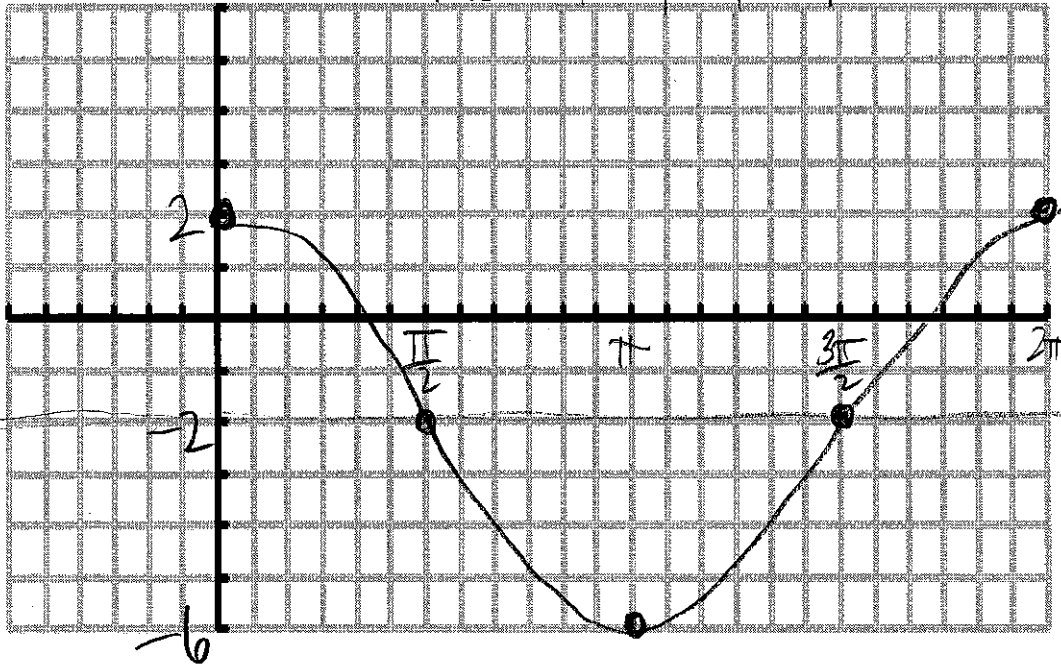


9.  $y = -2 + 4 \cos \theta$

$\theta$ : 0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\cos \theta$ :	1	0	-1	0
$-2 + 4 \cos \theta$ :	2	-2	-6	-2



