Index No: | 0 | 1 | 0 | 1 | 3 | | | | |

Alternative No:

Supervising Examiner's/ Invigilator's initial:

Mathematics

Writing Time: 3 hours
Total Marks : 100

READ THE FOLLOWING DIRECTIONS CAREFULLY:

1. **Do not** write during the first **fifteen minutes.** This time is to be spent on reading the questions. After having read over the questions, you will be given **Three Hours** to answer all questions.

2. Write your **index number** in the space provided on the **top right hand corner of this cover page only.**

3. In this paper, there are **three sections:** Section A, Section B and Section C. You are expected to answer **ALL** the questions in Section A and Section B. Under Section C, there are 8 questions (question numbers 13 -20). Each question has two parts, I and II. Attempt either I or II from each question. The intended marks for a question or its parts are stated in the brackets.

4. Read the directions to each question carefully and write **all** your answers in the space provided in the **question booklet** itself.

5. Remember to write **quickly** but **neatly.**

6. You are not allowed to remove any page from this booklet.

7. **Do not** leave the examination hall before you have made sure that you have answered all the required number of questions.

8. The use of calculator (fx-82/fx-100) without memory is allowed.

For Chief Marker's and Markers' Use Only

Section	**A**	**B**											**C**								
Question	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	
Award																					
Marker's initial																					

SECTION A

Answer all questions.

Question 1 **(2 x 10 = 20 marks)**

(i) The dimensions of the product matrix are based on:

A Number of columns in the 1st matrix and the number of rows in the 2nd matrix
B Number of columns in the 2nd matrix and the number of rows in the 1st matrix
C Number of rows in the 1st matrix and the number of columns in the 2nd matrix
D Number of rows in the 2nd matrix and the number of columns in the 1st matrix

Answer: ……..

(ii) The simplified form of $\frac{\sqrt{20}\times\sqrt{7}}{\sqrt{35}}$ is

A $2\sqrt{5}$
B $\sqrt{5}$
C 2
D 4

Answer: …….

(iii) Which of the following relation is a function?

A { (0,2), (0,3), (1,2), (1,3)}
B { (1,2), (2,2), (3,3), (4,3)}
C { (3,1), (3,2), (1,1), (2,2)}
D { (a,b), (a,c), (b,c), (c,c) }

Answer:……..

(iv) Pema measures the length of a book. Which of the following lengths is more precise?

A 42 cm
B 42.0 cm
C 40 cm
D 41 cm

Answer: ……

(v) The mapping notation of the function $f(x) = (x+3)^2 - 7$ is

A $(x,y) \rightarrow (x - 30, y - 7)$

B $(x,y) \rightarrow (x + 30, y + 7)$

C $(x,y) \rightarrow (x - 30, y + 7)$

D $(x,y) \rightarrow (x + 30, y - 7)$

Answer: …….

(vi) The graph of the following table values will be

Marks	Numbers of students
2-5	7
6-9	8
10-13	9
14-17	3
18-21	1
22-25	1

A right or positively skewed

B left or negatively skewed

C normal distribution

D uniform distribution

Answer: ……

(vii) The probability of getting a 4 on rolling a die is

A $\frac{1}{36}$

B $\frac{4}{36}$

C $\frac{1}{6}$

D $\frac{4}{6}$

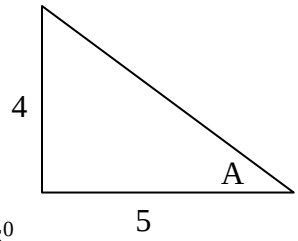
Answer:…….

(viii) If the value of '*sin x'* is 0.5, the value of '*tan x'* is

A 0.866
B 1.732
C 1.155
D 0.577

Answer: ……

(ix) Find the value of 'A' for the triangle given below:



A 36.86^0
B 38.65^0
C 51.34^0
D 53.13^0

Answer: …….

(x) What is the order of turn symmetry for a regular octagon?

