



# Labrador School Board



**Student** \_\_\_\_\_

**Teacher** \_\_\_\_\_

## DISTRICT ASSESSMENT MATHEMATICS 2204 JUNE 2007

**Value: 100 marks**

**Time: 3 hours**

### *General Instructions*

1. Candidates are required to do **ALL** items.
2. The examination consists of the following parts:  

<b>Section A:</b>	Selected Response	<i>Value: 50%</i>
<b>Section B:</b>	Constructed Response	<i>Value: 50%</i>
3. A self-powered calculator may be used for calculations and to obtain special values.
4. For Section B 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 Section A.
- 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**



**Section A**  
**Total Value: 50%**

**Answer all items. Shade the letter of the correct answer on the computer scorable answer sheet. All items of Section A have a value of one point.**

1. Which of the following systems has no solution?

(A) 
$$\begin{aligned} 2x + 8y &= 3 \\ -x + 4y &= 1.5 \end{aligned}$$

(B) 
$$\begin{aligned} 2x - 8y &= 3 \\ x - 4y &= -1.5 \end{aligned}$$

(C) 
$$\begin{aligned} 2x + 8y &= 3 \\ x - 4y &= 1.5 \end{aligned}$$

(D) 
$$\begin{aligned} 2x - 8y &= 3 \\ x + 4y &= -1.5 \end{aligned}$$

2. What is the solution to the system of equations represented by the matrix

multiplication  $\begin{bmatrix} 2 & 3 \\ -4 & 7 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 29 \end{bmatrix}$ ?

(A)  $\begin{bmatrix} -23 \\ -2 \end{bmatrix}$

(B)  $\begin{bmatrix} -16 \\ -15 \end{bmatrix}$

(C)  $\begin{bmatrix} -2 \\ 3 \end{bmatrix}$

(D)  $\begin{bmatrix} 97 \\ 183 \end{bmatrix}$

3. What is the solution for the following system of equations?

$$2x - 3y = 13$$

$$2x + 7y = 3$$

(A)  $\left(\frac{7}{2}, 1\right)$

(B)  $5, -1$

(C)  $5, 7$

(D)  $\left(\frac{27}{2}, 4\right)$

4. What is the determinant of the matrix  $\begin{bmatrix} 11 & 12 \\ 9 & 7 \end{bmatrix}$ ?

(A)  $-69$

(B)  $-31$

(C)  $31$

(D)  $69$

5. Megan went to the store and picked up 3 bottles of juice and 2 bags of chips for \$5.95. Amanda went to the same store and bought a bottle of juice and 2 bags of chips for \$3.45. If  $j$  represents the cost of a bottle of juice and  $c$  represents the cost of a bag of chips, which system models this situation?

(A)  $2c + 3c = 5.95$   
 $2j + j = 3.45$

(B)  $2j + 2c = 5.95$   
 $3j + c = 3.45$

(C)  $2j + 3c = 5.95$   
 $2c + j = 3.45$

(D)  $3j + 2c = 5.95$   
 $j + 2c = 3.45$

6. What is the  $y$ - $z$  trace line for  $2x + 3y - 6z = 30$ ?

(A)  $x - 3z = 15$

(B)  $x = 15$

(C)  $2x + 3y = 30$

(D)  $y - 2z = 10$

7. Which matrix multiplication is equivalent to the following system?

$$\begin{aligned} 2x + 3y &= -9 \\ -4x + 5y &= 16 \end{aligned}$$

(A)  $\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$

(B)  $\begin{bmatrix} 2 & 3 \\ -4 & 5 \end{bmatrix} \begin{bmatrix} y \\ x \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$

(C)  $\begin{bmatrix} 5 & -3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$

(D)  $\begin{bmatrix} 5 & -3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} y \\ x \end{bmatrix} = \begin{bmatrix} -9 \\ 16 \end{bmatrix}$

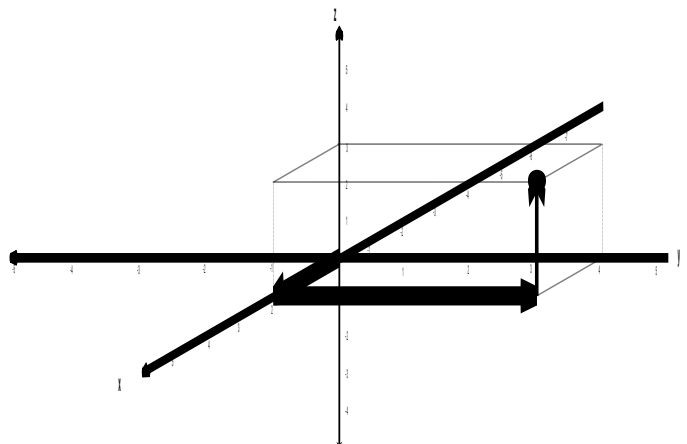
8. What are the coordinates of the point graphed to the right?

