SECTION A [20 MARKS]

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 **[20]**

i. Which pair of matrices can be multiplied?

I. $\begin{bmatrix}1 & 4 & 2\\3 & 4 & 3\end{bmatrix}$ and $\begin{bmatrix}1 & 2\\4 & 1\\3 & 0\end{bmatrix}$

II. $\begin{bmatrix}1 & 4\\0 & -3\\2 & 3\end{bmatrix}$ and $\begin{bmatrix}-1 & -2\\5 & 3\\6 & 4\end{bmatrix}$

III. $\begin{bmatrix}4\\3\\-1\end{bmatrix}$ and $\begin{bmatrix}1 & 2 & 0\end{bmatrix}$

IV. $\begin{bmatrix}0 & 1\\-1 & 1\end{bmatrix}$ and $\begin{bmatrix}2 & 1\\0 & -2\\1 & 3\end{bmatrix}$

A Only I
B I and II
C I and III
D II and IV

ii. The correct order of the following expressions $3\sqrt{2},\ 5,\ \sqrt{45},\ 2\sqrt{5}$ from greatest to least is

A $5,\ \sqrt{45},\ 2\sqrt{5},\ 3\sqrt{2}.$

B $\sqrt{45},\ 5,\ 2\sqrt{5},\ 3\sqrt{2}.$

C $3\sqrt{2},\ \sqrt{45},\ 2\sqrt{5},\ 5.$

D $2\sqrt{5},\ 3\sqrt{2},\ 5,\ \sqrt{45}.$

iii. Which system of equation has no solution?

A $2x+6y=26$ *and* $3y+8x=-1$

B $5x-6y=32$ *and* $18y=15x-96$

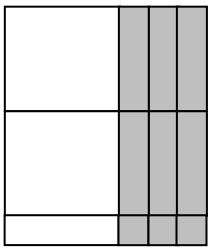
C $2x+3y=2$ *and* $4x+6y=4$

D $2x+6y=26$ *and* $2x+6y=24$

iv. The number of significant figure in 0.0030 is

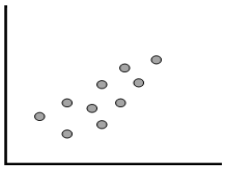
A 2.
B 3.
C 4.
D 5.

v. The factors of the given diagram is



A $(2x-1)(x+3)$.
B $(2x-1)(x-3)$.
C $(2x+1)(x-3)$.
D $(2x+1)(x+3)$.

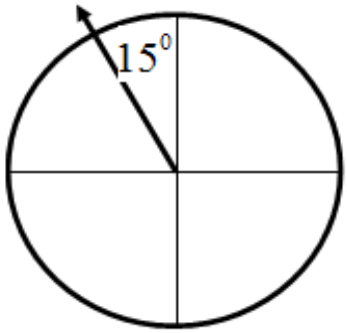
vi. The best correlation that describes the graph is



I. strong
II. weak
III. positive
IV. negative

A I and III.
B I and IV.
C II and IV.
D II and III.

vii. The bearing of the given vector is



A 15^0.

B 75^0.

C 180^0.

D 345^0.

viii. How many axis of rotation are there in a regular tetrahedron?

A 3

B 4

C 7

D 9

ix. The mapping notation for the function $f(x)=(x-3)^2-1$is

A $(x,y)\rightarrow(x-3,y+1)$.

B $(x,y)\rightarrow(x+3,y-1)$.

C $(x,y)\rightarrow(x-3,y-1)$.

D $(x,y)\rightarrow(x+3,y+1)$.

x. The value of $\cos 47^0$ is equal to

A $\sin(90-53)^0$.

B $\sin 47^0$.

C $\cos(90-53)^0$.

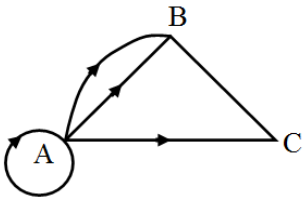
D $\cos 47^0$.