A 7
B 8
C 9
D 10

Answer: ……

Section B (32 marks)
Answer all questions

Question 2

Evaluate x and y, if $\begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix}\begin{bmatrix} 2x \\ 1 \end{bmatrix} + 2\begin{bmatrix} -4 \\ 5 \end{bmatrix} = \begin{bmatrix} 8 \\ 4y \end{bmatrix}$

Question 3

Which of the following options is best for you to invest Nu.1500 for 5 years?

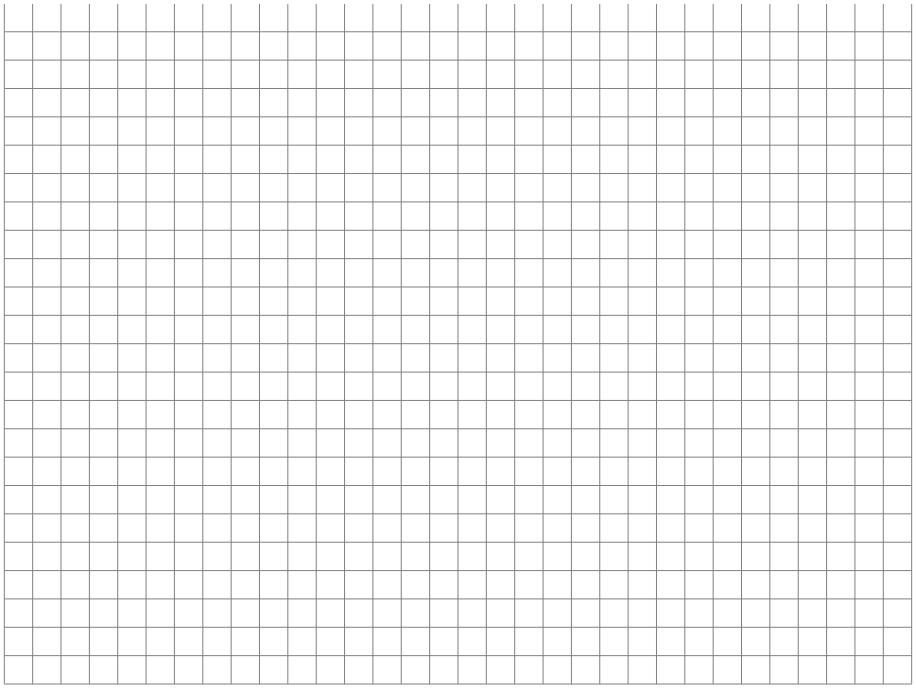
Option I : 3 % p.a S.I.

Option II : 2.75 % p.a compounded semi-annually .

