

Name: _____

Assignment 5.1 & 5.2

1. Determine the key features for the function: $y = -5\sin\left(\frac{1}{2}\left(x - \frac{\pi}{2}\right)\right) + 15$

a) Amplitude: $| -5 | = 5$

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

c) Phase Shift: $\frac{\pi}{2}$ right

d) Vertical displacement: 15 up

e) Domain: $\{x \mid x \in \mathbb{R}\}$

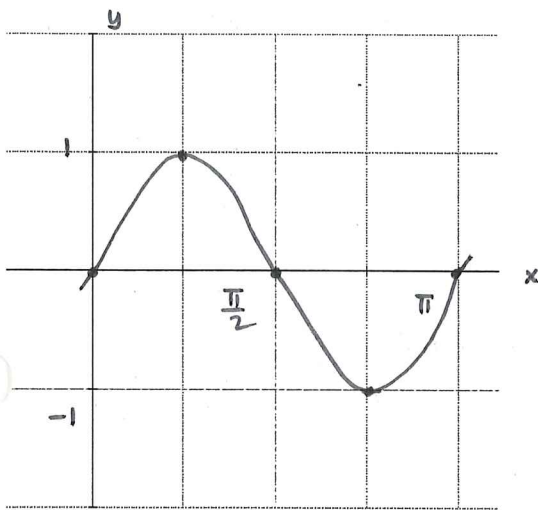
f) Range: $\{y \mid 10 \leq y \leq 20, y \in \mathbb{R}\}$

max: $15 + 5 = 20$

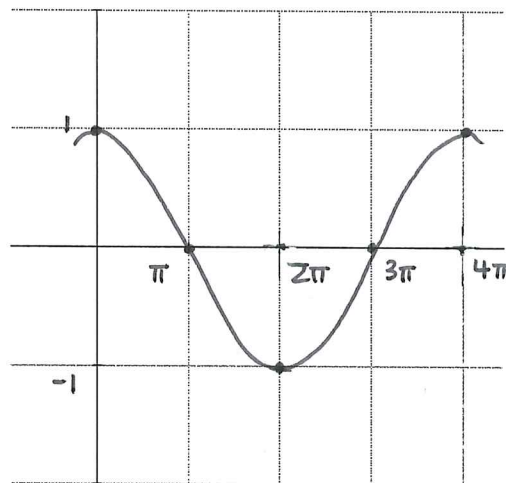
min: $15 - 5 = 10$

2. Graph the following functions and label the axis. (at least one period)

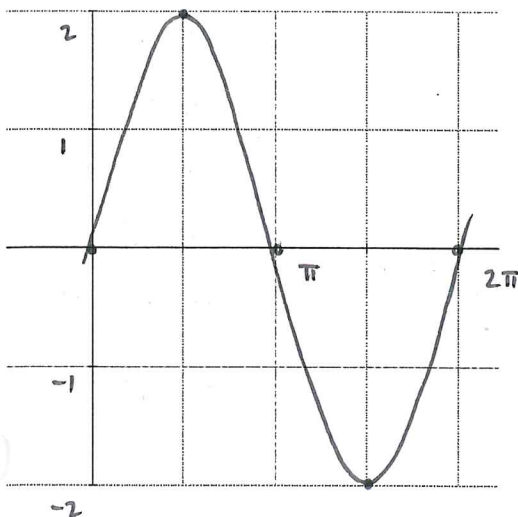
a) $y = \sin 2x$ per = $\frac{2\pi}{2} = \pi$