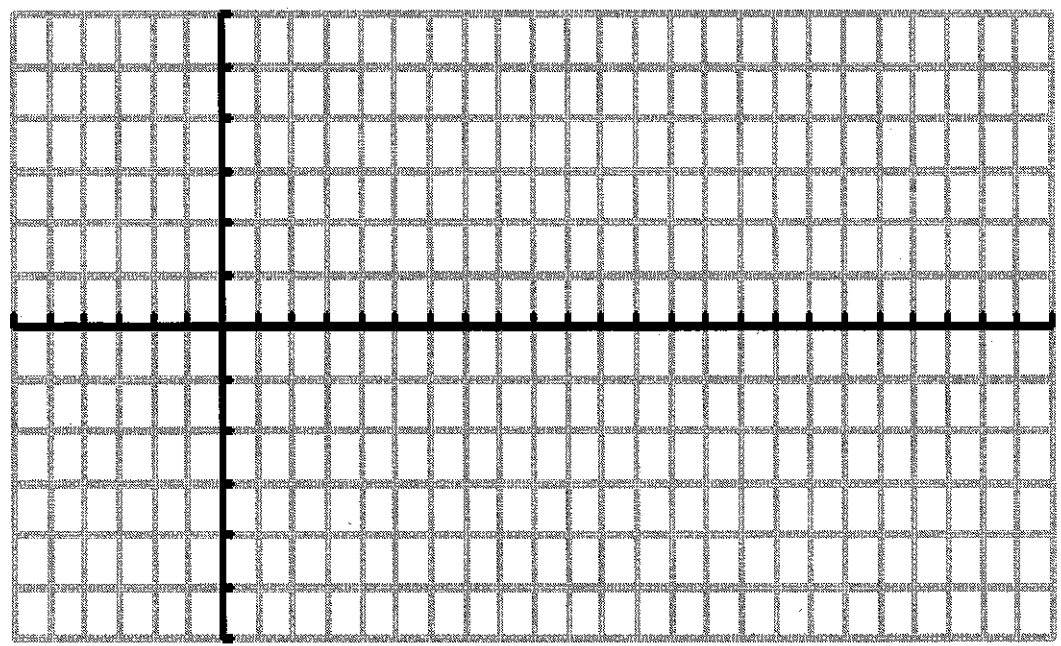
Period = 2π

Amplitude = 4

Phase Shift = —

Vertical Shift = -2

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



Period = \_\_\_\_\_

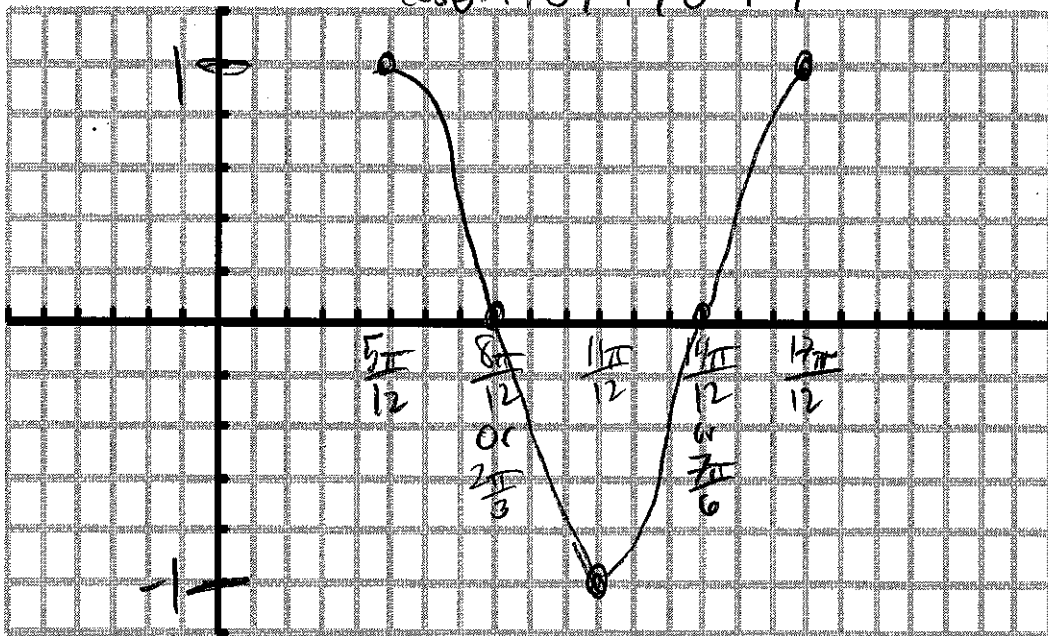
Amplitude = \_\_\_\_\_

Phase Shift = \_\_\_\_\_

Vertical Shift = \_\_\_\_\_

$$y = \cos 2\left(\theta - \frac{5\pi}{12}\right)$$

$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\frac{1}{2}\theta$ :	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	$\pi$
$\frac{1}{2}\theta + \frac{5\pi}{12}$ :	$\frac{5\pi}{12}$	$\frac{8\pi}{12}$	$\frac{11\pi}{12}$	$\frac{14\pi}{12}$	$\frac{17\pi}{12}$
$\cos \theta$ :	1	0	-1	0	1



