

AMPLITUDE AND VERTICAL SHIFTS

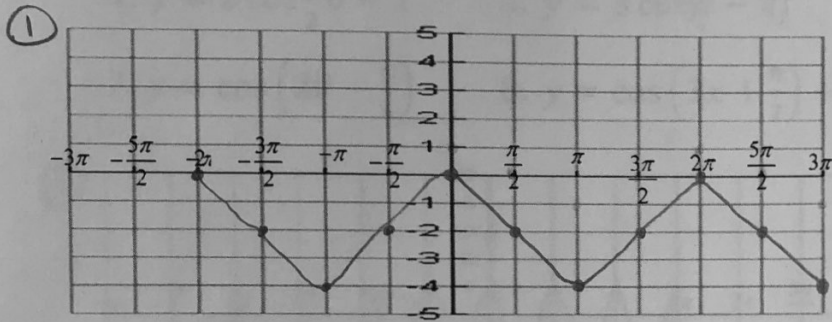
Graph each of the following functions. State the amplitude and the vertical shift.

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

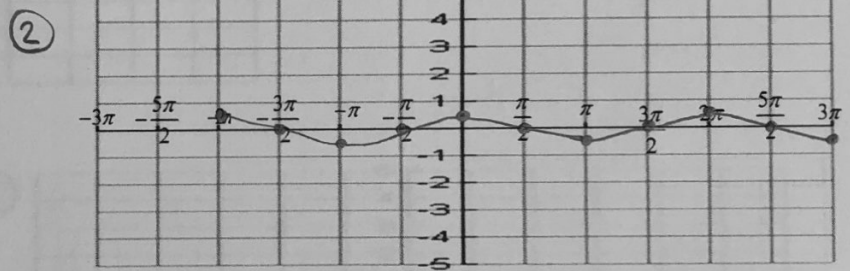
2. $y = \frac{1}{2} \cos \theta$

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

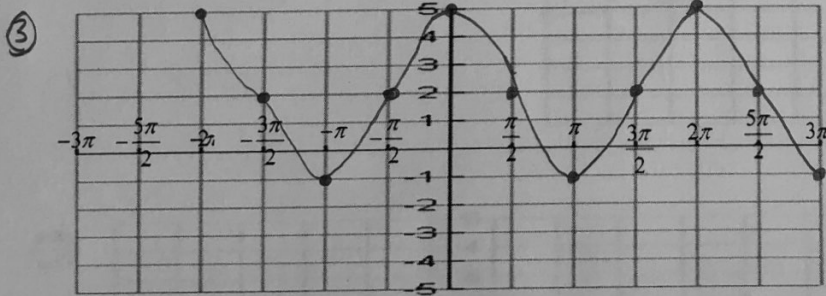
4. $y = 4 \cos \theta - 2$



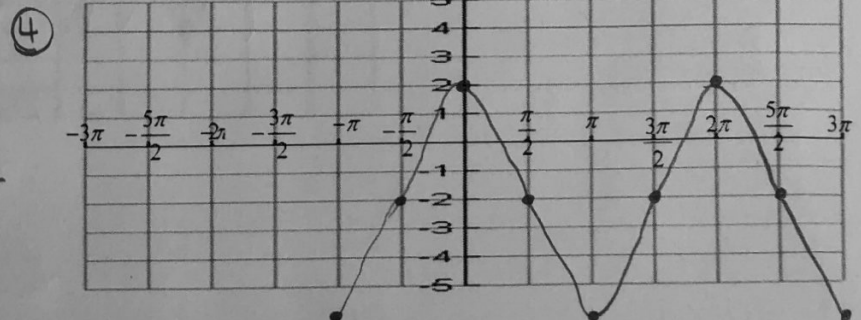
Amp = 2
VS = down 2



Amp = $\frac{1}{2}$
VS = none



Amp = 3
VS = up 2



Amp = 4
VS = down 2

PERIOD AND PHASE SHIFTS

Graph the following functions. State the period, amplitude, phase shift and vertical shift if any.

