



Labrador School Board



Student _____

Teacher _____

District Assessment

MATHEMATICS 2204

JUNE 17th, 2010

Value: 100 marks

Time: 3 hours

General Instructions

1. Candidates are required to do **ALL** items.
2. The examination consists of the following parts:
Part I: Selected Response *Value: 50%*
Part II: Constructed Response *Value: 50%*
3. A self-powered calculator may be used for calculations and to obtain special values.
4. For Part II items, candidates are reminded to show all necessary steps and calculations as credit may be given for incomplete or partially correct solutions. Correct answers without calculations will not merit full marks.

Student Checklist

The items below are your responsibility. Please ensure that they are completed.

- Write your name on the top of this page.
- Write your name on the computer scorable answer sheet for Part I.
- Write your teacher's name on the top of this page.
- Check this exam to see that there are no missing pages.

**DO NOT OPEN THIS EXAMINATION PAPER UNTIL
YOU ARE TOLD BY THE SUPERVISOR TO BEGIN**



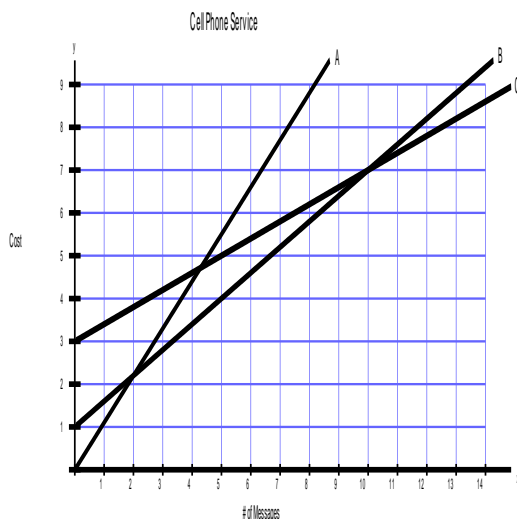
Part 1
Total Value: 50%

Answer all items. Shade the letter of the correct answer on the computer scorable answer sheet.

1. What is the solution for the system of equations below?

$$\begin{aligned} -6x + y &= -13 \\ 4x + y &= 7 \end{aligned}$$

- (A) (2, -1)
- (B) (3, -5)
- (C) (10, 33)
- (D) (10, 47)
2. Jason and Renee went to Wal-Mart. Jason purchased 2 T-shirts and 3 pairs of socks for \$26.95. Renee bought 4 T-shirts and 5 pairs of socks for \$50.91. If t represents the cost of a T-shirt and s represents the cost of a pair of socks, which system of equations models this situation?
- (A) $2t + 3s = 26.95$
 $4t + 5s = 50.91$
- (B) $3t + 2s = 26.95$
 $5t + 4s = 50.91$
- (C) $2t + 3t = 26.95$
 $4s + 5s = 50.91$
- (D) $2s + 3s = 26.95$
 $4t + 5t = 50.91$
3. The graph shows the fee structure for text messaging for 3 cell phone service providers. For which number of messages is it cheapest to use Company B?



- (A) Less than 2 messages
- (B) Between 2 and 10 messages
- (C) Greater than 10 messages
- (D) It is never best to use Company B.

4. Reid Taxi charges a flat rate of \$3 and \$0.50 per kilometre. O'Neill Taxi charges a flat rate of \$2 and \$0.75 per kilometre. At what distance, in kilometres, will both companies charge the same amount?

- (A) 0.25
(B) 0.80
(C) 4
(D) 20

5. Which matrix has **NO** inverse?

- (A) $\begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$
(B) $\begin{bmatrix} 2 & -3 \\ -2 & 3 \end{bmatrix}$
(C) $\begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$
(D) $\begin{bmatrix} 4 & 2 \\ -2 & 1 \end{bmatrix}$

6. What is the matrix representation for the system of equations given?

$$\begin{aligned} 7y - 3z &= 12 \\ 5x + 4y &= 16 \\ x - 13z &= -9 \end{aligned}$$

- (A) $\begin{bmatrix} 7 & -3 \\ 5 & 4 \\ 1 & -13 \end{bmatrix} \begin{bmatrix} 12 \\ 16 \\ -9 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$
(B) $\begin{bmatrix} 7 & -3 \\ 5 & 4 \\ 1 & -13 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 12 \\ 16 \\ -9 \end{bmatrix}$
(C) $\begin{bmatrix} 0 & 7 & -3 \\ 5 & 4 & 0 \\ 1 & 0 & -13 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 12 \\ 16 \\ -9 \end{bmatrix}$
(D) $\begin{bmatrix} 0 & 7 & -3 \\ 5 & 4 & 0 \\ 1 & 0 & -13 \end{bmatrix} \begin{bmatrix} 12 \\ 16 \\ -9 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$

7. What is the solution to the matrix equation given below?

$$\begin{bmatrix} 2 & 1 \\ 1 & -3 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \end{bmatrix}$$

- (A) $(-3,1)$
(B) $(-1,3)$
(C) $(1,-3)$
(D) $(3,-1)$
8. What is the inverse of $\begin{bmatrix} 1 & 1 \\ -5 & -7 \end{bmatrix}$?

