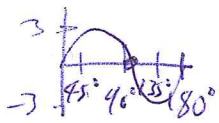
May 20 MCR3U Park

Transformations of Sinusoidal Graphs

* Unit Test on Monday, May 25



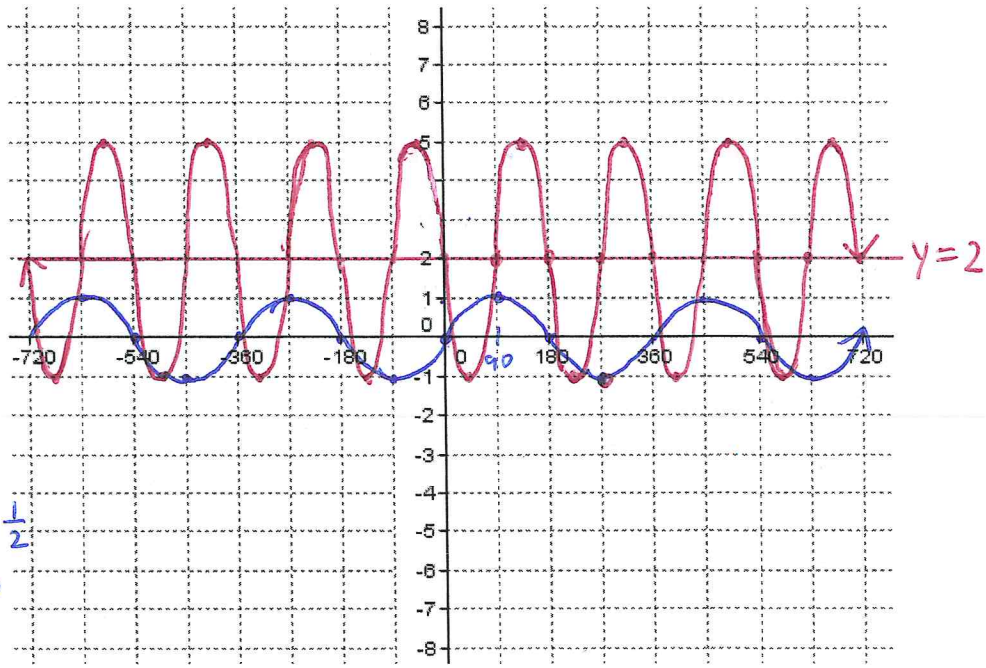
$y = 3\sin[2(\theta - 90)] + 2$

Amplitude 3

Period $\frac{360}{k} = \frac{360}{2} = 180°$

Phase Shift 90° right

Axis of Curve $y = 2$



Step 1: Vertical stretch by 3

Step 2: Horizontal compression by $\frac{1}{2}$

Step 3: shift to the right by 90°

Step 4: shift up by 2

Sin x	S1	S2	S3, S4
(0,0)	(0,0)	(0,0)	(90,2)
(90,1)	(90,3)	(45,3)	(135,5)
(180,0)	(180,0)	(90,0)	(180,2)
(270,-1)	(270,-3)	(135,-3)	(225,-1)

180
+270
450

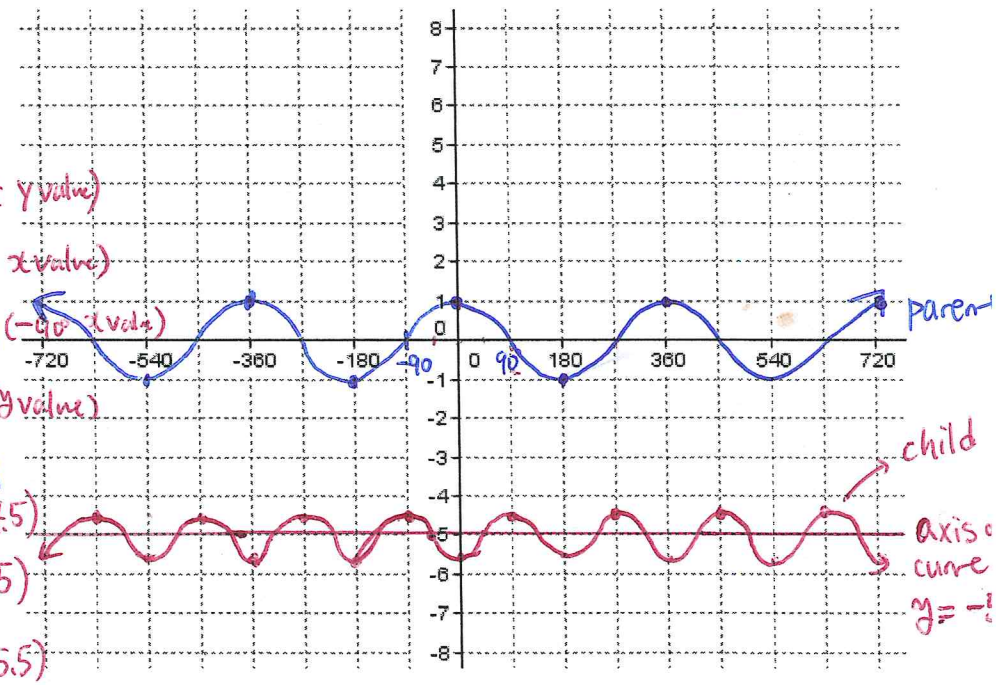
$y = \frac{1}{2}\cos(2(\theta + 90)) - 5$