(A)  $-2, 4, 1$

(B)  $-2, 4, 3$

(C)  $2, 4, 1$

(D)  $2, 4, 3$



9. Given  $A = \begin{bmatrix} 4 & 3 \\ -2 & 1 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ , which of the following statements is true?

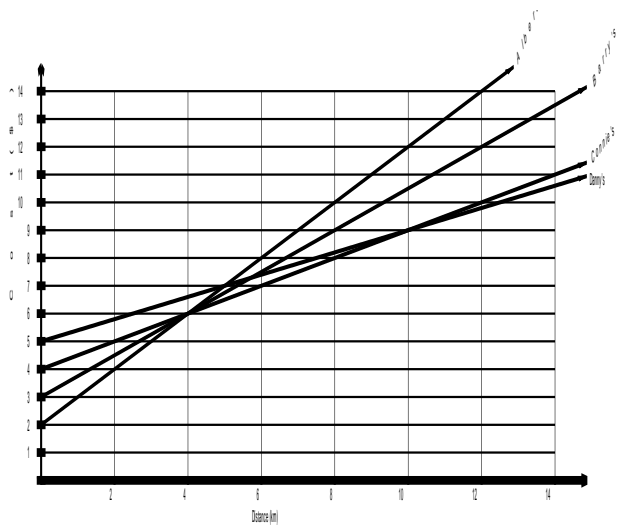
- (A)  $\frac{1}{A} \cdot A = I$   
 (B)  $A \cdot A = I$   
 (C)  $A^{-1} \cdot A = I$   
 (D)  $A^{-1} + A = I$

10. What is the  $z$ -intercept of the plane  $4x - 3y - 5z = 60$ ?

- (A)  $0, 0, -12$   
 (B)  $0, 0, -5$   
 (C)  $0, 0, 5$   
 (D)  $0, 0, 12$

11. The following graph represents the cost structure for four taxi companies – Albert's Cabs, Barry's Ride, Connie's Shuttle Service, and Danny's Taxi. If you are taking a 12km trip, which company should you use?

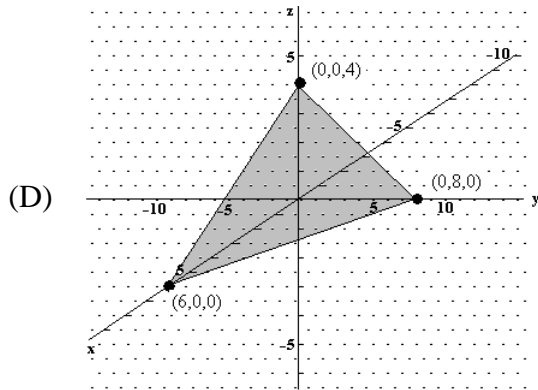
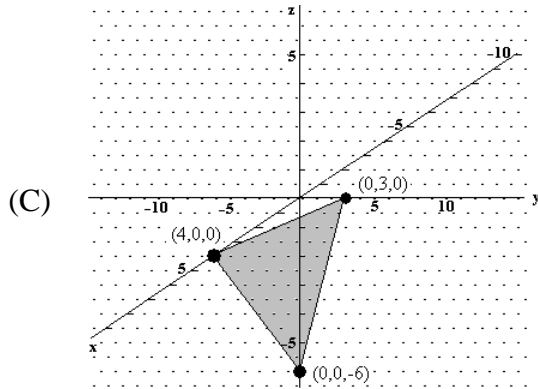
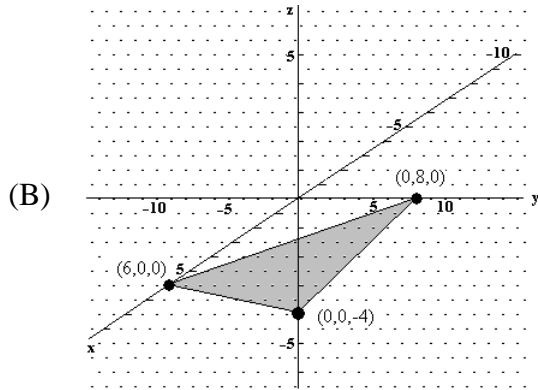
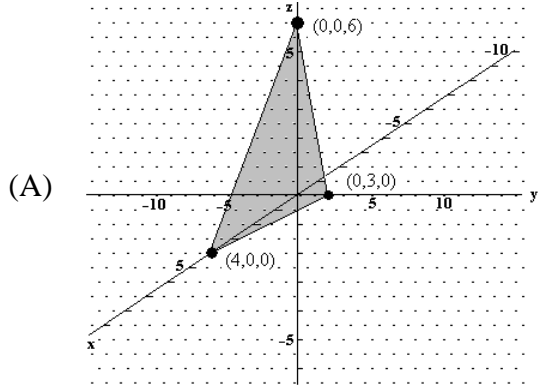
- (A) Albert's  
 (B) Barry's  
 (C) Connie's  
 (D) Danny's



