

Section 1: Multiple Choice

18 Marks

Answer all items. Read each question carefully. Then place the correct answer in the space provided at the end of this section. Please use CAPITAL letters.

1. Which measure is approximately equivalent to 60 radians?

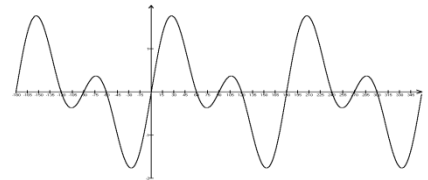
- (A) 1° (B) $\frac{\pi^\circ}{3}$ (C) 60° (D) 3438°

2. Which measure is approximately equivalent to 126° ?

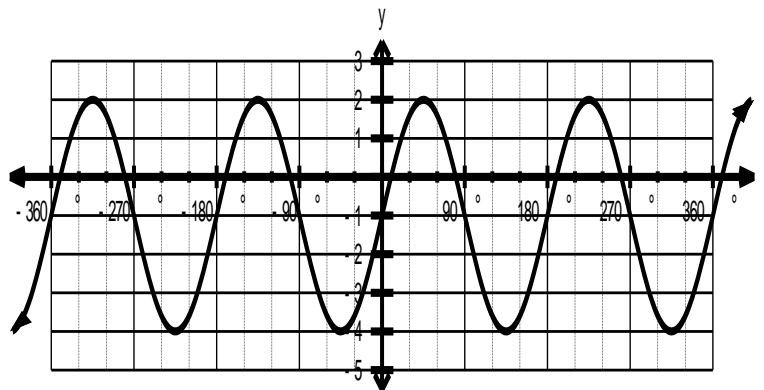
- (A) 1 radian (B) 2 radians (C) 40 radians (D) 7219 radians

3. Which best describes the graph shown?

- (A) periodic (B) wavy
(C) sinusoidal (D) none of these



Use the graph below to answer questions 4 to 9.



4. What is the period of the graph?

- (A) 90° (B) 180° (C) 270° (D) 360°

5. What is the amplitude of the graph?

- (A) -4 (B) 2 (C) 3 (D) 6

6. What is the equation of the midline of the graph?

- (A) $x = 45^\circ$ (B) $x = 135^\circ$ (C) $y = -1$ (D) $y = 0$

7. What is the local maximum of the graph?

- (A) 2 (B) 3 (C) 180° (D) 360°

8. What is the range of the graph?

- (A) $\{x \mid -360^\circ \leq x \leq 360^\circ, x \in \mathbb{R}\}$ (B) $\{y \mid -4 \leq y \leq 2, y \in \mathbb{R}\}$
(C) $\{x \mid x \in \mathbb{R}\}$ (D) $\{y \mid -5 \leq y \leq 3, y \in \mathbb{R}\}$

9. What is the equation of the graph?

- (A) $y = 3\sin(2x) - 1$ (B) $y = 2\sin(3x) - 1$
(C) $y = 3\sin(2x) + 1$ (D) $y = 2\sin(3x) + 1$

10. What is the minimum value of the graph of $y = 3\cos 2(x - 30^\circ) + 1$?
- (A) -2 (B) 1 (C) 3 (D) 4
11. Which graph would have a period of $\frac{\pi}{2}$, where x is measured in radians?
- (A) $y = 3\sin 4(x - \pi) + 2$ (B) $y = 2\cos \frac{1}{4}(x - \pi) + 1$
(C) $y = -5\sin \frac{\pi}{2}(x - \pi) + 1$ (D) $y = -4\cos 3\left(x - \frac{\pi}{2}\right) + 2$
12. What is the amplitude of the graph of $y = \frac{1}{2}\cos 3\left(x - \frac{\pi}{4}\right) + 5$?
- (A) $\frac{1}{2}$ (B) 2 (C) 3 (D) 5
13. What is the equation of the midline of the graph of $y = \frac{1}{2}\cos 3\left(x - \frac{\pi}{4}\right) + 5$?
- (A) $y = \frac{\pi}{4}$ (B) $y = 2$ (C) $y = 3$ (D) $y = 5$
14. What is the equation of the midline of the graph that has a maximum value of 4 and a minimum value of -2 ?
- (A) $x = 1$ (B) $x = 3$ (C) $y = 1$ (D) $y = 3$
15. What characteristic of the graphs of $y = \sin x$ and $y = \cos x$ is different?
- (A) amplitude (B) intercepts (C) midline (D) period
16. What translation of the graph of $y = \cos x$ is required so that it is congruent to the graph of $y = \sin x$?
- (A) 90° to the left (B) 90° to the right
(C) 180° to the left (D) 180° to the right
17. What is the amplitude of the graph that has a minimum value of -1 and a maximum value of 9?
- (A) 4 (B) 5 (C) 8 (D) 10
18. What is the range of the graph that has an amplitude of 4 and a midline at $y = 1$?
- (A) $\{y \mid -3 \leq y \leq 5, y \in \mathbb{R}\}$ (B) $\{y \mid 3 \leq y \leq 5, y \in \mathbb{R}\}$
(C) $\{y \mid 1 \leq y \leq 4, y \in \mathbb{R}\}$ (D) $\{y \mid y \in \mathbb{R}\}$

