

(A) Lesson Objectives

- a. Collect and/or analyze data of periodic phenomenon through a variety of contextual explorations
- b. Relate key terms related to data sets → periodic, period, amplitude, axis of the curve (equilibrium axis)

(B) Investigation #1 – Ferris Wheel Question (Nelson 11, Chap 5.6, p450, Q1-7)

- a. [Complete Ferris Wheel Question \(Nelson 11, Chap 5.6, p450, Q1-7\)](#)

(C) Investigation #2 – Hula Hoop & Motion Detector Activity

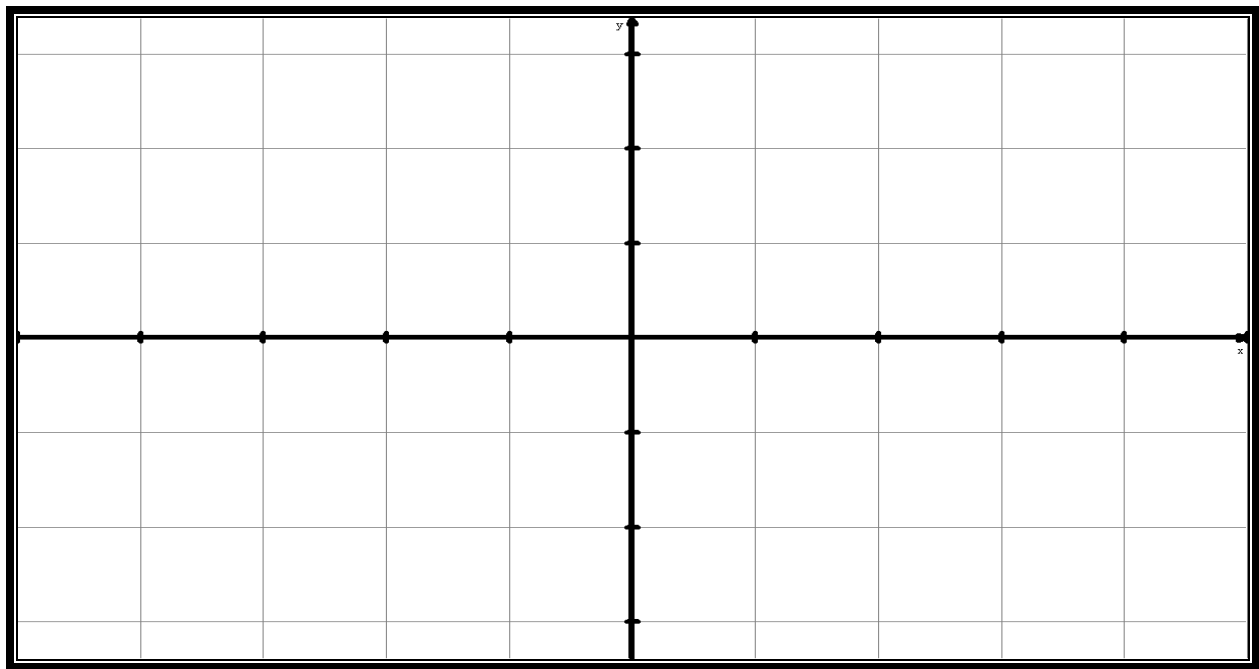
- a. [Complete the Hula Hoop activity](#)

(D) Characteristics of the Sinusoidal Function $f(x) = \sin(x)$

- a. From the MODE key, make sure that the angle measure is set to DEGREE mode
- b. On the TI-84, enter the equation $y1 = \sin(x)$
- c. Then go to ZOOM menu and select ZTrig
- d. Write down the WINDOW SETTINGS →

Xmin =	Xmax =	Ymin =	Ymax =
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- e. Draw a detailed sketch of the graph that appears on your GDC:
 - Label the x-intercepts and the y-intercept
 - Label the maximums and minimums
 - Draw in the axis of the curve/equilibrium axis
 - State the amplitude and the period
 - Label the “start point” of one cycle