Period = \_\_\_\_\_

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

Amplitude = 1

Phase Shift =  $+\frac{5\pi}{12}$

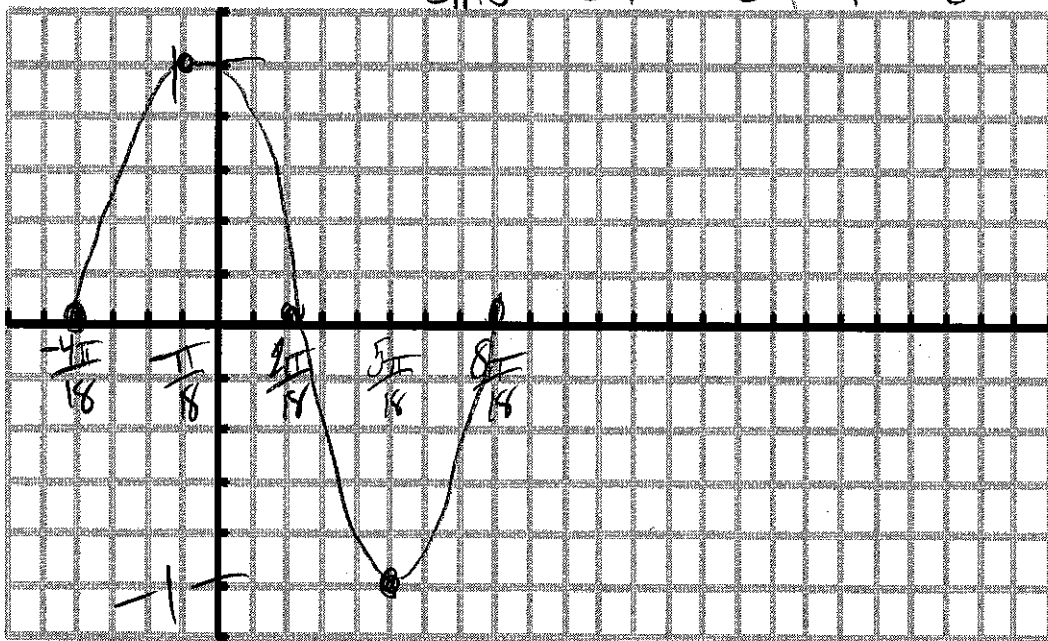
Vertical Shift = \_\_\_\_\_

$$12. y = \sin\left(3\theta + \frac{2\pi}{3}\right)$$

$$y = \sin 3\left(\theta + \frac{2\pi}{9}\right)$$

$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\frac{1}{3}\theta$ :	0	$\frac{\pi}{6}$	$\frac{\pi}{2}$	$\frac{3\pi}{6}$	$\frac{2\pi}{3}$
$\frac{1}{3}\theta + \frac{2\pi}{9}$ :	$\frac{2\pi}{9}$	$\frac{5\pi}{18}$	$\frac{7\pi}{18}$	$\frac{2\pi}{3}$	$\frac{8\pi}{9}$
$\sin \theta$ :	0	1	0	-1	0