(A) $\begin{bmatrix} -\frac{1}{12} & \frac{5}{12} \\ -\frac{1}{12} & \frac{7}{12} \end{bmatrix}$

(B) $\begin{bmatrix} \frac{7}{12} & -\frac{1}{12} \\ \frac{5}{12} & -\frac{1}{12} \end{bmatrix}$

(C) $\begin{bmatrix} \frac{7}{2} & -\frac{5}{2} \\ \frac{1}{2} & -\frac{1}{2} \end{bmatrix}$

(D) $\begin{bmatrix} \frac{7}{2} & \frac{1}{2} \\ -\frac{5}{2} & -\frac{1}{2} \end{bmatrix}$

9. Which system of equations has the solution $(5, 1, -2)$?

(A) $x = 5$
 $y + z = -1$
 $x + y + z = 4$

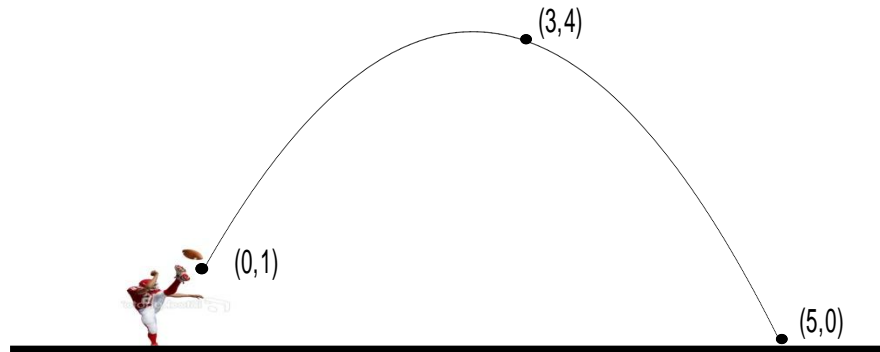
(B) $x + y = 6$
 $y = 1$
 $x + y - z = 18$

(C) $2x + z = 8$
 $2x + y + z = 17$
 $z = -2$

(D) $x + y = 6$
 $y + z = 3$
 $x + y + z = 4$

10. The graph below represents the path of a football, in metres. What is the value of “ c ” in the quadratic equation $y = ax^2 + bx + c$ that describes the path of the ball?

- (A) 0
 (B) 1
 (C) 4
 (D) 5



11. Which system is equivalent to the following system of equations?

$$\begin{aligned} 5x + 3y &= 14 \\ 2x - y &= 10 \end{aligned}$$

- (A) $-5x - 3y = 14$
 $-2x + y = 10$
 (B) $5x + 3y = 14$
 $6x - 3y = -30$
 (C) $10x + 6y = 14$
 $4x - 2y = 10$
 (D) $10x + 6y = 28$
 $10x - 5y = 50$

12. If $[A] = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $[I] = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then what is $[A] \times [I]$?

- (A) $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$
 (B) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
 (C) $\begin{bmatrix} 2 & 2 \\ 3 & 5 \end{bmatrix}$
 (D) $\begin{bmatrix} 0 & 2 \\ 3 & 3 \end{bmatrix}$

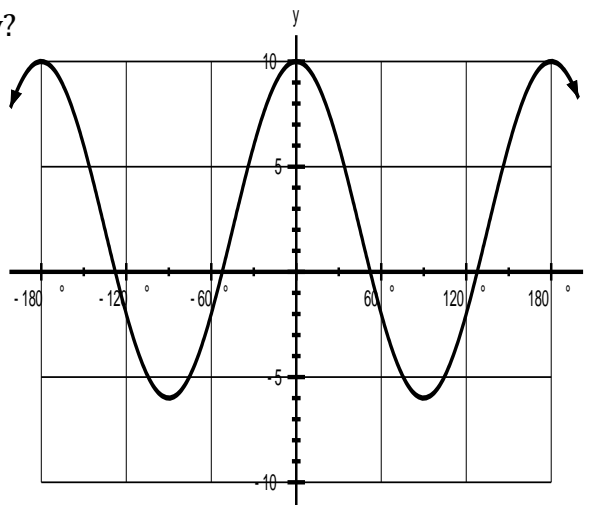
13. Which procedure would help you solve the system using elimination?

Equation X: $4m + 8n = 20$

Equation Y: $12m + 2n = 5$

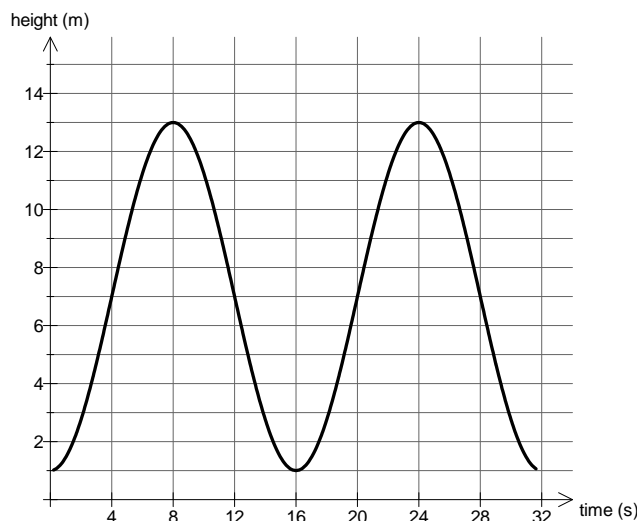
- (A) Multiply Equation X by 4 and add to Equation Y.
- (B) Multiply Equation X by -4 and add to Equation Y.
- (C) Multiply Equation Y by 4 and add to Equation X.
- (D) Multiply Equation Y by -4 and add to Equation X.