1. $y = \cos 4\theta$

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

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

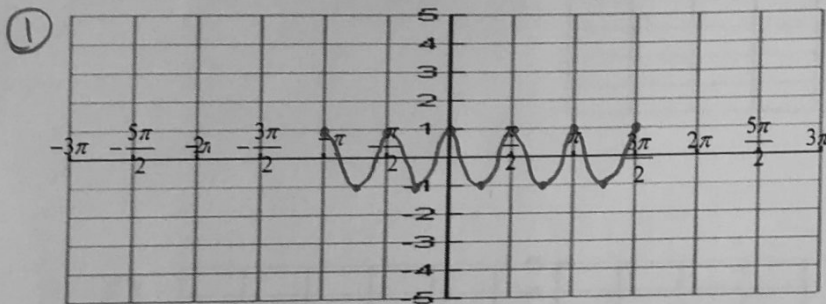
4. $y = 2 \cos \frac{1}{2}\theta - 1$

5. $y = 3 \cos(\theta - \pi)$

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

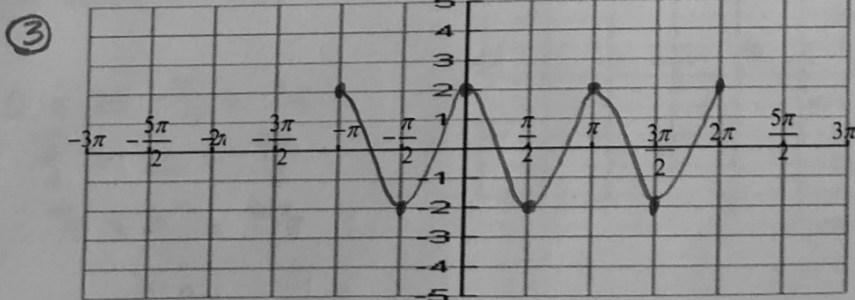
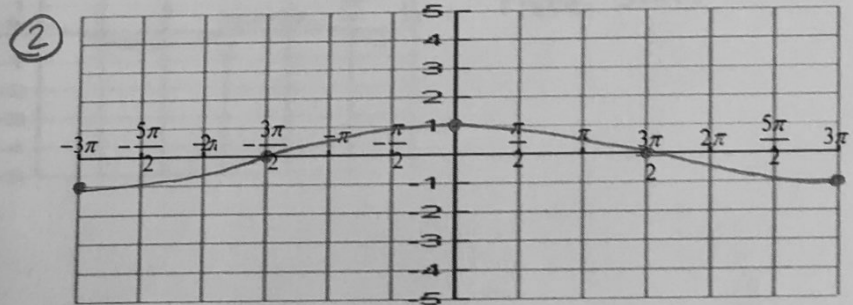
7. $y = \cos(2\theta - \frac{\pi}{4})$

8. $y = \cos(3x + \frac{\pi}{2}) + 1$



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

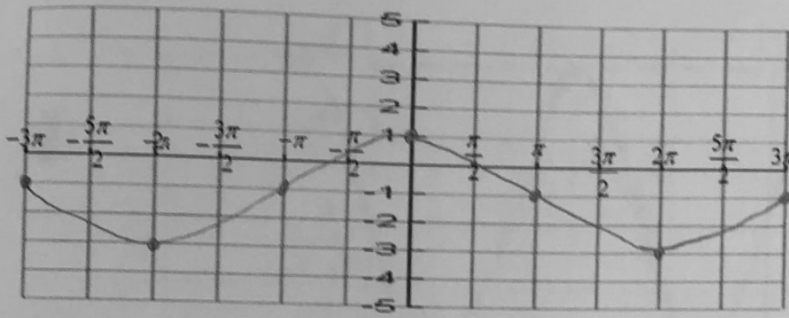
Period = $\frac{2\pi}{\frac{1}{3}} = 6\pi$