SECTION B [32 MARKS]

ANSWER **ALL** QUESTIONS

Question 2

a) Create an adjacency matrix for the given diagraph. [1]



b) Find the number of one-stop over trips from A to C. [2]

Question 3

a) Dendup deposited Nu 30,000 in a bank for 5 years at an interest of 5% p.a simple interest. Find the amount he will receive after 5 years? [2]

b) Find the value of 'n'. [2]

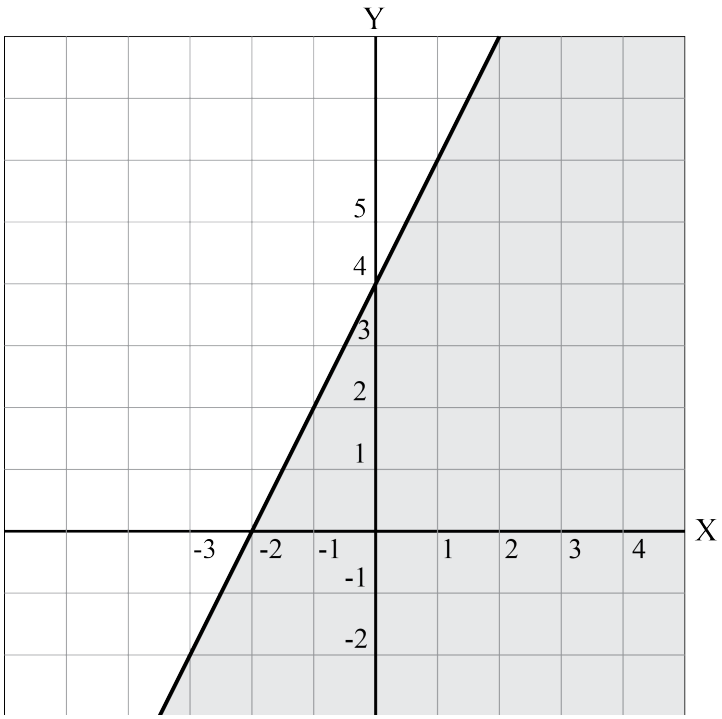
$(\sqrt{n}+\sqrt{17})(\sqrt{n}-\sqrt{17})=11$

Question 4 [2]

For the given equation $3s+5t=11$, write 't' as a function of 's'.

Question 5

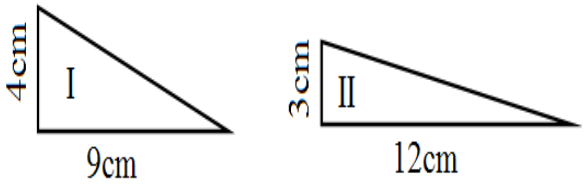
a) Create the inequality for the graph. [2]



b) What will happen to the inequality if the line is dashed? [1]

Question 6

The following triangles have same areas but different perimeters.



a) Which triangle has the shorter perimeter? Calculate to check it. [2]

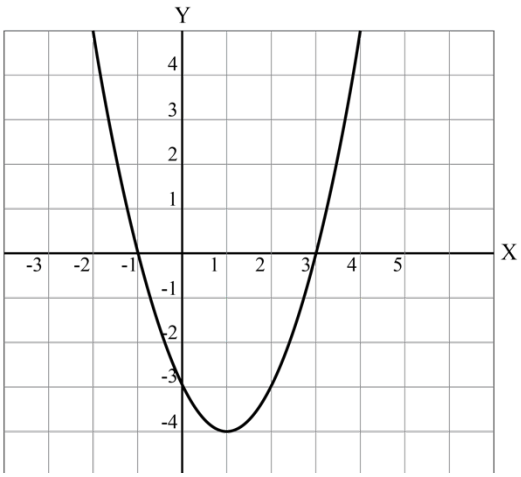
b) Which triangle is more efficient? Why? [1]

Question 7

a) Use two methods to show that $f(x)$ and $g(x)$ are equivalent. [2]

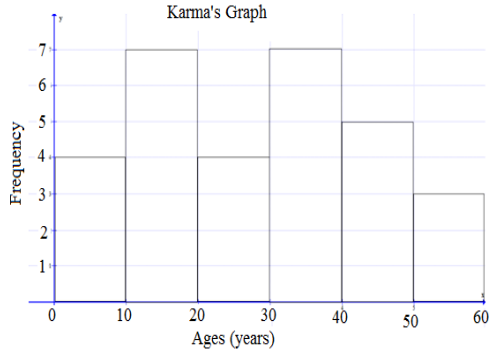
$f(x)=6x^2-10x-4 \; and \; g(x)=(3x+1)(2x-4)$

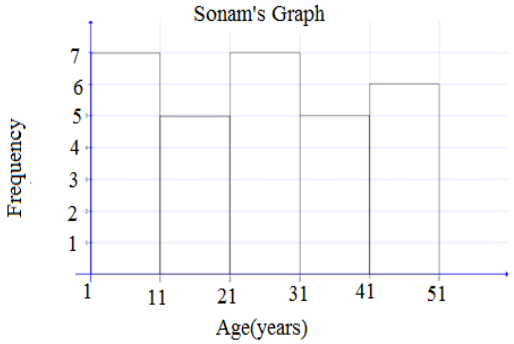
b) Create the equation of the given parabola. [3]



Question 8

Study the graph given below and answer the following questions.