Answers for Section 1: Please use CAPITAL letters.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 12. _____
13. _____ 14. _____ 15. _____ 16. _____ 17. _____ 18. _____

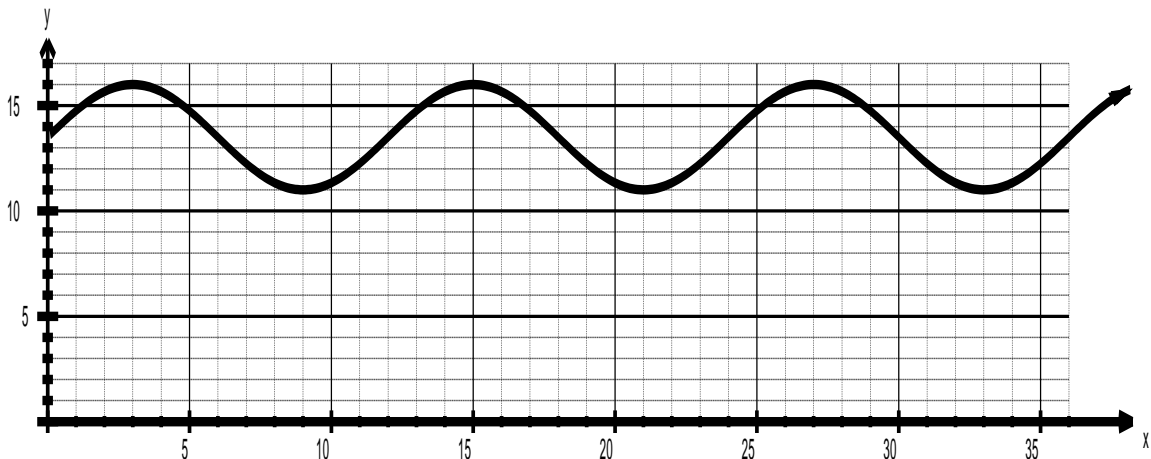
Answer ALL items in the space provided. Show ALL workings.

19. The depth of water $d(t)$, in metres, in a seaport can be approximated by the function $d(t) = 2.5\sin(30^\circ t) + 13.5$, where t is the time in hours.

(a) What is the period of the tide? (2 Marks)

(b) What information does the period give you? (1 Mark)

- (c) A cruise ship needs a depth of at least 12 metres of water to dock safely. Using the graph, for how many hours per tide cycle can the ship dock safely? (1 Mark)



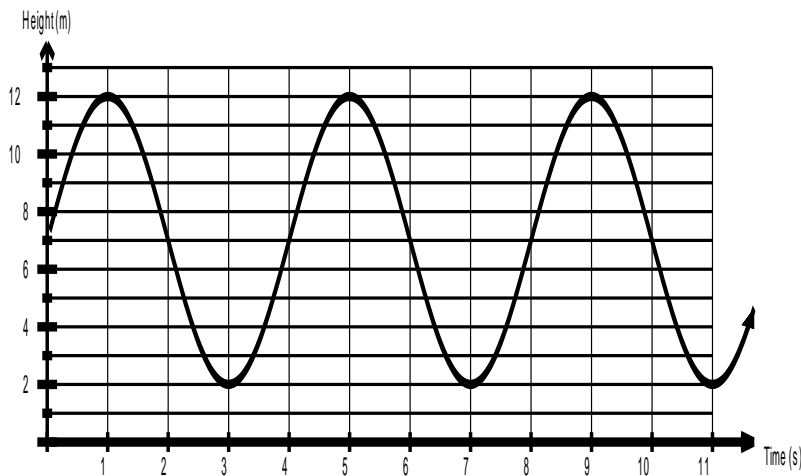
20. The average monthly rainfall in inches for Honolulu, Hawaii was calculated for 2013. The data followed a sinusoidal trend and hence a sinusoidal regression analysis was performed to determine the equation of best fit for the data.

(a) Given that the regression analysis produced the following output, what is the regression equation for this data? (1 Mark)

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SinReg
y=a*sin(bx+c)+d
a=1.654259045
b=.454506839
c=1.685461165
d=2.039419307
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(b) Using your equation from (a), predict the average monthly rainfall for February, 2014 (month 13). (2 Marks)

21. Jason rode on a Ferris wheel. The graph models Jason's height above the ground in metres in relation to time in seconds. The data were recorded while the ride was in progress.



- (A) At what height does Jason board the Ferris wheel? (1 Mark)
- (B) What does the height in (A) represent on the graph? (1 Mark)
- (C) At what height is the axle of the Ferris wheel located? (1 Mark)
- (D) What does the height in (C) represent on the graph? (1 Mark)
- (E) What is the radius of the Ferris wheel? (1 Mark)
- (F) What does the radius of the Ferris wheel represent on the graph? (1 Mark)
- (G) What are the highest and lowest heights Jason reaches on his ride? (2 Marks)
- (H) What do the heights in (G) represent on the graph? (2 Marks)
- (I) How long does it take for Jason to make one complete revolution on the Ferris wheel? (1 Mark)
- (J) What does the time in (I) represent on the graph? (1 Mark)