b) $y = \cos \frac{x}{2}$ per = $\frac{2\pi}{(1/2)} = 2\pi \cdot 2 = 4\pi$

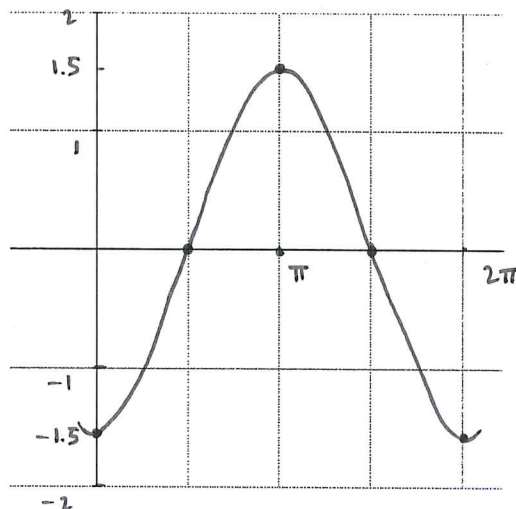


c) $y = 2\sin x$ per = 2π



d) $y = -1.5\cos x$ per = 2π

↑ reflection over x-axis



3. Write the equation of each sine function in the form $y = a \sin b(x - c) + d$ given its characteristics:

a) amplitude 2, period π , phase shift $\frac{\pi}{3}$ to the left, vertical displacement 1 unit down

$$a = 2 \quad c = -\frac{\pi}{3}$$

$$\pi = \frac{2\pi}{b} \quad d = -1$$

$$b = 2$$

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

b) amplitude $\frac{1}{4}$, period 6π , phase shift π to the right, vertical displacement 2 units up

$$a = \frac{1}{4} \quad c = \pi$$

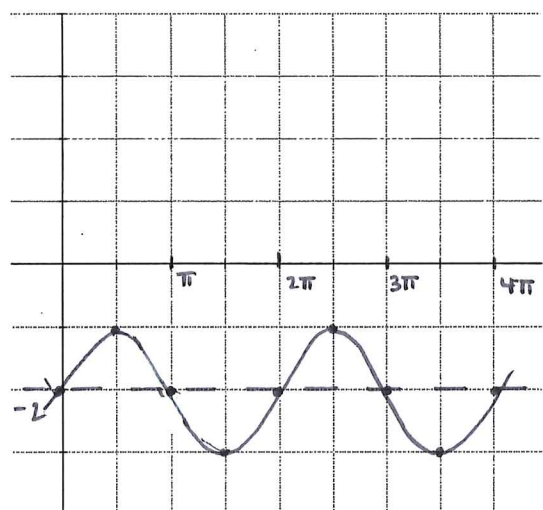
$$6\pi = \frac{2\pi}{b} \quad d = 2$$

$$b = \frac{1}{3}$$

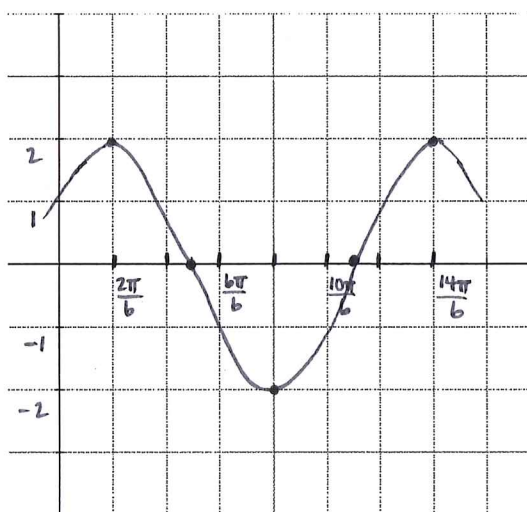
$$y = \frac{1}{4} \sin \frac{1}{3} (x - \pi) + 2$$

4. Graph the following functions and label the axis. (at least one period)

a) $y = \sin x - 2$



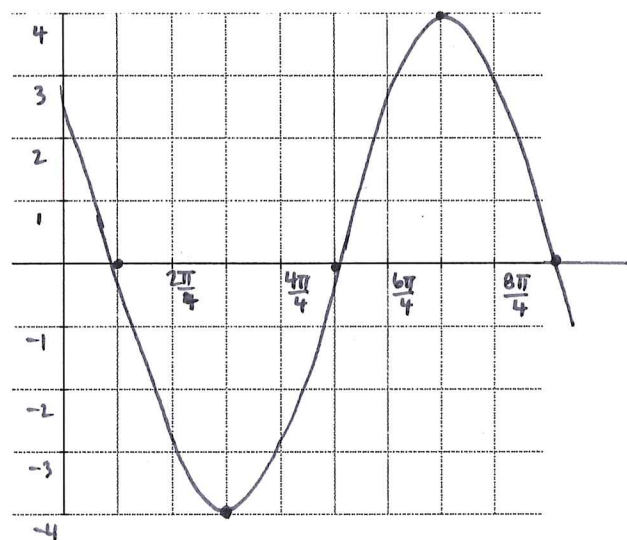
b) $y = 2 \cos \left(x - \frac{\pi}{3} \right)$
 $c = \frac{\pi}{3} = \frac{2\pi}{6}$
 phase shift