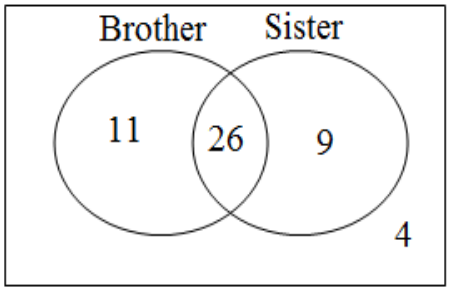
a) Make a conclusion based on Karma's graph. [1]

b) Make a conclusion based on Sonam's graph. [1]

c) Why do you think their conclusions are different although they used the same set of data? [1]

Question 9

a) The Venn diagram below shows the number of students in a class of 50 students who have only brothers, only sisters, brothers and sisters and no siblings.



A student is randomly selected. What is the probability that a student has [2]

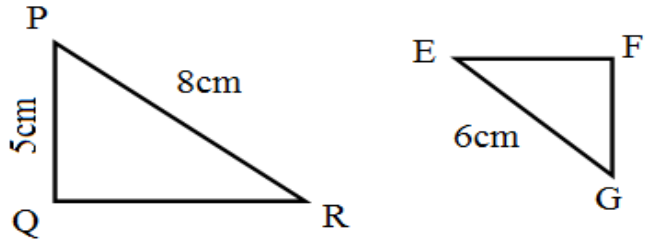
1. a brother?
2. a sister?
3. brothers and sisters?
4. no siblings?

1.	
2.	
3.	
4.	

b) Are the events in 1 and 2 given above, dependent or independent? Explain. [1]

Question 10

Calculate the length of side FG if the given triangles are similar. [2]



Question 11

Tenzin walked 6 km at a bearing of 045^0 and then 7 km at a bearing of 135^0. Use a single vector to describe his trip. Use a distance and bearing to describe the vector. [2]

Question 12

Laythro conjectured that pyramids with a certain base have one fewer face than prisms with the same bases. Verify her conjecture to be true using inductive reasoning. [2]

SECTION C [48 MARKS]

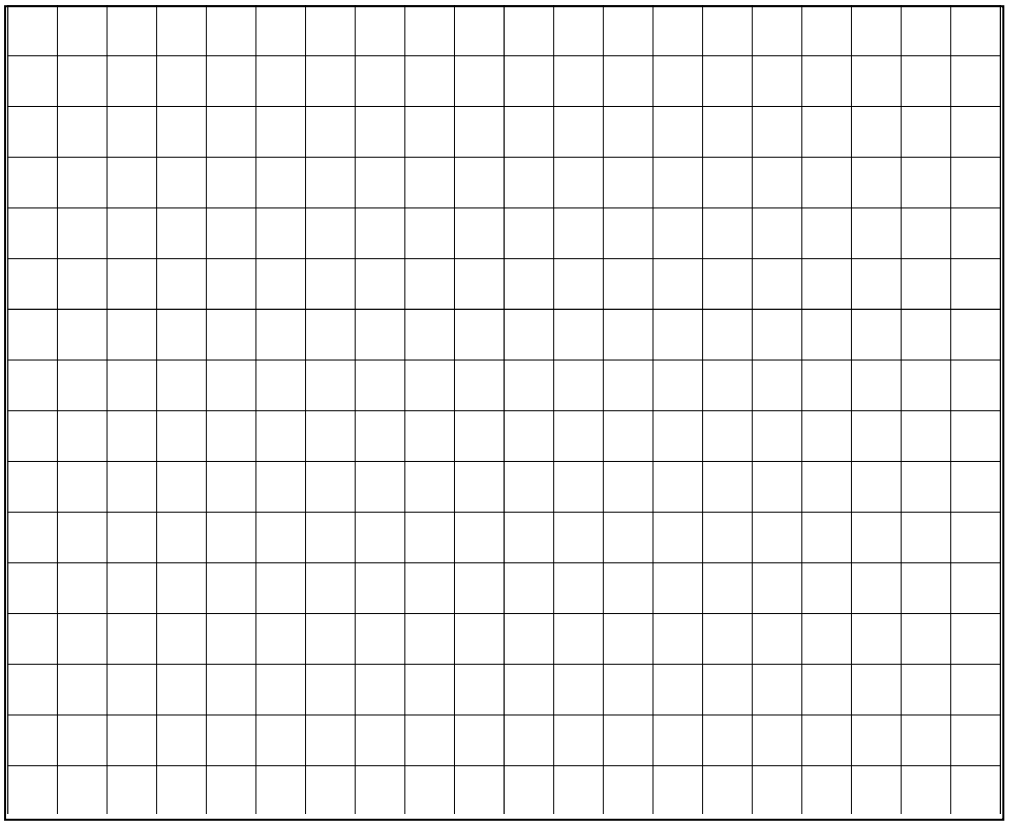
Under this section, there are 8 questions (question 13 – 20). Each question has two parts, I and II. Attempt either I or II from each question.