12. What is the inverse of  $\begin{bmatrix} -2 & 4 \\ -3 & 5 \end{bmatrix}$ ?

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

13. Which graph represents the plane  $4x + 3y - 6z = 24$ ?

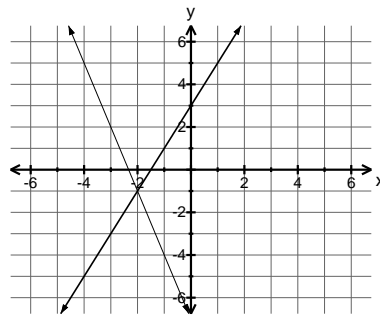


14. Which system of equations is equivalent to  $\begin{cases} x + 2y = 7 \\ -x - y = 4 \end{cases}$ ?

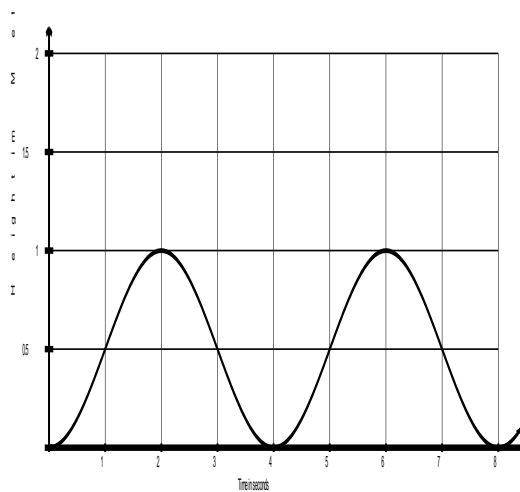
- (A)  $\begin{cases} x + 2y = 7 \\ 2x + 2y = 8 \end{cases}$
- (B)  $\begin{cases} 2x + 4y = 14 \\ x + y = -4 \end{cases}$
- (C)  $\begin{cases} 2x + 2y = 14 \\ x + y = 4 \end{cases}$
- (D)  $\begin{cases} 2x + 4y = -14 \\ 2x + 2y = -8 \end{cases}$

15. What is the solution to the system of equations graphed below?

- (A)  $-2, -1$
- (B)  $-2, 1$
- (C)  $-1, -2$
- (D)  $-1, 2$

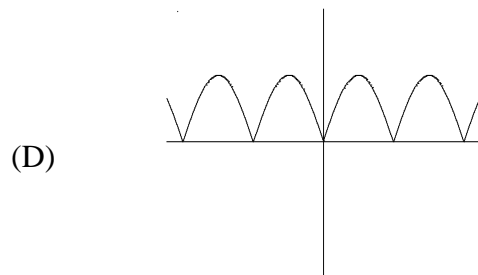
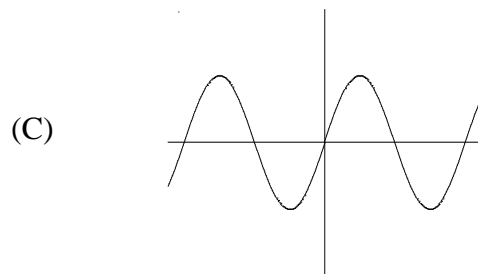
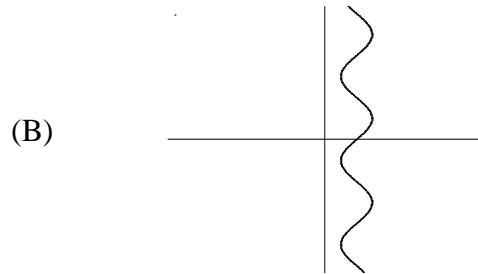
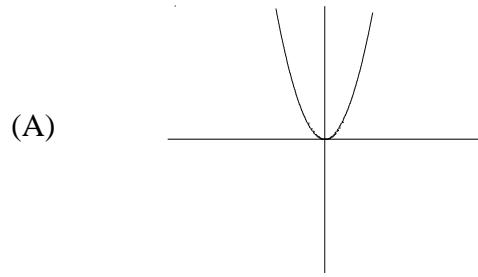


16. The graph below shows the height of a pebble stuck in a tire tread. What is the radius of the tire, in metres?



- (A)  $-0.5$
- (B)  $0.5$
- (C)  $1$
- (D)  $2$

17. Which of the following graphs represents a function that is periodic and sinusoidal?



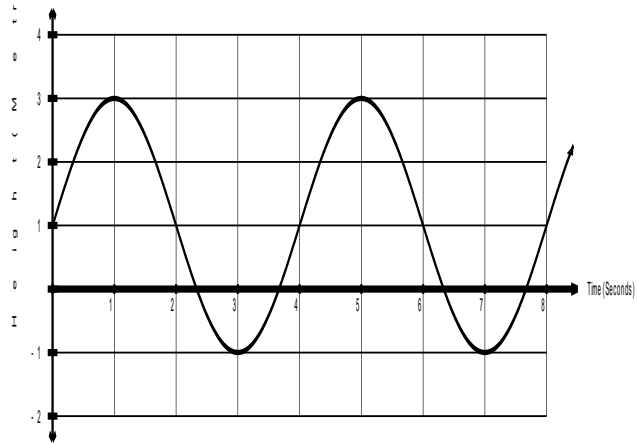
18. What is the amplitude of the graph represented by the equation

$$3y + 6 = \sin \frac{1}{2}x - 90^\circ ?$$

- (A) -6  
(B)  $\frac{1}{3}$   
(C) 3  
(D) 6

19. The graph below shows the height of the nail on a water wheel with respect to the water level. How many seconds does it take to make one complete revolution?

