གཞས་རིག་ལྷན་ཁག།

སྒྲིག་ཐང་འཛིང་རིམ་སློབ་གྲྭ་ཚོང་མ།

MOTITHANG HIGHER SECONDARY SCHOOL
THIMPHU THROMDE

"Every child is **inspired** to learn and **empowered** with **wisdom** to excel in life"

Trial Examination: 2019

X Mathematics **Writing Time: 3hour**
Date: **Full marks: 100**

Name: …… Class & Sec. …… Roll No.: ……

Invigilator's initial

	Sec A	Section B											Section C							
Question	Q1	Q 2	Q 3	Q 4	Q 5	Q 6	Q 7	Q 8	Q 9	Q 10	Q 11	Q 12	Q 13	Q 14	Q 15	Q 16	Q 17	Q 18	Q 19	Q 20
Marks	20	3	4	3	3	2	3	3	3	2	4	2	6	6	6	6	6	6	6	6
Award																				
Teacher's initial																				
Total marks awarded																				

READ THE FOLLOWING DIRECTIONS CAREFULLY:

1. **Do not** write for the first **fifteen minutes**. This time is to be spent reading the questions. After having read the questions, you will be given **three hours** to answer all the questions.

2. In this paper, there are **three sections**: A, B and C. Section A and B are compulsory. In section C, there are eight questions with part I and II, you must attempt either part I or II. The intended marks for each question is stated in the brackets.

3. Read the directions to each question carefully and write **all** your answer in the **answer script** provided to you.

4. Write **neatly** and **quickly**.

5. **Do not** leave the examination hall before you have made sure that you have answered all the questions according to the direction given above.

6. The use of calculator $(fx-82/\ fx100)$ is allowed without memory.

SECTION A (2x 10= 20 marks)

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

a) 2 X1 and 2X1
b) 2X2 and 2X1
c) 3X2 and 3X2
d) 2X3 and 2X3

2. The solution of the equation $(x + 3)(x - 9) = 0$ is

a) $x = -3,9$
b) $x = 3,9$
c) $x = -3, -9$
d) $x = 3, -9$

3. The 3-D shape is more efficient when it is more

a) Square
b) Spherical
c) Circular
d) Triangular

4. Dawa invested Nu.25000 in BOB shares with a face value of Nu. 100 but being sold at a premium of 50%. How many shares can he buy?

a) 166
b) 333
c) 167
d) 333.3

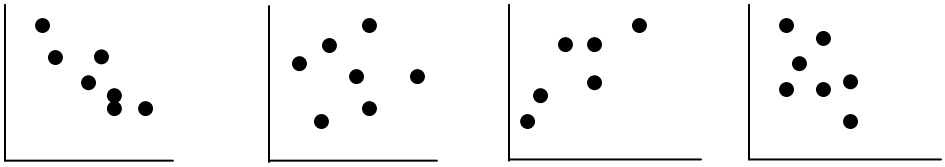
5. The equation of the parabola that would result from composite transformation of $(x, y) \rightarrow (x + 4, -3y + 6)$ to the graph of $y = x^2$ is

a) $y = 6(x - 4)^2 - 3$
b) $y = 3(x + 4)^2 - 6$
c) $y = -3(x - 4)^2 + 6$
d) $y = -6(x - 4)^2$

6. Two straight lines $y = 2x + 5$ & $y = 3x + 2$ intersects at

a) (3,0)
b) (3, 11)
c) (11, 3)
d) (6, 3)

7. The graph which shows strong negative correlation is



Graph I Graph II Graph III Graph IV

a) Graph I
b) Graph II
c) Graph III
d) Graph IV

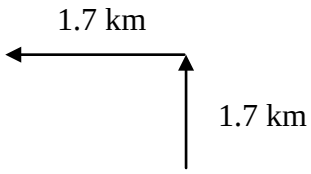
8. Which of the following is equivalent to Cos 30^o?

a) Cos (90 – 30)
b) Sin (90 -30)
c) Cos (90+30)
d) Sin (90 +30)

9. A box has 4 black tiles and 3 white tiles. What is the probability of drawing a white tile from the box on the second draw if the first tile drawn is black and you replace it.

a) $\frac{1}{7}$
c) $\frac{4}{7}$
b) $\frac{3}{7}$
d) 3

10. What is the bearing of the single vector for the trips on the right?



a) 50^0
b) 130^0
c) 230^0
d) 315^0

SECTION B (32 marks)