Question 13 (I)

a)

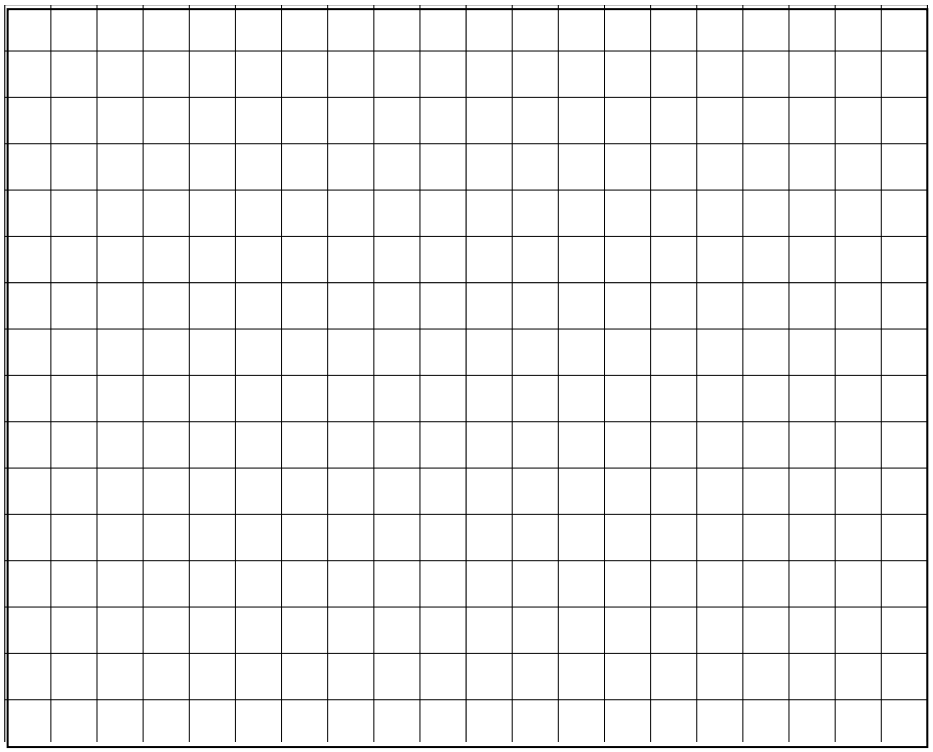
$$Matrix\ A = \begin{bmatrix} 2 & 2 & 4 \\ 1 & 3 & 1 \end{bmatrix}$$

i. Plot the points and draw the shape on the grid. [1]



ii. Multiply the matrix by 0.5. $\left[\frac{1}{2}\right]$

iii. Plot the new matrix on the same grid. [1]



iv. What happened to the new shape? Why? $\left[\frac{1}{2}\right]$

b) The following information shows the number of hours spent in a day by three students in doing each activity.

$$\begin{array}{c} \\ \textit{Dorji} \\ \textit{Pema} \\ \textit{Dawa} \end{array} \begin{array}{c} \begin{array}{cc} \text{TV} & \text{Reading} \end{array} \\ \begin{bmatrix} 3 & 1 \\ 2 & 5 \\ 4 & 2 \end{bmatrix} \end{array}$$

i. What does the sum of the elements in each row tell you? [1]

