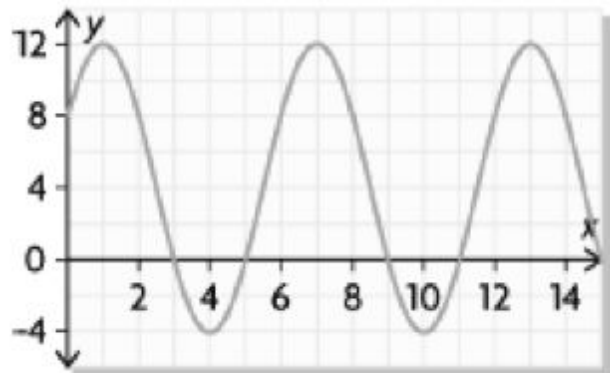


Mathematics 30-2
Chapter 8: Sinusoidal Functions Assignment
Total: _____ / 35 Marks

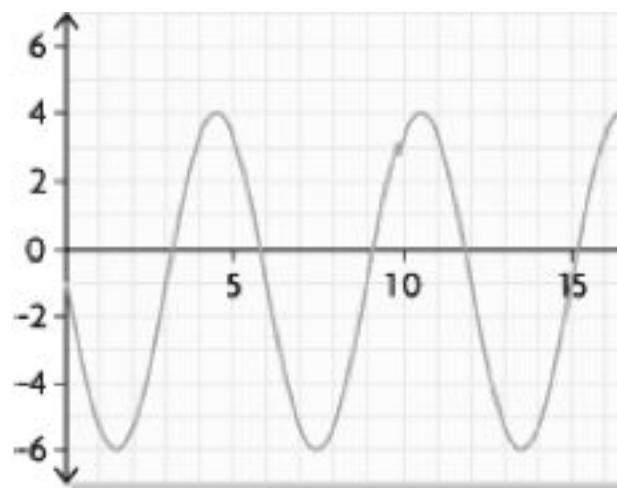
1. Identify the domain of $y = 2 \sin x - 1$. (1 mark)

2. Determine the period of the following graph. (1 mark)



3. Determine the midline of the following graph. (1 mark)

A. $y = -1$



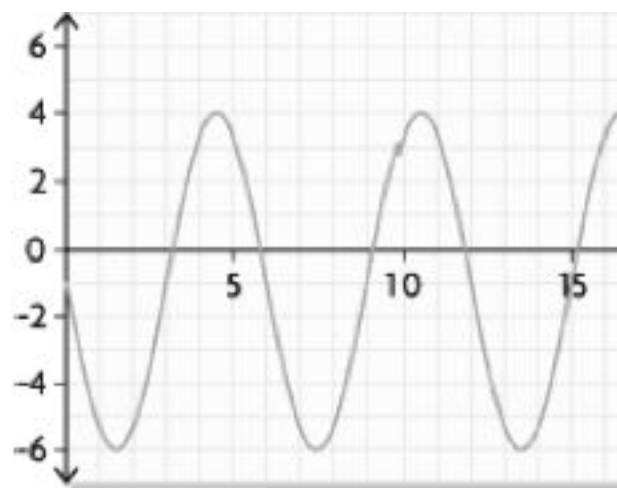
B. $y = 4$

C. $y = 5$

D. $y = 6$

4. Determine the amplitude of the following graph. (1 mark)

A. -1



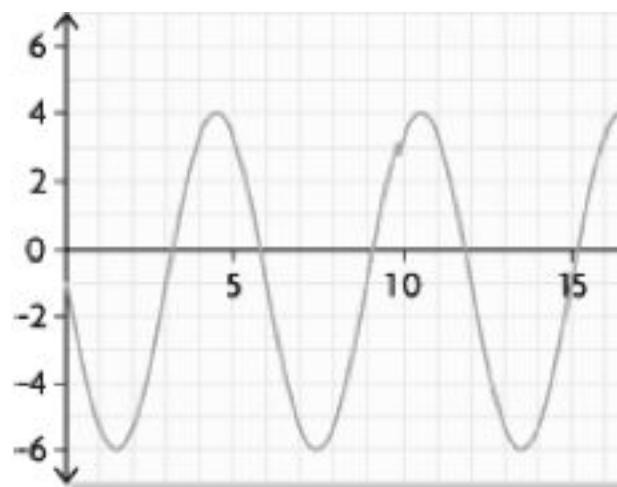
B. 4

C. 5

D. 6

5. Determine the range of the following graph. (1 mark)

A. $x \in \mathbb{R}$



B. $-6 \leq x \leq 4$

C. $y \in \mathbb{R}$

D. $-6 \leq y \leq 4$

6. A sinusoidal graph has a maximum at the point $(-40, 3)$ and a midline of $y = -12$. Determine the amplitude of the graph. **(1 mark)**