Answer ALL the questions

Question 2

Find the values of $x, y \; and \; z$ in the matrices. (3)

$$\begin{bmatrix} 1 & 2 & 3 & 0 \\ -1 & 3 & x & 1 \end{bmatrix} \begin{bmatrix} y & 3 \\ 1 & 2 \\ 0 & 1 \\ -1 & 0 \end{bmatrix} = \begin{bmatrix} 6 & 10 \\ z & 7 \end{bmatrix}$$

Question 3

a. Tashi invested Nu. 5000 in an account. After 4 years the amount had grown to Nu. 6802.4. What was the annual interest rate compounded annually? (2)

b. Simplify (2)

i. $\sqrt{80} \div \sqrt{45}$

ii. $\sqrt[3]{27x^5} \div \sqrt[3]{x^2}$

Question 4

Sketch the graph of inequality. Use the graph provided. (3)

$3x + 4y \geq 12$

Question 5

a) How many significant figures are there in each? (1)

i) 400 = ii) 0.003 =

b) Write a number for each. (1)

i) Less than 100 with 2SF =

ii) Greater than 1000 with 2 SF =

c) Round off each number as indicated. (1)

i) 16.962 to 3 SF =

ii) 922 to 1 SF

Question 6

Prove that $f(x) = 2x^2 + 4x - 6$ and $g(x) = 2(x - 1)(x + 3)$ are equivalent functions by taking at -least 3 values of x (2)

Question 7

The stem & leaf plot shows the number of days each member of a running club ran with the club in the month of May. (3)

Stem	Leaves
0	1 6 6 7 8 8 8
1	0 1 3 5 5 8 9
2	0 1
3	0

b) What is the 5 number summary? (2)

c) Construct a box & whisker plot for the above data (1)

Question 8

Sketch the graph for f(x) = 3(x-2) (x+2) **[use the graph paper provided]** (3)

Question 9

Is each pair of the correlation described below positively correlated, negatively correlated or not correlated? (3)

(i) Number of pages you write and the amount of ink left in your pen.

(ii) Distance you walked and the distance left for you to walk.

(iii) Amount of money in your pocket and the marks obtained in mathematics.

Question 10

Solve: $|3x + 2| - 3 = 0$ (2)

Question 11

a. Dawa is looking up at the top of the flag pole from 120 m away. His eyes are 165 cm above the ground level. The angle of elevation is 30^0. Calculate the height of the structure. (3)

b. What is the value of '*tan x*', if the value of '*sin x*' is 0.5? (1)

Question 12

Use algebra tiles to factor $3x^2 + 5x + 2$ (2)

SECTION C: (8 X 6=48 marks)

There are 8 questions. Each question has two parts, I and II. Attempt either I or II from each question. The intended marks for a question are given in the brackets.

Question 13: Set I

a. The coordinates of the three vertices of a shape are listed in this matrix. (3)

$$T = \begin{bmatrix} 6 & 12 & -2 \\ 0 & 5 & 3 \end{bmatrix}$$

i. Plot the points on a grid.

ii. Multiply the matrix by 2.

iii. Plot the new coordinates.

iv. What happened to the shape?

b.

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

i. Create a diagraphs for the above adjacency matrix. (1)

ii. Find one stopover trips between each pair of vertices using the adjacency matrix. (2)

Set II

a) If $A=\begin{bmatrix} 2 & 0 \\ 3 & -1 \end{bmatrix}$, $B=\begin{bmatrix} 5 & 2 \\ 0 & 0 \end{bmatrix}$ and $C=\begin{bmatrix} 1 & 2 \\ 4 & 5 \end{bmatrix}$, then find (3)

i. $2A+3B$

ii. A(B+C)

b) Simplify (3)

i. $\frac{1}{2}\begin{bmatrix} 2 & 0 & -4 \\ 8 & 2 & -2 \\ -6 & 2 & 8 \end{bmatrix} + \begin{bmatrix} 0 & 1 & 2 \\ 2 & -1 & 0 \\ 1 & -3 & 5 \end{bmatrix}$

ii. $\begin{bmatrix} 2 & 4 & 0 \\ 4 & 8 & 2 \end{bmatrix} + \begin{bmatrix} 10 & 8 & 0.5 \\ -2 & 0 & -4 \end{bmatrix}$

iii. $-4\begin{bmatrix} 2 & -1 & 9 \\ -5 & 8 & 0 \end{bmatrix}$

Question 14: Set I

a. You invest Nu.2000 in each account

Account A: 8% p.a simple interest

Account B: 6% p.a compounded annually

How much interest will you earn in each account by the end of one year? (3)

b. Which interest rate compounded monthly is equivalent to 11.5 % p.a compounded annually? (3)

Set II

a. Simplify. (3)

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

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

b. Sonam buys a stock at a discount of 25%. Each share has a face value of Nu. 100. (3)

i. How many shares can she buy with Nu 25000?

ii. If the company pays a dividend of 17% at the end of the 1st year, what dividend amount will she earn?

iii. What will be her yield percentage?