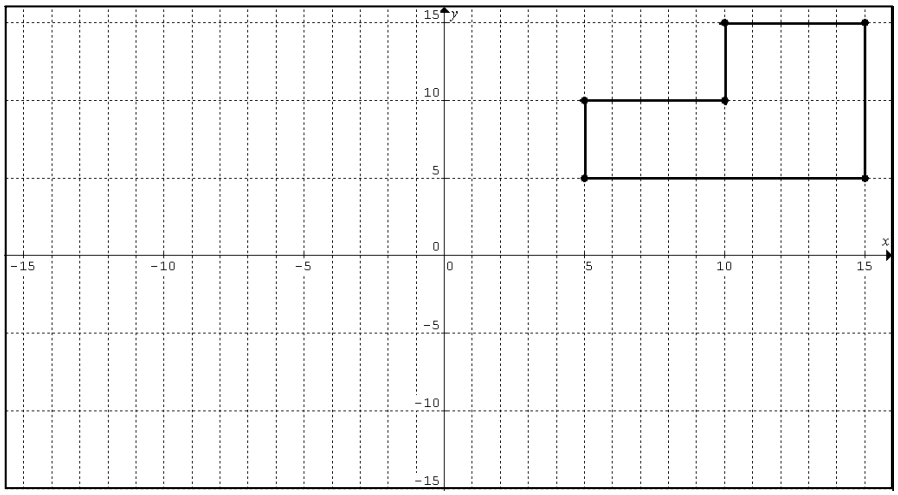
ii. What does the sum of the elements in each column tell you? [1]

iii. Who has spent the maximum hours in doing both the activities? [1]

OR

Question 13 (II)

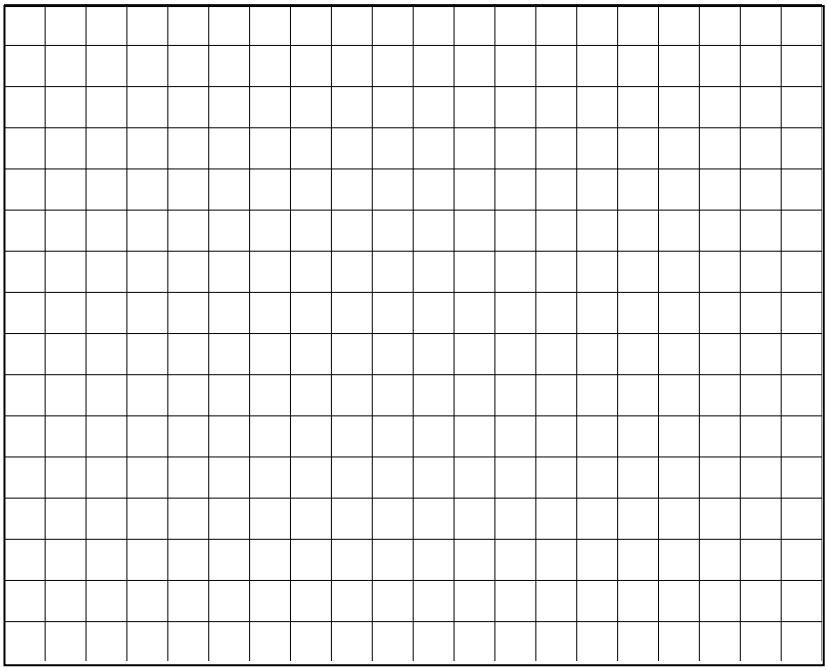
a)



i. Create a matrix for the shape given above. [1]

ii. Multiply the matrix by –1. $\left[\frac{1}{2}\right]$

iii. Plot the new matrix on the grid below. [1]



iv. What happened to the new shape? Why? $\left[\frac{1}{2}\right]$

b) Find the values of a, b and c. [3]

$$\begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \end{bmatrix} \times \begin{bmatrix} 2 & 0 \\ a & b \\ c & 0 \end{bmatrix} = \begin{bmatrix} 2 & 4 \\ -6 & 0 \end{bmatrix}$$

Question 14 (I)

a) Wangmo has a loan of Nu 85,000. Which is the better option to pay off the loan? [3]

Option 1: Pay off the loan at the end of 1 year at an interest rate of 14% p.a. compounded semi-annually.
Option 2: Pay off the loan at the end of 1 year at an interest rate of 13% p.a. compounded monthly.

b) Durga is paid Nu 2000 each week and additional 5% commission on sales.

i. Calculate his total income for a week for sales of Nu 90,000. [1]

ii. His goal is to earn Nu 9,000 each week. What is the minimum amount of weekly sales required to earn this level of income? [2]

OR

Question 14 (II)

a) Yeshi borrowed Nu 20,000 at an interest rate compounded quarterly. The balance was Nu 14,850 after making his first payment of Nu 6,000. What was the rate of interest? [3]

b) BNB declares a 25% dividend rate on its stock. Sonam owns 200 shares each with a face value of Nu 100.