- (A) 2  
 (B) 3  
 (C) 4  
 (D) 5

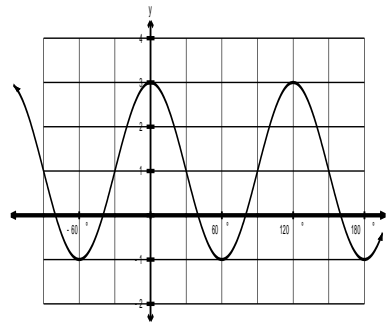


20. Which of the following mapping rules will transform  $y = \cos x$  to the relation  $\frac{1}{5}y + 1 = \cos 2x + 45^\circ$ ?

- (A)  $x, y \rightarrow \left(\frac{1}{2}x + 45^\circ, 5y - 1\right)$   
 (B)  $x, y \rightarrow \left(\frac{1}{2}x - 45^\circ, 5y - 1\right)$   
 (C)  $x, y \rightarrow \left(2x + 45^\circ, \frac{1}{5}y + 1\right)$   
 (D)  $x, y \rightarrow \left(2x - 45^\circ, \frac{1}{5}y - 1\right)$

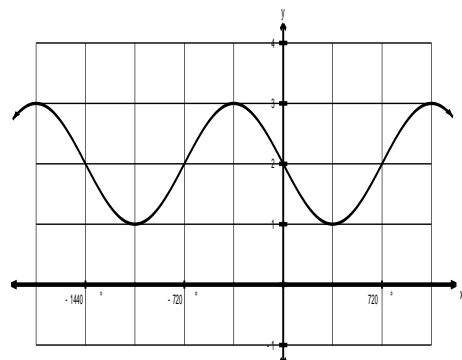
21. What is the range of the graph to the right?

- (A)  $x | x \in \mathbf{R}$   
 (B)  $x | -1 \leq x \leq 3, x \in \mathbf{R}$   
 (C)  $y | y \in \mathbf{R}$   
 (D)  $y | -1 \leq y \leq 3, y \in \mathbf{R}$



22. What is the equation of the sinusoidal axis of the graph below?

- (A)  $x = 1$   
 (B)  $x = 2$   
 (C)  $y = 1$   
 (D)  $y = 2$



23. If the image of  $y = \cos x$  is given by  $x, y \rightarrow \left(\frac{1}{3}x + 45^\circ, \frac{1}{2}y - 7\right)$ , what is the period of the image?

- (A)  $120^\circ$
- (B)  $180^\circ$
- (C)  $720^\circ$
- (D)  $1080^\circ$

24. Which of the following angles is coterminal with  $-65^\circ$ ?

- (A)  $-245^\circ$
- (B)  $65^\circ$
- (C)  $115^\circ$
- (D)  $295^\circ$

25. If  $\sin \theta = 0.6428$ , what are the values of  $\theta$  to the nearest degree if  $0^\circ \leq \theta < 360^\circ$ ?

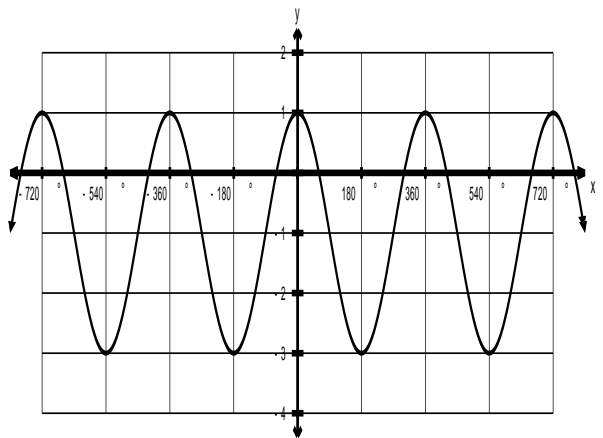
- (A)  $40^\circ, 140^\circ$
- (B)  $40^\circ, 320^\circ$
- (C)  $140^\circ, 220^\circ$
- (D)  $220^\circ, 320^\circ$