14. What is the range of the graph below?



- (A) $\{x \mid -10 \leq x \leq 10, x \in \mathbb{R}\}$
- (B) $\{x \mid -10 < x < 10, x \in \mathbb{R}\}$
- (C) $\{y \mid -6 \leq y \leq 10, y \in \mathbb{R}\}$
- (D) $\{y \mid -6 < y < 10, y \in \mathbb{R}\}$

15. Reuben is riding on a Ferris wheel. The graph of his height, h , above ground at time, t , is shown. How many seconds does it take to complete one revolution?



- (A) 8
- (B) 16
- (C) 24
- (D) 32

16. A student attempted to graph $\frac{1}{2}y = \sin 3(x)$ using software, however they accidentally graphed $2y = \sin \frac{1}{3}(x)$ instead. How did this change the amplitude of the graph?

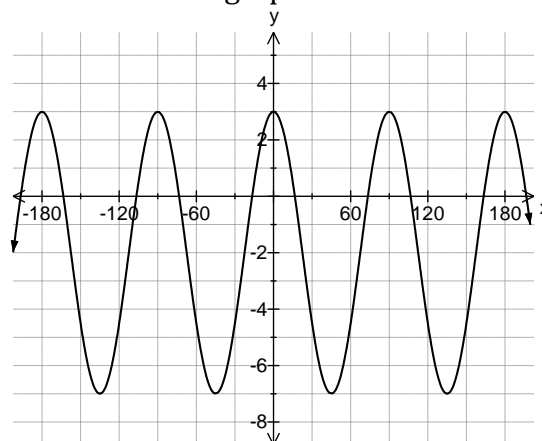
- (A) From $\frac{1}{3}$ to 3
- (B) From $\frac{1}{2}$ to 2
- (C) From 2 to $\frac{1}{2}$
- (D) From 3 to $\frac{1}{3}$

17. What is the maximum value of the function $\frac{1}{4}(y - 3) = \sin 2(x + 30^\circ)$?

- (A) -7
- (B) -1
- (C) 1
- (D) 7

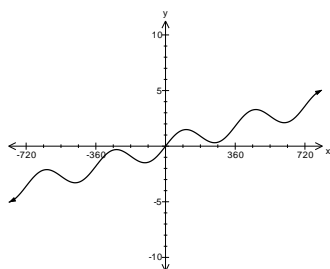
18. What is the equation of the sinusoidal axis of the function graphed below?

- (A) $y = -7$
- (B) $y = -2$
- (C) $y = 2$
- (D) $y = 3$

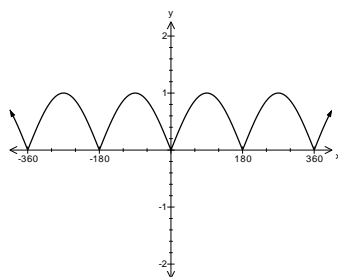


19. Which graph is periodic, but **NOT** sinusoidal?

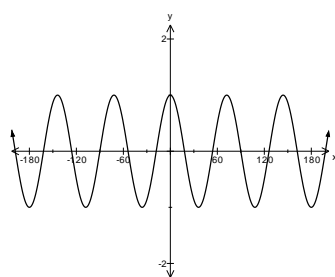
(A)



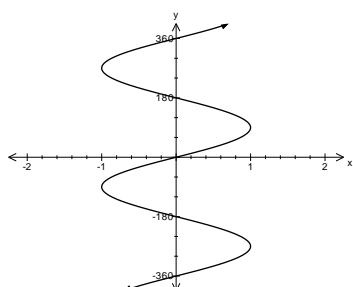
(B)



(C)

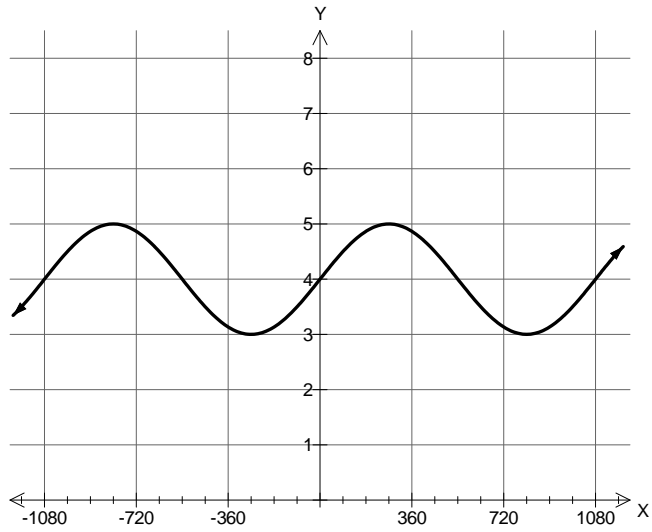


(D)

