SECTION A

Answer all questions.

Direction: *For each question, there are four alternatives: A, B, C and D. Choose the correct alternative and circle it. Do not circle more than ONE alternative. If there are more than one choice circled, **NO** score will be awarded.*

Question 1 **[2 x 10 = 20]**

i. Which of the following pairs of matrices represented by their orders can be multiplied?

A 5x3 and 5x3

B 2x3 and 3x3

C 3x2 and 3x2

D 5x6 and 4x5

ii. What is the value of "**s**" in the equation $\left(\sqrt{s}\right)^2 = \left(8\sqrt{2}\right)^2$?

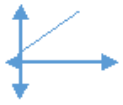
A 16

B 64

C 128

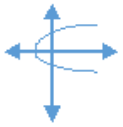
D 182

iii. Which of the following graphs is a function?

A 

B 

C 

D 

iv. The total surface area of a square based prism is $96\,\text{cm}^2$. What is the height of the prism if the base is 4.0 cm × 4.0 cm?

A 2 cm

B 3 cm

C 4 cm

D 5 cm

v. Which of the following is a quadratic function?

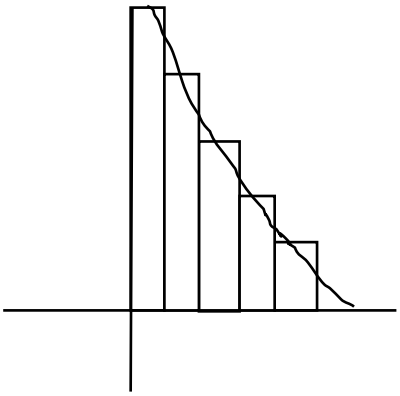
A $f(x) = -3x + 2$

B $f(x) = -2(x+1) + 3$

C $f(x) = 3(x-2)(x+2)$

D $f(x) = x^3 + 2x^2 + 3x + 1$

vi. The type of distribution described by the histogram displayed below is



A Normal distribution.

B U-shaped distribution.

C Negatively skewed distribution.

D Positively skewed distribution.

vii. The solution of the equation $(x-4)(x-2)=0$ is

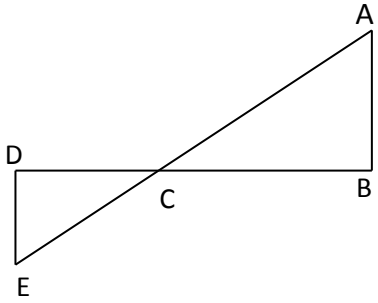
A -4, 2.

B 4, 2.

C 4, -2.

D -4, -2.

viii. In the given diagram, which is the corresponding side of DE?



A AB

B AC

C CB

D EC

ix. Tshering is 12 meters away from a cliff and looks up to the top of the cliff at an angle of 45°. His eyes are 2 meters above the ground. How tall is the cliff?

A 10 meters

B 12 meters

C 14 meters

D 16 meters

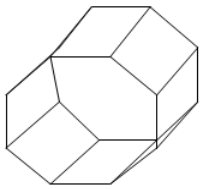
x. The plane of symmetry for the given figure is

A 6.

B 7.

C 8.

D 9.

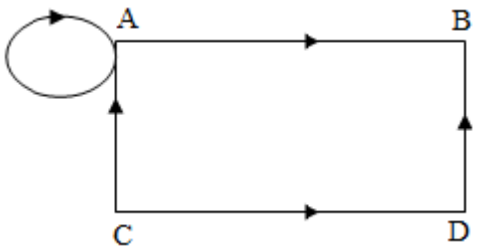


SECTION B (32 marks)

*Answer **all** questions.*

Question 2

a) Create an adjacency matrix for the given digraph. **[2]**



b) Use the above adjacency matrix to identify the element in the fourth row, the third column. **[1]**