26. What is the exact value, in simplest form, of the expression  $\frac{\cos 210^\circ}{\sin -30^\circ}$ ?

- (A)  $-1$
- (B)  $\frac{\sqrt{3}}{3}$
- (C)  $1$
- (D)  $\sqrt{3}$

27. The graph of  $y = 2 \cos x - 1$  is provided below. What are the solutions of the equation  $2 \cos x - 1 = -3$ ?

- (A)  $x = 180^\circ k, k \in I$
- (B)  $x = 360^\circ k, k \in I$
- (C)  $x = 90^\circ + 360^\circ k, k \in I$
- (D)  $x = 180^\circ + 360^\circ k, k \in I$



28. The point  $(1, 0)$  on the unit circle is rotated  $200^\circ$ . What are the coordinates of the new point?

- (A)  $-0.9397, -0.3420$
- (B)  $-0.3420, -0.9397$
- (C)  $0.3640, -0.3420$
- (D)  $0.9397, 0.3640$

29. What is the value of  $\theta$  if  $\cos\theta = -\frac{\sqrt{3}}{2}$  and  $0^\circ \leq \theta \leq 180^\circ$ ?

- (A)  $30^\circ$
- (B)  $120^\circ$
- (C)  $150^\circ$
- (D)  $210^\circ$

30. Simplify:  $\frac{1}{y^2} - \frac{3}{y}$

- (A)  $-\frac{2}{y}$
- (B)  $-\frac{2}{y^2}$
- (C)  $\frac{1-3y}{y^2}$
- (D)  $\frac{y-3}{y^3}$

31. What are the restrictions of the expression  $\frac{x-6}{4x-x-3}$ ?

- (A)  $x \neq -3, x \neq 0$
- (B)  $x \neq 0, x \neq 3$
- (C)  $x \neq 3, x \neq 4$
- (D)  $x \neq 3, x \neq 6$

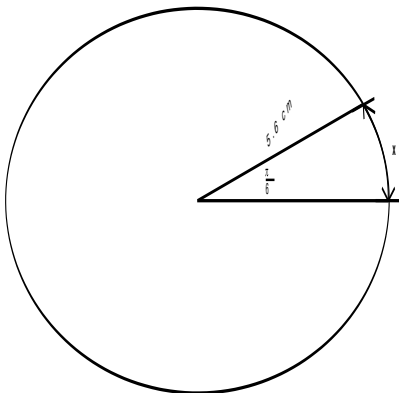
32. What quadrant is  $\theta$  in if  $\cos\theta = -0.1736$  and  $\sin\theta = 0.9848$ ?

- (A) 1
- (B) 2
- (C) 3
- (D) 4

33. What is the value of  $\frac{5\pi}{6}$  in degrees?

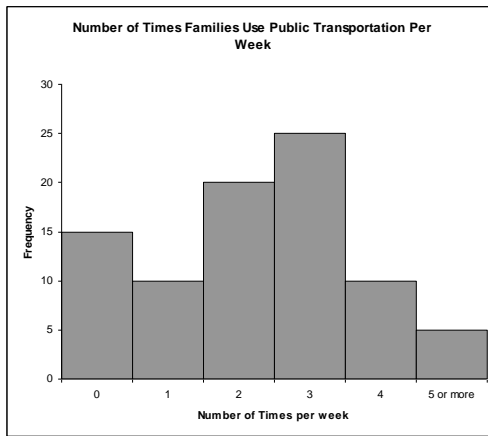
- (A)  $120^\circ$
- (B)  $150^\circ$
- (C)  $210^\circ$
- (D)  $240^\circ$

34. In the circle given below, the central angle measures  $\frac{\pi}{6}$  and the radius is 5.6 cm. What is the length of arc  $x$  in centimetres?

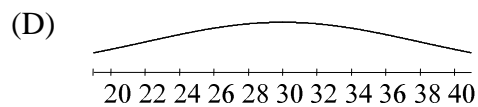
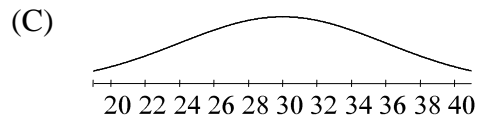
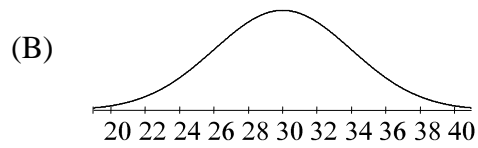
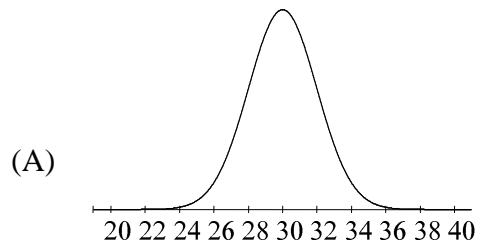