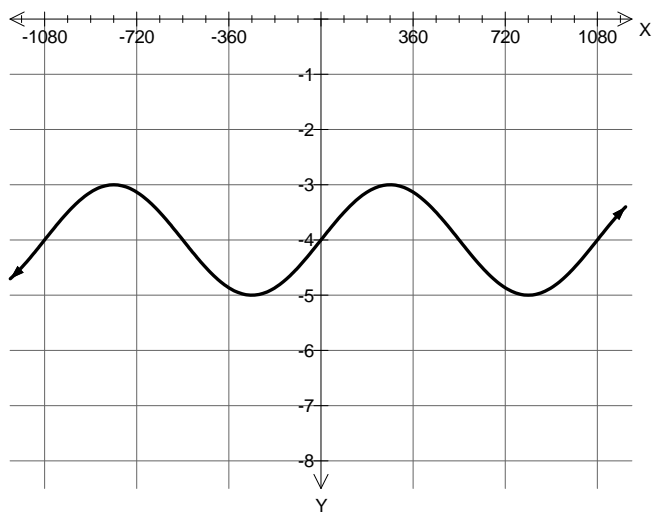


20. Which graph represents the equation $y - 4 = \sin(3x)$?

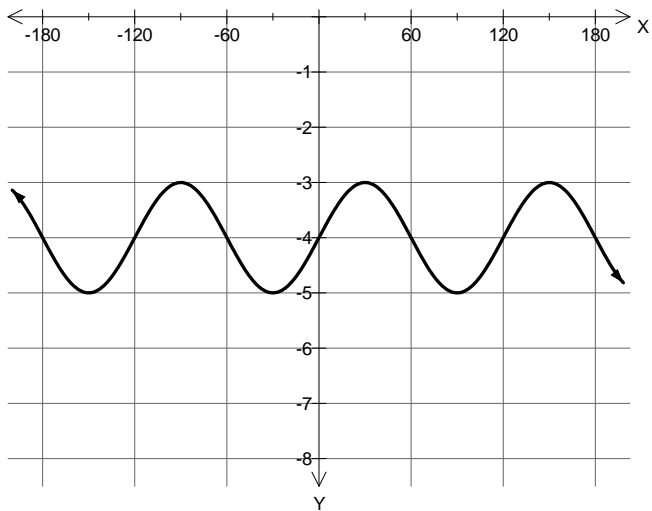
(A)



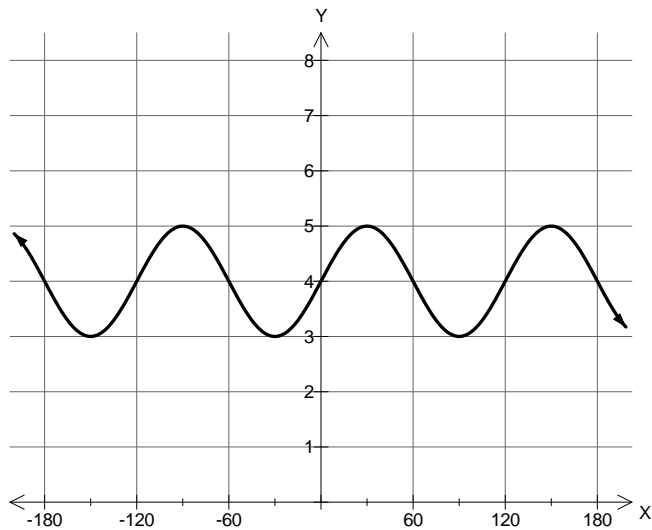
(B)



(C)



(D)



21. Which mapping rule describes the transformation of $y = \sin(x)$, with the following characteristics?

- Amplitude of 3
- Sinusoidal axis of $y = -5$
- Horizontal stretch of $\frac{1}{6}$
- Horizontal translation of 45° to the left

(A) $(x, y) \rightarrow \left(\frac{1}{6}x - 45^\circ, 3y - 5\right)$

(B) $(x, y) \rightarrow \left(\frac{1}{6}x + 45^\circ, 3y - 5\right)$

(C) $(x, y) \rightarrow \left(6x - 45^\circ, \frac{1}{3}y - 5\right)$

(D) $(x, y) \rightarrow \left(6x + 45^\circ, \frac{1}{3}y - 5\right)$

22. In which quadrants of the unit circle is cosine negative?

(A) 1 and 2

(B) 1 and 4

(C) 2 and 3

(D) 3 and 4

23. Which angle is co-terminal with 585° ?

(A) -315°

(B) -225°

(C) 135°

(D) 225°

24. What is the exact value of $\frac{\cos(120^\circ)}{\sin(210^\circ)}$?

(A) $-\sqrt{3}$

(B) -1

(C) 1

(D) $\frac{\sqrt{3}}{3}$

25. What is the value of $\frac{5\pi}{3}$ in degrees?
- (A) 270°
(B) 300°
(C) 600°
(D) 900°
26. Which restriction(s) apply to the expression $\frac{x+3}{x^2+4x+3}$?
- (A) $x \neq -3, x \neq -1$
(B) $x \neq -1$
(C) $x \neq 1$
(D) $x \neq 1, x \neq 3$
27. If $\sin\theta = \frac{-\sqrt{3}}{2}$ and $0^\circ \leq \theta \leq 360^\circ$, what are the values of θ ?
- (A) $60^\circ, 120^\circ$
(B) $60^\circ, 300^\circ$
(C) $120^\circ, 240^\circ$
(D) $240^\circ, 300^\circ$
28. What is the simplified form of $\frac{1-\cos^2\theta}{\sin\theta}$?
- (A) $\cos\theta$
(B) $\sin\theta$
(C) $1 - \cos\theta$
(D) $\frac{\sin\theta}{\cos^2\theta}$
29. Simplify $\frac{4}{x} + \frac{x+1}{2x}$.
- (A) $\frac{x+5}{3x}$
(B) $\frac{5}{3x}$
(C) $\frac{x+9}{2x}$
(D) $\frac{x+5}{2x^2}$

