Math 30-1
Trigonometry : Graphing

Name: Key

1. For the following functions, determine the

	$y=-3\sin x+6$	$y=2\sin\left(x-\frac{\pi}{4}\right)-3$	$y=-2\cos 3(x-90^\circ)+4$	$y=-\cos(3(\theta-\pi))+4$
Amplitude	3	2	2	1
Phase shift	0	$\pi/4$ right	90° right	π right
Period	2π	2π	120°	~~120°~~ $2\pi/3$
Median	$y=6$	$y=-3$	$y=4$	$y=4$
Max	9	-1	6	5
Min	3	-5	2	3
Range	[3,9]	[-5,-1]	[2,6]	[3,5]

2. Write an equation of a sine function with the following characteristics
   a. Period 180° and amplitude of 3

$b=\frac{360^\circ}{180^\circ}=2$ $\quad a=3$ $\quad y=3\sin(2x)$

   b. Period $\frac{\pi}{3}$, maximum 14 and minimum 10

$b=\frac{2\pi}{\frac{\pi}{3}}=2\pi\cdot\frac{3}{\pi}=6$ $\quad d=12$ $\quad a=2$ $\quad y=2\sin[6(x)]+12$

   c. Period 2π, amplitude 5, median at $y=-2$

$b=\frac{2\pi}{2\pi}=1$ $\quad a=5$ $\quad d=-2$ $\quad y=5\sin(x)-2$

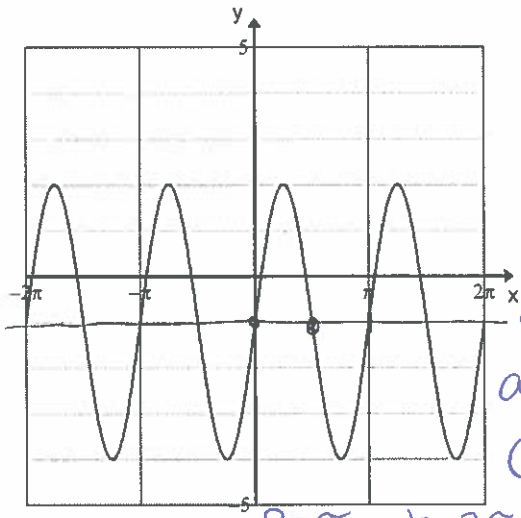
3. Write an equation of a cosine function with the following characteristics
   a. Vertical displacement 3 units up, period 120°, maximum of 6 and a phase shift of 60°

$d=3$ $\quad C=60^\circ$ $\quad b=\frac{360^\circ}{120^\circ}=3$ $\quad a=3$ $\quad y=3\cos[3(x-60^\circ)]+3$

   b. Vertical displacement of 4 units down, period $\frac{4\pi}{3}$, minimum of -9, and a phase shift of $\frac{\pi}{4}$ left

$d=-4$ $\quad b=\frac{2\pi}{\left(\frac{4\pi}{3}\right)}=2\pi\cdot\frac{3}{2\pi}=\frac{3}{2}$ $\quad C=+\pi/4$ $\quad a=5$ $\quad y=5\cos[3/2(x+\pi/4)]-4$

4. Determine the equation of the following sine function



d=-1
a=3
C=0
P=π b=2π/π=2

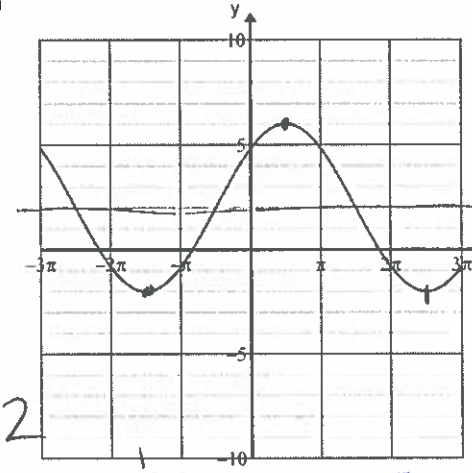
a. If the 'a' value is positive

$y = 3\sin(2x) - 1$

b. If the 'a' value is negative

$y = -3\sin(2(x - \pi/2)) - 1$

5. Determine the equation of the following cosine function



a=4
d=2
C=π/2 right
b=2π/4π=1/2
5π/2 - -3π/2 = 8π/2 = 4
-3π/2

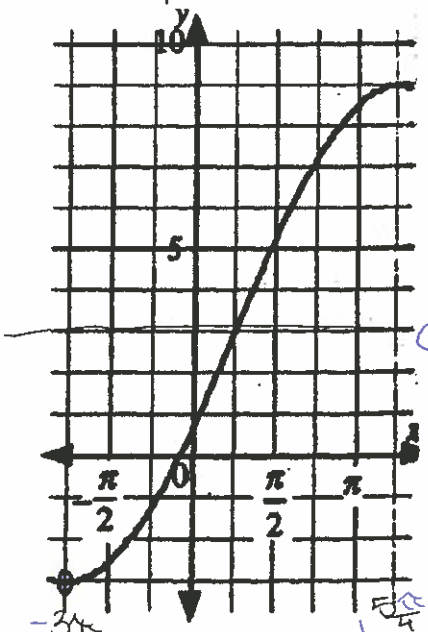
a. If the 'a' value is positive

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

b. If the 'a' value is negative

$y = -4\cos\left[\frac{1}{2}(x + \frac{3\pi}{2})\right] + 2$

6. The graph of the cosine function has a range of $-3 \le y \le 9$, determine the equation of the function with the smallest possible phase shift.



