

Helpful hints – Trig Equations

$$y = A \cos B(x - D) + C$$

SIN → MHMLM

COS → HMLMH

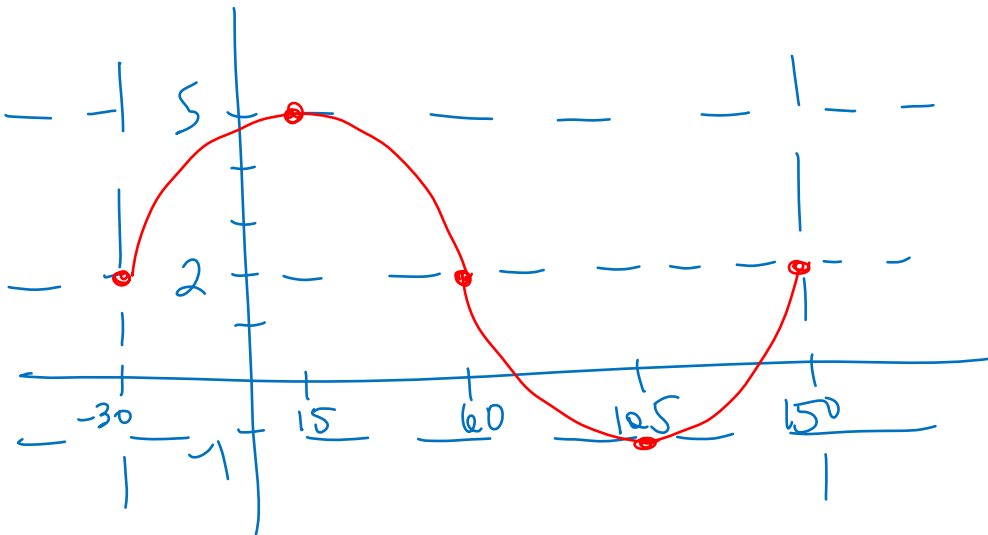
1. **Find C** = New “midline” or sinusoidal axis (vertical shift)
2. **Find A**: Amplitude.
 - Use amplitude to calculate new “high” and “low”
 - If “A” is negative (reflection):
 - The cosine graph is: **LMHML**
 - The sine graph is: **MLMHM**

3. **Use B** to find Period: $\frac{360}{B} = \text{period}$ OR $\frac{2\pi}{B} = \text{period}$

4. **Find D** (phase shift)
 - **(x - D) shifts** the starting and ending points of one cycle to the **right**
 - **(x + D) shifts** the starting and ending point of one cycle to the **left**

Directions: Graph 2 periods of each graph.

1) $y = 3 \sin (2(\theta + 30)) + 2$



Amplitude: 3

Sinusoidal axis: 2

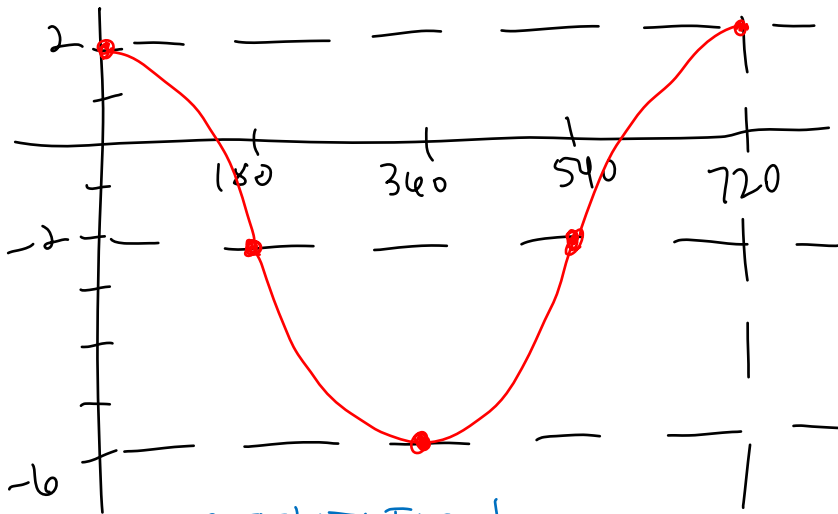
Period: $(0 \rightarrow 360) \cdot \frac{1}{2}$