Need 18ths



Period = \_\_\_\_\_

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

Amplitude = 1

Phase Shift =  $-\frac{2\pi}{9}$

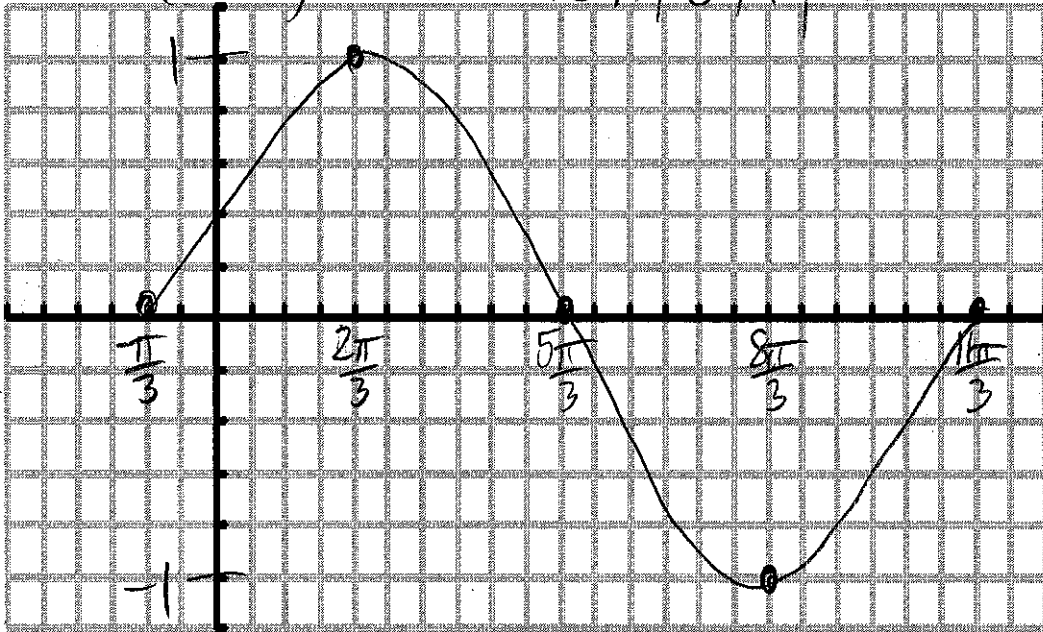
Vertical Shift = \_\_\_\_\_

13.  $y = \sin(\frac{\theta}{2} + \frac{\pi}{6})$

$y = \sin \frac{1}{2}(\theta + \frac{\pi}{3})$

$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$2\theta$ :	0	$\pi$	$2\pi$	$3\pi$	$4\pi$
$2\theta - \frac{\pi}{3}$ :	$-\frac{\pi}{3}$	$\frac{2\pi}{3}$	$\frac{5\pi}{3}$	$\frac{8\pi}{3}$	$\frac{11\pi}{3}$
$\sin \theta$ :	0	1	0	-1	0

Need 3<sup>rd</sup>s



Period = \_\_\_\_\_

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

Amplitude = 1

Phase Shift =  $-\frac{\pi}{3}$

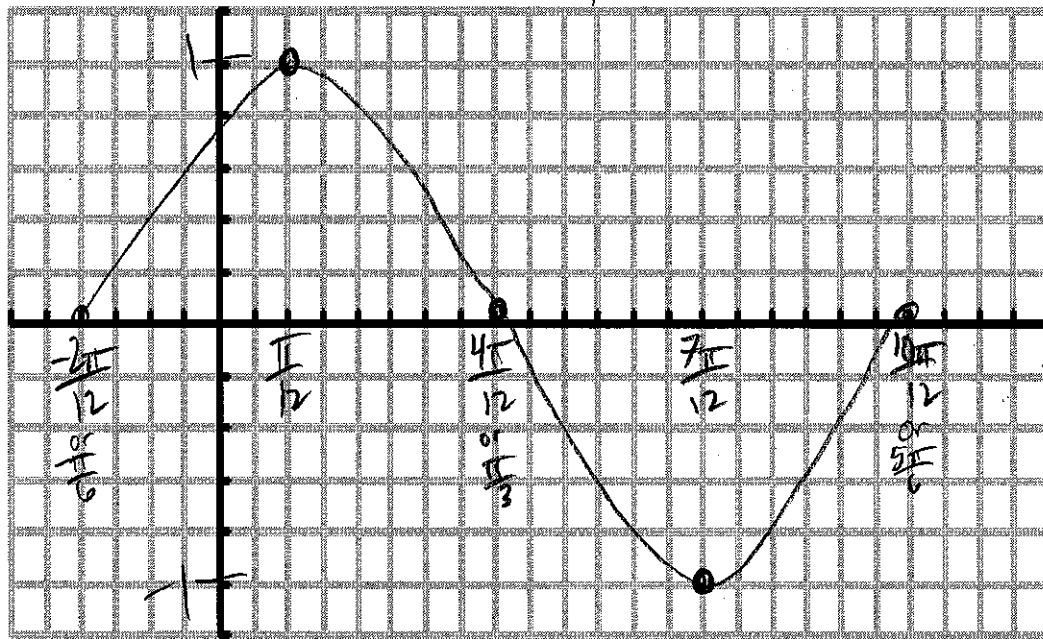
Vertical Shift = \_\_\_\_\_

14.  $y = \sin(2\theta + \frac{\pi}{3})$

$y = \sin 2(\theta + \frac{\pi}{6})$

$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\frac{1}{2}\theta$ :	0	$\frac{3\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	$\pi$
$\frac{1}{2}\theta - \frac{\pi}{6}$ :	$-\frac{2\pi}{12}$	$\frac{2\pi}{12}$	$\frac{\pi}{12}$	$\frac{7\pi}{12}$	$\frac{10\pi}{12}$
$\sin \theta$ :	0	1	0	-1	0

