

MATH 12 - REVIEW FOR FINAL EXAM

Multiple Choice

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

1. Determine the future value of a simple interest investment with a 6-year term on a principal of \$150 at 2.8%. $150 \times 0.028 \times 6 + 150$

A. \$180.50 **B.** \$175.20 C. \$402.00 D. \$154.30

2. Principal of \$80 is invested at 2.3% simple interest, paid annually, for 4 years. What is the rate of return? $(80 \times 0.023 \times 4) \div 80 \times 100$

A. 8.9% B. 9% C. 8.4% **D.** 9.2%

3. Tenzin has \$9000 to invest for 2 years. Which investment option will earn her more interest? How much more interest?

A. 5% simple interest, paid quarterly $9000 \times 2 \times 0.05 = 900$
 B. 7% compound interest, paid annually $9000(1 + 0.07)^2 = 1304.10$

A. Option A: \$401.70 C. Option A: \$359.20
 B. Option B: \$380.47 **D.** Option B: \$404.10

4. Determine the future value and the total interest earned for the investment.

Principal (\$)	Annual Interest Rate (nominal %)	Compounding Frequency	Term (years)
9000	2.25	semi-annually	3 years

$9000(1 + \frac{0.0225}{2})^6$

A. \$9728.91; \$728.91 C. \$9626.65; \$625.65
 B. \$9696.45; \$696.45 **D.** \$9624.84; \$624.84

5. Determine the future value of a simple interest investment where 5% interest paid monthly for 1.5 years on \$1000. $1000 \times 0.05 \times 1.5 + 1000$

A. \$1000 B. \$1050 **C.** \$1075 D. \$1100

6. A \$6000 investment grows to \$7351.81 in 5.5 years. If the investment has interest compounded monthly, determine the interest rate. $7351.81 = 6000(1 + \frac{r}{12})^{66}$

A. 3.7% B. 3.5% C. 3.3% D. 3.2%

7. Patrick invested \$4000 for 9 years. At the investment's maturity, its value was \$5476. What was the annual simple interest rate? $1476 = 4000(r)9$

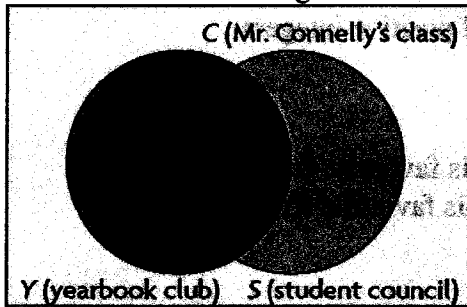
A. 3.8% **B.** 4.1% C. 6.2% D. 5.3%

8. Rosa invested \$600 at 3.9% simple interest. At the investment's maturity, its value was \$1302. How long was the money invested? $702 = 600 \times 0.039 \times t$
- A. 25 years B. 30 years C. 35 years D. 40 years
9. How many compounding periods are there for \$1000 invested for 6 years at 4.2% compounded semi-annually? 6×2
- A. 6 B. 12 C. 42 D. 6000
10. Determine the present value of a 10-year GIC with an interest rate of 5.6%, compounded monthly, if the future value is \$10 000. $10000 \div (1 + \frac{0.056}{12})^{120}$
- A. \$5769.74 B. \$5719.54 C. \$5662.89 D. \$5744.47
11. Determine the interest earned on a 20-year investment with an interest rate of 4.25%, compounded quarterly, if the future value is \$100 000. $100000 = P(1 + \frac{0.0425}{4})^{80}$
- A. \$56 501.05 B. \$59 741.77 C. \$57 066.43 D. \$58 428.18
12. Gila took out a loan from the bank to buy a new car that costs \$22 500. The bank offered her a simple interest rate of 4.3%. The loan is to be repaid in 5 years. What amount did Gila need to pay back? $22500 \times 0.043 \times 5 + 22500$
- A. \$27 771.80 B. \$27 337.50 C. \$23 467.50 D. \$22 500.00
13. Yu needs a car. He can lease a car for 3 years for \$300 per month and a down payment of \$4100. He can purchase a new car for \$28 000, which would be financed with a bank loan at an interest rate of 5.2%, compounded monthly, and a down payment of \$3700. He would pay off this loan with regular monthly payments. He can also rent a car at \$75 per day. What is the total cost of leasing the car? $300 \times 36 + 4100$
- A. \$10 800 B. \$18 500 C. \$14 900 D. \$12 600
14. Carmen must now pay \$9000 to pay off her bank loan, which she borrowed 10 years ago. The loan was compounded monthly at an interest rate of 5.2%. How much did Carmen originally borrow? $9000 \div (1 + \frac{0.052}{12})^{120}$
- A. \$15 121.25 B. \$5421.07 C. \$5356.70 D. \$5921.05
15. A loan worth \$10 000 is due in 5 years. Which compounding period will result in the highest amount of interest?
- A. annually B. quarterly C. monthly D. daily