i. Determine the amount of dividend. [1]

ii. She originally bought the shares at a premium of 15%.What is the yield percentage? [2]

Question 15 (I)

a) Determine the coordinates of the point of intersection.

i. $6x-8y=4 \; and \; 2x+5y=9$ $\left[1\frac{1}{2}\right]$

ii. $y=3x+2 \; and \; 2x+4y=36$ $\left[1\frac{1}{2}\right]$

b) One fourth of one number is 5 times of another. The sum of two numbers is 210. Find the numbers. [3]

OR

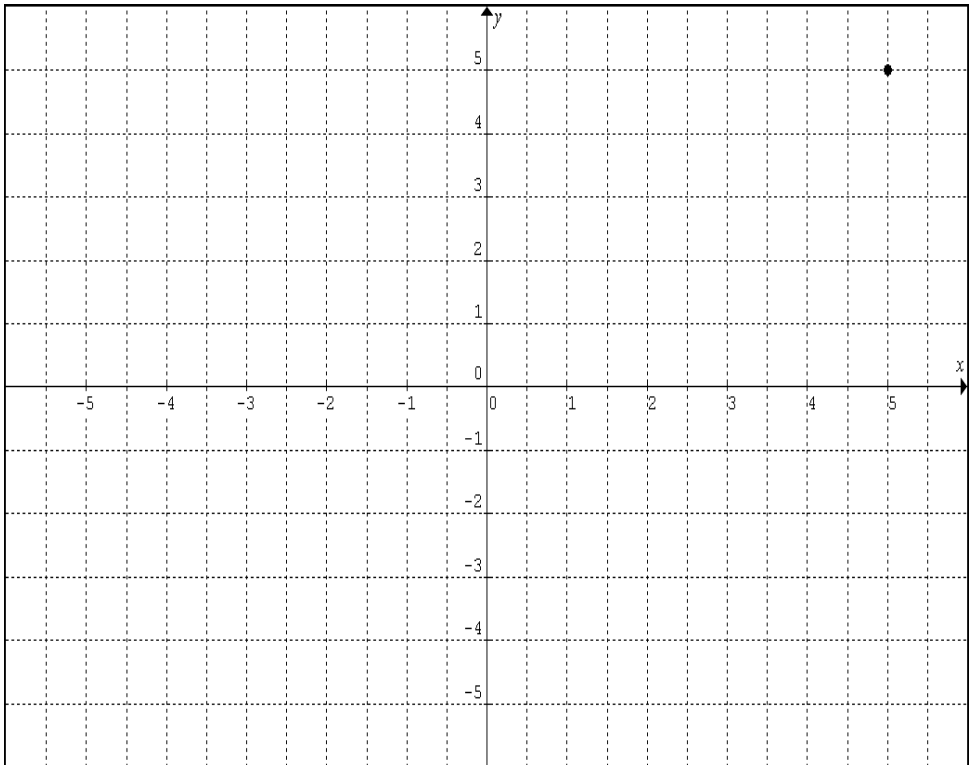
Question 15 (II)

a) Tshewang withdraws Nu 3800 in Nu 20 and Nu 50 notes from a bank.

Write an equation to model this situation. [1]

b) How many of each note will Tshewang have if he has 100 notes altogether? [2]

c) i. Sketch the graph of $f(x)=2x+1$. [1]



ii. Draw the new graph of $f(x-1)$ on the same grid provided and describe the transformation. [2]

Question 16 (I)

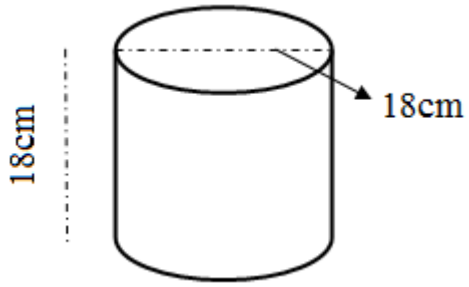
a) Two students measured the length of the calculator (fx-82) as:
Student A: 15 cm long
Student B: 14.9 cm long

i. Who do you think is more precise? $\left[\frac{1}{2}\right]$

ii. Comment on the precision and accuracy. $\left[1\frac{1}{2}\right]$

iii. Convert: $3\,m^3 = \_\_\_\_\_\ cm^3$ [1]

b) i. Determine the total surface area of the cylinder given. [1]



ii. Determine the volume of a sphere with the same total surface area as the cylinder above. [2]