S1 Amplitude $\frac{1}{2}$ ($\times\frac{1}{2}$ y value)

S2 Period $\frac{360}{2} = 180°$ ($\times\frac{1}{2}$ x value)

S3 Phase Shift $-90°$ (left) (-90 x value)

S4 Axis of Curve -5 (-5 y value)



Cos x	S1	S2	S3+S4
(0,1)	(0, $\frac{1}{2}$)	(0, $\frac{1}{2}$)	(-90, -4.5)
(90,0)	(90,0)	(45°,0)	(-45, -5)
(180,-1)	(180, $-\frac{1}{2}$)	(90°, $-\frac{1}{2}$)	(0, -5.5)
(270,0)	(270,0)	(135,0)	(45, -5)

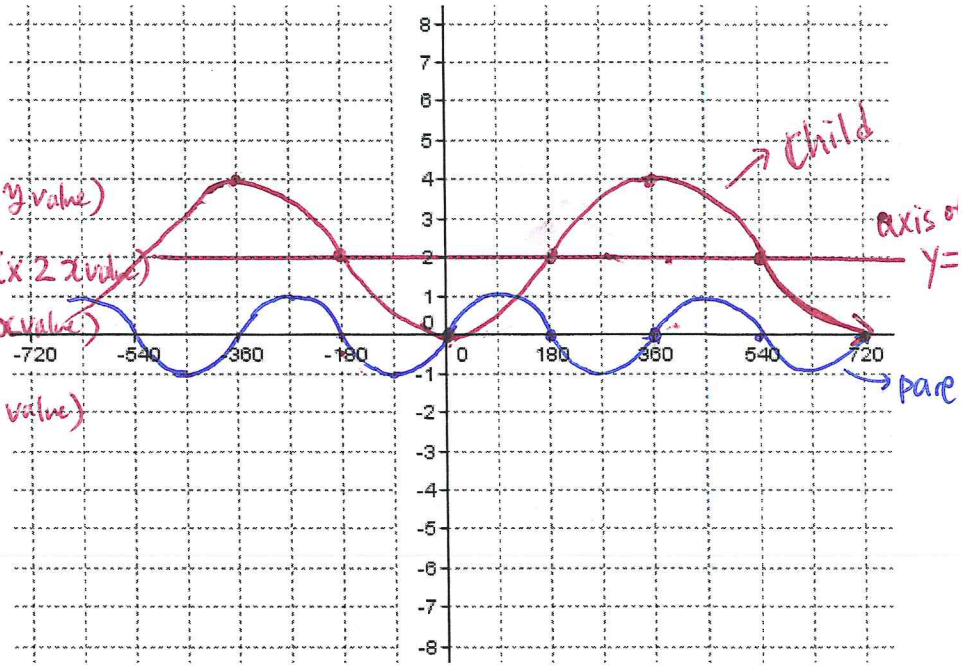
$$f(x) = -2\sin\left(\frac{1}{2}(\theta + 180)\right) + 2$$

S1 Amplitude $|-2| = 2$ (x -2 y value)

S2 Period $\frac{360}{k} = \frac{360}{\frac{1}{2}} = 720^\circ$ (x 2 x value)

S3 Phase Shift -180° (-180° x value)

S4 Axis of Curve 2 (+2 y value)



sin x	S1	S2	S3+S4
(0,0)	(0,0)	(0,0)	(-180, 2)
(90,1)	(90,-2)	(180,-2)	(0,0)
(180,0)	(180,0)	(360,0)	(180,2)
(270,-1)	(270,2)	(540,2)	(360,4)