Question 15: Set I

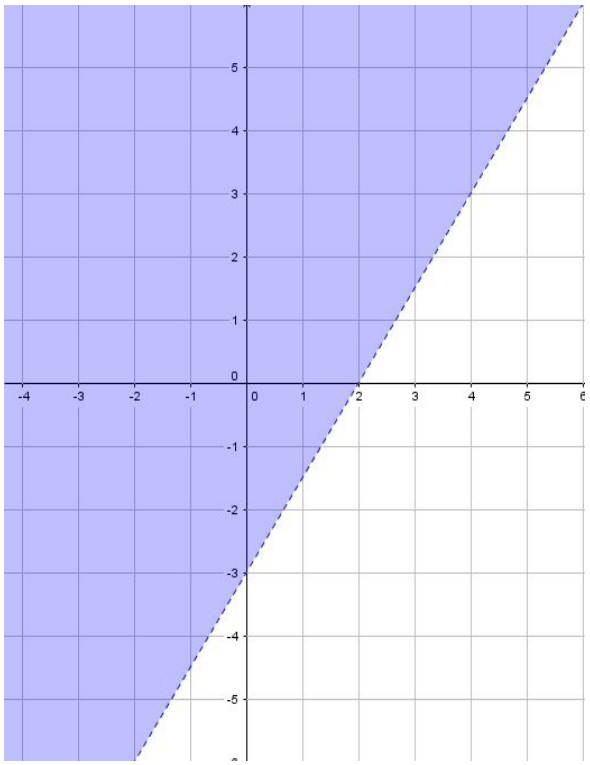
a. Rewrite $3x - 2y = 8$ in slope & y intercept form and graph the line. Use the graph provided (3)

b. Solve system of equations.

$$x + 6y = 35 \; and \; 5x - 10 = 3y$$ (3)

Set II

a. Write an inequality for the graph below. (3)



b. The perimeter of one rectangle is 120 cm. Another rectangle with twice the length & one third the width has a perimeter of 170 cm. What are the dimensions of the two rectangles? (3)

Question 16: Set I

a. Determine the height of a solid cylinder whose radius is 12 cm and total surface area is $2714cm^2$. (3)

b. Determine the volume and total surface area of a prism with a base of 6 cm X 6 cm & a height of 16 cm. (3)

Set II

a. The area of a circle is 154 cm^2. Calculate the circumference of a circle. (2)

b. A closed rectangular box 40 cm long, 30 cm wide and 25cm deep has the same volume as that of cylindrical tin of radius 17.5 cm. Calculate the height of the cylindrical tin correct to one decimal place. (2)

c. The perimeter of a circle & square is 132 cm. Find their areas and which has larger area. (2)

Question 17: Set I

a. Describe geometric transformations inborder that applied to $f(x) = x^2$ to result in each function? (3)

i. $f(x) = 3(x-2)^2 - 30$

ii. $f(x) = 8 - 0.1x^2$

b. Solve each: (3)