Option III : 2.5 % p.a compounded quarterly

The best option is……

Question 4
Sketch the graph of $y > 4x - 8$



Question 5

Write ‘a’ as a function of ‘b’ in the equation 10a – 3b = 30

Question 6

How many significant figures are there in each number? **[3]**

i) 40300

ii) 0.002000

iii) 6.3×10^3

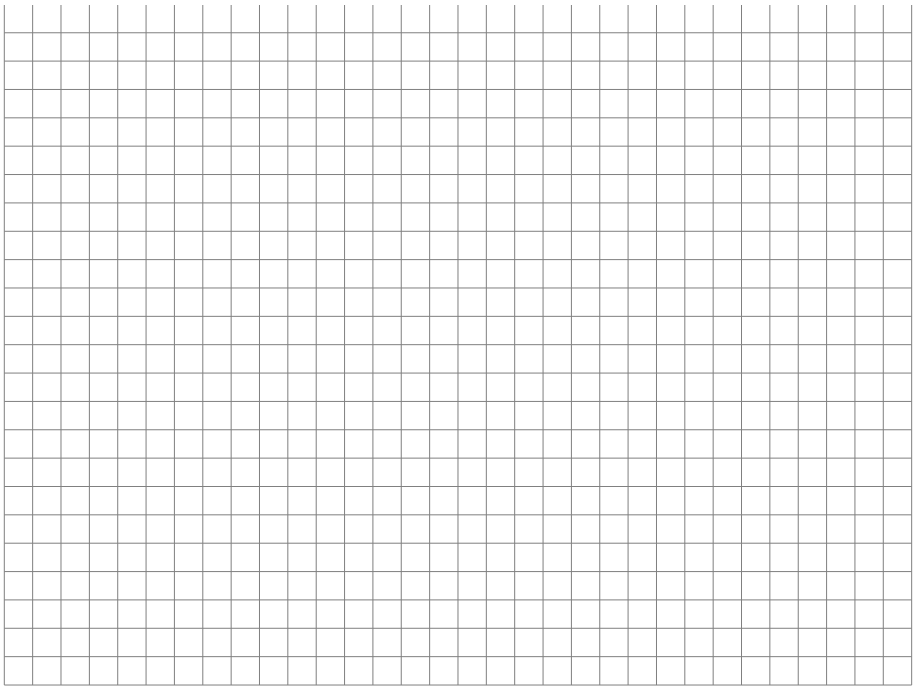
Question 7

For the quadratic function, $f(x) = (2x-5)(3x+3)$, **[4]**

a) Find the x –intercepts.

b) Write the coordinate of the vertex

c) Sketch the graph



Question 8

The sides of a right-angled triangle are *(2x-1)*, *2x* and *(2x+1)*.
Determine the dimensions of the right triangle.

Question 9

The following data shows the marks scored by 20 students in a mathematics unit test. **[4]**

25	30	12	8	11	22	20	35	15	33
19	24	38	9	13	26	22	20	34	15

i) Create a stem and leaf plot for the data.

ii) What is the range of marks?

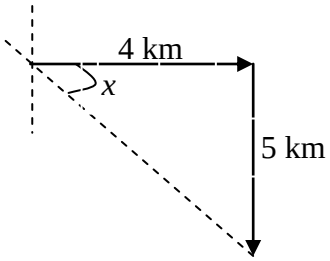
iii) What is the median mark?

Question 10

From a point P on a level ground, the angle of elevation of the top of a tower is 30^0.
If the tower is 100m high, how far is 'P' from the foot of the tower? **[2]**

Question 11

What is the bearing and distance of this two-part trip?



Question 12

Draw Δ ABC where AB = 6.9 cm, BC = 8.3cm and $<B = 62^0$. Locate the in-centre of this tr

SECTION C (8 x 6 = 48 marks)

*Under this section, there are **8** questions (question number 13-20). Each question ha*
*parts I and II. **Attempt either I or II from each question.***

Question 13 (I)

(a) Find the value of x, y and z.

$$\begin{bmatrix} 1 & 0 & 2 \\ 3 & x & 2 \end{bmatrix} \begin{bmatrix} y & 3 \\ 2 & 1 \\ 0 & z \end{bmatrix} = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix}$$

[3]

(b) Draw a digraph to represent the games played among four houses in Pelki

House	Games
Tag	Basket ball, volley ball and football
Singye	Basket ball and football
Chung	Volley ball
Druk	Football

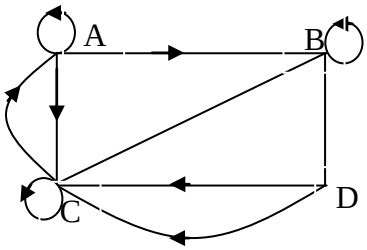
OR

Question 13 (II)

(a) Find the value of a, b and c, if

$$\begin{bmatrix} a & 3 \\ 4 & 2 \end{bmatrix} + \begin{bmatrix} 2 & b \\ 1 & -2 \end{bmatrix} - \begin{bmatrix} 1 & 1 \\ -2 & c \end{bmatrix} = \begin{bmatrix} 5 & 0 \\ 7 & 3 \end{bmatrix}$$ **[3]**

(b) i) Create an adjacency matrix for the network given below.



ii) How many one-stopover trips are there from A to B?