16. What is the meaning of *disjoint* in set theory?

- A. two or more sets having no elements in common
- B. two or more sets that do not match
- C. sets that are in different universal sets
- D. sets that contain no elements

17. There are 28 students in Mr. Connelly's Grade 12 mathematics class. The number of students in the yearbook club and the number of students on student council are shown in the Venn diagram. Use the diagram to answer the following questions.



How many students are in both the yearbook club and on the student council?

- A. 2
- B. 5
- C. 1
- D. 7

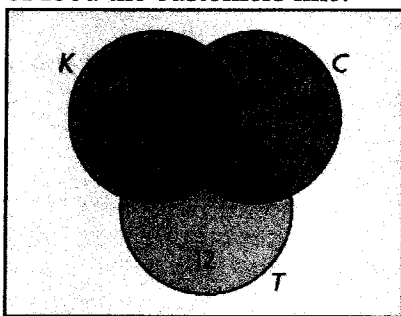
18. Consider the following two sets:

• $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$ • $B = \{-9, -6, -3, 0, 3, 6, 9, 12\}$

Determine $A \cap B$.

- A. $\{3, 6, 9, 12\}$
- B. $\{0, 3, 6, 9, 12\}$
- C. $\{1, 2, 4, 5, 7, 8, 10, 11\}$
- D. $\{-9, -6, 6, 9\}$

19. A restaurant offers Chinese, Thai, and Korean food. The following Venn diagram shows the types of food the customers like.



Handwritten calculation: $50 - 23$ with arrows pointing to the intersection of circles C and T.

Use the diagram to determine $n(K) - n(C \cap T \cap K)$.

- A. 10
- B. 50
- C. 27
- D. 33

20. Which statement is the inverse of the conditional statement below?
 "If tomorrow is Monday, then today is Sunday."
 A. If tomorrow is Sunday, then today is not Monday.
 B. If today is Sunday, then tomorrow is Monday.
 C. If tomorrow is not Monday, then today is not Sunday.
 D. If today is not Sunday, then tomorrow is not Monday.

21. Which pair of sets represents disjoint sets?
 A. N , the set of natural numbers, and I , the set of integers
 B. T , the set of all triangles, and C , the set of all circles
 C. N , the set of natural numbers, and P , the set of positive integers
 D. none of the above

22. Rahim described the set as follows:

- $M = \{\text{all of the foods he eats}\}$
- $V = \{\text{his favourite vegetables}\}$
- $D = \{\text{his favourite desserts}\}$
- $F = \{\text{his favourite fruits}\}$

Which are the disjoint sets?