30. The point $(1, 0)$ on the unit circle is rotated -210° . What are the coordinates of the new point?

(A) $\left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$

(B) $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$

(C) $\left(\frac{1}{2}, -\frac{\sqrt{3}}{2}\right)$

(D) $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

31. What is the simplified form of the expression $\frac{x^2+x-12}{x+2} \div \frac{x-3}{x+4}$?

(A) $\frac{x-3}{x+2}$

(B) $\frac{(x+3)(x-3)}{x+2}$

(C) $\frac{x+4}{x+2}$

(D) $\frac{(x+4)(x+4)}{x+2}$

32. What is the value of 240° in radians?

(A) $\frac{2\pi}{3}$

(B) $\frac{4\pi}{3}$

(C) $\frac{8\pi}{3}$

(D) $\frac{10\pi}{3}$

33. What are the solutions of the equation $\cos x = -\frac{\sqrt{3}}{2}$?

(A) $x = \begin{cases} 30^\circ + 360^\circ k, k \in I \\ 150^\circ + 360^\circ k, k \in I \end{cases}$

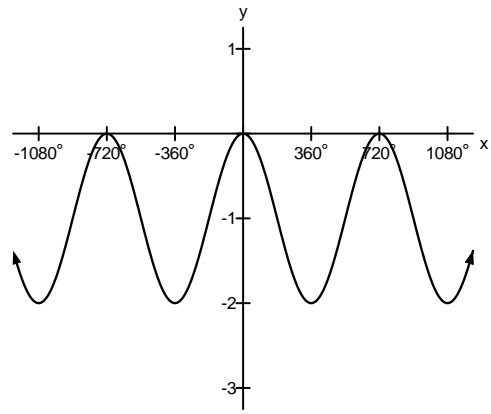
(B) $x = \begin{cases} 30^\circ + 360^\circ k, k \in I \\ 330^\circ + 360^\circ k, k \in I \end{cases}$

(C) $x = \begin{cases} 150^\circ + 360^\circ k, k \in I \\ 210^\circ + 360^\circ k, k \in I \end{cases}$

(D) $x = \begin{cases} 210^\circ + 360^\circ k, k \in I \\ 330^\circ + 360^\circ k, k \in I \end{cases}$

34. The graph of $y = \cos 0.5(x) - 1$ is given. What are the solutions of the equation $0 = \cos 0.5(x) - 1$ for $-720^\circ \leq x \leq 720^\circ$?

- (A) $-1080^\circ, -720^\circ, 0^\circ, 720^\circ, 1080^\circ$
 (B) $-720^\circ, 0^\circ, 720^\circ$
 (C) $-360^\circ, 360^\circ$
 (D) 0°



35. Evaluate: $2\sin 30^\circ + 2\cos 120^\circ$

- (A) 0
 (B) 2
 (C) $2\sqrt{3}$
 (D) $1 + \sqrt{3}$

36. The NBA is trying to determine the average shoe size of its players. They randomly select one team and survey all its players. What type of sample is this?

- (A) cluster
 (B) simple random
 (C) stratified
 (D) systematic

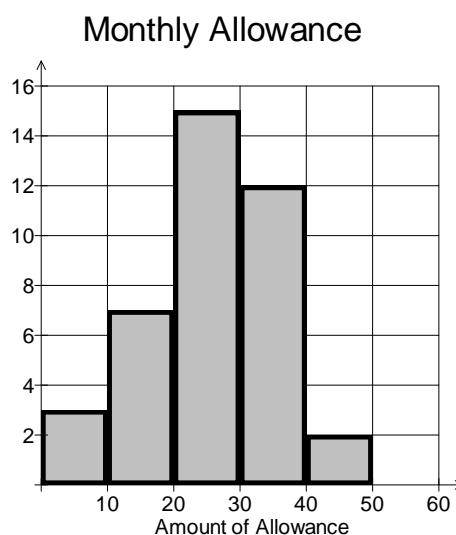
37. Which sample size gives the smallest 95% confidence interval?

- (A) 25
 (B) 250
 (C) 2 500
 (D) 25 000

38. The community recreation program is trying to determine what summer programs to offer. Which sampling method will give an unbiased sample?

- (A) Call every 10th person in the town's phone directory.
 (B) Leave surveys at the school's office for people to pick up if they want.
 (C) Survey members of the town's recreational basketball league.
 (D) Survey the first thirty males entering the hockey arena.

39. The length of time that the flavour of Stride gum lasts is normally distributed with a mean of 6 hours and a standard deviation of 0.5 hours. In a sample of 200 pieces of gum, how many are expected to last between 5 and 7 hours?
- (A) 136
 (B) 190
 (C) 195
 (D) 199
40. A survey was conducted to determine the number of hours teenagers spend using their cellphones each week. If the confidence interval was between 16 and 32 hours, what is the margin of error?
- (A) 8
 (B) 16
 (C) 24
 (D) 48
41. The mean of a normally distributed population is 85 and the standard deviation is 5. What percentage is between 80 and 95?
- (A) 47.5
 (B) 68
 (C) 81.5
 (D) 95
42. The histogram below shows the monthly allowance for a group of grade 11 students. What percentage of students has an allowance below \$30?

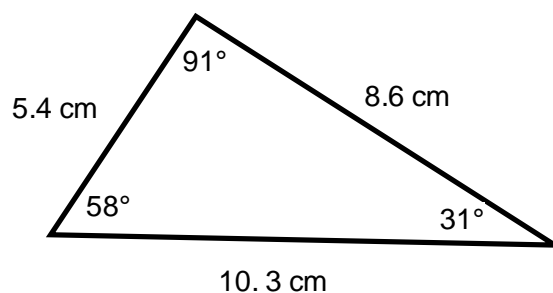


43. A sample of 100 laptops was randomly selected. The mean life span of their battery was 150 minutes with a standard deviation of 16 minutes. Based on this data, what is the margin of error for a 95% confidence interval?