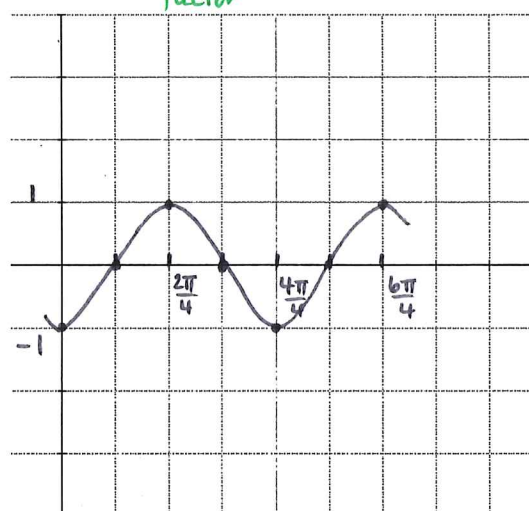
$\frac{2\pi}{6}$	x	y	• 2
$\frac{2\pi}{6}$	0	1	2
$\frac{5\pi}{6}$	$\pi/2$	0	0
$\frac{8\pi}{6}$	π	-1	-2
$\frac{11\pi}{6}$	$3\pi/2$	0	0
$\frac{14\pi}{6}$	2π	1	2

c) $y = -4 \sin \left(x - \frac{\pi}{4} \right)$

$$c = \frac{\pi}{4}$$



d) $y = \cos(2x - \pi)$ $y = \cos 2 \left(x - \frac{\pi}{2} \right)$
 factor



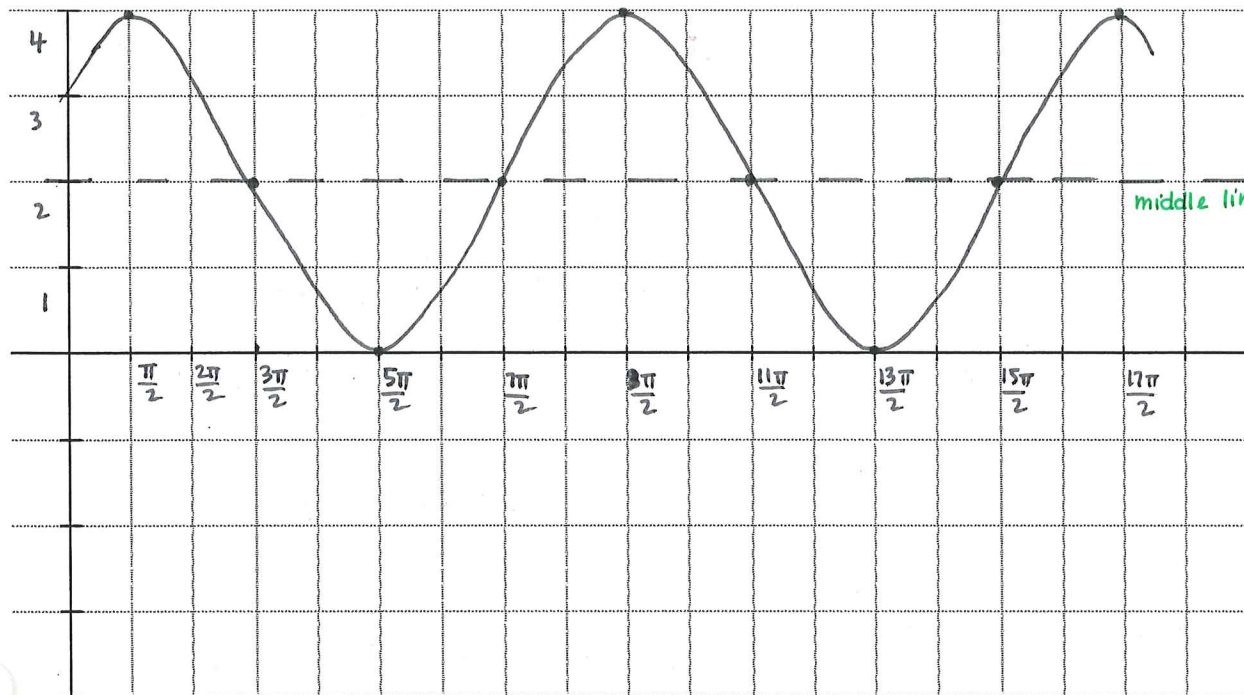
$+\frac{\pi}{2}$	$\cdot \frac{1}{2}$	x	y
$\frac{2\pi}{4}$	0	0	1
$\frac{3\pi}{4}$	$\pi/4$	$\pi/2$	0
$\frac{4\pi}{4}$	$\pi/2$	π	-1
$\frac{5\pi}{4}$	$3\pi/4$	$3\pi/2$	0
$\frac{6\pi}{4}$	π	2π	1

