

Multiple Choice

Identify the choice that best completes the statement or answers the question.

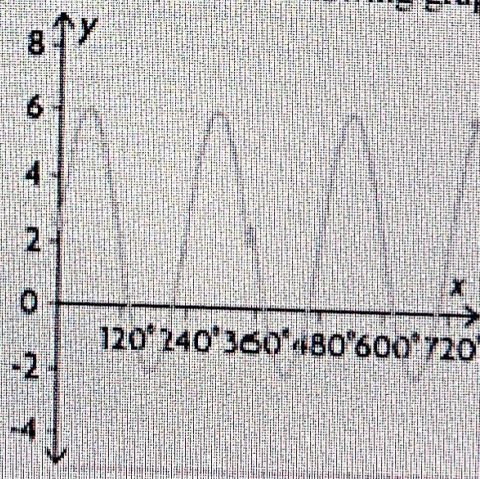
1. Which of the following is **NOT** an x -intercept of the graph of $y = \cos x$?

- A. 90°
 - B. 180°
 - C. 270°
 - D. 450°
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2. Identify the range of the graph of $y = 1 + \sin x$.

- A. $\{y \mid -1 \leq y \leq 1, y \in \mathbb{R}\}$
 - B. $\{y \mid 0 \leq y \leq 2, y \in \mathbb{R}\}$
 - C. $\{y \mid -1 \leq y \leq 2, y \in \mathbb{R}\}$
 - D. $\{y \mid -2 \leq y \leq 2, y \in \mathbb{R}\}$
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3. Determine the midline, or median line, of the following graph.



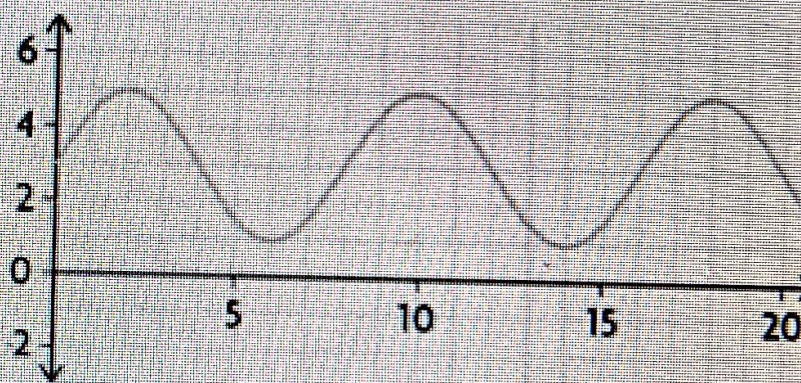
- A. $y = 2$
- B. $y = 3$
- C. $y = 4$
- D. $y = 5$

4. Determine the period of the following function. $y = 3 \sin 2x - 1$

- A. π
- B. 2π
- C. 4π
- D. 6π

5. Determine the amplitude of the following graph.

- A. 2
- B. 3
- C. 4
- D. 5



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6. Determine the period of the following graph.

- A. 2
- B. 2.5
- C. 5
- D. 1.25



7. A sinusoidal graph has an amplitude of 10 and a maximum at the point (18, 5). Determine the midline of the graph.

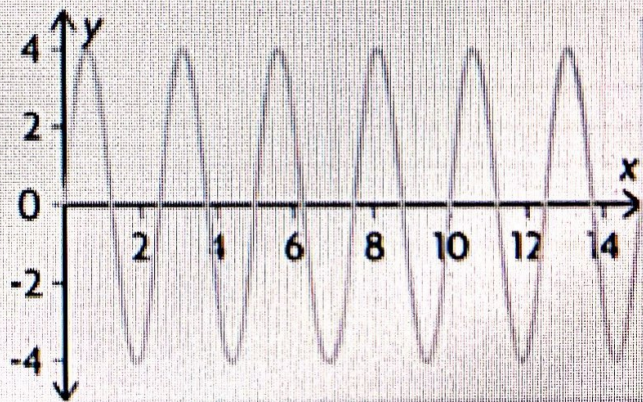
- A. $y = 0$
 - B. $y = -5$
 - C. $y = 13$
 - D. $y = 8$
-

8. Select the function with the greatest amplitude.

- A. $y = 2\sin 3(x + 90^\circ) + 5$
 - B. $y = 3\sin 2(x - 90^\circ) - 3$
 - C. $y = \frac{1}{3}\sin(x + 90^\circ) - 1$
 - D. $y = \sin 0.5(x - 90^\circ)$
-