7. Determine the amplitude of the following function: $y = 10 \cos 4(x - 180^\circ) + 2$. **(1 mark)**

8. Determine the midline of the following function: $y = 5 \sin 1.5(x + 60^\circ) - 5$. **(1 mark)**

9. Determine the period of the following function: $y = 5 \sin 1.5(x + 60^\circ) - 5$. **(1 mark)**

10. Determine the range of the following function: $y = 5 \sin 1.5(x + 60^\circ) - 5$. **(1 mark)**

11. A seat's position on a Ferris wheel can be modelled by the function

$$y = 18 \cos 2.8(x + 1.2) + 21$$

where y represents the height in feet and x represents the time in minutes.

a. Determine the diameter of the Ferris wheel. (*HINT: The chair will start at the bottom of the Ferris Wheel and go upto the top*) **(1 mark)**

b. Which parameter(s) of the equation change if the diameter of the Ferris wheel changes to 24 feet. Explain your answer. **(2 marks)**

c. Determine the time that elapses between the two minimum heights. **(1 mark)**

12. The following data set is sinusoidal. Determine the missing value from the table. (*HINT: Use the regression equation to find the missing value*) **(1 mark)**

x	0	2	4	6	8	10	12
y	-1	3	-1		-1	3	-1

13. Determine the equation of the sinusoidal function for the data. Round values to the nearest tenth. **(1 mark)**

x	3	4	5	6	7	8	9	10
y	1.2	2.1	4.3	6.1	6.2	4.7	2.5	1.3

14. The height of a mass attached to a spring can be modelled by the sinusoidal function

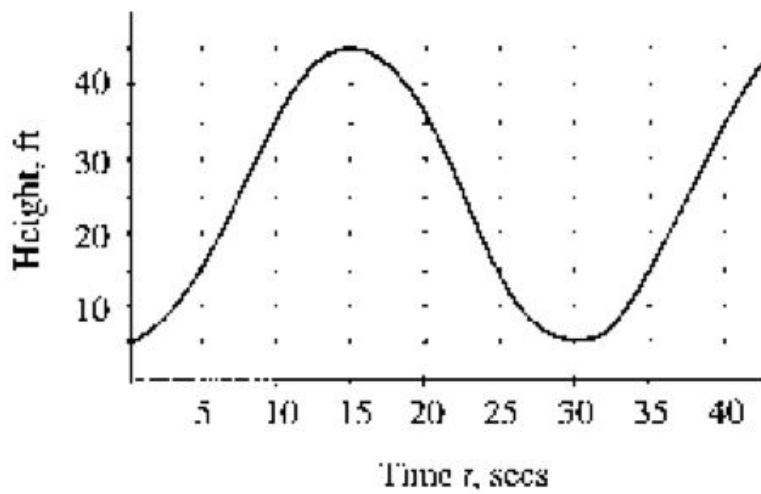
$$h(t) = 53.5 - 4.2 \cos 23.5t$$

where h represents the height in centimetres and t represents the time in seconds.

a. What is the height of the mass, to the nearest tenth of a centimetre, after the first minute? **(1 mark)**

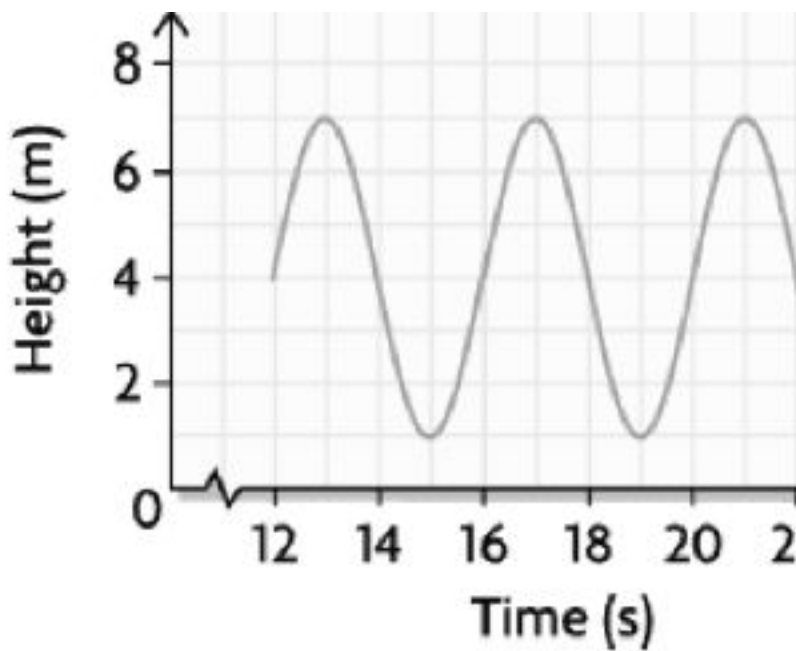
b. Calculate, to the nearest tenth of a centimeter, the height of the mass at the moment of release. **(1 mark)**

15. Brianna's position on a Ferris wheel can be modelled by the graph below, where h represents her height in feet and t represents the time in seconds.