Need 12<sup>ths</sup>



Period = \_\_\_\_\_

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

Amplitude = 1

Phase Shift =  $-\frac{\pi}{6}$

Vertical Shift = \_\_\_\_\_

15.  $y = 2 + 3 \cos(2\theta + \frac{2\pi}{3})$

$y = 2 + 3 \cos 2(\theta + \frac{\pi}{3})$

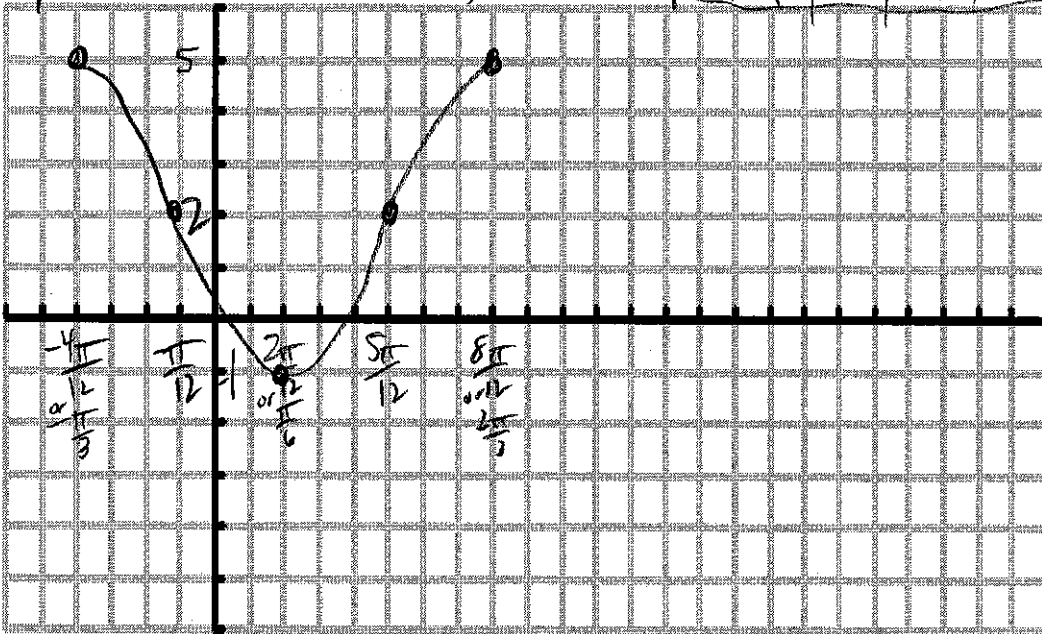
$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\frac{1}{2}\theta$ :	0	$\frac{3\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	$\pi$
$\frac{1}{2}\theta - \frac{\pi}{3}$ :	$-\frac{4\pi}{12}$	$-\frac{4\pi}{12}$	$-\frac{\pi}{12}$	$\frac{2\pi}{12}$	$\frac{5\pi}{12}$
					$\frac{8\pi}{12}$

Period = \_\_\_\_\_

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

Phase Shift =  $-\frac{\pi}{3}$

Vertical Shift = +2



$\cos \theta$ :	1	0	-1	0	1
$2 + 3 \cos \theta$ :	5	2	-1	2	5

16.  $y = 2 \cos(\frac{\theta}{2} - \frac{3\pi}{4})$

$y = 2 \cos \frac{1}{2}(\theta - \frac{3\pi}{2})$

$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$2\theta$ :	0	$\pi$	$2\pi$	$3\pi$	$4\pi$
$2\theta - \frac{3\pi}{2}$ :	$\frac{3\pi}{2}$	$\frac{3\pi}{2}$	$\frac{5\pi}{2}$	$\frac{7\pi}{2}$	$\frac{9\pi}{2}$
				$\frac{9\pi}{2}$	$\frac{11\pi}{2}$

