For each set of data,

a Use the data to estimate the period, amplitude, and vertical and horizontal translations.

b Write a cosine function in the form $y = a\cos(b(x - c)) + d$ to model the data.

c Graph the function on the same axes as the data points.

d Use the regression function on your GDC to get a sine model for the data, and graph this function on the same axes as the data points.

Be sure your GDC is in RADIANS mode.

1

x	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
y	11.8	8.5	2.2	5.5	11.8	8.5	2.2	5.5	11.8	8.5	2.2

2

x	5	10	15	20	25	30	35	40	45	50	55
y	12.5	9.3	12.5	18.9	21.9	18.9	12.5	9.3	12.5	18.9	21.9

3

x	2	4	6	8	10	12	14	16	18	20	22
y	1.8	2.1	1.8	1.3	0.7	0.5	0.7	1.3	1.8	2.1	1.8

During the summer months, a reservoir supplies water to an outer suburb based on the water demand, $D(t) = 120 + 60\sin\left(\frac{\pi}{90}t\right), 0 \le t \le 90$, where t measures the number of days from the start of Summer (which lasts for 90 days).

(a) Sketch the graph of $D(t)$.

(b) What are the maximum and minimum demands made by the community over this period?

When a person is at rest, the blood pressure, P millimetres of mercury at any time t seconds can be approximately modelled by the equation

$$P(t) = -20\cos t\left(\frac{5\pi}{3}t\right) + 100, t \ge 0$$

(a) Determine the amplitude and period of P.

(b) What is the maximum blood pressure reading that can be recorded for this person?

(c) Sketch the graph of $P(t)$, showing one full cycle.

(d) Find the first two times when the pressure reaches a reading of 110 mmHg.

The function

$$h(t) = 67.5\cos\left(\frac{2\pi}{30}(t-15)\right)+67.5$$

can be used to model the height of a passenger above the boarding platform on the London Eye.

a Use this function to estimate the height of a passenger above the platform

i 8 minutes after boarding

ii 19 minutes after boarding.

b Use this function to estimate how long it takes for a passenger to first reach a height of 100 m.

Create a model for this data, which shows the depth of the water measured off a buoy in the ocean over an 18-hour period, starting at midnight.

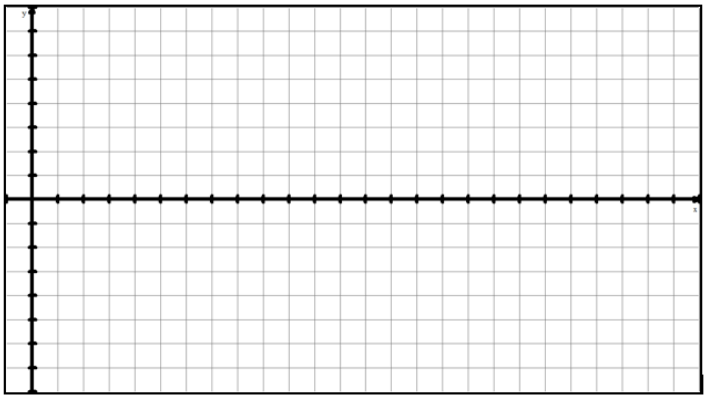
Time	0:00	2:00	4:00	6:00	8:00	10:00	12:00	14:00	16:00	18:00
Water depth (m)	6.7	8.3	9.1	8.1	6.4	5.6	6.7	8.4	9.2	8.2

*Note: DO NOT use SinReg here

See if you can calculate the transformations then check to see if your equation fits the data!

16. The depth of water in a harbour on the Bay Fundy that faces the ocean changes each hour, as shown.

Time (h)	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00
Depth (m)	5.5	6.3	8.5	11.5	14.5	16.7	17.5	16.7	14.5	11.5	8.5	6.3	5.5



Complete scatter plot

Determine the equation

Determine the depth at 10:30, verify with graph.

When is the water 7m deep?

Homework

Trig Modeling WS