- a. How much higher is she after 30 s than at the start of the ride? Round your answer to the nearest tenth of a metre. Explain. **(1 mark)**
- b. What is the maximum height of Brianna above the ground? **(1 mark)**

16. Jeremy's gymnastics coach graphs one particular series of jumps. Describe Jeremy's jumps using the graph. Show your work. **(2 marks)**



Amplitude: _____

Period: _____

Midline: _____

Range: _____

17. Sketch a possible graph of a sinusoidal function with the following set of characteristics. Explain your decision. **(2 marks)**

Domain: $\{x \mid 0 \leq x \leq 4, x \in \mathbb{R}\}$

Range: $\{y \mid 1 \leq y \leq 5, y \in \mathbb{R}\}$

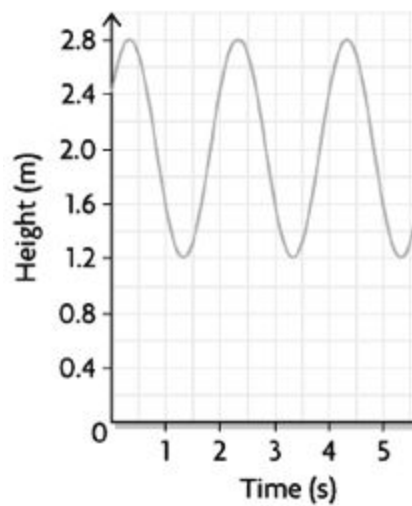
Period: 8

y-intercept: 1



18. Kira is sitting in an inner tube in the wave pool. The depth of the water below her, in terms of time, during a series of waves can be represented by the graph shown.

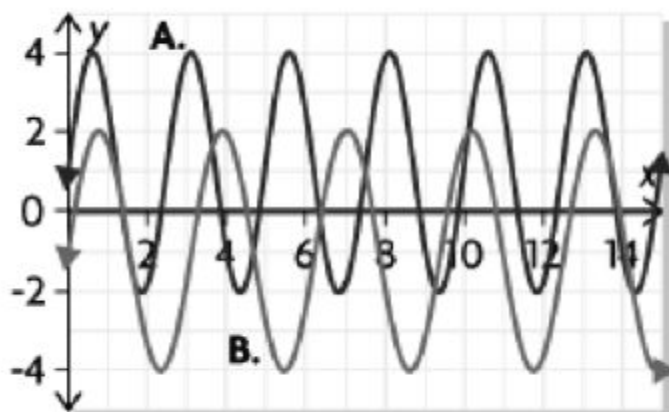
- a) How long does it take for one complete wave to pass?
Show your work. **(1 mark)**



- b) What is the approximate depth of the water below Kira after 4 s? **(1 mark)**

c) What is the depth of the water below Kira at 9 s? Assume that the waves continue at the same rate. Explain your answer. **(1 mark)**

19. Match each graph with the corresponding equation below. Explain your answers. (2 marks)



i) $y = 2 \cos 2.5(x - 0.8) - 1$

iv) $y = 3 \cos 2.5(x - 0.6) - 1$

ii) $y = 3 \cos 2(x - 0.8) + 1$

v) $y = 3 \cos 2.5(x - 0.6) + 1$

iii) $y = 3 \cos 2(x - 0.8) - 1$

vi) $y = 2 \cos 2(x - 0.6) - 1$

20. Describe the graph of the function $y = \frac{1}{10} \sin(2x) + 3.5$ by stating the amplitude, equation of its midline, range, and period. Show your work. **(2 marks)**

Amplitude: _____ Midline: _____

Range: _____ Period: _____

21. A competitive gymnast's coach analyzes one particular series of jumps. These jumps can be modelled

$$h(t) = 11.5 \sin\left(\frac{\pi}{2}t\right) + 9.8$$

by the sinusoidal function , where h represents the height of the gymnast in feet and t represents the time in seconds.

a) What is the maximum height of the gymnast jumps? Explain how you know. **(1 mark)**

b) How often does the gymnast jump? Explain how you know. **(1 mark)**

22. The following table gives the population of a predator animal over a decade.

Year	1	2	3	4	5	6	7	8	9	10
Population	165	158	174	198	212	216	205	184	162	161

a) Determine the sinusoidal equation for the data above in the form $y = a \sin(bx + c) + d$, where a , b , c , and d have been rounded to the nearest hundredth. **(1 mark)**

b) Use your graph to estimate the population in the 12th year. **(1 mark)**