- (A) 0.3136
- (B) 3.1360
- (C) 12.25
- (D) 49.00

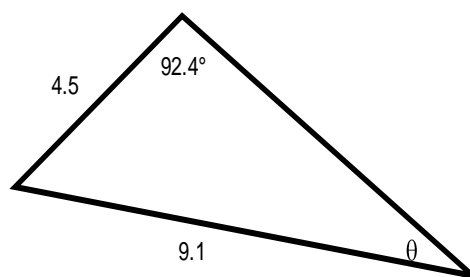
44. Which expression represents the area of the triangle?

- (A) $\text{Area} = \frac{1}{2}(5.4)(8.6)\sin(31^\circ)$
- (B) $\text{Area} = \frac{1}{2}(5.4)(8.6)\sin(91^\circ)$
- (C) $\text{Area} = \frac{1}{2}(5.4)(10.3)\sin(91^\circ)$
- (D) $\text{Area} = \frac{1}{2}(5.4)(10.3)\sin(31^\circ)$



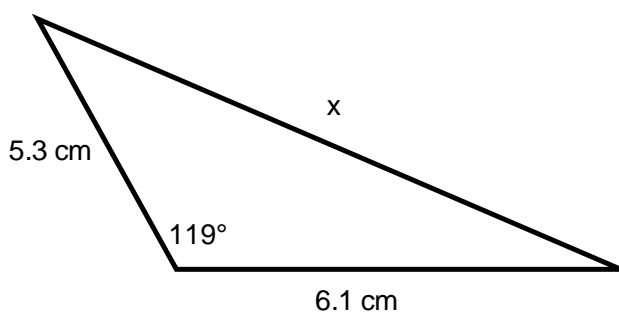
45. On a test, Sarah used the Law of Sines and calculated the angle θ to be 150.4° . She did not receive full marks for this question. Her teacher wrote “Almost right, however, the angle is acute.” What was the correct answer to this question?

- (A) 29.6°
- (B) 43.8°
- (C) 75.1°
- (D) 87.7°



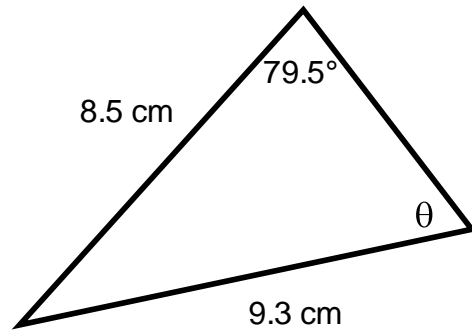
46. What is the value of x , in cm?

- (A) 3.0
- (B) 8.1
- (C) 9.8
- (D) 11.4



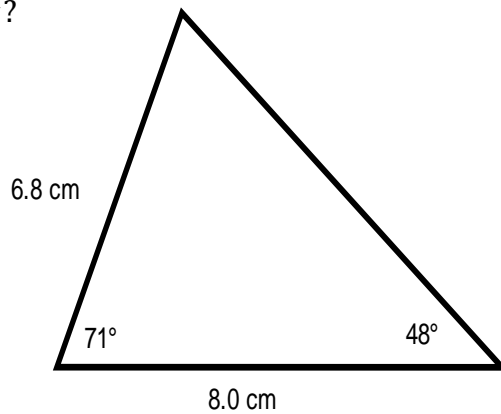
47. What is the value of θ ?

- (A) 36.5°
- (B) 55.2°
- (C) 61.3°
- (D) 64.0°



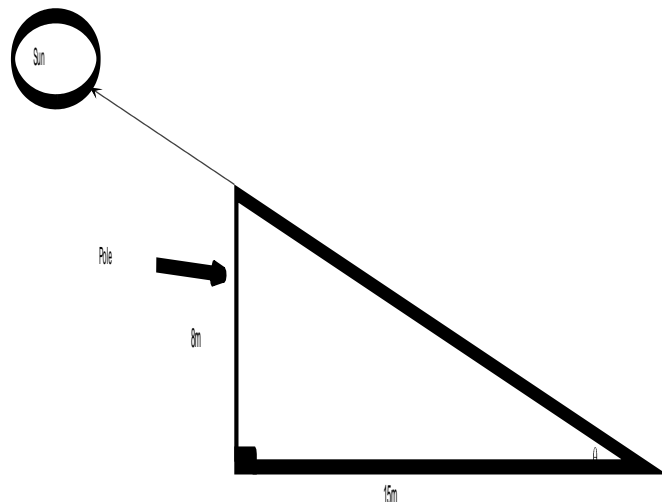
48. What is the area of triangle, in cm^2 ?