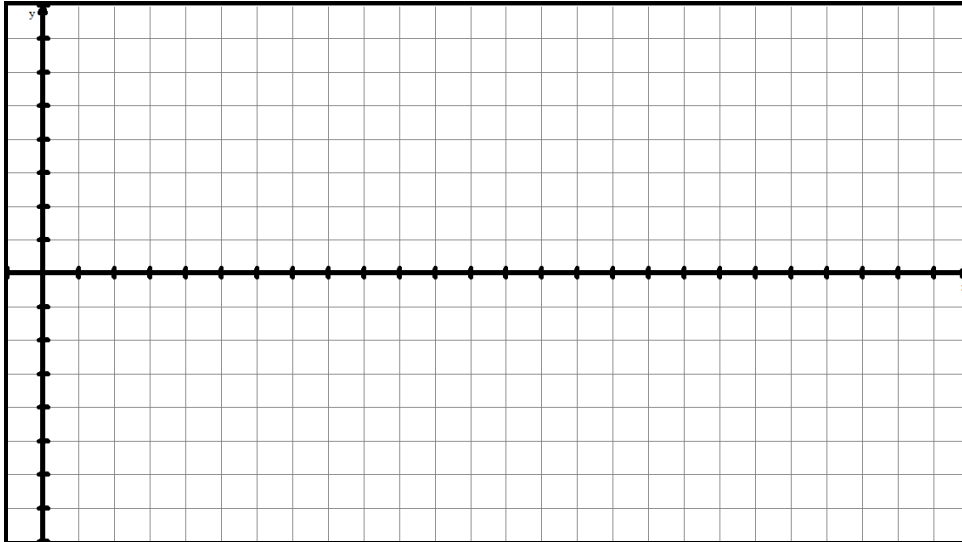


Investigation #3 – Temperatures in Kapuskasing (Nelson 11 Chap 5.7, p465, Q15)

15. The table shows the average monthly high temperature for one year in Kapuskasing.

Time (months)	J	F	M	A	M	J	J	A	S	O	N	D
Temperature (°C)	-18.6	-16.3	-9.1	0.4	8.5	13.8	17.0	15.4	10.3	4.4	-4.3	-14.8

Source: Environment Canada.

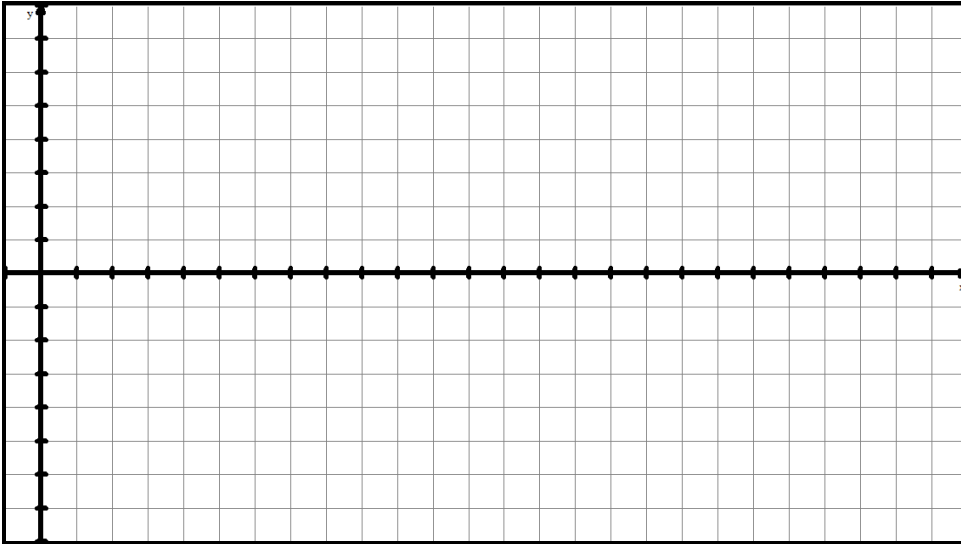


- Complete a scatter plot (by hand & on GDC)
- Determine equation
- What is the average monthly temperature for the 38th month?

(E) Investigation #4 – Water Levels in the Bay of Fundy (Nelson 11, Chap 5.7, p466, Q16)

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

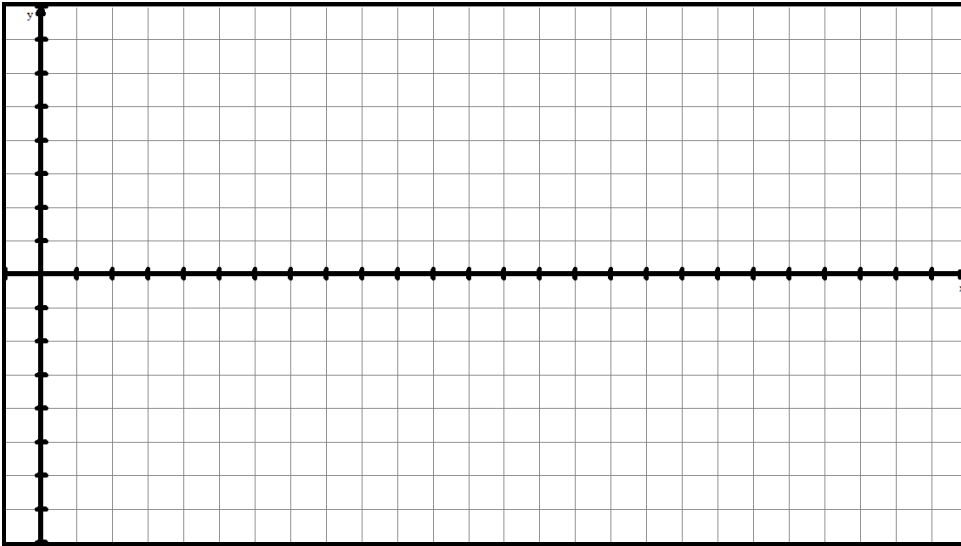


- Complete a scatter plot (by hand & on GDC)
- Determine equation.
- Use the equation to determine the depth of water at 10:30. Verify your answer using the graph.
- When is the water 7 m deep?