- A. M and D B. M and V C. M and F D. V and F

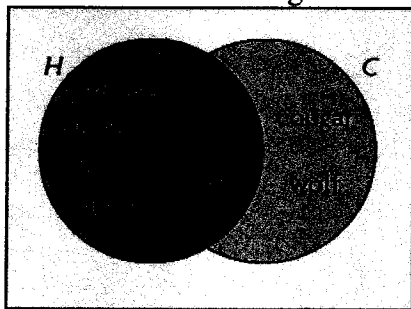
23. Given the following situation:

- the universal set $U = \{\text{positive integers less than } 20\}$
- $X = \{4, 5, 6, 7, 8\}$
- $P = \{\text{prime numbers of } U\}$
- $O = \{\text{odd numbers of } U\}$

Which set represents the odd, prime numbers of set U ?

- A. $\{0, 3, 5, 7, 11, 13, 17, 19\}$ C. $\{2, 3, 5, 7, 11, 13, 17, 19\}$
 B. $\{3, 5, 7, 11, 13, 17, 19\}$ D. $\{1, 2, 3, 5, 7, 11, 13, 17, 19\}$

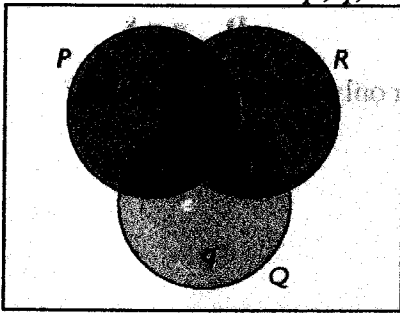
24. Consider the following Venn diagram of herbivores and carnivores:



Determine $n(H \cup C)$.

- A. 2 B. 9 C. 4 D. 3

25. The three circles in the Venn diagram (P , Q , and R) contain the same number of elements. Which set of values is true for p , q , and r ?



$$P \rightarrow p + 22$$

$$Q \rightarrow q + 23$$

$$R = r + 28$$

$$p + 22 = q + 23$$

$$p = q + 1$$

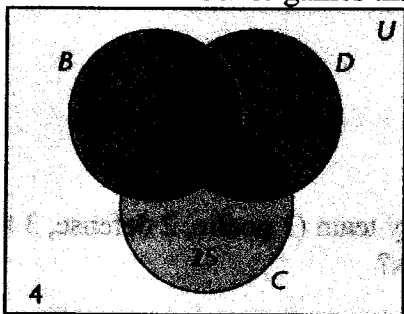
$$p + 22 = r + 28$$

$$p = r + 6$$

- A. $p = 11, q = 11, r = 5$
 B. $p = 7, q = 8, r = 2$

- C. $p = 7, q = 6, r = 1$
 D. $p = 14, q = 13, r = 7$

26. Some table games use a board, dice, or cards, or a combination these. The following Venn diagram shows the number of games that use these tools.



$$14 + 8 + 3$$

Use the diagram to determine the number of games that use exactly two of these tools.

- A. 13 B. 51 C. 25 D. 74

27. Which statement is the converse of the conditional statement below?

"If a bird has wings, then the bird can fly."

- A. If a bird does not have wings, then the bird cannot fly.
 B. If the bird cannot fly, then the bird does not have wings.
 C. If a bird can fly, then the bird has wings.
 D. If a bird does not have wings, then the bird can fly.

28. A combination lock opens with the correct three-digit code. Each wheel rotates through the digits 1 to 8. Suppose each digit can be used only once in a code. How many different codes are possible when repetition is not allowed?