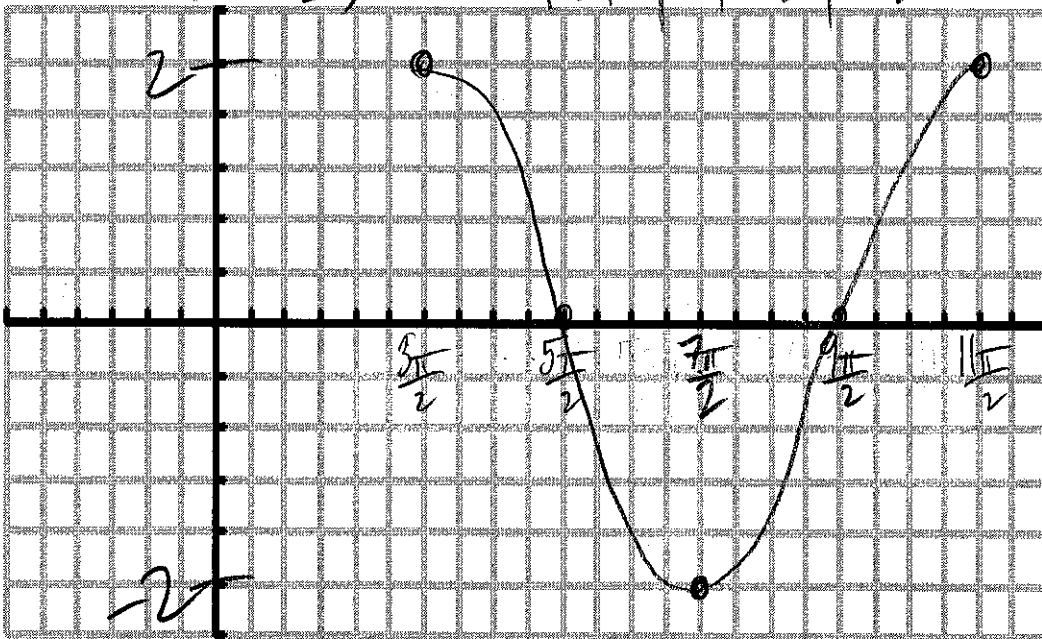
Need halves

Period = \_\_\_\_\_

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

Phase Shift =  $+\frac{3\pi}{2}$

Vertical Shift = \_\_\_\_\_

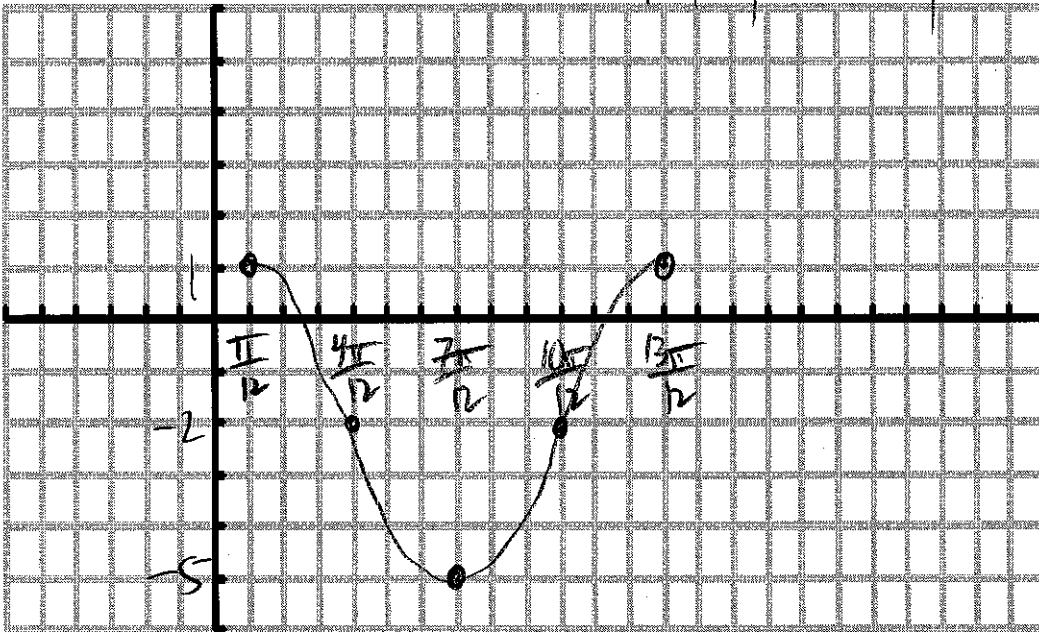


$\cos \theta$ :	1	0	-1	0	1
$2 \cos \theta$ :	2	0	-2	0	2

17.  $y = 3 \cos(2\theta - \frac{\pi}{6}) - 2$

$y = 3 \cos 2(\theta - \frac{\pi}{12}) - 2$

$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$\frac{1}{2}\theta$ :	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	$\pi$ → Need 12 <sup>th</sup>
$\frac{1}{2}\theta + \frac{\pi}{12}$ :	$\frac{\pi}{12}$	$\frac{4\pi}{12}$	$\frac{7\pi}{12}$	$\frac{10\pi}{12}$	$\frac{13\pi}{12}$