Question 3

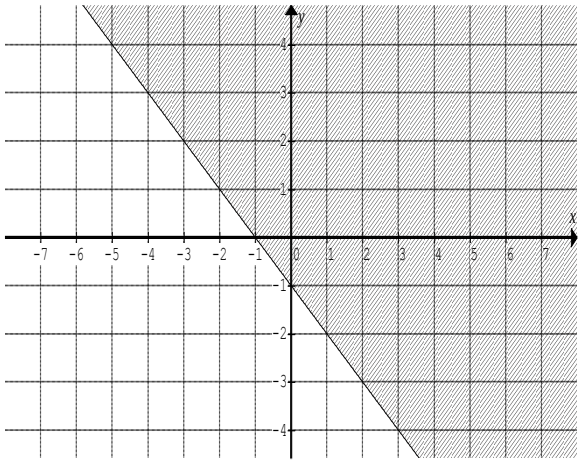
a) Karma invests Nu 125,000 in T-Bank shares with a face value of Nu 100 but they are being sold at a premium of 25%. How many shares can he buy? **[2]**

b) Solve: **[2]**

$$\left(\sqrt{z}+\sqrt{22}\right)\left(\sqrt{z}-\sqrt{22}\right)=35$$

Question 4

Write the inequality for the given graph. **[3]**



Question 5

When should you choose to use a graph in solving a linear system of equations instead of solving it algebraically? **[2]**

Question 6 **[3]**

a) How many significant figures are there in each number?

i. 67.80

ii. 6.5×10^3

b) Write a number:

i. Less than 100 with 3 SF

ii. Greater than 1000000 with 2 SF

c) Round off each number as indicated:

i. 16.962 to 3 SF

ii. 992 to 1 SF

Question 7

a) Use $f(x)=3x+2$ to determine each. **[2]**

i. $f(-3)$

ii. $-3f(x)$

b) Use algebra tiles to check the following: **[3]**

i. Factors of $x^2 - 4$ are $(x-2)(x+2)$

ii. Factors of $12x^2 + 18x$ are $(6x)(2x+3)$

Question 8

A bag contains 5 black, 6 white and 4 grey balls. **[3]**

i. You drew a black ball and did not replace it. What was the probability of drawing a grey ball next?

ii. You drew a black ball and replaced it. What was the probability of drawing a black ball next?

Question 9

Give an example of two quantities or variables that would show 1 and -1 correlation. **[3]**

Question 10

In a right triangle, $\sec x = 2$. What is the value of x ? **[2]**

Question 11

How can your knowledge on similarity help you to understand how trigonometric ratios work? **[2]**

Question 12

Name and create a shape with 3 lines of symmetry? **[2]**

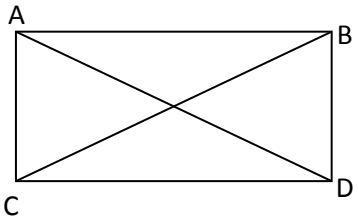
SECTION C [48 marks]

Under this section, there are 8 questions (question 13 – 20).

*Each question has **two** parts, I and II. Attempt **either** I or II from each question.*

Question 13(I)

a) This diagram represents a network of football tournament played among the four teams. **[3]**



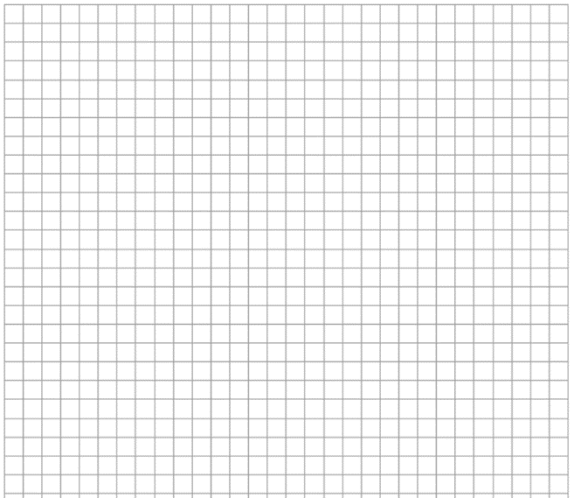
i. Create an adjacency matrix.

ii. How many one-stop over trips are there between each pair of vertices.

b) The coordinates of the four vertices of a parallelogram are listed in this matrix. **[3]**

$$Z = \begin{bmatrix} 0 & 1 & 4 & 3 \\ 0 & 2 & 2 & 0 \end{bmatrix}$$

i. Plot the points on the grid.



ii. Multiply the matrix by 1.5.

iii. Plot the new coordinates.

iv. What has happened to the shape?