- (A) 0.9  
 (B) 2.9  
 (C) 33.6  
 (D) 168.0
35. Which of the following is equivalent to  $\sec \theta \cdot \cot \theta \cdot \sin \theta$ ?
- (A) 1  
 (B)  $\cot \theta$   
 (C)  $\tan \theta$   
 (D)  $\tan^2 \theta$
36. To find the average weight of players in the National Football League, Susan randomly selects one team and then finds the average weight of all players on that team. What kind of sampling method was used?
- (A) Cluster  
 (B) Simple Random  
 (C) Stratified  
 (D) Systematic
37. The life expectancy of a washing machine is normally distributed with a mean of 7 years and a standard deviation of 1.5 years. What percentage of washing machines is expected to last between 4 and 10 years?
- (A) 34.0%  
 (B) 47.5%  
 (C) 68.0%  
 (D) 95.0%
38. Sheila randomly selects 50 people and asks how many hours in a week they watch television. She calculates her 95% confidence interval to be 5.659, 6.341 . What was the mean number of hours of her sample of 50 people?
- (A) 0.341  
 (B) 5.659  
 (C) 6.000  
 (D) 6.341

39. According to the histogram, what percentage of families uses public transportation more than 3 times a week?

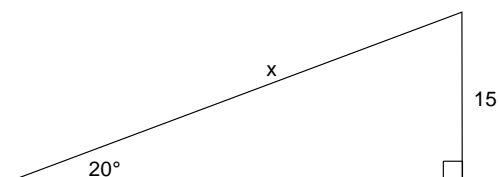


- (A) 10  
 (B) 12  
 (C) 15  
 (D) 18
40. Which of the following normal distributions has the smallest standard deviation?



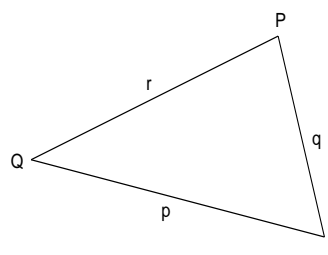
41. Tracey is creating a 95% confidence interval. Which of the following sample sizes will create the smallest confidence interval?
- (A) 100  
 (B) 200  
 (C) 300  
 (D) 400
42. A sample of 30 bags of potato chips is collected. The bags are opened and the number of chips in each bag is recorded. It is determined that the average number of chips per bag is 40.5 with a standard deviation of 4.9. If a 95% confidence interval is to be created, what is the margin of error?
- (A) 0.32  
 (B) 1.47  
 (C) 1.75  
 (D) 2.29
43. Which of the following would typically result in producing a biased sample from a population of 10000 people?
- (A) Asking people if they want to be a member of the sample, and selecting those people who want to be a member.  
 (B) Making a list of every person's name in alphabetical order, randomly selecting a number  $n$ , and selecting every  $n$ th person to be a part of the survey.  
 (C) Randomly selecting a letter and selecting every person in the population whose last name begins with that letter.  
 (D) Writing each person's name on a sheet of paper, placing the sheets in a hat, and then randomly picking 50 pieces of paper.

44. What is the value of  $x$  in the diagram below?

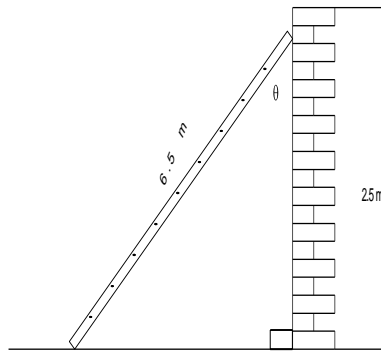


- (A) 16.0  
 (B) 41.2  
 (C) 43.9  
 (D) 77.3
45. Which of the following formulas is correct to find the area of  $\triangle PQR$  given below?

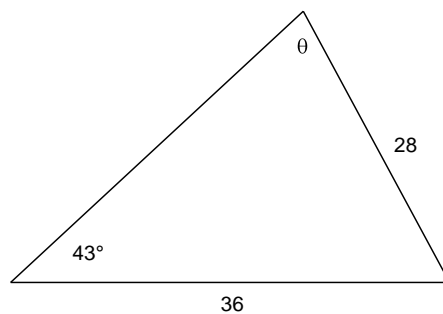
- (A)  $\frac{pq \sin R}{2}$   
 (B)  $\frac{pr \sin R}{2}$   
 (C)  $\frac{qp \sin P}{2}$   
 (D)  $\frac{qr \sin R}{2}$



46. A ladder is 6.5m long and is placed against a wall so that it reaches 2.5m up the wall as shown in the diagram below. What is the value of the angle, to the nearest degree, that the ladder makes with the wall?