Question 14 (I)

(a) Pema Yuden invests Nu 2200 in buying shares of face value Nu 100 and selling at 10% premium. The dividend on the shares is 20% p.a. **[3]**

i) Calculate the number of shares she buys.

ii) Calculate the dividend she receives annually.

iii) Calculate the yield %.

(b) Find the value of x :

$\sqrt{36a^x} \times \sqrt{48} = 24a^7\sqrt{3a}$

OR

Question 14 (II)

(a) Tobden sold a Sersho Gho for Nu 80,000. **[3]**

i) Calculate the percent markup, if he paid a cost price of Nu 40,000.

ii) He paid Nu 10,000 for delivery and other expenses in addition to the cost price of Nu 40,000. What is the new percent up if the gho is still sold for Nu 80,000?

(b) Dorji Dema borrows Nu 40,000 from Pema Tshering who charges an interest rate of 4% p.a for three years compounded annually. She agrees to pay Nu 10,000 at the end of each year until the loan has been repaid.

i) Determine the amount she owes after the first payment.

ii) Determine the amount of the final payment.

iii) Find the amount of interest she paid altogether.

Question 15 (I)

(a) i) Determine the point of intersection for the given system of linear equations, $2x+6y=26$ and $3y+8x=-1$.

ii) Which strategy did you use in part (i)?

(b)Yewong withdraws Nu 5000 in Nu 100 and Nu 500 notes from the Tashi Bank. **[3]**

i) Write an equation to model this situation.

ii) Write a function that tells the number of Nu 100 notes, if she knows the number of Nu 100 and Nu 500 notes.

OR

Question 15 (II)

(a) Penjor answered 20 multiple choice questions in a monthly test. He scored 10 points for each correct item and lost 5 points for each incorrect item. If his total score was 110 points, how many items did he answer correctly? **[3]**

(b) Create a table of values for $f(x) = 10 - 3x$ **[1 ½]**

(c) How do you know that the given equation is a function? **[1 ½]**

Question 16 (I)

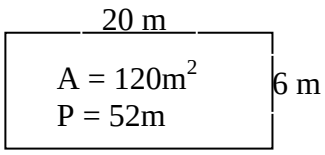
(a) Write a number for each of the following:

(i) Less than 1000 with 3 SFs.

(ii) Greater than 1000 with 4 SFs.

(iii) Round off 2.947 to 3 SFs.

(b) (i) Draw and write the dimensions of two other non-square rectangles, each with the same area as the one shown below but with a shorter perimeter. **[1 ½]**



(ii) Explain your strategy for finding rectangles to meet the condition in part (i). **[1 ½]**

.

OR

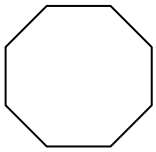
Question 16 (II)

(a) (i) Determine the total surface area of a cylinder with a diameter of 20cm and height of 20cm. **[1 ½]**

(ii) Determine the radius of a sphere with the same total surface area. **[1 ½]**

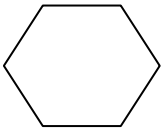
(b) (i) If the perimeter remains constant for the figures given below, which of the two shapes is more efficient? **[1 ½]**

Figure 1



Octagon

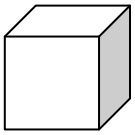
Figure 2



Hexagon

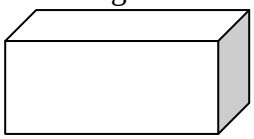
(ii) If the volume remains constant for the figures given below, which of the two shapes is more efficient? **[1**

Figure 1



Cube

Figure 2



Cuboid

Question 17 (I)

(a) Show that $f(x) = 3(x+3)(x-1)$ and $g(x) = 3(x+1)^2 - 12$ are equivalent. **[3]**

(b) Solve for x, if $10x - \frac{1}{x} = 3$

OR

Question 17 (II)

(a) Describe the geometric transformation applied to $f(x) = x^2$ to result in each function. **[3]**

(i) $g(x) = -2x^2 - 30$

(ii) $f(x) = (x+10) + 4$

(b) Write an equation in the form $ax^2 + bx + c = 0$ using the pair of roots of - 2 and + 7. **[2]**

Question 18 (I)

(a) The following data sets show the class size in the beginning and at the end of the year in Pema's class. **[4]**

Class size

First day of school				Last day of school			
15	26	23	31	20	26	20	23
23	14	17	43	23	25	22	36
38	23	30	26	35	23	33	29
12	34	23	28	22	27	26	33

(i) Construct a box plot for each data set using the same scale.

