May 19 Youtube: "Trigonometric Functions and Graphing" by patrick JMT

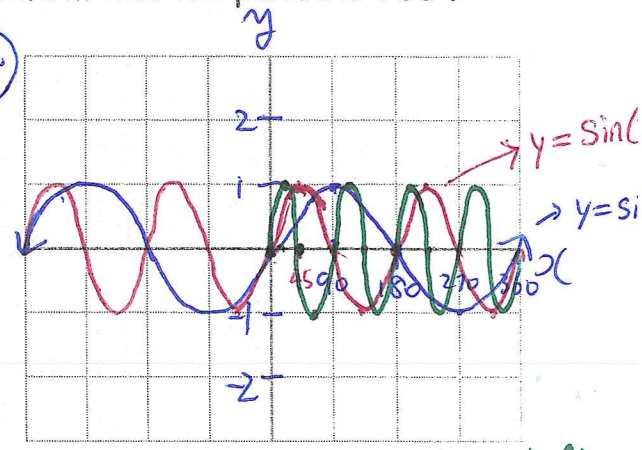
Part 2 - Period

Youtube: "Graphing $y = -2\cos(2x)$" by patrick JMT

The period of a periodic function is the length of one cycle, measured along the horizontal axis. Check your graph of y = sin(x) to confirm that the period is 360°.

1. Graph y = sin(x).

* Unit 6 test on Friday, May 22!



2. For y = sin(2x), what is the transformation from the graph of y = sin(x)?

Horizontal compression by a factor of $\frac{1}{2}$

When $k > 1$, → horizontal compression

3. Graph y = sin(2x)

When $0 < k < 1$ → horizontal stretch

4. What is the period of y = sin(2x)? 180° $= \frac{360°}{2}$

x, y	x, y	x, y
0, 0	0, 0	0, 0
90, 1	45, 1	22.5°, 1
180, 0	90, 0	45° 0

5. For y = sin(4x), what is the transformation from the graph of y = sin(x)?

Horizontal compression by a factor of $\frac{1}{4}$

6. Graph y = sin(4x).

7. What is the period of y = sin(4x)? 90° $= \frac{360°}{4}$

8. Complete the following table.

Function	Period
y = sin(x)	360°
y = sin(2x)	180°
y = sin(4x)	90°

$y = \sin(kx)$

9. How can you determine the period from the equation?

Period $= \frac{360°}{k}$ (assuming that your parent function is sine or cosine)

If tangent is parent function → $\frac{180°}{k}$

Part 3-Phase Shifts (Horizontal Shifts)

1. What is the transformation from y = sin(x) to y = sin(x + 90°)?

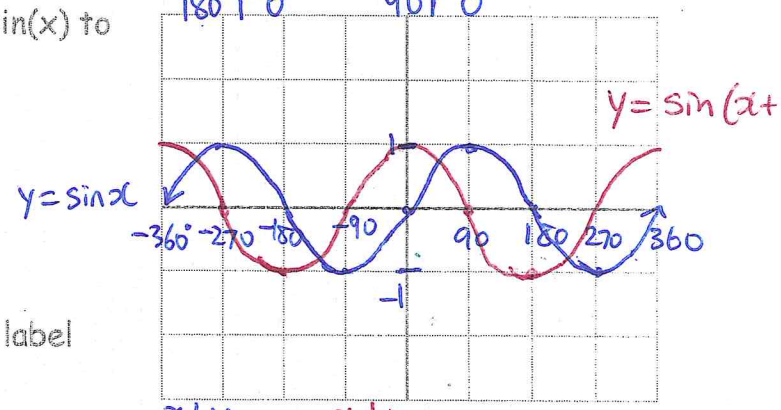
   Shift it to the left by 90°

sin x →

x	y
0	0
90	1
180	0

x	y
-90	0
0	1
90	0

← sin(x+90°)



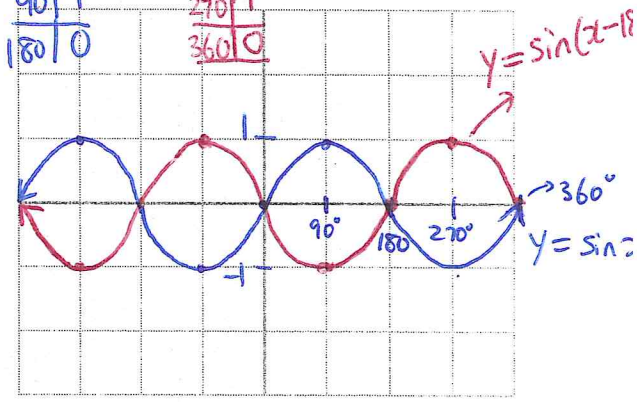
2. Sketch the graph of y = sin(x) and y = sin(x + 90°) on the grid and clearly label them.