d=3
5π/4 - -3π/4 = 8π/4
b=2π/8π=1/4
a=-6
C=3π/4 left

$y = -6\cos\left[\frac{1}{4}(x + \frac{3\pi}{4})\right] + 3$

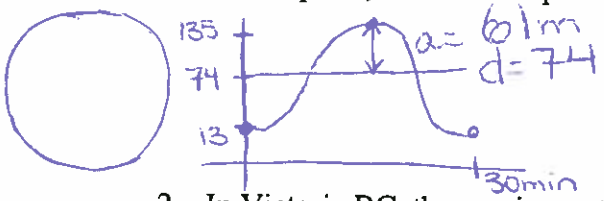
Math 30-1
Applications of Trig Functions

Name: Key

r = 61m (amp)

135 − 122 = 13m off ground

1. The London Eye has a diameter of 122m and reaches a maximum height of 135m. If it takes 30 minutes for one complete rotation of the wheel and passengers get on at the lowest point, what is an equation that can represent this?

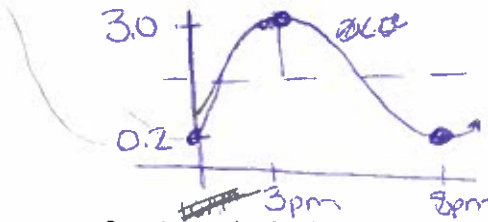


$y = -61\cos\left(\frac{\pi}{15}x\right) + 74$

$P = 30 \quad b = \frac{2\pi}{30}$

answers vary.

2. In Victoria BC, the maximum tide height of 3.0m was reached at 3:00Pm and the minimum tide height of 0.2m was reached at 8:00PM. What is an equation that represents this data?



$P = 10h \quad b = \frac{2\pi}{10} = \frac{\pi}{5}$

$a = \frac{3 - 0.2}{2} = 1.4$

$d = 1.4 + 0.2 = 1.6$

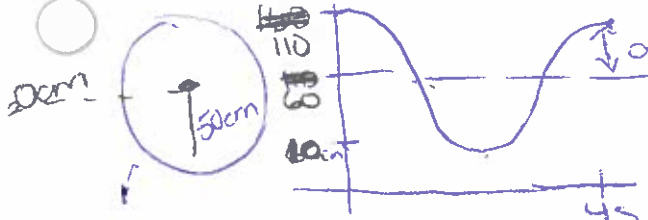
$y = -1.4\cos\left(\frac{\pi}{5}(x-3)\right) + 1.6$

$y = -1.4\cos\left(\frac{\pi}{5}x + 2\right) + 1.6$

3. A vertical wheel with a radius of 50 cm rotates about an axle 60cm above the ground. A marker placed at the top of the wheel is seen to make a complete rotation in 4s. Determine an equation that represents this data.

$P = 4s$

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



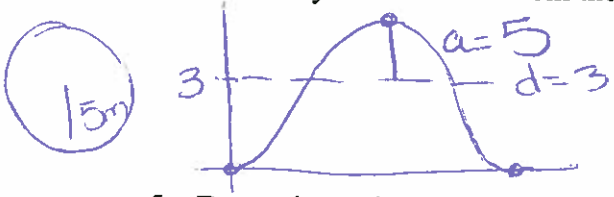
$y = 50\cos\left(\frac{\pi}{2}x\right) + 60$

4. A water wheel has a diameter of 10 m and completes 4 revolutions every minute. The centre of the wheel is located 3.0 m above the river. Determine and equation for the wheel if you measure it from the lowest point at time 0.

4 rev in 60s

1 rev in 15s

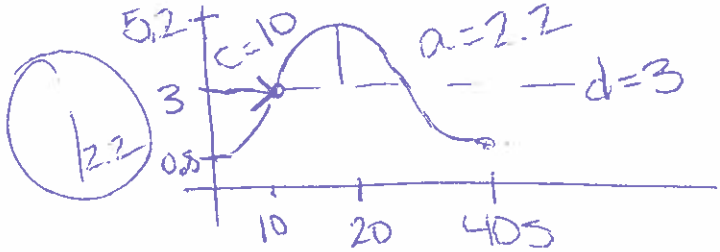
$P = 15\text{min} \quad b = \frac{2\pi}{15}$



$y = -5\cos\left(\frac{2\pi}{15}x\right) + 3$

5. Determine a sine and cosine equation for the following information. A Ferris Wheel makes a complete cycle in 40 seconds. The radius of the Ferris wheel is 2.2 m and you get on the Ferris wheel 0.8 m off the ground.

$P = 40s \quad b = \frac{2\pi}{40}$



$y = -2.2\cos\left(\frac{\pi}{20}x\right) + 3$

$y = 2.2\sin\left[\frac{\pi}{20}(x-10)\right] + 3$