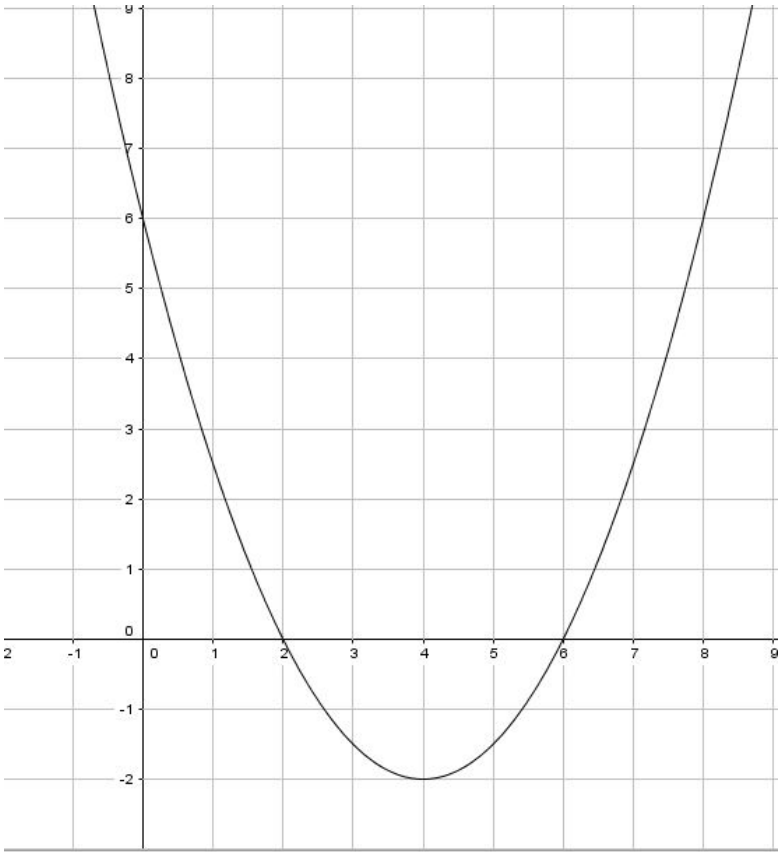
i. $|3x - 2| = 6$

ii. $|3x + 1| + 4 = 10$

Set II

a. The hypotenuse of a right triangle is 18 units longer than the shorter leg of the triangle. The longer leg is 3 units longer than the triple the length of the shorter leg. How long is the hypotenuse? (3)

a. Create the equation of the graph below? (3)



Question 18: Set I

This frequency table shows the lifespan in hours of 400 light bulbs that were tested at a light bulb manufacturing company. (3)

Lifespan (Hours)	Frequency(number of light bulbs)
300 – 400	20
400 – 500	40
500 – 600	56
600 – 700	75
700 - 800	78
800 - 900	55
900 – 1000	50
1000 – 1100	18
1100- 1200	8

a. Construct a histogram and identify the type of distribution. (3)

b. Estimate the mean, median and mode. (3)

Set II

This table shows the age of a sample of people & how many hours each person engages in physical activity each week. (6)

Age	Hours of activity	Age	Hours of activity
20	15	22	11
30	7	30	6
34	6	26	14
26	8.5	18	16
36	3	36	6
28	11	30	9
40	3	35	4

a) Identify the independent & dependent variable. Explain how you know.

b) Create a scatter plot of the data. [use the grid paper provided].
c) What type of correlation is shown?

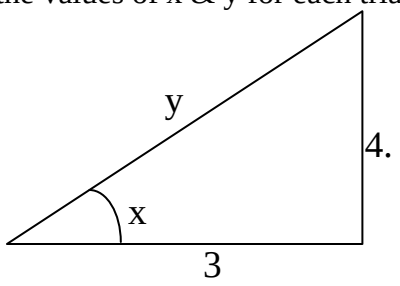
c) Estimate the value of the correlation coefficient.

d) Is line of best fit appropriate? Explain

e) Estimate the number of hours of weekly physical activity a 25 year old person engages in.

Question 19: Set I

a. Determine the values of x & y for each triangle. (2)



b. Dema is looking down at a car from the top of a cliff. The angle of depression is 30^{o}. If the cliff is 60m height, how far is the car from the base? (Draw the diagram & Solve) (3)

c. Draw a vector to represent each bearing $145°$. (1)

Set II

a. If the sine ratio of an angle is 0.5, answer the following questions (2)

i. What is the value of the angle?

ii. What would be its cosine & cotangent values?

b. Determine the acute angle for which is true (2)

$\sec x = 2$

c. Fill in each blank with an acute angle (2)

i. Cos ____ = 0.45

iii. tan … … = $\frac{sin35^0}{\cos 35^0}$

ii. Sin ____ = 0.15

iv. Cos _____ = sin 37°

Question 20: Set I

a) Dorji randomly chooses a number card froms numbered 1 to 100 (3)

Event A: The number is even

Event B: The number is a multiple of 5

What is the probability of each of the following?

Event A happening

Event B happening

Event A and B both happening

b) You withdraw Nu 2000 in Nu 20 and Nu 50 notes from the bank (3)

i) Write an equation to model this situation

ii) Write a function that tells the number of Nu 20 notes if you know the number of Nu 50 notes.

Set II

a) Solve the given system of linear equation (3)

$\frac{1}{2}x + \frac{1}{3}y = 9$ and $\frac{3}{5}x - \frac{3}{4}y = -3$

b) Tshewang walked 3km at a bearing of 135° and 4km at a bearing of 45°. Represent his two-parttrip as a single vector. What is its bearing and distance? (3)