$$8 \cdot 7 \cdot 6$$

- A. 21 B. 63 C. 256 D. 336

29. Solve for n , where $n \in \mathbb{I}$.

$$\frac{n!}{(n-1)!} = 4!$$

$$\frac{n(n-1)!}{(n-1)!}$$

$$n = 4!$$

- A. 8 B. 16 C. 24 D. 32

30. Solve for n .

$${}_n P_4 = 120$$

$$\frac{n!}{(n-4)!} = 120$$

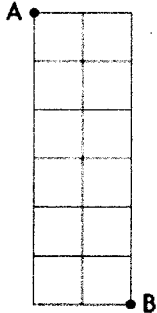
A. $n = 5$

B. $n = 6$

C. $n = 7$

D. $n = 8$

31. How many different routes are there from A to B, if you only travel south or east?



A. 16

B. 24

C. 28

D. 56

32. Evaluate.

$$\binom{4}{1}$$

$$4^C_1 = \frac{4!}{1!3!} = 4$$

A. 0

B. 1

C. 4

D. 16

33. How many ways can the 6 starting positions on a hockey team (1 goalie, 2 defense, 3 forwards) be filled from a team of 1 goalie, 4 defense, and 8 forwards?

$$1^C_1 \times 4^C_2 \times 8^C_3$$

A. 164

B. 254

C. 336

D. 1716

34. The lunch special at a sandwich bar offers you a choice of 6 sandwiches, 4 salads, 6 drinks, and 3 desserts. How many different meals are possible if you choose one item from each category?

A. 432

B. 576

C. 646

D. 720

$$\frac{6!}{5!} \times \frac{4!}{3!} \times \frac{6!}{5!} \times \frac{3!}{2!}$$

35. Evaluate.

$$8! + 1!$$

A. 40 321

B. 5041

C. 40 123

D. 16 777 217

36. Identify the expression that is equivalent to the following:

$$\frac{n!}{(n-2)!} + n$$

$$n(n-1) + n = n^2 - n + n = n^2$$

A. n

B. $-n$

C. n^2

D. n^3

37. How many different permutations can be created when 7 people line up to buy movie tickets?

A. 49

B. 128

C. 720

D. 5040

$$7!$$

38. Suppose a word is any string of letters. How many three-letter words can you make from the letters in REGINA if you do not repeat any letters in the word? $\frac{6!}{3!}$
- A. 20 B. 16 C. 216 **D. 120**
39. How many ways can 8 friends stand in a row for a photograph if Molly, Krysta, and Simone always stand together? $3! \times 6!$
- A. 1440 **B. 4320** C. 5040 D. 2160
40. There are 14 members of a student council. How many ways can 4 of the members be chosen to serve on the dance committee? $14^C 4$
- A. 1001** B. 2002 C. 6006 D. 24 024
41. How many ways can 3 representatives be chosen from a soccer team of 16 players? $16^C 3$
- A. 1120 **B. 560** C. 3360 D. 1580
42. Given the following probabilities, which event is most likely to occur?
- A. $P(A) = 0.2$ B. $P(B) = \frac{1}{6} \approx 0.1\bar{6}$ C. $P(C) = 0.3$ **D. $P(D) = \frac{1}{3} \approx 0.\bar{3}$**
43. A sports forecaster says that there is a 75% probability of a team winning their next game. Determine the odds(against that team winning their next game. $\frac{25}{75}$
- A. 3 : 4 **B. 1 : 3** C. 3 : 1 D. 1 : 4
44. Two dice are rolled. Let A represent rolling a sum greater than 6. Let B represent rolling a sum that is a multiple of 4. Determine $P(A \cap B)$. $\frac{6}{36}$
- A. $\frac{1}{9}$ **B. $\frac{1}{6}$** C. $\frac{1}{4}$ D. $\frac{7}{12}$
45. Misha draws a card from a well-shuffled standard deck of 52 playing cards. Then he puts the card back in the deck, shuffles again, and draws another card from the deck. Determine the probability that both cards are even numbers. $\frac{20}{52} = \frac{5}{13} \times \frac{5}{13} = \frac{25}{169}$
- A. $\frac{1}{100}$ B. $\frac{3}{45}$ C. $\frac{6}{15}$ **D. $\frac{25}{169}$**
46. Two cards are drawn, without being replaced, from a standard deck of 52 playing cards. Determine the probability of drawing a face card then drawing an even-numbered card. $\frac{12}{52} \times \frac{20}{51}$
- A. 1.96% **B. 9.05%** C. 14.32% D. 23.08%

47. Which expression correctly describes the experimental probability, $P(B)$, where $n(B)$ is the number of times event B occurred and $n(T)$ is the total number of trials, T , in the experiment?