OR

Question 16 (II)

a) Round off each number as indicated. [3]

i. 2823 to two significant figures	
ii. 0.719 to one significant figure	
iii. 1.39 to two significant figures	

b) Find the area of a regular hexagon that has a perimeter of 30 cm. [3]

Question 17 (I)

a) Phuntsho has 25 m of fencing to enclose a garden. Since the garden is next to his house, he needs to fence only three of its sides.

i. Create a function to model the area of his garden. [1]

ii. Find the maximum area he can enclose. [2]

b) Solve:

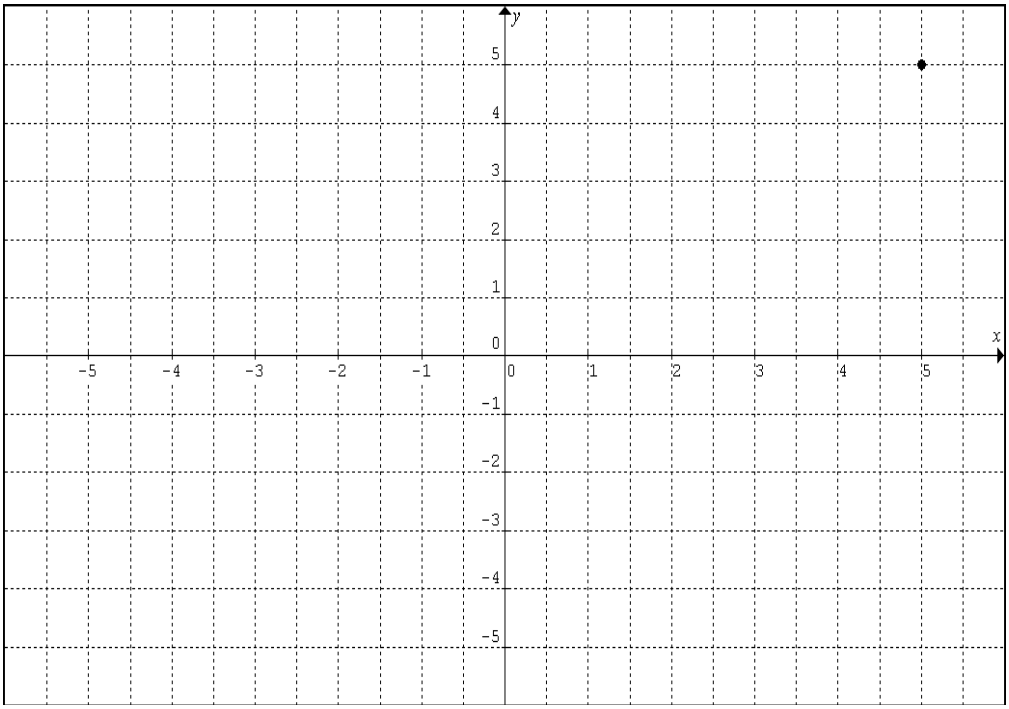
i. $|3x+1|+4=10$ [2]

ii. $4x^2 - 64 = 0$ [1]

OR

Question 17 (II)

a) Sketch the graph of $f(2x-1)$, if $f(x)=|x|$. [3]



b) When the squares of two consecutive even integers are added, the sum is 244. Find the integers. [3]

Question 18 (I)

a) The following data represents the points scored by Karma and Pemo in their last 20 basketball games.

Karma				
25	19	12	8	11
22	20	18	15	13
19	24	14	9	13
26	22	20	18	15

Pemo				
9	12	29	15	18
20	32	8	10	12
6	4	14	22	35
30	12	7	28	15

Construct a double stem and leaf plot. [3]

b) Sonam randomly chooses an integer from 1 to 50. $\left[1\frac{1}{2}\right]$
Event A: The integer is even.
Event B: The integer is a multiple of 3.
What is the probability of

i. Event A happening ?

ii. Event B happening ?

iii. Event A and B both happening ?

iv. Show: P(A and B) = P(A/B) × P(B) $\left[1\frac{1}{2}\right]$

OR

Question 18 (II)

a) This data shows the monthly savings of 65 people. [4]

Monthly Savings (Nu)	No. of people
0 - 200	16
200 - 400	12
400 – 600	8
600 – 800	12
800 – 1000	10
1000 – 1200	7

Calculate the five number summary.

b) A bag contains three white buttons and five black buttons. You reach in and draw one button and then draw another button. What is the probability of drawing