5. Graph the following function (show 2 periods). State the period and phase shift.

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

period : $\frac{2\pi}{(1/2)} = 4\pi$

phase shift: $\frac{\pi}{2}$ right

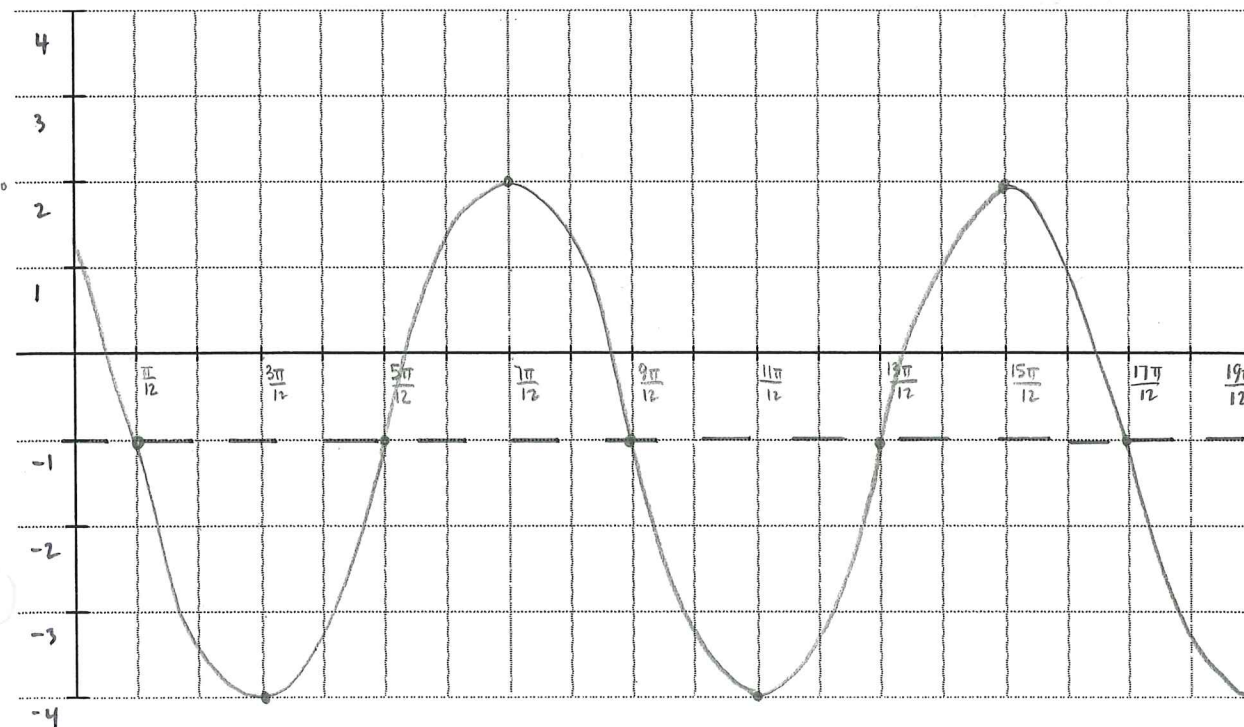


$+\frac{\pi}{2} \cdot 2$	x	y
$\pi/2$	0	0
$3\pi/2$	π	$\pi/2$
$5\pi/2$	2π	π
$7\pi/2$	3π	$3\pi/2$
$9\pi/2$	4π	2π