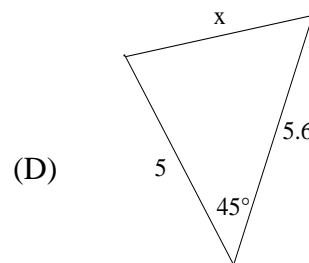
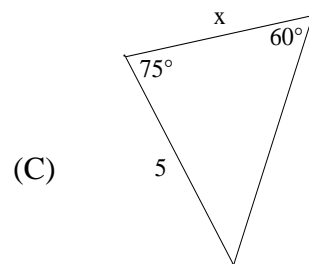
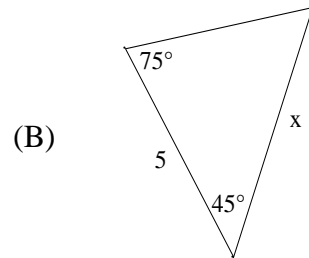
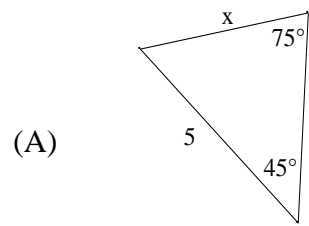


- (A) 21  
 (B) 23  
 (C) 67  
 (D) 70
47. What is the area of  $\triangle ABC$ , in  $\text{m}^2$ , if  $AB = 10.6\text{m}$ ,  $AC = 8.4\text{m}$ , and  $\angle A = 100^\circ$ ?
- (A) 22.5  
 (B) 43.8  
 (C) 76.8  
 (D) 87.7
48. If  $\theta$  is an acute angle, what is the value of  $\theta$  to the nearest degree in the diagram given below?

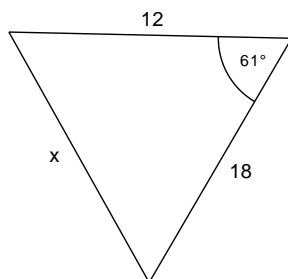


- (A)  $20^\circ$   
 (B)  $32^\circ$   
 (C)  $55^\circ$   
 (D)  $61^\circ$

49. Which triangle would require the law of cosines to solve for  $x$ ?



50. Given the diagram below, what is the value of  $x$ ?



- (A) 9.5
- (B) 16
- (C) 19
- (D) 26

**Section B**  
**Total Value: 50%**

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

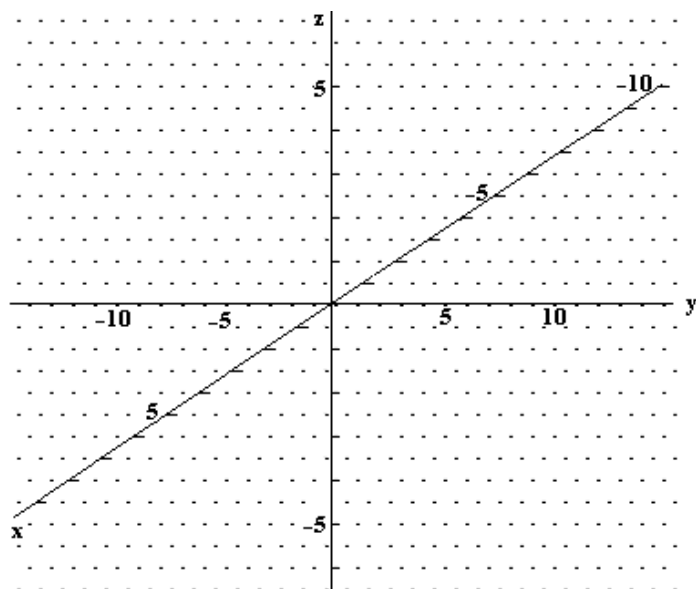
- 4            51.    Solve the following system of equations using either substitution or elimination:

$$-3x + 5y + z = -20$$

$$2x - 2y + 3z = 18$$

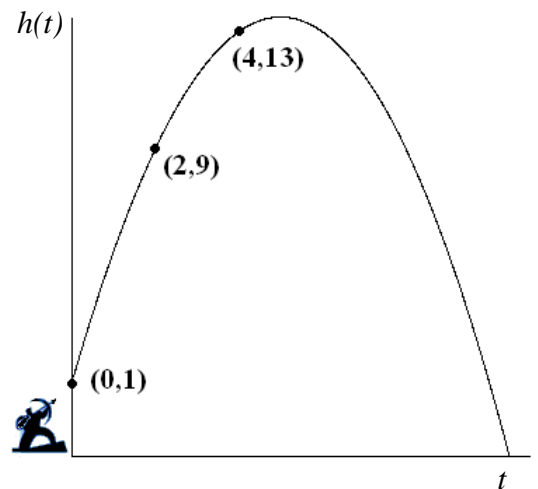
$$4x + 2y + 3z = 18$$

- 3            52.    Graph the plane defined by the equation  $15x - 5y + 9z = 45$ .

