



ཤེས་རིག་ལྟན་ལགས།
 ལུ་ཏིག་ཐང་འབྲིང་རིམ་སློབ་གྲྭ་གོང་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
Date:

Writing Time: 3hours
Full marks: 100

Name: Class & Sec. Roll No.:

Invigilator's initial

	Sec A	Section B										Section C							
Question	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19
Marks	20	3	3	3	4	3	4	3	3	3	3	6	6	6	6	6	6	6	6
Award																			
Teacher's initial																			
Total marks awarded																			

READ THE FOLLOWING DIRECTIONS CAREFULLY:

- 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.
- 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.
- Read the directions to each question carefully and write **all** your answer in the **answer script** provided to you.
- Write **neatly** and **quickly**.
- Do not** leave the examination hall before you have made sure that you have answered all the questions according to the direction given above.
- The use of calculator ($fx-82 / fx100$) is allowed without memory.

SECTION A (2 x 10 = 20 Marks)

Attempt ALL the questions.

Question 1

a) Identify the column matrix from the following matrices:

A. $\begin{bmatrix} 4 & 3 & 7 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 4 \\ 6 & 8 \end{bmatrix}$

C. $\begin{bmatrix} 4 & 8 \\ 3 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 3 \\ 6 \\ 7 \end{bmatrix}$

Ans :.....

b) Which of the following pairs of matrices can be multiplied?

A. 3×3 and 3×2

B. 2×1 and 2×1

C. 3×1 and 2×3

D. 2×4 and 2×3

Ans :.....

c) The amount received in an investment of Nu 6000 for two years at an interest of 5% p.a. compounded semi-annually is:

A. Nu 6500

B. Nu 6623

C. Nu 6288

D. Nu 6262

Ans :.....

d) 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. $\{(a,b), (a,c), (b,a), (c,c)\}$

Ans :.....

e) The total surface area of a square based prism is 96cm^2 . What is the height of the prism if the base is $4\text{cm} \times 4\text{cm}$.

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

Ans :

f) The solution of the equation $(x - 4)(x + 2) = 0$ is

- A. $(4, -2)$
- B. $(4, 2)$
- C. $(-4, -2)$
- D. $(-4, 2)$

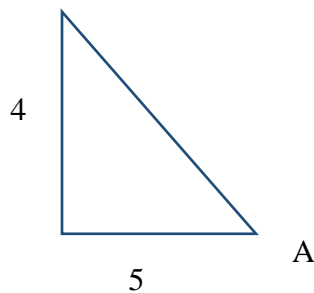
Ans :

g) Which of the following is an independent event?

- A. Drawing a black tile and do not replace it.
- B. Rolling a 6 consecutively two times when you roll a die.
- C. Drawing an ace from a deck of cards and do not replace it.
- D. Drawing a white tile from a bag containing black and white tiles without replacing it.

Ans :

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



- A. 36.86°
- B. 51.34°
- C. 53.13°
- D. 38.65°

Ans :

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

- A. 5
- B. 6
- C. 7
- D. 8

Ans :.....

j) Which one of these given shapes with same area would have shortest perimeter?

A.



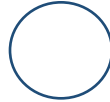
B.



C.



D.



Ans :.....

Section: B (32 Marks)
Attempt ALL the questions.

Question 2

a) Numbers of buses plying between three towns are given below. Create a digraph to represent the information. (2 marks)

- 2 buses from Thimphu to Paro.
- 6 buses from Thimphu to Phuntsholing.
- 1 bus from Phuntsholing to Paro.
- 2 buses from Thimphu to Phuntsholing.
- 1 bus from Phuntsholing to Punakha.
- 1 bus from Paro to Punakha.

b) Create an adjacency matrix for the digraph above. (2 marks)

Question 3

Dendup earned a dividend of amount of Nu1050 from 50 shares of a stock with a face value of Nu 100.

a. What was the dividend rate? (1 mark)

b. How much more would he have earned if the rate had been 7 % higher? (2 marks)

Question 4

Sketch the graph of $y \leq -\frac{2}{3}x - 1$

Question 5

a) Determine the total surface area of a sphere with the diameter of 32cm. (2 marks)

b) Calculate the height of a cylinder of radius 12cm with the same total surface area of the sphere. (2 marks)

Question 6

What are the coordinates of the vertex of the function given below? (3 marks)

$$f(x) = -\frac{1}{2}(x-2)(x+4)$$

Question 7

The following are the number of rice bags sold by 21 shops in Thimphu in a month.

