac{9\pi}{6} = \frac{3\pi}{2}$$

$$\frac{2\pi}{3} + \frac{3\pi}{3} = \frac{5\pi}{3}$$

4 pt each problem

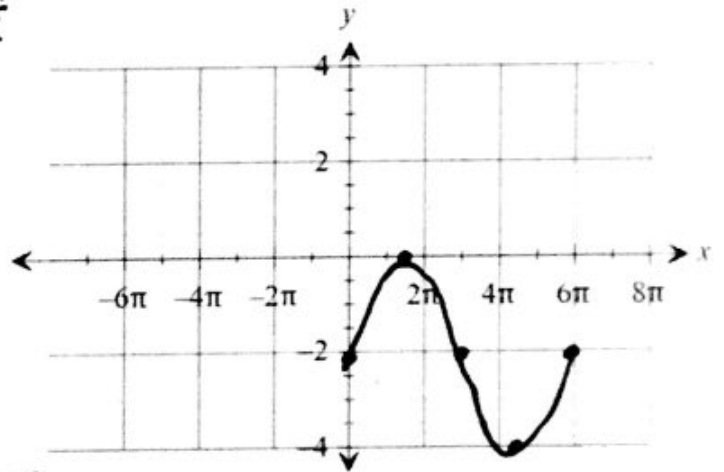
9. $f(\theta) = 2 \sin\left(\frac{\theta}{3}\right) - 2$

Vertical Shift (k): down 2

Amplitude (a): 2

Phase Shift (h): none

Period: $3 \cdot 2\pi = 6\pi$



mult. by 3	0	$\frac{3\pi}{2}$	3π	$\frac{9\pi}{2}$	6π *
$3 \cdot \theta$	0	$\frac{\pi}{2}$	π	$\frac{3\pi}{2}$	2π
$y = \sin \theta$	0	1	0	-1	0
mult. by 2	-2	2	-2	-4	-2 *
down 2					

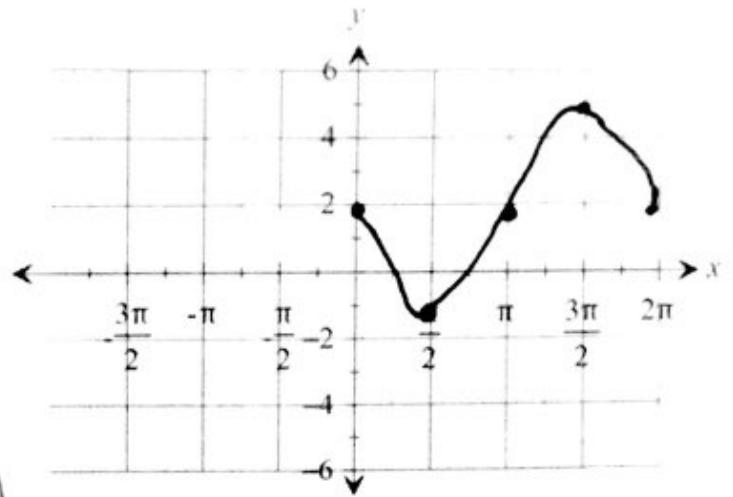
10. $f(\theta) = 2 - 3 \sin \theta$

Vertical Shift (k): up 2

Amplitude (a): 3 (reflect)

Phase Shift (h): none

Period: 2π



θ	0	$\pi/2$	π	$3\pi/2$	2π	*
$y = \sin \theta$	0	1	0	-1	0	
mult. by -3	2	-1	2	5	2	*
add 2						

4 pt each problem

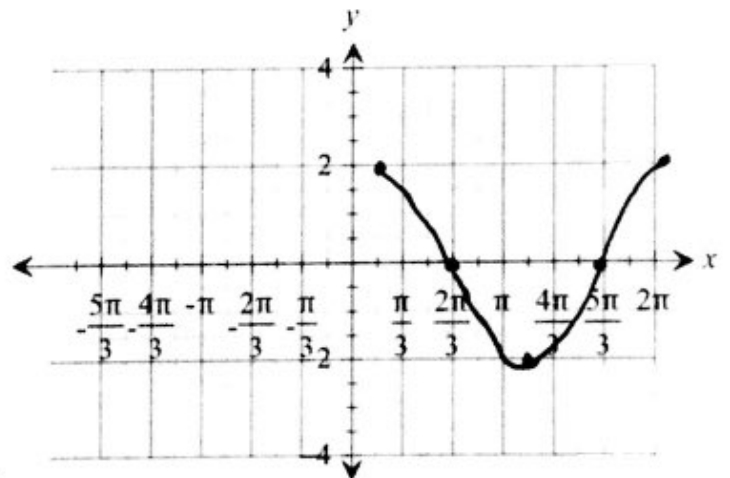
11. $f(\theta) = -2 \cos(\theta - \frac{\pi}{6})$

Vertical Shift (k): none

Amplitude (a): 2 (reflect)

Phase Shift (h): right $\pi/6$

Period: 2π



	$\pi/6$	$2\pi/3$	$7\pi/6$	$5\pi/3$	$13\pi/6$
$\theta + \pi/6$	0	$\pi/2$	π	$3\pi/2$	2π
$y = \cos \theta$	1	0	-1	0	1
mult. by 2	2	0	-2	0	2

$$\begin{array}{l} \frac{3 \cdot \pi}{3 \cdot 2} + \frac{\pi}{6} \\ \frac{3\pi}{6} + \frac{\pi}{6} \\ \frac{4\pi}{6} = \frac{2\pi}{3} \end{array} \quad \left| \quad \frac{\frac{6\pi}{6} + \frac{\pi}{6}}{\frac{7\pi}{6}} \right. \quad \left. \frac{\frac{3 \cdot 3\pi}{3 \cdot 2} + \frac{\pi}{6}}{\frac{9\pi}{6} + \frac{\pi}{6}} \right. \quad \left. \frac{\frac{6 \cdot 2\pi}{6} + \frac{\pi}{6}}{\frac{12\pi}{6} + \frac{\pi}{6}} \right.$$

$$\frac{10\pi}{6} = \frac{5\pi}{3} \quad \frac{13\pi}{6}$$