3. What is the transformation from y = sin(x) to y = sin(x - 180°)?

   Shift it to the right by 180°

x	y
0	0
90	1
180	0

x	y
180	0
270	1
360	0



4. Sketch the graph of y = sin(x) and y = sin(x - 180°) on the grid and clearly label them.

   0, 0 → shift by 180 → 180, 0
   90, 1 — 270, 1
   180, 0 — 360, 0

5. Complete the following table.

Function	Phase Shift (Horizontal Shift)
y_1 = sin(x)	none
y_2 = sin(x + 90°)	Shift left by 90°
y_3 = sin(x - 180°)	Shift right by 180°

6. Explain how you can determine the phase shift from the equation.

   y = sin (x − d) You should shift the parent function by d. = (what x value makes the bracket zero?)

Part 4 - Vertical Shifts

1. Neatly sketch the graphs below on the grid and label them clearly.

(A) y = sin(x)

(B) y = sin(x) + 2

(C) y = sin(x) - 1

(A) (0,0) → (B) (0, 2)

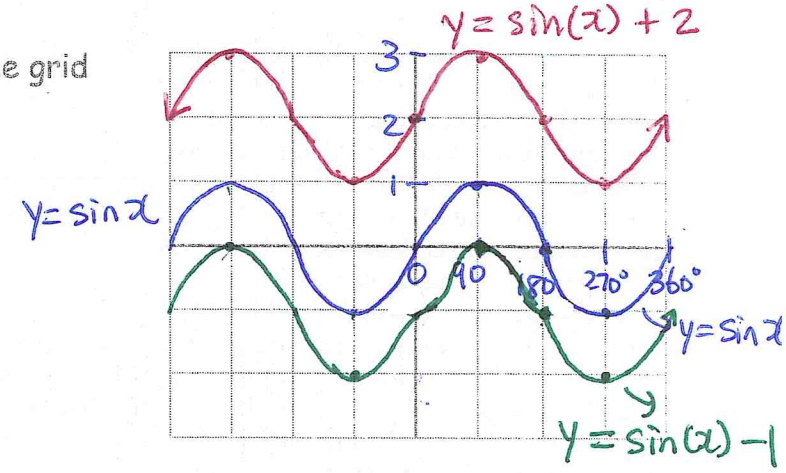
(90, 1) → (90, 3)

(180, 0) → (180, 2)

(C) (0, -1)

(90, 0)

(180, -1)



2. Complete the following table.

Function	Vertical Shift
$Y_1 = \sin(x)$	None
$Y_2 = \sin(x) + 2$	shift up by 2
$Y_3 = \sin(x) - 1$	Shift down by 1

3. Describe how you can determine the vertical shift from the equation.

y = sin x + c → You should shift the parent function by c. =(If c is positive → "shift up")

negative → "shift down"

Using your knowledge

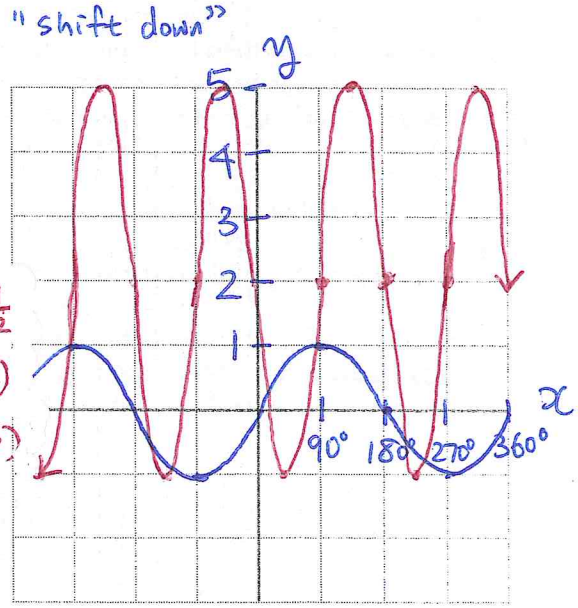
1. Given the equation $y = \overset{a}{3}\sin[\overset{k}{2}(\theta - \overset{d}{90^0})] + \overset{c}{2}$, predict the following:

Step 1 Amplitude 3 (multiply y values by 3)

Step 2 Period $\frac{360^\circ}{2} = 180^\circ$ (multiply x values by $\frac{1}{2}$)

S 3 Phase Shift right 90° (add 90° to x value)

S4 Vertical Shift up 2 (add 2 to y value)



2. Sketch the graph, shifting last.

	Step 1	Step 2	Step 3	Step 4
(0,0)	(0, 0)	(0, 0)	(90, 0)	(90, 2)
(90,1)	(90, 3)	(45, 3)	(135, 3)	(135, 5)
(180,0)	(180, 0)	(90, 0)	(180, 0)	(180, 2)
(270,-1)	(270, -3)	(135, -3)	(225, -3)	(225, -1)
				(315, 5)

Homework: pg. 309 C3, #1(don't sketch) 2(don't sketch), 3, 6, 7, 8a, 9, 11a)EOO