71 63 99 90 92 49 80

40 97 92 94 56 70 39

99 83 84 50 53 41 68

a) Use the data to find 5 number summary. (2 marks)

b) Construct a box and whisker plot of the data. (2 marks)

Question 8

Pema stood 13.2m from a prayer flag pole and looked up to the top of the pole at an angle of 50° . If Pema's eyes were 1.6m above the ground, what would be the height of the flag pole? (3 marks)

Question 9

Construct the incircle of $\triangle ABC$, where $AB=4.7\text{cm}$, $BC=6.6\text{cm}$ and $AC=7.5\text{cm}$. (3 marks)

Question 10

Determine the point of intersection for the given system of linear equations. (3 marks)

$$2x + 6y = 26 \quad \text{and} \quad 3y + 8x = -1$$

Question 11

A bag contains four white marbles and six black marbles. Sonam drew one marble. What is the probability of drawing the marble of each colour for the second draw?

- a) A white marble, if the first marble drawn was white and was put back in the bag before the second draw. (1 mark)

- b) A white marble, if the first marble drawn was black and was not put back in the bag.(1 mark)

- c) A black marble, if the first marble drawn was black and was not put back in the bag. (1 mark)

Section C (8 x 6 marks=48 marks)
Choose either part I or II from each question.

Question 12 I

- a) Matrix A shows the number of girls and matrix B shows the number of boys of three different schools with respect to their classes.

$$\begin{array}{c}
 \begin{array}{cccc}
 & \text{I} & \text{II} & \text{III} & \text{IV} \\
 \begin{array}{c} \\ \\ \\ \end{array} & \begin{array}{c} 25 \\ 15 \\ 18 \end{array} & \begin{array}{c} 12 \\ 17 \\ 16 \end{array} & \begin{array}{c} 16 \\ 15 \\ 10 \end{array} & \begin{array}{c} 10 \\ 14 \\ 10 \end{array} \\
 A = & & & &
 \end{array}
 \end{array}
 \quad
 \begin{array}{c}
 \begin{array}{cccc}
 & \text{I} & \text{II} & \text{III} & \text{IV} \\
 \begin{array}{c} \\ \\ \\ \end{array} & \begin{array}{c} 23 \\ 13 \\ 22 \end{array} & \begin{array}{c} 18 \\ 18 \\ 20 \end{array} & \begin{array}{c} 14 \\ 15 \\ 12 \end{array} & \begin{array}{c} 12 \\ 16 \\ 16 \end{array} \\
 B = & & & &
 \end{array}
 \end{array}$$

- i. Calculate A+B. What do the elements in the resulting matrix represent? (2 marks)

- ii. Calculate A-B. Interpret from the resulting matrix, the number of students in class II of KPS. (2 marks)

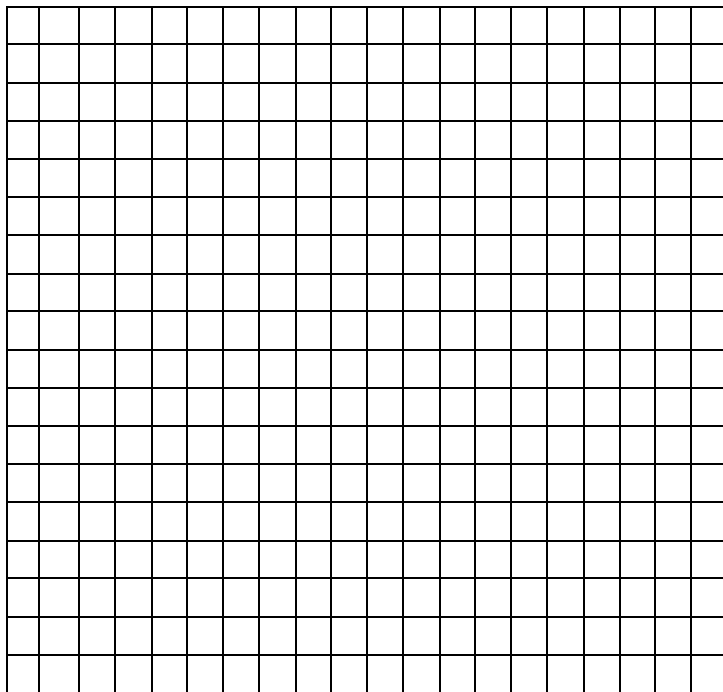
- b) Create the digraph for the given adjacency matrix. (2 marks)

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

Question 12 II

- a) i) Draw the shape on the grid for matrix B describing the shape of a quadrilateral. (2 marks)

$$B = \begin{bmatrix} 1 & 4 & 1 & 4 \\ 2 & 2 & 5 & 5 \end{bmatrix}$$



- ii) If $A = \begin{bmatrix} -1 & 0 \\ 0 & -1 \end{bmatrix}$, plot the coordinates of $A \times B$ on the same grid. Then, explain the change in the same. (3 marks)

b) How many axes of rotation are there in a cube? (1 mark)

Question 13 I

Your father is purchasing a compound bow for Nu 60,000 and he is offered two payment options.