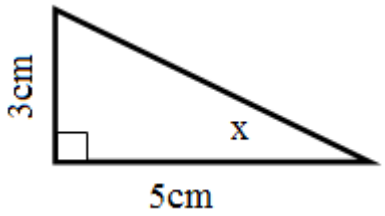
i. a second white button if the first button drawn is white and you replace it before drawing another again? [1]

ii. a second white button if the first button drawn is white and you do not replace it? [1]

Question 19 (I)

a) Lhaki and Pelzang are both looking at the top of a 250 m high building. Both girls are standing on a flat ground. Their eyes are kept at 1.5 m above the ground level. Lhaki is 300 m away from the centre of the building and Pelzang is 450 m away from the centre of the building but on the opposite side. At what angle of elevation does each girl look up at the building? [3]

b) i. Determine the secant, cosecant and cotangent for the angle ‘x’. [2]



ii. Determine the acute angle if $\cot x = 1.6$ [1]

OR

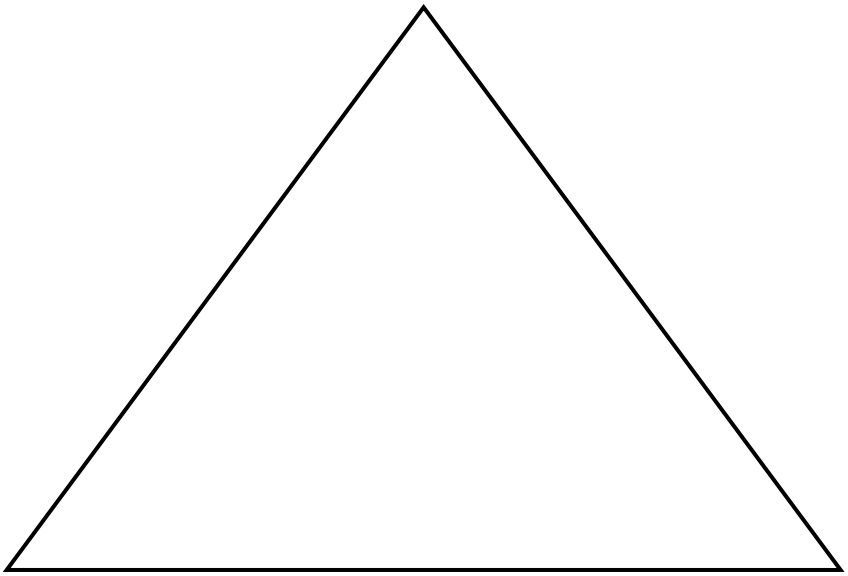
Question 19 (II)

a) From an even ground level, Pemala is looking up at a tree that is 700 m away. The angle of elevation is 5^0. His eyes are 2 m above the ground. How high is the tree? [3]

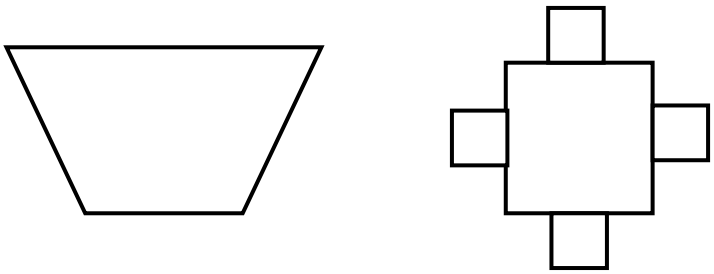
b) Calculate the other five trigonometric ratios if $\cos x = 0.6$ [3]

Question 20 (I)

a) Construct the medians and locate the centroid for the shape given. [3]



b) i. How many lines of symmetry does each have? Sketch them on the figures given below. [2]

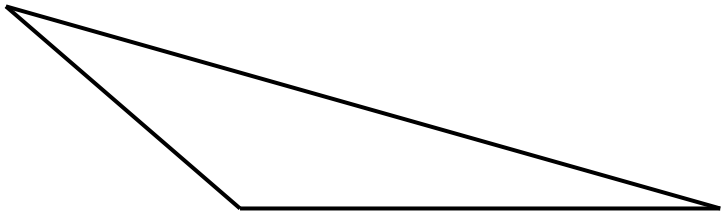


ii. Describe the turn symmetry of a regular pentagon based pyramid. [1]

OR

Question 20 (II)

a) i. Find the height of the triangle with the help of construction. [2]



ii. Calculate its area. [1]

b) Construct ΔPQR, where PQ = 4.7 cm, QR = 6.6 cm and PR = 7.5 cm. Locate the circum-centre and construct the circum-circle. [3]

Rough Work

Rough Work