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

Amplitude = 3

Phase Shift =  $+\frac{\pi}{12}$

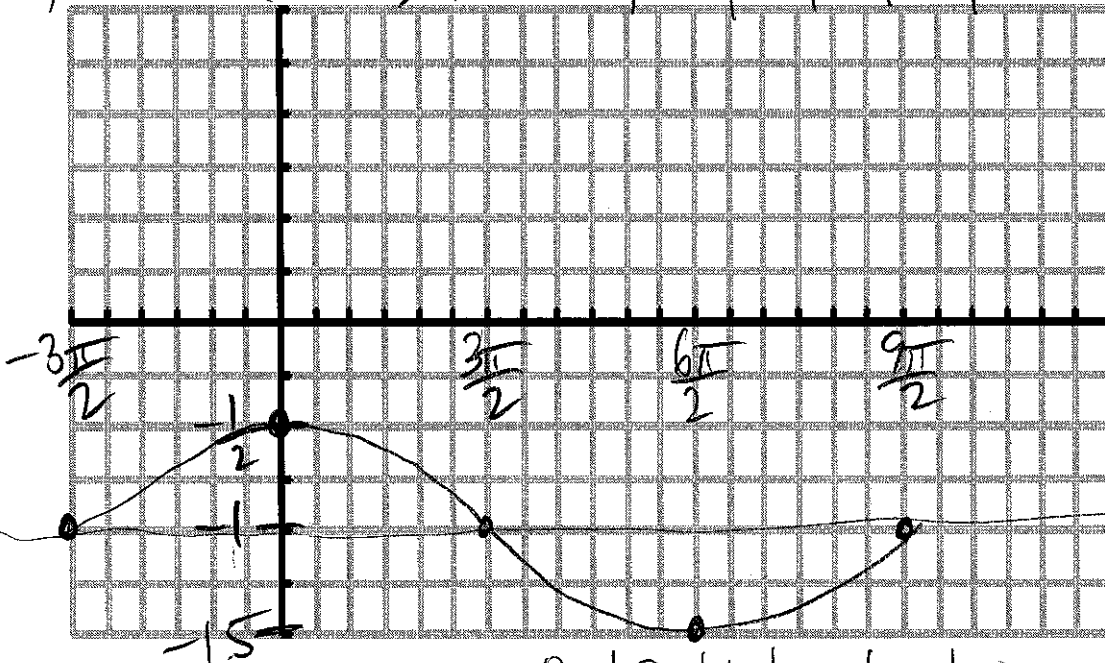
Vertical Shift = -2

$\cos \theta$ :	1	0	-1	0	1
$3 \cos \theta - 2$ :	1	-2	-5	-2	1

18.  $y = \frac{1}{2} \sin(\frac{\theta}{3} + \frac{\pi}{2}) - 1$

$y = \frac{1}{2} \sin \frac{1}{3}(\theta + \frac{3\pi}{2}) - 1$

$\theta$ :	0	$\frac{\pi}{2}$	$\pi$	$\frac{3\pi}{2}$	$2\pi$
$3\theta$ :	0	$\frac{3\pi}{2}$	$3\pi$	$\frac{9\pi}{2}$	$6\pi$ → Need halves
$3\theta - \frac{3\pi}{2}$ :	$-\frac{3\pi}{2}$	0	$\frac{3\pi}{2}$	$\frac{6\pi}{2}$	$\frac{9\pi}{2}$



Period =  $\frac{2\pi}{1/3} = 6\pi$

Amplitude =  $\frac{1}{2}$

Phase Shift =  $-\frac{3\pi}{2}$

Vertical Shift = -1

$\sin \theta$ :	0	1	0	-1	0
$\frac{1}{2} \sin \theta - 1$ :	-1	$-\frac{1}{2}$	-1	-1.5	-1