(ii) Use your plots to write two statements comparing the class size in the beginning and [illegible] of the year.

(b) There are 4 black balls and 3 white balls in a box. What is the probability of drawing each? **[2]**

i) a second white ball if the first ball drawn is white and you replace it before drawing again.

ii) a white ball on the second draw if the first ball drawn is black and you do not replace it.

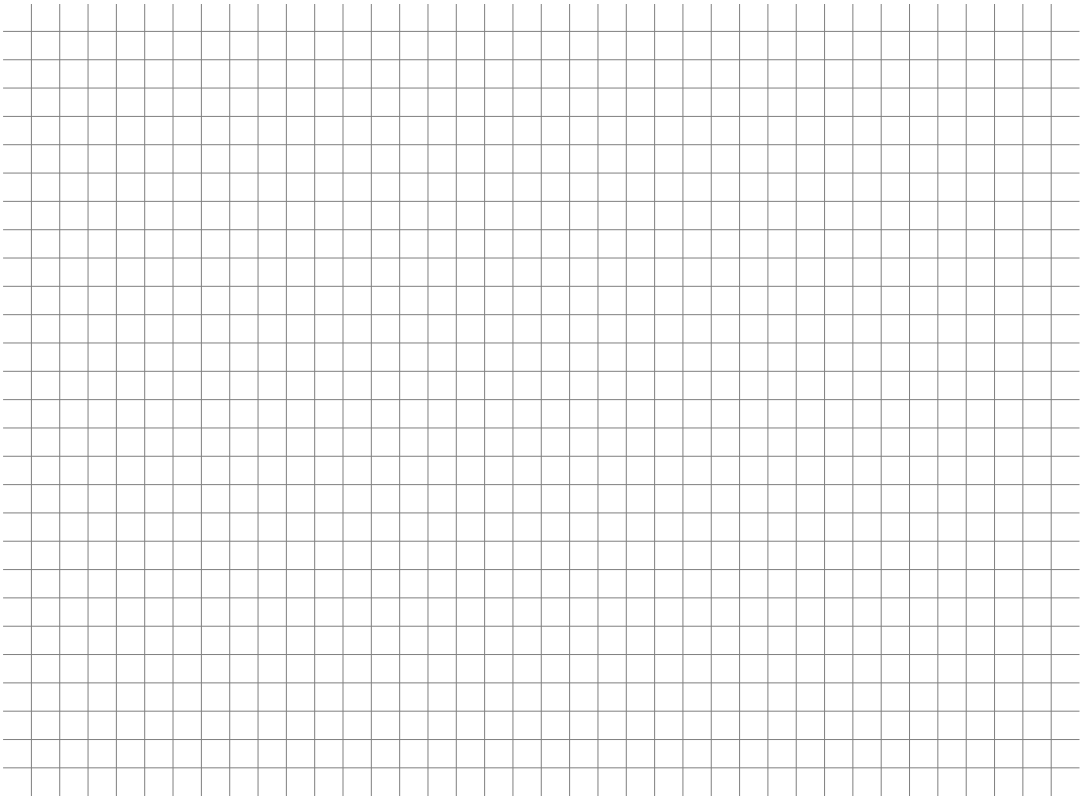
OR

Question 18 (II)