Phase shift: $0 \rightarrow 180$
 $30 \rightarrow -30$

New Interval:

every 45
-30 → 150

$$2) y = 4\cos\left(\frac{1}{2}\Theta\right) - 2$$



→ REFLECTION

Amplitude: 4

Sinusoidal axis: -2

Period: $(0 \rightarrow 720) \cdot 2$

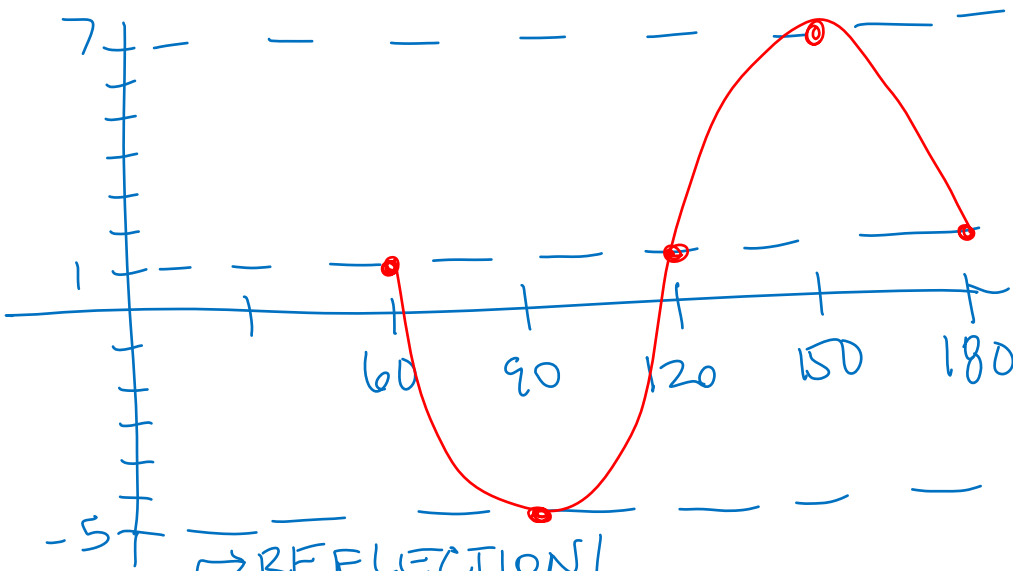
Phase shift: 0

New Interval:

$0 \rightarrow 720$

$\frac{720}{4} = 180^\circ$
every 180°

$$3) y = -6\sin(3(\Theta - 60)) + 1$$



→ REFLECTION!

Amplitude: 6

Sinusoidal axis: 1

Period: $(0 \rightarrow 360) \cdot \frac{1}{3}$
 $0 \rightarrow 120$

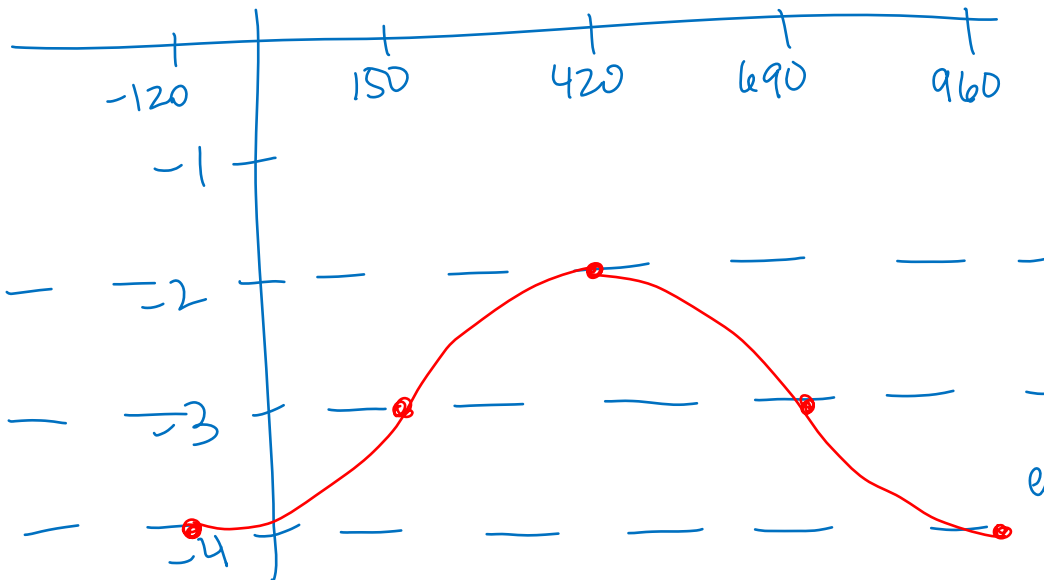
Phase shift: +60 +60

New Interval:

$60 \rightarrow 180$

every 30

$$4) y = -\cos\left(\frac{1}{3}(\Theta + 120)\right) - 3$$



Amplitude: 1

Sinusoidal axis: -3

Period: $(0 \rightarrow 360) \cdot 3$
 $0 \rightarrow 1080$

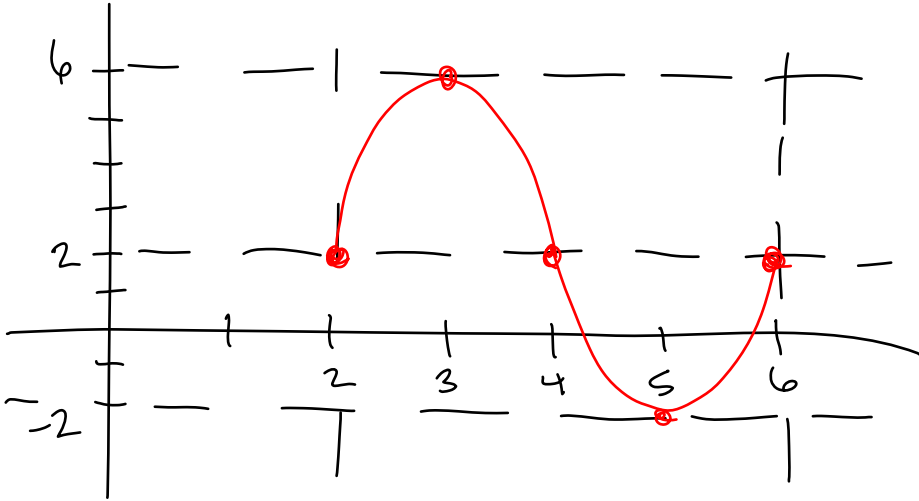
Phase shift: -120 -120

New Interval:

$-120 \rightarrow 960$

every 270

5) $y = 4 \sin\left(\frac{\pi}{2}(\theta - 2)\right) + 2$ (use radians)



Amplitude: 4

Sinusoidal axis: 2

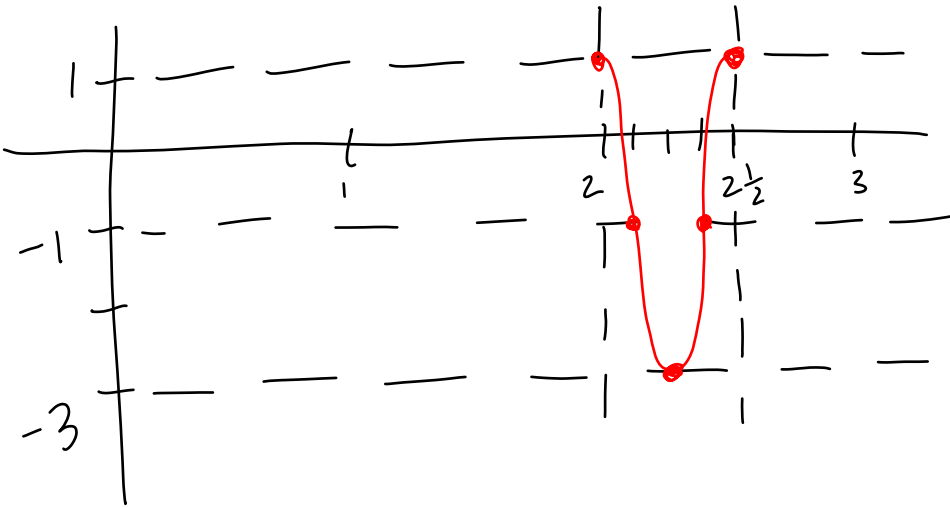
Period: $\frac{2\pi}{\frac{\pi}{2}} = 4$

Phase shift: $0 \rightarrow 4$
 $+2 \quad +2$

New Interval:

$\frac{4}{4} = \text{every } 1$
2 → 6

6) $y = 2 \cos(4\pi(\theta - 2)) - 1$ (use radians)