(F) Investigation #5 – Velocity of Air (Nelson 11, Chap 5.7, p466, Q17)

17. The table shows the velocity of air in litres per second of Nicole's breathing while she is at rest.

Time (s)	0	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2	2.25	2.5	2.75	3
Velocity (L/s)	0	0.22	0.45	0.61	0.75	0.82	0.85	0.83	0.74	0.61	0.43	0.23	0

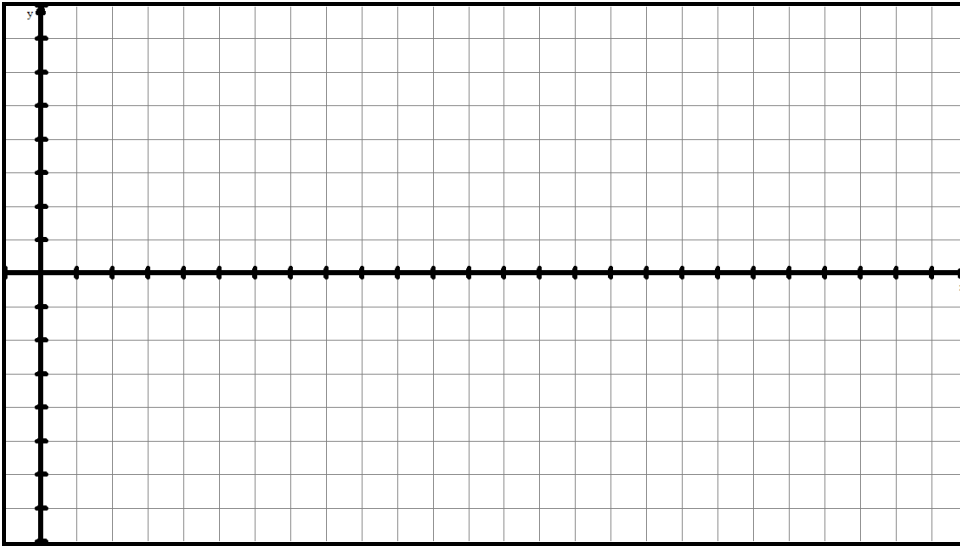


- Complete a scatter plot (by hand & on GDC)
- Determine equation.
- For $t = 6$ s, what is the velocity of Nicole's breathing? Verify your answer using an alternative method.
- How many seconds have passed when the velocity is 0.5 L/s?

(G)Investigation #6 – Angles of Elevation of Sun (Nelson 11, Chap 5.7, p465, Q14)

14. **Application:** In the “land of the midnight sun,” it is daylight all the time during the summer. The first coordinate is the hour of the day. The second coordinate is the angle of elevation of the sun, in degrees, above the horizon at a location in Canada’s Far North.

(00:00, 38.59), (01:00, 41.49), (02:00, 42.95), (03:00, 42.75), (04:00, 40.93),
(05:00, 37.73), (06:00, 33.51), (07:00, 28.67), (08:00, 23.56), (09:00, 18.52),
(10:00, 13.82), (11:00, 9.73), (12:00, 6.46), (13:00, 4.22), (14:00, 3.13),
(15:00, 3.26), (16:00, 4.61), (17:00, 7.09), (18:00, 10.55), (19:00, 14.80),
(20:00, 19.59), (21:00, 24.67), (22:00, 29.74), (23:00, 34.47), (24:00, 38.48)



- Complete a scatter plot (by hand & on GDC)
- Determine equation
- How could you use the model to calculate the elevation of the sun at 02:00 for the given location?
- When is the elevation of the sun above the horizon 30° ?

(H)Investigation #7 – Visibility of the Moon (Nelson 11, Chap 5.7, p460, Intro)

Day of the Year	1	2	3	4	5	6	10	15	20	21
Fraction of Moon Visible	0.25	0.18	0.11	0.06	0.02	0.00	0.11	0.57	0.99	1.00

Day of the Year	25	30	35	40	45	50	55	60	65	66
Fraction of Moon Visible	0.80	0.32	0.02	0.14	0.64	1.00	0.77	0.31	0.01	0.00

Source: US Naval Observatory, Washington.

- Complete a scatter plot (by hand & on GDC)
- Determine equation
- Use the model to calculate the visibility of the moon on the 53rd day.
- When is 75% of the moon visible?