OR

Question 13(II)

a) The given matrix is **[3]**

	A	B	C	D
A	1	1	0	0
B	0	0	0	0
C	0	1	0	0
D	1	0	1	0

i. Create a digraph for the matrix given above.

ii. How many two stop-over trips are there from vertex A to A?

b) Find the value of x, y and z. **[3]**

$$\begin{bmatrix} 5 & -2 & 3 \\ 6 & x & 0 \end{bmatrix} \times \begin{bmatrix} y & 1 \\ 2 & -2 \\ 0 & z \end{bmatrix} = \begin{bmatrix} 16 & 18 \\ 26 & 4 \end{bmatrix}$$

Question 14(I)

a) Order the following expressions from the least to the greatest by expressing them as entire radicals. **[3]**

$3\sqrt{13}, 4\sqrt{7}, 9\sqrt{2}, 6\sqrt{3}, 11$

b) Aum Dema borrowed Nu 6,000 at a rate of interest compounded quarterly. The balance was Nu 5,475 after making her first quarterly payment of Nu 750. What was the interest rate? **[3]**

OR

Question 14(II)

a) Simplify: **[3]**

i. $\dfrac{\sqrt{5x^3} \times \sqrt{9x^6}}{\sqrt{80x}}$

ii. $\left(\sqrt{3}+2\sqrt{5}\right)\left(\sqrt{5}+\sqrt{3}\right)$

b) Kezang bought 200 shares that had a face value of Nu100 for Nu 85 each. She sold the shares for Nu 220 each. **[3]**

i. What was her percent profit?

ii. If she has earned a dividend of 17% before selling the shares, what dividend amount did she earn?

Question 15(I)

a) Study the inequalities given below and write true or false if (0,0) is in the shaded region. **[3]**

i. $2y < x - 5$ ……

ii. $4y + 2x < 10$ ……

iii. $\frac{1}{2}y + \frac{3}{4}x > {}^{-}8$ ……

iv. $3x + 5y > 9$ ……

v. $0.03x - 0.04y \leq 0.5$ ……

vi. $3x + 4y \geq 24$ ……

b) Solve the system using elimination method. **[3]**

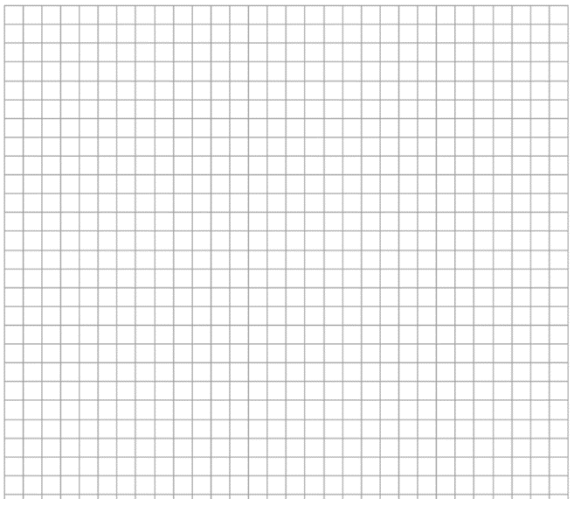
$\frac{1}{2}x + \frac{2}{3}y = 6$ *and* $\frac{3}{4}x - \frac{1}{3}y = 1$

OR

Question 15(II)

a) i. Transform the linear equation $3x-4y=8$ to slope and y-intercept form. **[3]**

ii. Sketch the graph of linear function.



b) Find the point of intersection of the system of equations. **[3]**

$4x = 2y + 3$ *and* $3x - y = 2$

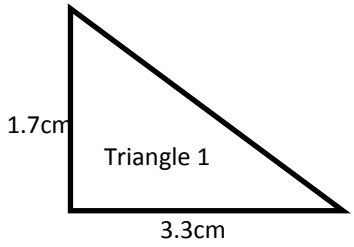
Question 16(I)