Option A: Pay Nu 4000 at the end of each month for 18 months. No down payment is required.

Option B: Pay 40% as down payment and then pay Nu 15,000 every six months until the full amount is paid. The interest charged on any outstanding balance after each payment is 20% p.a. compounded semi-annually.

a) Which option would you recommend to your father? Why? Show your work. (4 marks)

b) What will be the annual interest rate compounded annually for investing Nu 2500 that can generate Nu 2903.91 in four years? (2 marks)

Question 13 II

a) Yuden invest Nu 2200 in buying shares of face value Nu 100 and selling at 10% premium. The dividend on the shares is 20% p.a.

i) Calculate the number of shares she buys?(1 marks)

ii) Calculate the dividend she receives annually. (1 marks)

iii) Calculate the yield percent.(1 marks)

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

Question 14 I

- a) Yewong withdraws Nu5000 in Nu 100 and Nu 500 notes from Tashi Bank. (3 marks)

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.

b) Determine the point of intersection for the following pair of lines. (3 Marks)

$$\frac{3}{4}x - \frac{2}{3}y = 3 \quad \text{and} \quad \frac{1}{2}x - \frac{1}{3}y = 3$$

Question 14 II

a) Without graphing, find the point of intersection for the system of equation. (3 marks)

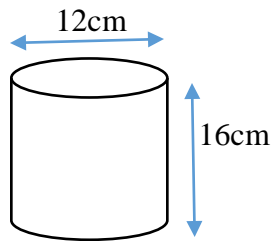
$$-2x + 7y = 4$$

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

- b) The sum of two numbers is 7. The difference of five times the first number and 3 times the second number is 3. Find the two numbers. (3 marks)

Question 15 I

- a) i) Find the total surface area of the cylinder given below. (2 marks)

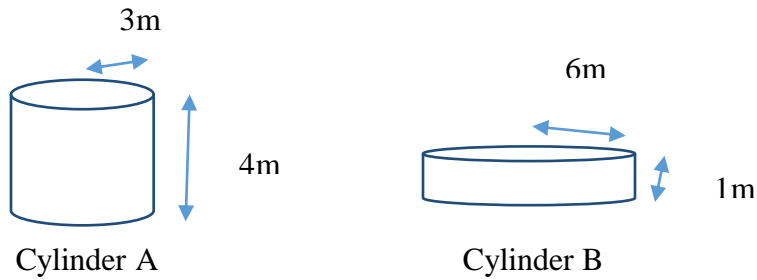


- ii) Determine the radius of a sphere with the same total surface area? (2 marks)

- b) Transform the linear equation $3x - 4y = 8$ to slope and y-intercept form. (2 marks)

Question 15 II

- a) The following two cylinders have the same volume, but different TSA.



- i) Find the TSA of two cylinders (3 marks)

- ii) Which one is more efficient? Why? (1)

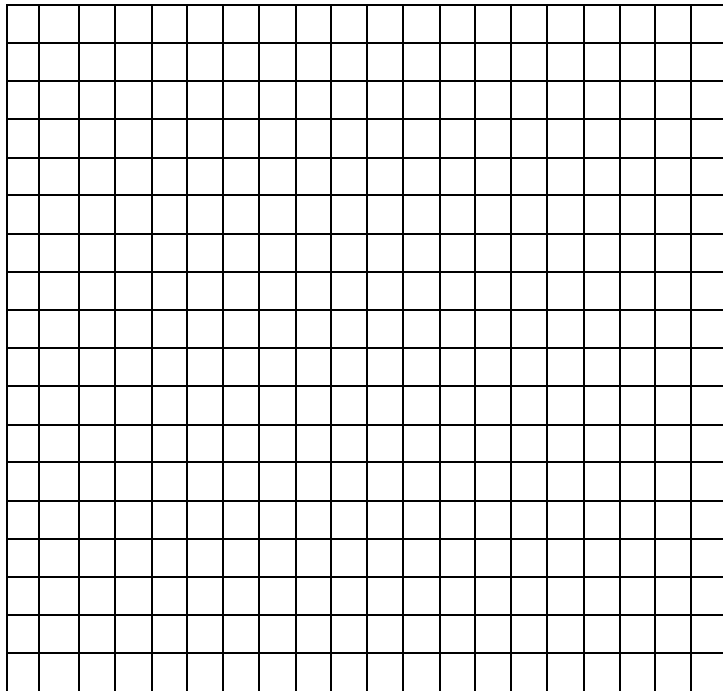
- b) How many lines of symmetry does each regular polygon have? (2 mark)

- i) Decagon

- ii) Hexagon

Question 16 I

- a) Sketch the graph of the function $f(x) = 2(x - 3)(x + 5)$ and estimate the coordinates of the vertex. (3 marks)