b) $y = 3\sin 3\left(x + \frac{\pi}{4}\right) - 1$

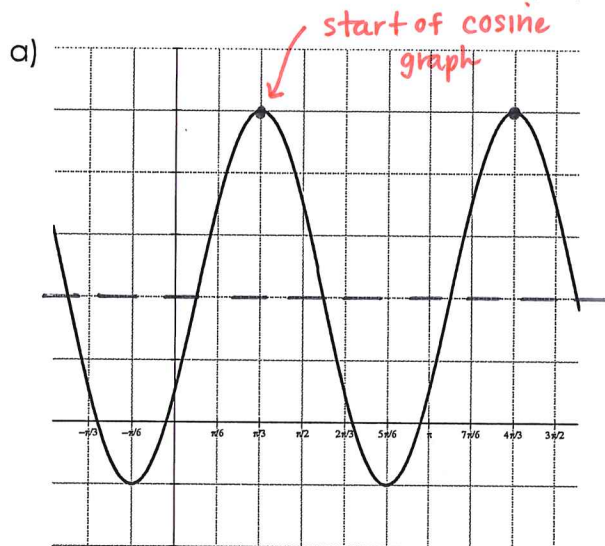
period : $\frac{2\pi}{3} = \frac{4\pi}{6} = \frac{8\pi}{12}$

phase shift: $\frac{\pi}{4}$ left



$-\frac{\pi}{4} \cdot \frac{1}{3}$	x	y
$-\frac{\pi}{4}$	0	0
$-\frac{\pi}{12}$	$\frac{\pi}{6}$	$\pi/2$
$\frac{\pi}{12}$	$\frac{\pi}{3}$	π
$\frac{3\pi}{12}$	$\frac{3\pi}{6}$	$3\pi/2$
$\frac{5\pi}{12}$	$\frac{2\pi}{3}$	2π

6. Write an equation to represent the graph below.



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

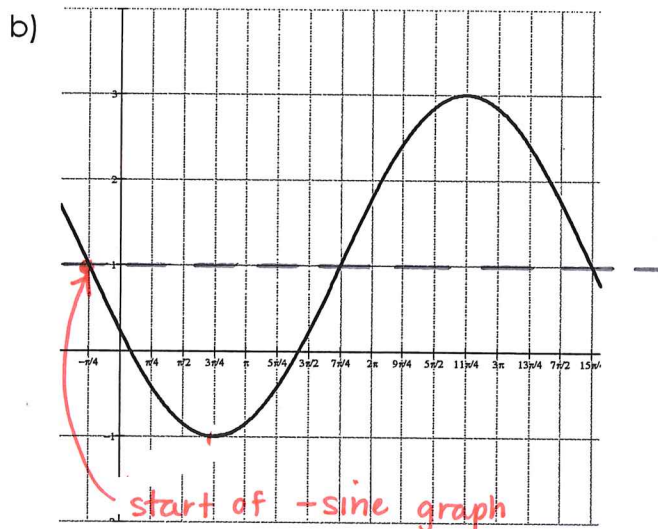
$$a = 3$$

$$k = 2$$

$$\text{period} = \frac{4\pi}{3} - \frac{\pi}{3} = \frac{3\pi}{3} = \pi$$

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

$$h = \frac{\pi}{3} \text{ (for +cosine graph)}$$



$$y = -2 \sin \frac{1}{2} \left(x + \frac{\pi}{4} \right) + 1$$

$$a = -2 \text{ (-sine graph)}$$

$$k = 1$$

$$h = -\frac{\pi}{4} \text{ (for -sine graph)}$$

$$\text{period} = \frac{15\pi}{4} - \left(-\frac{\pi}{4} \right) = \frac{16\pi}{4} = 4\pi$$

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