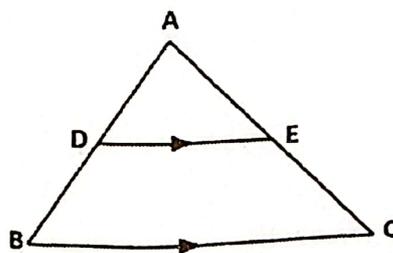


SECTION A (60 MARKS)

1. (a) Three bells ring at intervals of 20 minutes, 30 minutes and 40 minutes. If they ring together at 7:30 am.
 - (i) After how long will they all ring together again?
 - (ii) At what time will this be?
- (b) Given that $\frac{m}{n} = 0.\dot{3}2\dot{7}$, where m and n are integers, and $n \neq 0$. Find the value of the following. (i) m and n (ii) $m + n$
2. (a) Given that $2^{2-y} \cdot 5^{3x-4} - 25 = 3100$, Evaluate the value of
 - (i) x and y
 - (ii) Use the above values in part (i) if $T = \frac{2}{5}(2y^2 - x)$
- (b) Show the truth of this statement that, the quotient of two logarithms of the same base, is equal to their difference.
3. (a) Every woman in a certain club, owns a land rover or a bicycle. If 23 women own land rovers, 14 own bicycles and 5 own both a land rovers and bicycle. Use formula of sets or otherwise, find the number of women in the club.
- (b) The probability that Halaand plays football is 0.75 and the probability that he score the goal is 0.32. Find the probability that Halaand
 - (i) Play football and he does not score the goal.
 - (ii) Does not play and score the goal.
4. (a) Given three vectors, $\underline{u} = 3\underline{i} + 4\underline{j}$, $\underline{v} = -2\underline{i} + 3\underline{j}$ and $\underline{w} = 4\underline{j} - 5\underline{i}$. Find
 - (i) $\underline{d} = 2\underline{v} - 3\underline{w} + \underline{u}$. (ii) $|\underline{d}|$
- (b) Find the equation of the perpendicular bisector of the points A (4, 8) and B(-4, -6), give your answer in form of $\frac{x}{a} + \frac{y}{b} = 1$
5. (a) In the figure, $\overline{DE} \parallel \overline{BC}$ and $\overline{AE} = 2\text{cm}$, $\overline{EC} = 3\text{cm}$. If the area of $DBCE = 21\text{cm}^2$. Find the area of $\triangle ABC$



- (b) Find the perimeter of a regular hexagon (6 sided-polygons) inscribed in a circle having a radius of 4cm.
6. (a) Pieces of length 2.30m, 1.8m, 2.37m and 0.95m are cut off from a rope of 13.5m long. Then the remaining part is divided into equal pieces each of length 16cm. How many pieces are there?

- (b) The compression l of a spring is directly proportional to the thrust, T exerted on it. If the thrust of $2N$ produces a compression of $0.4cm$, Find (i) the compression when the thrust is $5N$ (ii) the thrust when the compression is $0.5cm$.
7. (a) Mzee ndiyo paid $2,000$ to a bodaboda who transport 10 carton of water and each carton was bought for $2,000$ Tshs. After few days he then sell each carton for $2,500$ Tshs. Find the percentage profit/loss that he got.
- (b) From the following data, prepare a trading account of Mr. JB for the year ended 31^{st} December 2022 to find the gross profit or gross loss.
- Sales for the year were Tshs. $3,550$ Stock at close was 750 for year 2022
Purchases for the year was Tshs. $2,000$ Stock at start was Tshs. 500
8. (a) Madam Mwanaisha has $322,000$ Tshs. in the bank, the first month she takes out $10,000$ Tshs. The second month she takes out $12,000$ Tshs. And so on. The amount she take out increasing by $2,000$ Tshs each month. Find when will there be no money left?
- (b) Shomari invested a certain amount of money in a saving Bank account whose interest rate was 10% compounded annually. After two years he got $5,000$ Tshs.
- (i) How much did he invest at the first start?
(ii) How much did he receive as an interest at the end of the two years?
9. (a) Two pegs, P and Q are on the level ground. Both pegs lie due west of a flag post. The angle of elevation of the top of the flag post from P is 45° and from Q is 60° . If P is $24cm$ from the foot of the flag post, find \overline{PQ}
- (b) A rectangular field of $80m$ long is to be fenced with a wire. If the diagonal of the field is $100m$ long. Find (i) Width of the field. (ii) Length of the wire needed to fence the field.
10. (a) A house girl was employed under condition that, she would be paid Tshs. $6,350$ for the days that she went to work and $2,750$ Tshs for the days that she didn't go to work. At the end of the month of 30 days she was paid $176,100$ Tshs. Find the number of days that she went to work.
- (b) A piece of wire $56cm$ long is bent to form a rectangle of $171cm^2$. What will be the dimensions of the rectangle? (Use completing the square method)

SECTION B (40 MARKS)

Answer all Questions

11. (a) (i) Differentiate between a diameter and a chord as used in circles.
(ii) Two chords \overline{PQ} and \overline{RS} of a circle of radius 13 cm are equal and parallel. If each chord is 24 cm long, find the distance between them.

(b) The following table shows the scores of 40 students in Basic Mathematics test.

Scores	35 – 45	45 – 55	55 – 65	65 – 75	75 – 85	85 – 95
Frequency	3	4	6	8	12	7

Calculate measures of central tendency that is (Mean, Median and Mode Scores)

12. (a) Draw a right angled rectangular pyramid and label it as $VABCD$ having a base $ABCD$, Vertex V and Centre of base P . If $\overline{AB} = \overline{CD} = 8\text{ cm}$, $\overline{AD} = \overline{BC} = 6\text{ cm}$ and $\overline{VA} = \overline{VB} = \overline{VC} = \overline{VD} = 13\text{ cm}$.

- (i) Calculate the angle between \overline{VB} and the base $ABCD$
(ii) The angle between triangle VBC and the base $ABCD$
(iii) The volume of rectangular pyramid $VABCD$

(b) (i) Briefly give the meaning of the terms Nautical mile and Knot as used in the Earth as a Sphere.

(ii) A ship starts at $A(40^\circ\text{S}, 30^\circ\text{W})$ and sails due West for 1000 km . Find its new latitude and longitude

13. (a) If the Matrix A has no inverse, what will be the value(s) of t , given that

$$A = \begin{bmatrix} 1 & t-1 \\ 1+t & 3 \end{bmatrix}$$

(b) By using matrix method, solve the simultaneous equations $\begin{cases} 2x = 7 - y \\ 3y - 17 = -4x \end{cases}$

(c) Find the image of $(-3, 5)$ after rotation of 270° about the origin in anticlockwise direction followed by a reflection in the line $y = 0$

14. (a) If $R(x) = \left\{ (x, y) : y = \frac{2}{x-3} \right\}$ find

(i) $R(4)$

(ii) What value of x will make $R(x)$ not defined/not exist?

(b) Given that $T(x) = \begin{cases} x+2 & \text{if } 2 \geq x \\ 4 & \text{if } 2 < x \leq 6 \end{cases}$, draw the graph of $T(x)$ and hence state domain and range

(c) A shopkeeper buys two types of sugar white and brown sugar. The white sugar is sold at $40,000$ per bag and brown sugar is sold at $60,000$ per bag. He has Tshs. $1,500,000$ available and decides to buy at least 30 altogether. He has also decides that at most one third of 99 bags should be white sugar. He buys x bags of white sugar and y bags of brown sugar.

(i) Write down inequalities which summarize the information above,

(ii) Represent these inequalities graphically.