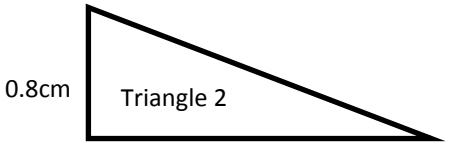
a) Describe the situation for each: **[3]**

i. Maximize the area for a given perimeter.

ii. Minimize the perimeter for a given area.

b) The following two triangles have the same area, but different perimeters. **[3]**





i. Find the perimeters of the two triangles.

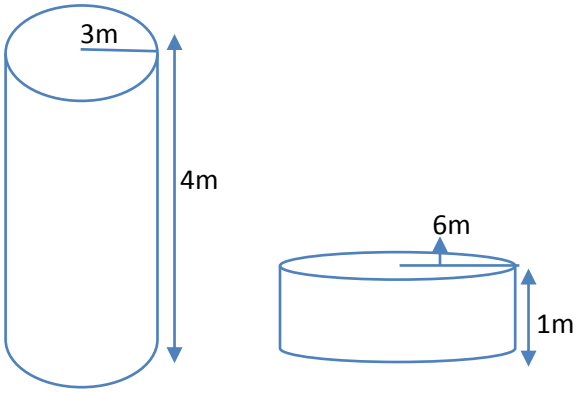
ii. Which triangle is more efficient?

OR

Question 16(II)

a) Explain how the total surface area to volume ratio can be used to compare the efficiency of shapes. **[3]**

b) The following two cylinders have the same volume, but different total surface area.**[3]**



i. Find the total surface area of the two cylinders.

ii. Which one is more efficient?

Question 17(I)

a) Write an equation using the pair of roots of (x +2) and (x+7). **[3]**

b) Solve the following: **[3]**

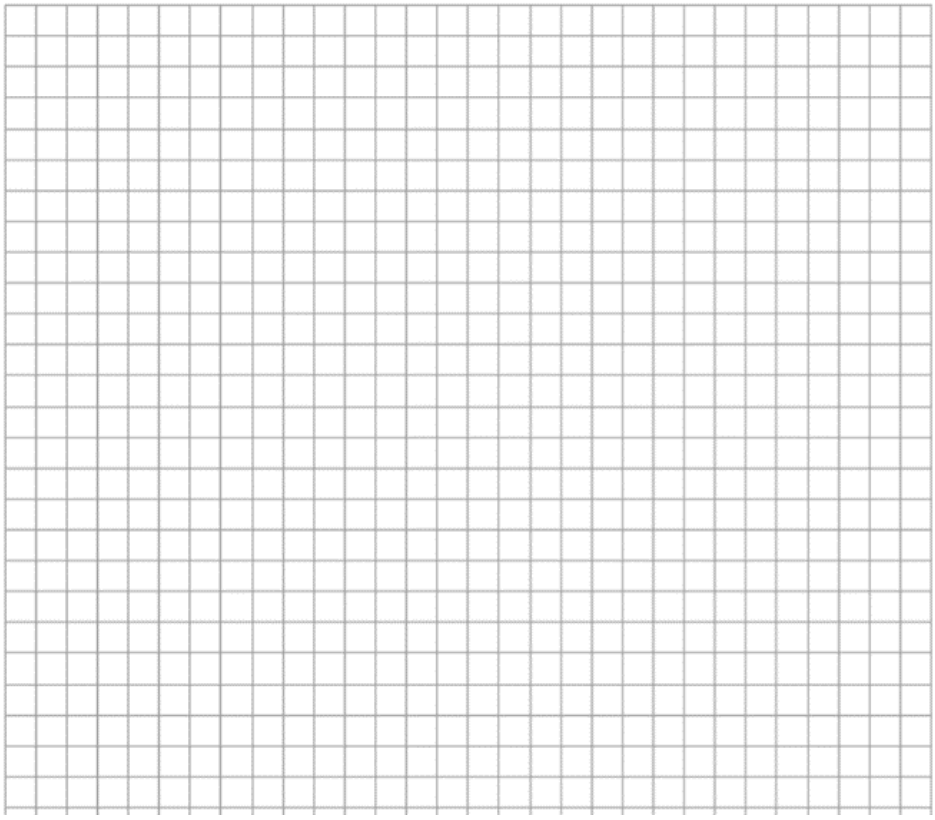
i. $2|x-1|=8$

ii. $|2x-4|+3=6$

OR

Question 17(II)