Amplitude: 2

Sinusoidal axis: -1

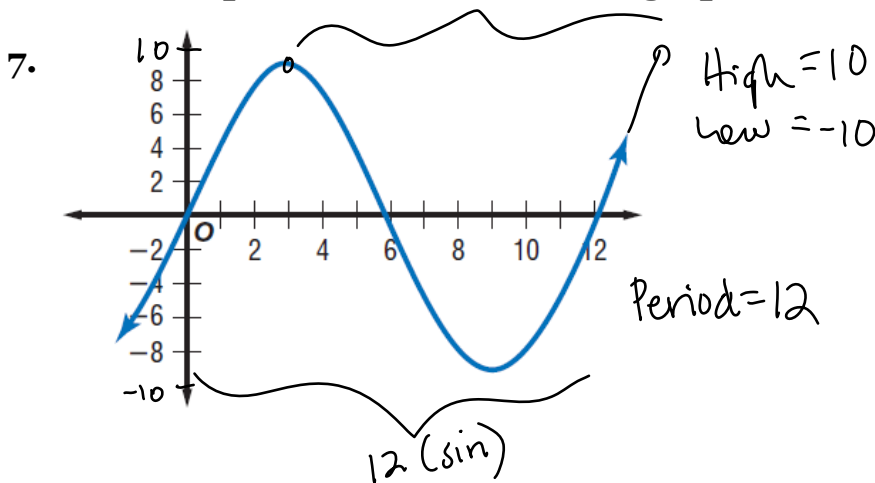
Period: $\frac{2\pi}{4\pi} = \frac{1}{2}$

Phase shift: $0 \rightarrow \frac{1}{2}$
 $+2 \quad +2$

Interval:

$\frac{1}{2} = \text{every } \frac{1}{8}$
2 → 2.5

Write two equations for each of the graphs below using $\sin\theta$ and $\cos\theta$.



Middle = 0 S.A.

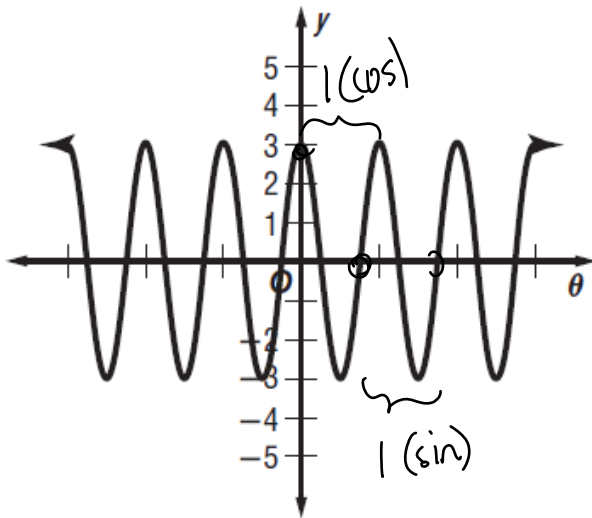
Amp = 10

$\frac{2\pi}{B} = 12$ $\frac{2\pi}{6} = 12B$
 $\frac{\pi}{6} = B$

$$y = 10 \cdot \cos\left(\frac{\pi}{6}(\theta - 3)\right)$$

$$y = 10 \cdot \sin\left(\frac{\pi}{6}\theta\right)$$

8.



High = 3
low = -3

Middle = 0 S.A.

Amp = 3

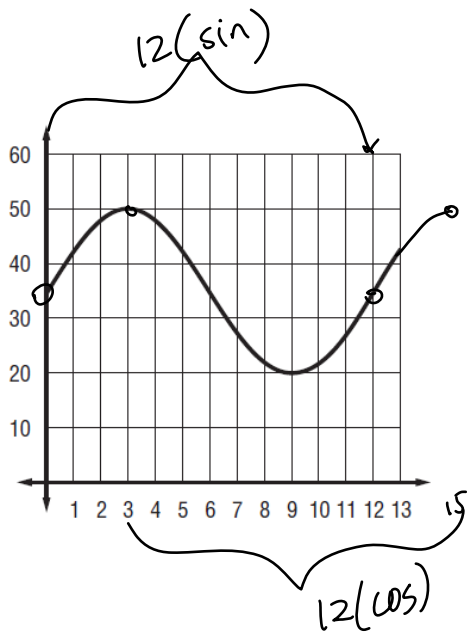
Period = 1

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

$$y = 3 \cdot \cos(2\pi\theta)$$

$$y = 3 \cdot \sin(2\pi(\theta - .75))$$

9.



High = 50
Low = 20

Middle = 35 S.A.

Amp = 15

Period = 12

$\frac{2\pi}{B} = 12$ $2\pi = 12B$
 $\frac{\pi}{6} = B$

$$y = 15 \cdot \cos\left(\frac{\pi}{6}(\theta - 3)\right) + 35$$

$$y = 15 \cdot \sin\left(\frac{\pi}{6}\theta\right) + 35$$