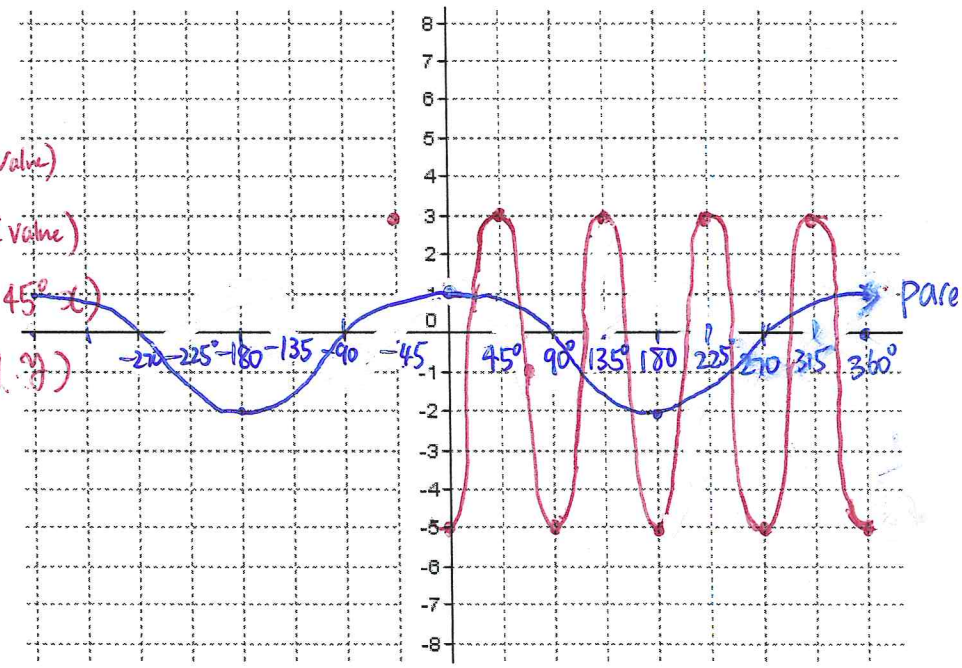
$$f(x) = 4\cos(4(\theta - 45)) - 1$$

y Amplitude 4 (x 4 y value)

x Period $\frac{360}{4} = 90^\circ$ (x $\frac{1}{4}$ x value)

x Phase Shift 45° (right) (+45° x)

y Axis of Curve -1 (down) (-1 y)



cos x	Final step
(0, 1)	(45°, 3)
(90, 0)	(67.5, -1)
(180, -1)	(90, -5)
(360, 1)	(135, 3)

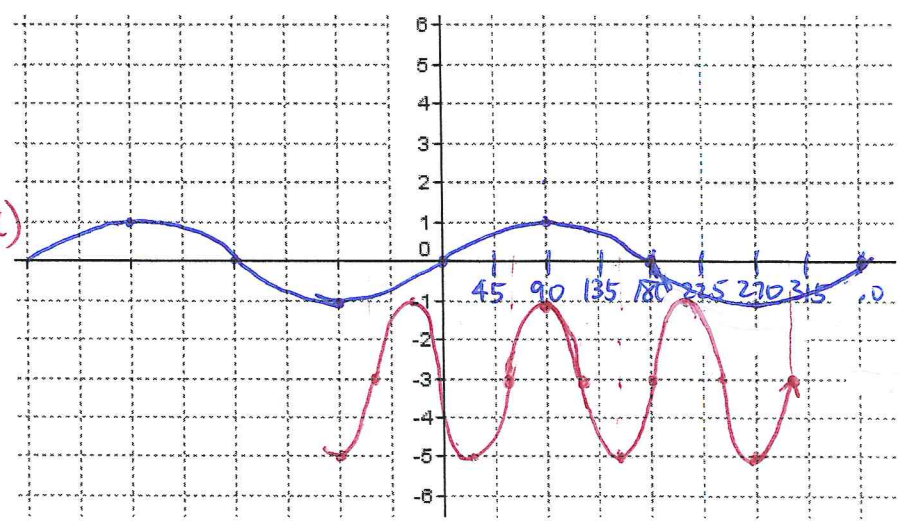
$$f(x) = 2\sin(3(\theta - 60)) - 3$$

y Amplitude 2 (x2 y)

x Period $\frac{360}{3} = 120^\circ$ (x $\frac{1}{3}$ x)

x Phase Shift 60° (+60 x)

y Axis of Curve -3 (-3 y)



sin x	x	y
(0,0)	(60, -3)	
(90,1)	(90, -1)	
(180,0)	(120, -3)	
(270,-1)	(150, -5)	