Amp = 2

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

4



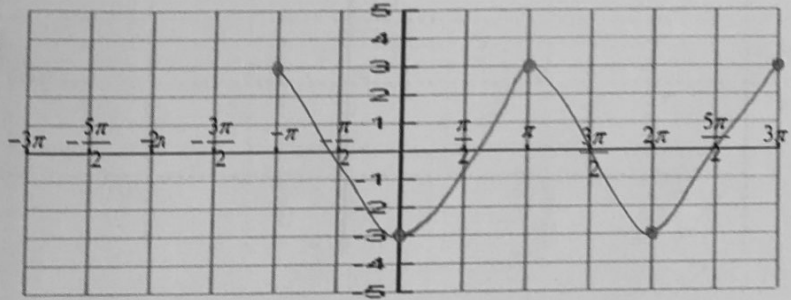
Amp = 2

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

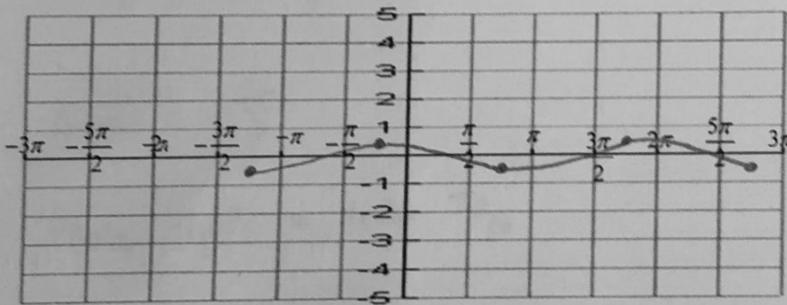
VS = down 1

5

Amp = 3
Phase shift = right π



6



Amp = $1/2$

Phase shift = left $\pi/4$

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

$0 \leq 2\theta - \frac{\pi}{4} \leq 2\pi$

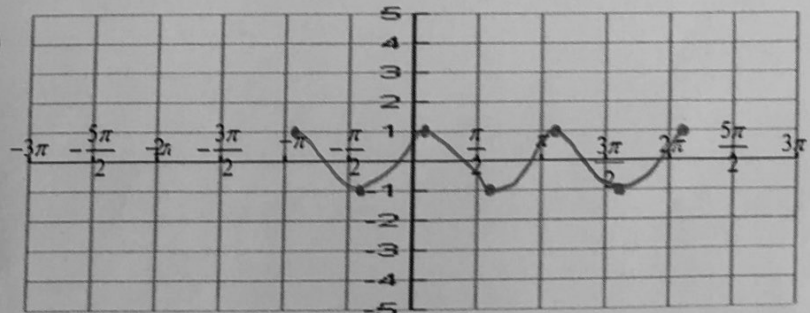
$\frac{\pi}{4} \leq 2\theta \leq \frac{9\pi}{4}$

$\frac{\pi}{8} \leq \theta \leq \frac{9\pi}{8}$

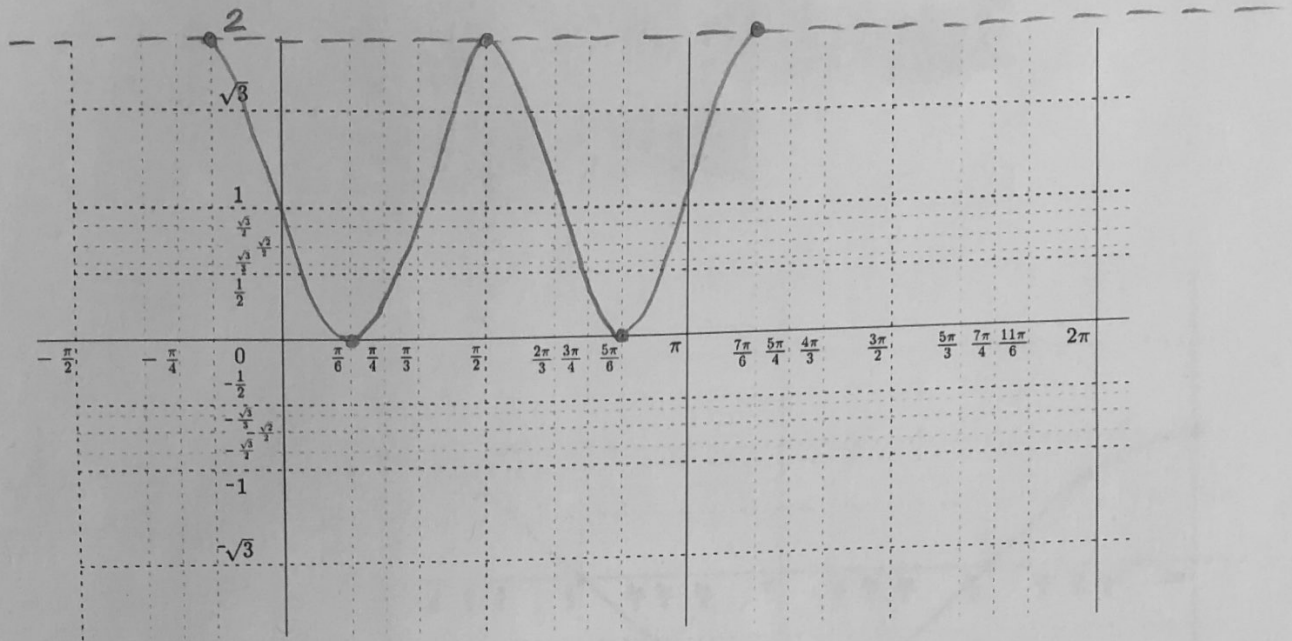
Period = $\frac{2\pi}{2} = \pi$

Phase shift = right $\pi/8$

7



8



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

$$\text{Period} = \frac{2\pi}{3}$$

Phase shift = left $\frac{\pi}{6}$

VS = up 1

$$0 \leq 3x + \frac{\pi}{2} \leq 2\pi$$

$$-\frac{\pi}{2} \leq 3x \leq \frac{3\pi}{2}$$

$$-\frac{\pi}{6} \leq x \leq \frac{\pi}{2}$$

$$-\frac{\pi}{6} \leq x \leq \frac{\pi}{2}$$