9. Determine the range of the following graph.

- A. $\{y \mid -8 \leq y \leq 8, y \in \mathbb{R}\}$
- B. $\{y \mid -4 \leq y \leq 4, y \in \mathbb{R}\}$
- C. $\{y \mid 0 \leq y \leq 15, y \in \mathbb{R}\}$
- D. $\{y \mid y \in \mathbb{R}\}$



10. Determine the midline of the following function, $y = 3\sin 2(x - 90^\circ) - 1$

- A. $y = 2$
 - B. $y = 3$
 - C. $y = 0$
 - D. $y = -1$
-

11. The following data set is sinusoidal and in radians. Determine the missing value from the table.

x	0	1	2	3	4	5	6
y	1.0	2.5	4.0	2.5	1.0	2.5	

- A. -0.5
 - B. 1.0
 - C. 2.5
 - D. 4.0
-

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12. The amount of daylight in a town can be modelled by the sinusoidal function

$$d(t) = 4.37 \cos 0.017t + 12.52$$

where $d(t)$ represents the hours of daylight and t represents the number of days since June 20, 2012.

How many hours of daylight should be expected on August 20, 2012, which is 61 days after June 20, 2012?

- A. 14.74 h
- B. 14.89 h
- C. 15.04 h
- D. 15.19 h

13. The amount of daylight in a town can be modelled by the sinusoidal function

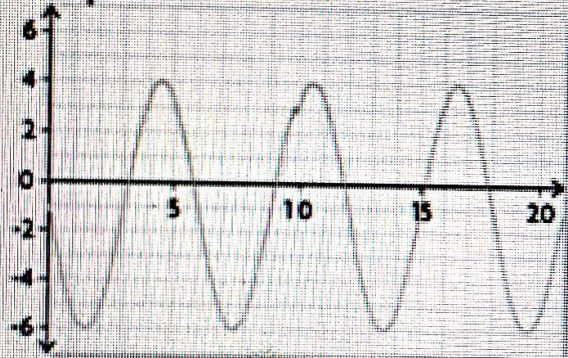
$$d(t) = 4.37 \cos 0.017t + 12.52$$

where $d(t)$ represents the hours of daylight and t represents the number of days since June 20, 2012. How many hours of sunlight are expected on June 20, 2012?

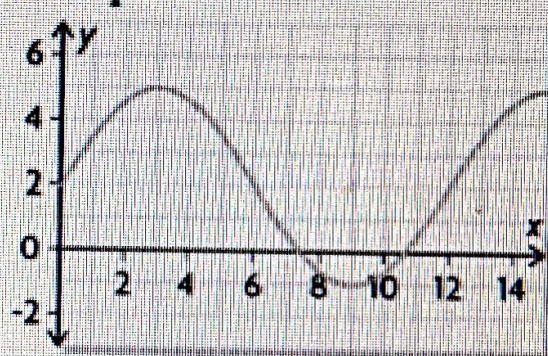
- A. 4.37 hrs
- B. 12.52 hrs
- C. 16.89 hrs
- D. 8.15 hrs