A. $P(B) = n(B) \cdot n(T)$

C. $P(B) = n(B) + n(T)$

B. $P(B) = \frac{n(B)}{n(T)}$

D. $P(B) = \frac{n(T)}{n(B)}$

48. Tia notices that yogurt is on sale at a local grocery store. The last eight times that yogurt was on sale, it was available only three times. Determine the odds against yogurt being available this time.

A. 3 : 5

B. 3 : 8

C. 5 : 8

D. 5 : 3

49. A credit card company randomly generates temporary three-digit pass codes for cardholders. The pass code will consist of three different even digits. Determine the total number of pass codes using three different even digits.

A. ${}_5P_5$

B. ${}_5P_3$

C. ${}_5P_4$

D. ${}_5P_1$

50. Nine boys and twelve girls have signed up for a trip. Only six students will be selected to go on the trip. Determine the probability that only boys will be on the trip.

A. 0.02%

B. 0.08%

C. 0.15%

D. 0.23%

$\frac{9P_6}{21P_6}$

51. Yvonne tosses three coins. Determine the probability that at least one coin will land as heads.

A. 12.5%

B. 37.5%

C. 62.5%

D. 87.5%

$1 - \frac{1}{2^3}$

52. Hilary draws a card from a well-shuffled standard deck of 52 playing cards. Then she draws another card from the deck without replacing the first card. Determine the probability that both cards are hearts.

A. $\frac{1}{20}$

B. $\frac{1}{17}$

C. $\frac{1}{12}$

D. $\frac{1}{8}$

$\frac{13}{52} \times \frac{12}{51}$

53. A three-colour spinner is spun, and a die is rolled. Determine the probability that you spin blue and roll a 4.

A. 1.24%

B. 5.56%

C. 7.17%

D. 9.82%

$\frac{1}{3} \times \frac{1}{6}$

54. Raymond has 12 coins in his pocket, and 9 of these coins are quarters. He reaches into his pocket and pulls out a coin at random. Determine the odds against the coin being a quarter.

A. 1 : 4

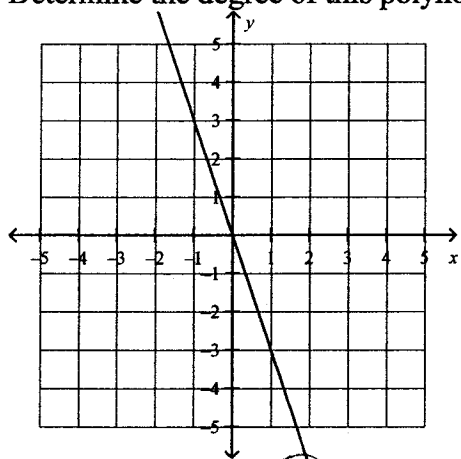
B. 1 : 3

C. 3 : 4

D. 3 : 1

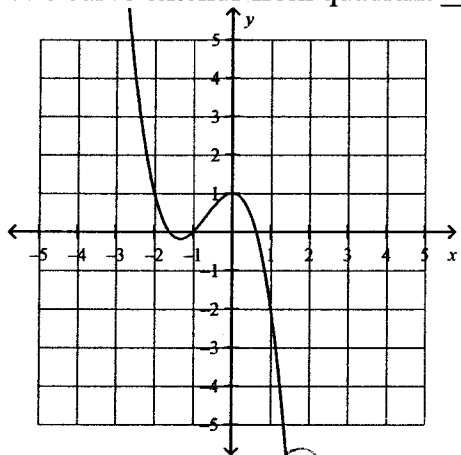
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55. Determine the degree of this polynomial function:



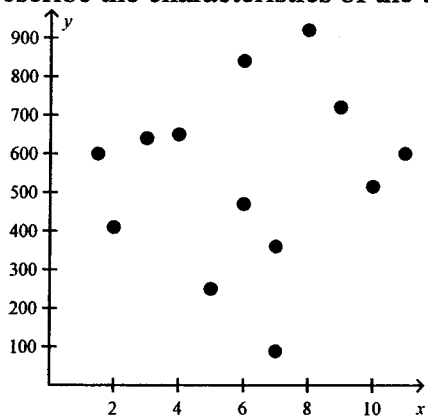
- A. 0 **B. 1** C. 2 D. 3

56. Fill in the blanks to describe the end behaviour of this polynomial function:
The curve extends from quadrant ____ to quadrant ____.



- A. II; I **B. II; IV** C. III; I D. III; IV

57. Describe the characteristics of the trend in the data.



- A. increasing B. decreasing C. constant **D. no trend**

58. The path of a shot put thrown at a track and field meet is modelled by the quadratic function $h(d) = -0.048(d^2 - 20.7d - 26.28)$ where h is the height in metres and d is the horizontal distance in metres. Determine the height of the ~~discus~~ when it has travelled 10 m horizontally.

A. 6.2 m **B.** 6.4 m C. 6.6 m D. 6.8 m

59. Describe the characteristics of the trend in the data.

	100	200	300	400	500	600	700	800
	2.8	3.0	3.3	3.7	4.0	4.2	4.5	5.0

A. increasing B. decreasing C. constant D. no trend

60. The growth of a tree can be modelled by the function $h(t) = 2.3t - 0.45$ where h represents the height in metres and t represents the time in years. Approximately how long will it take the tree to grow 32 m tall?

A. 13 years **B.** 14 years C. 15 years D. 16 years

61. Determine the leading coefficient of this polynomial function:

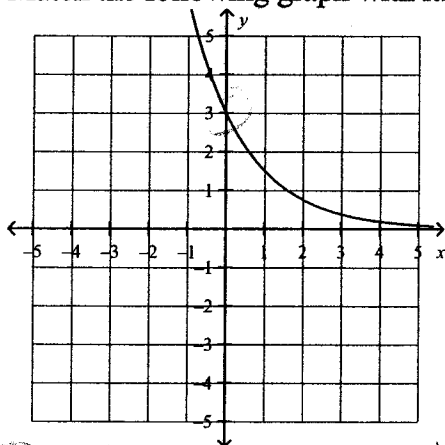
$$f(x) = \frac{1}{2}x^3 + 6x - 8$$

A. $\frac{1}{2}$ B. 6 C. -8 D. 0

62. Which of the following is an exponential function?

A. $f(x) = x^2$ B. $g(x) = (-1)^x$ **C.** $h(x) = 17^x$ D. $j(x) = 2^8 - x$

63. Match the following graph with its function.



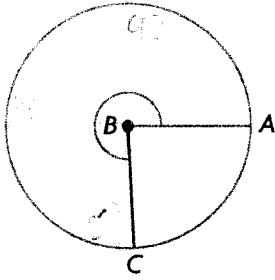
A. $y = 3(0.5)^x$ B. $y = 2(1.25)^x$ C. $y = 0.5(3)^x$ D. $y = 2(0.75)^x$