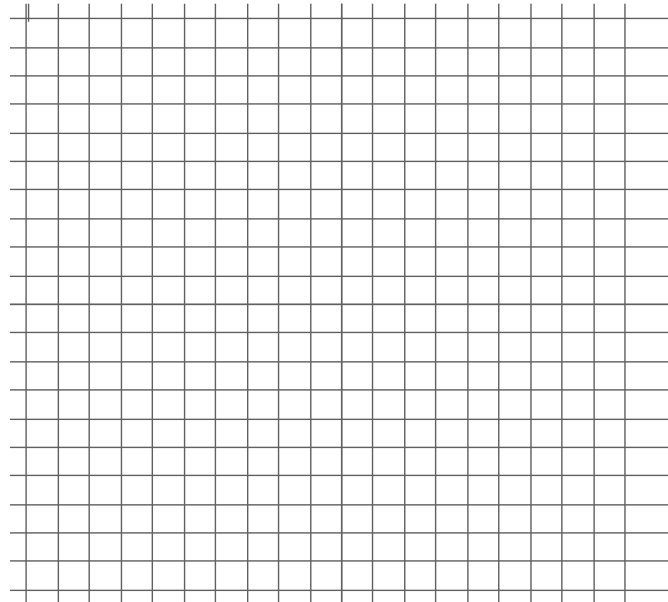


- 4 53. The student council is having a dance as a fundraiser. They are selling two kinds of tickets: singles and couples. On the first day, 39 singles tickets and 24 couples tickets are sold for a total of \$268.50. On the second day, 13 singles tickets and 18 couples tickets are sold for a total of \$144.50. Create a system of equations to represent this information and, using matrices, find the cost for each type of ticket.

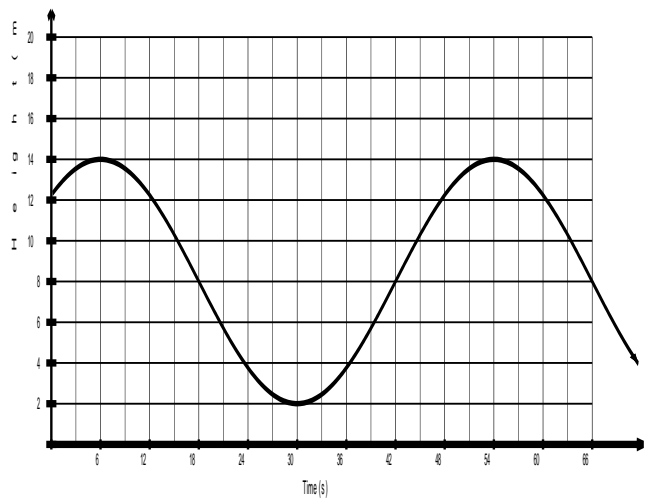
- 4 54. An arrow is fired into the air from a height of 1 metre. After 2 seconds, the arrow is 9 metres in the air. After 4 seconds, the arrow is 13 metres in the air. Set up and solve a system of equations to determine the quadratic relation, of the form  $h(t) = at^2 + bt + c$ , that models this situation. Use this relation to determine the height,  $h(t)$ , of the arrow at  $t=10$  seconds.



- 3 55. Graph the following relation:  $-\frac{1}{4}y + 2 = \cos 2x - 90^\circ$ .



- 4 56. Jack is riding a Ferris wheel. The graph below shows his height above the ground with relation to time. Determine the equation of the function in terms of sine or cosine that describes Jack's height above the ground in relation to time.



- 4 57. Simplify the following expression, expressing your answer in EXACT simplest form:

$$3\sin 225^\circ \cos 135^\circ + \cos 330^\circ$$

- 3 58. Simplify the following expression and list all restrictions:

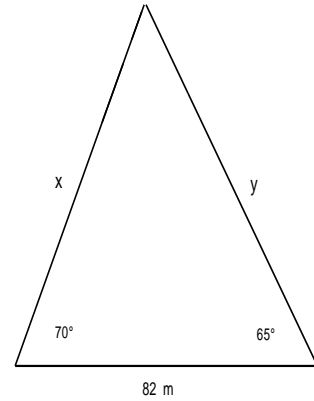
$$\frac{5}{x-1} - \frac{3}{x-2}$$

3    59.    Solve  $2\sin x + \sqrt{2} = 0$  where  $0^\circ \leq x < 360^\circ$ .

3    60.    Prove:     $\sec^2 \theta - \sec^2 \theta \sin^2 \theta = 1$

- 3      61.    The life expectancy of a certain brand of hair dryer is known to be normally distributed with a mean of 3 years and a standard deviation of 0.75 years. A company produces 3000 of these hair dryers. Draw and label a normal distribution curve and determine how many hair dryers are expected to last more than 1.5 years.
- 4      62.    A soft drink manufacturer advertises that a certain size of its diet cola has a mean weight of 591 grams. A random sample of 50 bottles is selected. The sample mean is 589.3 grams and the sample standard deviation is 13.7 grams. Algebraically determine the 95% confidence interval. Does the confidence interval support the company's claim?

- 4 63. Before moving in drilling equipment for oil exploration, O'Neill Oil must fence the triangular piece of land shown below. The given sides and angles were measured, but due to presence of a swamp, the remaining sides cannot be measured directly. Determine the lengths of the missing sides (to the nearest metre) and calculate the amount of fencing that must be ordered in total.



- 4 64. Two airplanes leave point A at the same time and travel in different directions. The first plane travels 200 km while the second plane travels 150 km. The planes are now 152 km apart. With the aid of a diagram, calculate the angle between the flight paths of the planes.