a) Sketch the graph of the function $f(x)=2(x-3)(x+5)$ and estimate the co-ordinate of the vertex. **[3]**



b) What geometric transformations should be applied to $f(x)=x^2$ to result in the function $f(x)=^{-}2(x+3)^2-4$? **[3]**

Question 18(I)

a) You roll a die twice. **[3]**

i. What is the probability that you roll a number greater than 4 in the first roll?

ii. What is the probability that the total of the two rolls is 6?

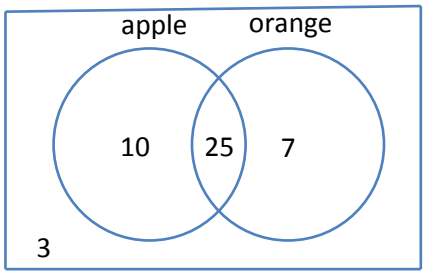
b) Show 5-number summery for the Geography marks of 21 students as given below. **[3]**

60	90	35	67	54	48	33
32	52	69	15	72	61	79
80	65	45	10	30	20	75

OR

Question 18(II)

a) The Venn diagram below shows the number of students in a class of 45 students who eat only apples and only oranges or both. **[3]**



A student is randomly selected. What is the probability that the student

i. eats apple?

ii. eats orange?

iii. eats both apple and orange?

b) The list below gives the age in months for 30 snow leopards tagged in the Wild Life Sanctuary at Thrimshingla Park. **[3]**

64	48	37	42	22	37
54	40	33	47	42	29
25	39	41	31	28	47
25	34	23	26	29	21
33	37	28	45	18	36

i. Create a stem and leaf plot for the above data?

ii. Find the range, mean and mode.

Question 19(I)

a) Find the value of each for the following: **[3]**

i. Cos…….= 0.2

ii. Sin ……..= 0.2

iii. Tan……..= 1.5

iv. Sec……..= 2

v. Sin…….= $\cos 85^{o}$

vi. Cos……..= $\sin 50^{o}$

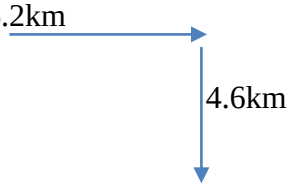
b) A regular pentagon has a side length of 60 cm. What is its area? **[3]**

OR

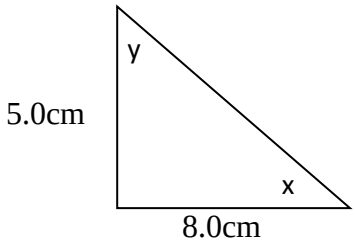
Question19 (II)

a) Represent each trip as a single vector. What is its bearing and distance? **[3]**

i. 6.2km



b) The legs of a right triangle are 5.0 cm and 8.0 cm. Find the values of x and y. **[3]**



Question 20(I)

a) Draw a triangle and construct two circles in such a way that one of the circle touches all the vertices and the other circle touches all its edges. **[3]**

b) How many lines of symmetry does each of the following shape have? **[3]**

i. Regular hexagon

ii. Circle

iii. Equilateral triangle

iv. Rhombus

v. Square

vi. Isosceles trapezoid

0R

Question 20(II)

a) Fill in the blanks **[3]**

i. A median is a line segment that joins a ……to the mid-point of side opposite to it.

ii. The point of intersection of the altitudes is called …….

iii. The longest side of a right triangle is called……

b) Construct an altitude for Δ XYZ in which XY=9.7cm, $\angle X = 32^{\circ}$ and $\angle Y = 43^{\circ}$. Calculate its area. **[3]**

Rough work

Rough work