14. Determine which graph has the greatest period.

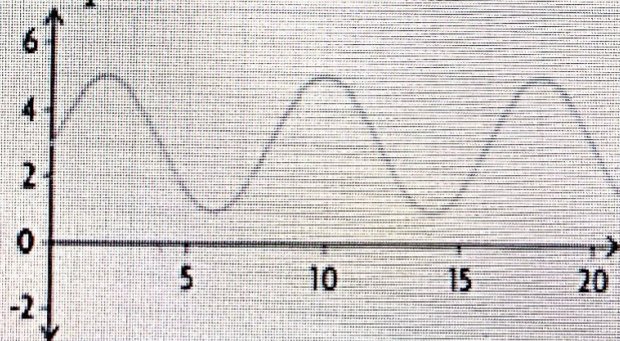
Graph A



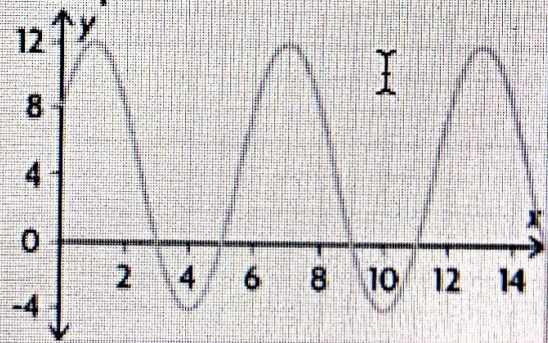
Graph C



Graph B



Graph D



- A. Graph A
- B. Graph B
- C. Graph C
- D. Graph D

Problem

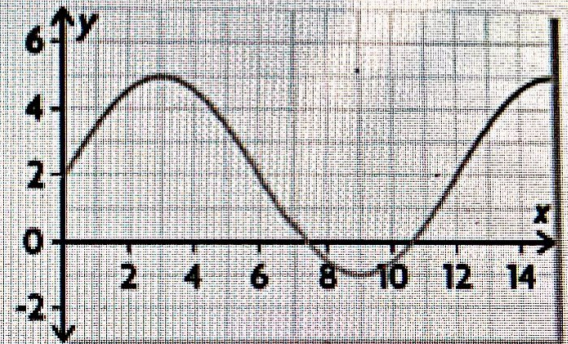
1. The graph of a sinusoidal function is shown. Describe this graph by determining its range, the equation of its midline, its amplitude, and its period. (2 marks)

Range: _____

Midline: _____

Amplitude: _____

Period: _____



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

i) $y = 2 \cos(x - 120^\circ) + 4$

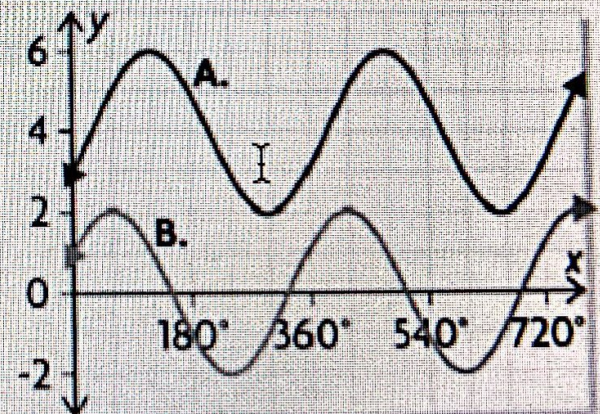
ii) $y = 2 \cos(x - 60^\circ) + 4$

iii) $y = 2 \cos(x + 60^\circ) + 4$

iv) $y = 2 \cos(x - 120^\circ)$

v) $y = 2 \cos(x - 60^\circ)$

vi) $y = 2 \cos(x + 60^\circ)$



Graph A matches Equation _____.
Explanation:

Graph B matches Equation _____.
Explanation:

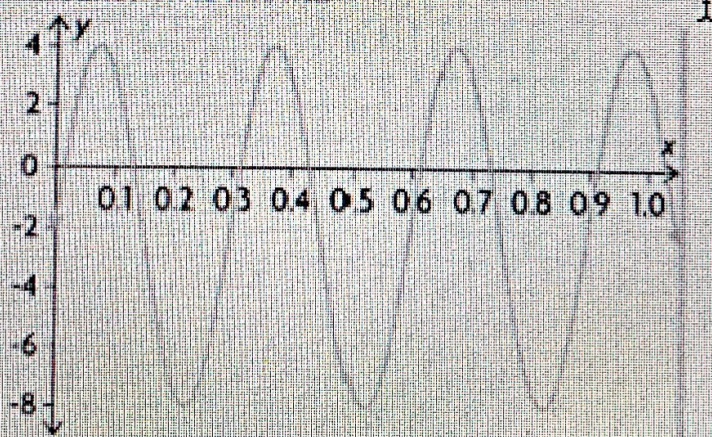
3. The height of a chair on a Ferris wheel is described by the function

$$h(t) = -14 \cos 3.2t + 16$$

where $h(t)$ represents the height of the chair in metres and t represents the time in minutes.