(a) The frequency table shows the result of a Physics exam in class IX. [a

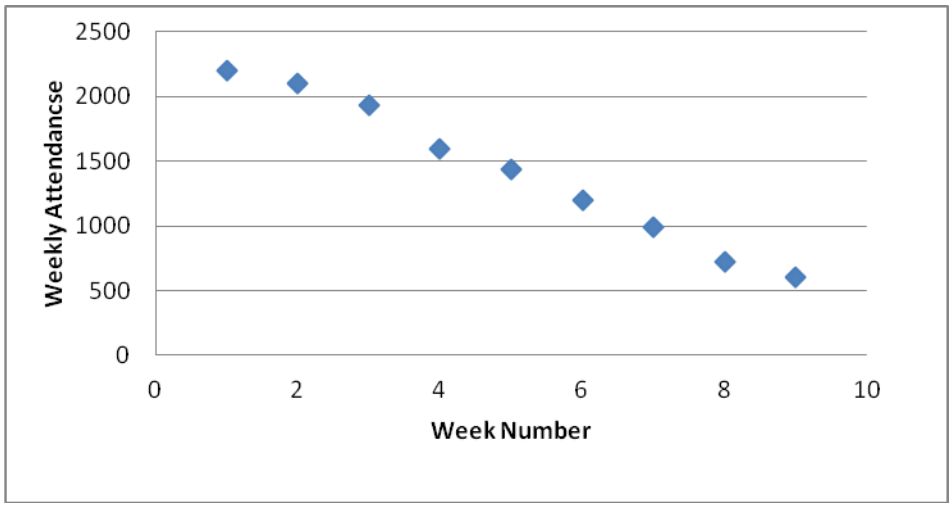
Score	Frequency
20-30	80
30-40	10
40-50	12
50-60	5
60-70	3
70-80	2

(i) Construct a histogram and a frequency polygon.



(ii) Identify the type of distribution.

(b) Karma created a scatter plot and drew the line of best fit as shown. [3]



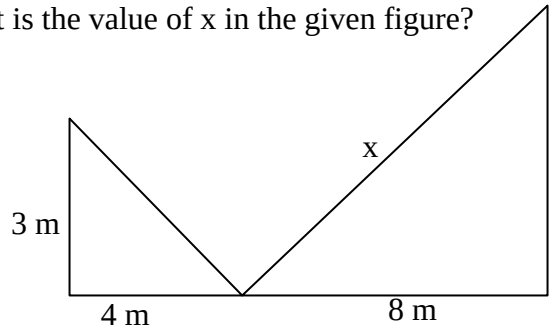
(i) What are the independent and dependent variables?

(ii) Explain why a line of best fit is not appropriate for this situation.

(iii) Estimate the correlation coefficient and describe the correlation linear close to -1,which is a strong negative linear correlation.

Question 19 (I)

(a) What is the value of x in the given figure?



(b) A boy of height 1.7m is standing 20m away from a flag pole on the same level ground. He observes that the angle of elevation of top of the flag pole is 24^0 . Calculate the height of the flag pole. **[3]**

OR

Question 19 (II)

(a) Choden walked 4 km at a bearing of 135^0 and 6 km at a bearing of 45^0. Draw a single vector to represent her two part trip. What are its bearing and distance? **[3]**

(b) Draw a diagram and show the necessary calculation to prove why $\tan 30^0 = \frac{1}{\sqrt{3}}$. **[3]**

Question 20 (I)

(a) Create 2-D shapes with **[3]**

i) Three lines of symmetry.

ii) Four lines of symmetry.

iii) Five lines of symmetry

(b) Construct Δ PQR where PQ=8cm,$< P=20^0$ and $<Q=60^0$ and locate the centroid. **[3]**

OR

Question 20 (II)

(a) Use the chart given below to answer the questions that follow:

No of sides in the prism's base	**No of planes of symmetry**
4	5
5	6
6	7
7	8

(i) Use what you noticed to develop a conjecture about the symmetry in a regular polygon based prism.

(ii) Use deductive reasoning to explain why your conjecture must be true.

(b) Determine the area of ΔABC where AB=4cm, AC=6cm and BC=5cm. **[3]**

ROUGH WORK

ROUGH WORK