

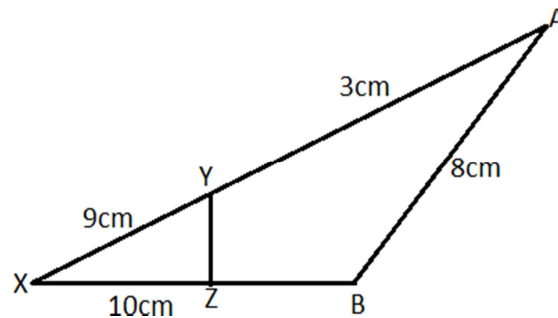
- (i) The number of students take both subjects.
 - (ii) The number of students take neither Geography nor Commerce.
- (b) A box contains 4 white and 6 black balls. Two balls are drawn one after the other without replacement.
- (i) What is the probability that both balls are white?
 - (ii) What is the probability that the first ball is white and the second is black?

4. (a) Prove that the two lines $3x - 7y = 12$ and $14x + 6y = -5$ are perpendicular to each other.

(b) The distance between the points $(-3, 5)$ and $(x, 2)$ is 5. Calculate x.

5. (a) A regular hexagon is inscribed in circle, if the perimeter of hexagon is 42 cm, find the radius of the circle

(b) Prove that $\triangle XYZ \sim \triangle XBA$, hence calculate the length of ZB



6. (a) If 10 people can cultivate a farm for 2 days in 3 hours, how many people will cultivate the same farm for 1 day and 2 hours?

(b) Mr. Japhet Mduma from USA wishes to exchange USD 10,000 into Tanzanian shillings. How much will he get if $1\text{USD} = 2,700\text{ Tsh}$?

7. (a) Given the data on Trading, Profit and Loss Account as follows

Opening stock 1.1.2020	44,430 Tsh.
Closing stock on 31.12.2020	36,372 Tsh.
Net purchasing during 2020	322,290 Tsh
Gross profit mark up	50%
Expenses for the year	46,880 Tsh

Use the above transaction data to find the following

- i. Average stock
- ii. Cost of goods sold
- iii. Sales

(b) Three students shared 1,125,000 Tsh in the ratio of $x : 5 : 7$. Calculate x if the first student got 225,000 Tsh.

8. (a). Write down the first four terms of a sequence whose general term is $(2n - 1)$. Briefly explain whether it is an Arithmetic Progression or Geometric Progression.

(b) The 7th and 9th terms of G.P are 729 and 6561 respectively. Find the two possible values for the common ratio and for the first term

9. (a) A girl bikes 24km due North from point A and then bikes 25 km due East to point P. What is the shortest distance from point A to P?

(b) A bird is perched on the top of a tree 20 m high and its elevation from a point on the ground is 45° . It flies off horizontally straight away from the observer and in one second the elevation of the bird is reduced to 30° . Find its speed.

10. (a) One number is twice another number. If the sum of their reciprocal is three-tenth, what are the numbers?

(b) Solve for x : $9^{x+1} + 3^{2x+1} = 36$

SECTION B (40 Marks)

11. (a) The mass in kilogram of 40 athletes was recorded as shown in the following table

Mass (kg)	10 - 25	25 - 40	40 - 55	55 - 70	70 - 85	85-100
Frequency	2	3	7	6	6	6

Find

i. The mode and

ii. The mean

(b) Convert 120 degrees into radians

12.(a) P and Q are two points on the earth's surface with coordinates $(27^\circ\text{N}, 30^\circ\text{W})$ and $(39^\circ\text{N}, 30^\circ\text{W})$ respectively.

i. Calculate the distance between P and Q

ii. Calculate the distance PQ to the nearest kilometers, use $1\text{nm}=1.852\text{k}$

(b) Calculate the circumference of a small circle, in kilometers, along the parallel of latitude 30°N (Leave your answer in surd form)

13.(a) IF a matrix A is singular, what will be the value of y given that

$$A = \begin{pmatrix} 3 & y - 1 \\ y + 1 & 1 \end{pmatrix}$$

(b). Solve the following simultaneous equation by matrix method

$$\begin{cases} 2x + y = 7 \\ 4x + 3y = 17 \end{cases}$$

(c) A point P (2,3) is rotated 90° anticlockwise about the origin. Find the image of P

14. (a) i. Draw the graph of $f(x) = x^2 - x - 6$ and hence use it to solve the equation $x^2 - x - 12 = 0$

ii. Express the function $f(x) = -5x^2 + 9x - 7$ in the form of

$$f(x) = -a(x + b)^2 + c$$

hence use the result to identify the turning points.

(b) Given that $R = \{(x, y): y > -2x + 1\}$. Draw the graph of the relation and state the domain and range of R.