- a) What are the maximum and minimum heights you can reach if you are riding the Ferris wheel? (2 marks)
- b) What is the period, to the nearest hundredth, of the function? What does the period tell you about the Ferris wheel in this context? (2 marks)
- c) Determine the first instance, time to the nearest hundredth, the Ferris wheel reaches 20.0 m. (1 mark)

4. The graph of a sinusoidal function is shown.



- a) Determine the period of this graph. Show your work. (1 mark)
- b) Determine the y-value of this graph when $x = 0.7$. Explain your answer. (1 mark)

5. The following table gives the average temperature in an Alberta town for the first nine months of the year.

Month	Jan.	Feb.	Mar.	Apr.	May
Average Temperature (°C)	-10.8	-3.1	1.6	8.8	15.2
Month	Jun.	Jul.	Aug.	Sept.	Oct.
Average Temperature (°C)	20.3	23.0	22.7	17.8	

a. Determine the sinusoidal regression in the form $y = a \cdot \sin(bx + c) + d$, where a , b , c and d have all be rounded to the nearest hundredth. (2 marks)

$$a = \underline{\hspace{2cm}} \quad b = \underline{\hspace{2cm}} \quad c = \underline{\hspace{2cm}} \quad d = \underline{\hspace{2cm}}$$

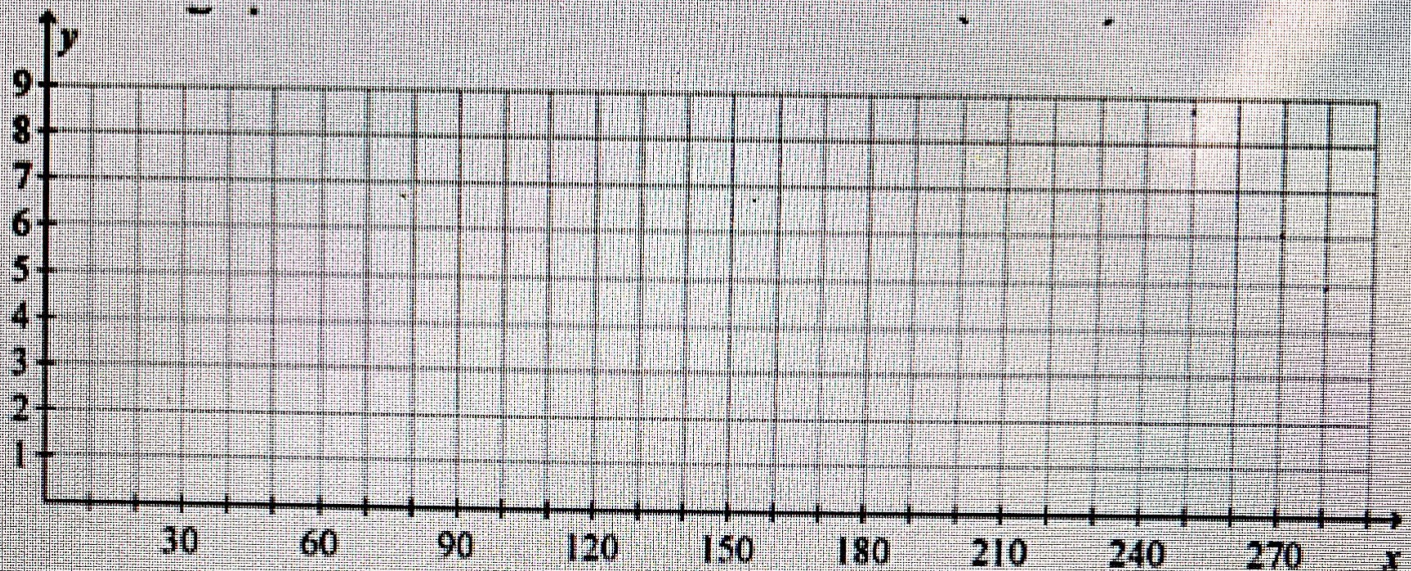
b. Using your regression equation, extrapolate what the average temperature for October will be. (1 mark)

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6. Allison is sitting on a Ferris wheel and records her height at various times throughout the ride.

Time (s)	0	30	60	90	120	150	180	210	240	270
Height (m)	2	5	8	5	2	5	8	5	2	5

a) Sketch a graph for the sinusoidal function above. (1 mark)



b) State the amplitude, period and midline of the graph. (3 marks)

- amplitude = _____
- period = _____
- equation of the midline = _____

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c) Using the amplitude and the midline from part b, complete $y = a \cdot \sin\left(\frac{\pi}{60}(x - 30)\right) + d$ (1 mark)

d) Which value, a , $\frac{\pi}{60}$, or d , would be affected by the following scenarios: (2 marks)

i) larger diameter of the Ferris wheel _____

ii) quicker rotation of the Ferris wheel _____