64. Determine the equation of the exponential regression function for the data.

x	0	1	2	3	4	5
y	3.5	5.6	9.0	14.2	23.1	36.7

- A. $y = 3.5(1.6)^x$
 B. $y = 2.2(1.6)^x$
 C. $y = 3.5(1.8)^x$
 D. $y = 3.5(0.8)^x$
65. The equation of the exponential function that models a data set is $y = 6.8(1.03)^x$.
 Extrapolate the value of y when $x = 22$. 6.8×1.03^{22}
- A. 8.72
 B. 29.46
 C. 7.46
 D. 13.03
66. Which exponential equation correctly represents the logarithmic equation $y = \log_{10} 50$?
- A. $50^y = 10$
 B. $10^y = 50$
 C. $y^{50} = 10$
 D. $y^{10} = 50$
67. The equation of the logarithmic function that models a data set is $y = 8.2 + 0.7 \ln x$.
 Interpolate the value of y when $x = 5.5$.
- A. $y = 8.8$
 B. $y = 9.4$
 C. $y = 9.9$
 D. $y = 11.1$
68. Which option best describes the behaviour of the exponential function $f(x) = 4\left(\frac{1}{2}\right)^x$?
- A. increasing because $a > 1$
 B. decreasing because $0 < a < 1$
 C. increasing because $b > 1$
 D. decreasing because $0 < b < 1$
69. How many x -intercepts does the exponential function $f(x) = 2(10)^x$ have?
- A. 0
 B. 1
 C. 2
 D. 3
70. Choose the best estimate for 120° in radians. $120 \div 57.3$
- A. 2.1
 B. 0.7
 C. 2.8
 D. 3.1
71. Choose the best estimate for 280° in radians. $280 \div 57.3$
- A. 3
 B. 4
 C. 5
 D. 6

72. Choose the best estimate for the central angle in degrees.

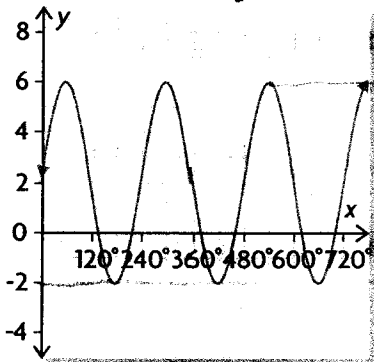


- A. 263° **B. 273°** C. 283° D. 293°

73. Which of the following is not a periodic function?

- A. $y = \cos x$ **B. $y = x$** C. $y = -\sin x$ D. $y = -2 \cos x$

74. Determine the amplitude of the following graph.

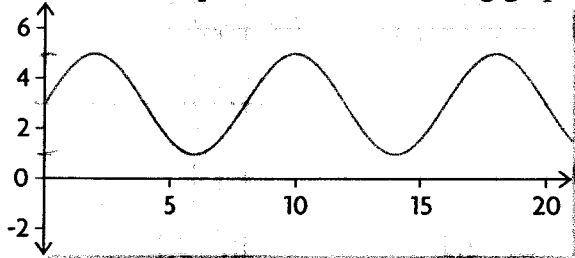


$$\frac{6 - (-2)}{2} = 2 \text{ mid}$$

$$6 - 2 = 4$$

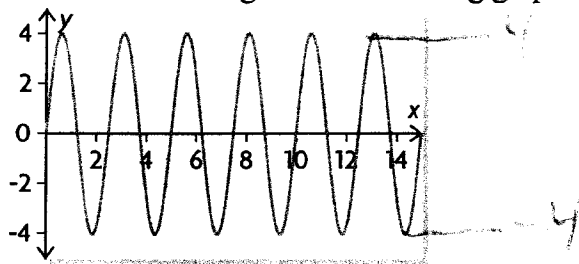
- A. 2 B. 3 **C. 4** D. 5

75. Determine the period of the following graph.



- A. 5 B. 6 C. 7 **D. 8**

76. Determine the range of the following graph.



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

77. Select the function with the greatest amplitude.

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

78. Determine the period of the following function.

$y = 3 \sin 2(x + 90^\circ) - 1$ $360/2$

- A. 180° B. 360° C. 720° D. 1080°

79. Determine the midline of the following function.

$y = 0.5 \sin(x - 2) + 0$

- A. $y = -2$ B. $y = 0.5$ C. $y = 0$ D. $y = 2$

80. The following data set is sinusoidal. Determine the missing value from the table.

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

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