- (A) 20.2
- (B) 25.7
- (C) 40.4
- (D) 51.4



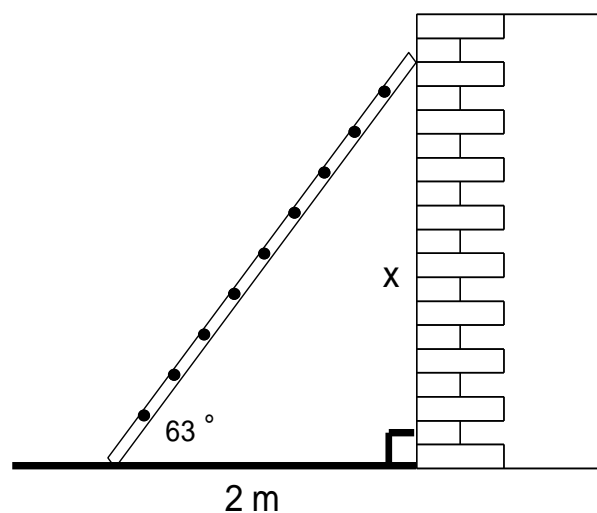
49. An 8m pole casts a shadow that is 15m long. What is the angle of elevation, θ , to the sun?

- (A) 28.1
- (B) 32.2
- (C) 57.8
- (D) 61.9



50. A ladder is leaning against a wall. The ladder makes a 63° angle with the ground. The base of the ladder is 2m from the base of the wall. How far up the wall, in metres, does the ladder reach?

- (A) 1.02
- (B) 2.24
- (C) 3.93
- (D) 4.40



SECTION B
Total Value: 50%

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

Value

- 4 51. Solve using either substitution **OR** elimination.

$$x + 2y + z = 8$$

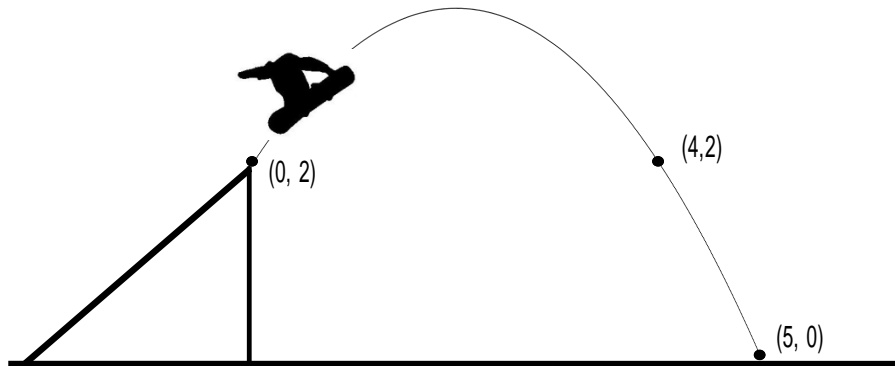
$$2x - y + 5z = 4$$

$$x + 4y - z = 12$$

- 4 52. Bernärd buys 12 apples and 6 pears and is charged \$10.50. Sophie buys 4 apples and 8 pears and is charged \$8.00. Create a system of equations to represent this information and, using matrices, find the price of each item.

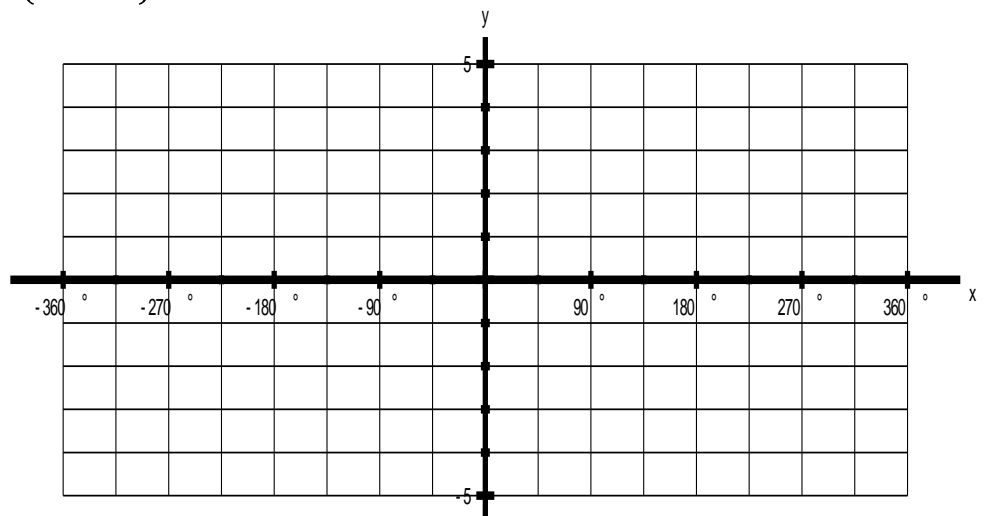
Value

- 4 53. A snowboarder launches from a jump that is 2 m in height. When she is 4 m away from the ramp she is at a height of 2 m. She lands at a distance of 5 m from the ramp. Set up and solve a system of equations to determine the quadratic function, of the form $y = ax^2 + bx + c$, that models the path of the snowboarder.