- b) What geometric transformation should be applied to $f(x) = x^2$ to result in the function $f(x) = -2(x + 3)^2 - 4$? (3 marks)

Question 16 II

- a) The orange orchard of Pema is of rectangular shape with the length 40m more than twice the breadth. Find the length and the breadth of the orchard if the area is 4800m^2 . (3 marks)

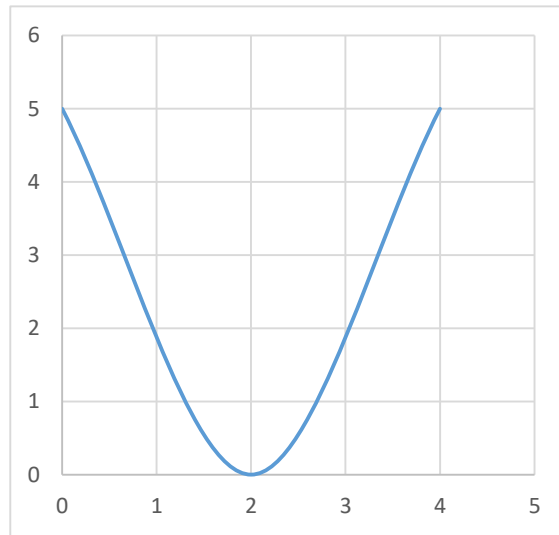
- b) For the quadratic function, $f(x) = (2x - 5)(3x + 3)$ (3 marks)

i) Find the x-intercepts.

ii) Write the coordinates of the vertex.

Question 17 I

a) Determine the equation of the parabola. (3 Marks)



b) Use the stem and leaf plot to answer the questions below. (3 marks)

Speed of vehicles in km/h

Stem	Leaves
5	0 5 5 7 7 7 9 9 9 9 9
6	2 3 3 4 4 6 6 6 8 8 9 9 9 9 9
7	0 1 1 1 1 4 6 8 8 8 9

i) How many vehicles had their speeds measured?

ii) If the maximum speed limit was 60 km/h, how many vehicles were exceeding the limits?

iii) What was the range of the speed?

Question 17 II

a) The stem and leaf plot shows the number of days each member of a dance club employed with the club in December. (3 marks)

No. of days danced

stem	Leaves
0	2 4 4 5 6 7 7
1	0 1 3 5
2	0 2 3
3	0
4	1 4

i) Construct a histogram for the above data.

ii) Construct a box and plot above the histogram.

- b) Dema randomly chooses an integer from 1 to 50.
Event A: The integer is an even number.
Event B : The integer is a multiple of 6.
What is the probability of each? (3 marks)

- i) Event A happening.
- ii) Event B happening.
- iii) Events A and B both happening.

Question 18 I

- a) The following table shows the weights in grams of a sample of 100 potatoes taken from a large consignment. (4 marks)

Weight in grams	50-60	60-70	70-80	80-90	90-100	100-110	110-120	120-130
Frequency	8	10	12	16	18	14	12	10

- i) Draw a histogram for the above information.

ii) Make two conclusions based on the above data.

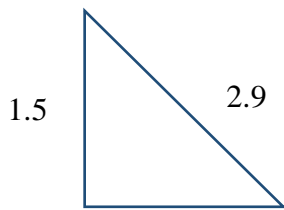
b) Complete each with an acute angle. (2 marks)

i) $\sin 20^\circ = \cos \dots\dots\dots$

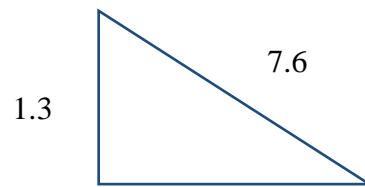
ii) $\sin \dots\dots\dots = 0.71$

Question 18 II

a) In each of the triangle given below, order the following ratios from the greatest to the least: $\sin A$, $\cos A$ and $\tan A$. (3 marks)



2.5
Triangle 1



7.5
Triangle 2

- b) Sonam stood 12.0 m from a prayer flag pole and looked up to the top of the pole at an angle of 40° . Sonam's eyes are 1.5m above the ground. How tall is the pole? (3 marks)

Question 19 I

- a) Calculate the area of regular hexagon with a side length of 60 cm. (3 marks)

- b) Without using a ruler/protractor, construct $\triangle ABC$ with $AB = \frac{3}{4}BC$ and $\angle ABC = 60^\circ$ (3 Marks)

Question 19 II

- a) Construct the circumcircle of $\triangle DEF$ with $DF = 3.6$ cm, $ED = 5.8$ cm and $\angle D = 65^\circ$. (3 marks)

- b) Construct $\triangle PQR$ where $PQ = 8$ cm, $\angle P = 20^\circ$ and $\angle Q = 60^\circ$ and locate the centroid. (3 marks)

ALL THE BEST