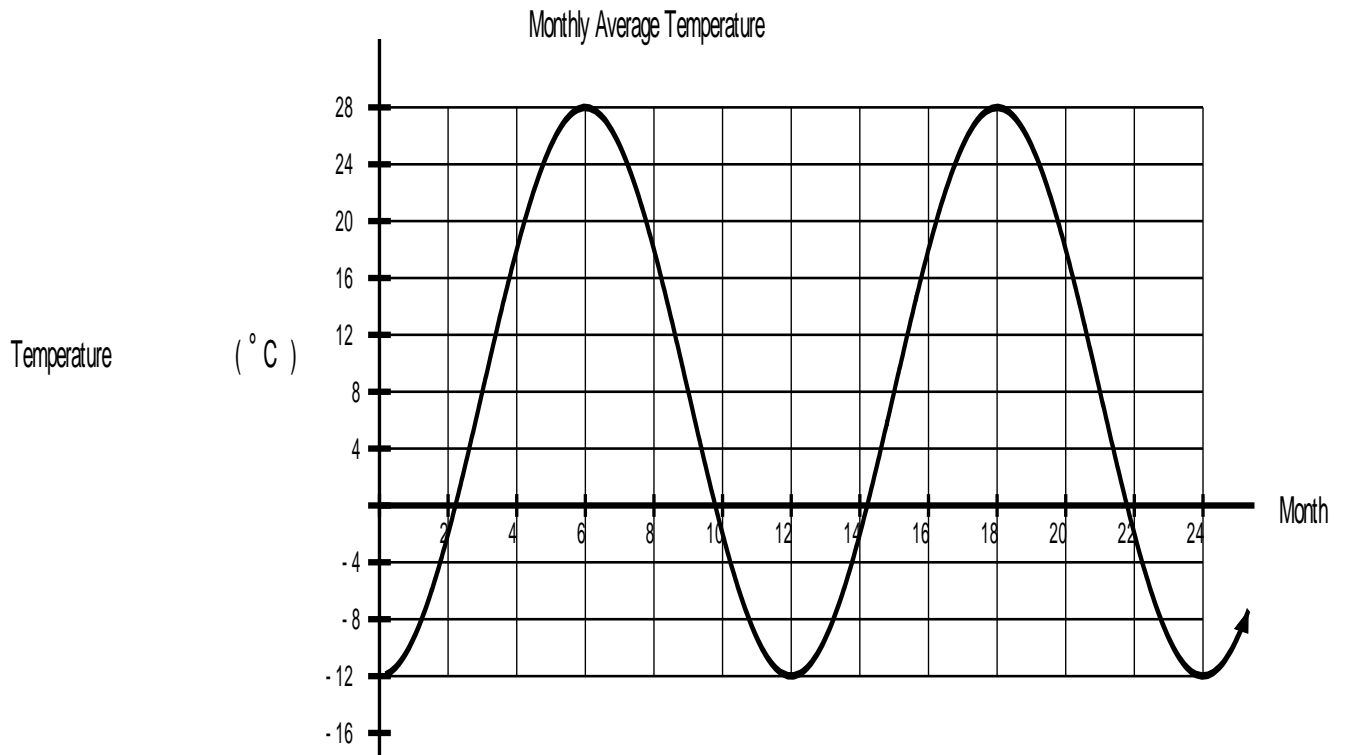
- 3 54. Graph the following relation.

$$\frac{1}{3}(y - 1) = \cos 2(x + 45^\circ)$$



Value

- 4 55. The average monthly temperature in Newfoundland behaves sinusoidally as shown in the graph. At the beginning of the year its minimum temperature is -12°C . Its maximum temperature of 28°C occurs six months later. Determine the equation that models this situation in terms of sine **OR** cosine.



- 3 56. Simplify: $\frac{x+3}{x+2} + \frac{x+3}{x^2+3x+2}$

Value

3 57. Prove: $\cos\theta - \sin^2\theta\cos\theta = \cos^3\theta$

4 58. Solve: $(2\sin\theta - \sqrt{3})\left(\cos\theta + \frac{1}{2}\right) = 0$ where $0^\circ \leq \theta \leq 360^\circ$.

Value

3 59. Simplify: $\frac{x^2-4}{2x^2+11x+5} \times \frac{x^2+2x-15}{x^2-x-6}$

3 60. Simplify the following expression, expressing your answer in EXACT simplest form:

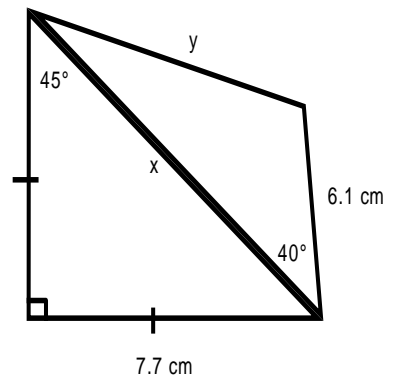
$$\sin 225^\circ \sin 45^\circ - \cos 240^\circ \sin 120^\circ$$

Value

- 3 61. The mass of a bag of Doritos is known to be normally distributed with a mean of 280 grams and a standard deviation of 2 grams. Draw and label a normal distribution curve for this situation and determine the percentage with mass less than 278 grams.
62. Wilson Electronics claims that their new line of Plasma televisions will last for 60 000 hours. A consumer research group decides to test this claim. The group randomly selects 50 televisions to test. The data from this sample shows that the mean life of a television is 57 000 hours, with a standard deviation of 1200 hours.
- 3 (A) Algebraically determine the 95% confidence interval for the mean life of a television?
- 1 (B) Does the confidence interval support the claim of Wilson Electronics? Explain your answer.

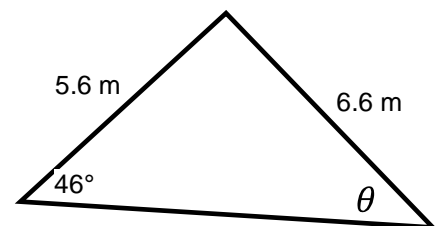
Value

- 3 63. (A) What are the values of x and y ?



- 1 (B) What is the perimeter of the quadrilateral?

- 2 64. (A) What is the value of θ , to the nearest degree?



- 2 (B) What is the area of the triangle?