

FORM FOUR MATH'S' PROGRAM

041 BASIC MATHEMATICS

3 Hours

Tuesday June 16, 2025

SECTION A (60%) Marks)

- 1 (a) Express $0.08\dot{3} + 0.1\dot{6}$ in the form of $\frac{a}{b}$
 (b) Evaluate $51 \div 3 + 20\% \text{ of } (43 + 7) \times 3 - 7$
- 2 (a) Given $\log_4 t = 12$, find $\log_2 \left(\frac{t}{4} \right)$
 (b) Rationalize the denominator $\frac{2 + \sqrt{2}}{1 - \sqrt{2}}$
- 3 (a) P and Q are finite sets such that $n(P \cap Q) = 12$, $n(P \cup Q) = 25$ and $n(P \cap Q) = 7$,
 without using Venn diagram, find $n(Q)$
 (b) Ten cards are numbered 1, 2, 3.....10. Three cards chosen without replacement. What is the probability that only one of the cards has even number on it?
- 4 (a) Given a vector $a = 6i - 2j$, $b = 2i + j$ and $c = 3i - 5j$, find
 (i) $|2a + b - 3c|$
 (ii) Scalar t and k if $ta + kb = 4i - 3j$
 (b) Find the coordinates of the foot of perpendicular from $(-2, 5)$ to the line
 $3x + y + 11 = 0$
- 5 (a) The area of triangle is 61.56 cm^2 if the two adjacent sides of triangle are 24 cm and 15 cm respectively. Find the included angle

- (b) Prove that an exterior angle of a triangle is equal to the sum of the measures of the two non-adjacent interior angles of the triangle.
- 6 (a) y Varies directly as the square of x and inversely as z . If x increased by 10% and z decreased by 20%, find the percentage change of y .
- (b) A white pipe takes 20 minutes to fill 3000liters water tank. Calculate the rate at which the tank is filled
- 7 (a) Juma, Ally and Amina share property in the ratio $2 : p : q$ respectively. It is known that $q = p + 2$, if the largest shareholder had shs 39,100/= in monetary terms. Find the value of this property.
- (b) The big T paid shs 30,000/= for 10 books. He sold $\frac{2}{5}$ of them at shs 3,000/= each and the remaining at shs 2,500/= each. What was his percentage profit
- 8 (a) A wall is in the shape of a trapezium. The first level of the wall is made up of 50 bricks whereas the top level has 14 bricks. If the levels differ from each other by 4 bricks, determine the number of:
- (i) Levels of the bricks
- (ii) Bricks used to make the wall.
- (b) The third term of a geometric progression is equal to the square of its first term. If the second term is 8, determine its sixth term
- 9 (a) Given that $2 \cos \theta = -1$ and θ lies between 0° and 360° , find the possible value of θ
- (b) A triangle ABC , $\angle A = 90^\circ$, $\angle B = 43^\circ$ and $\overline{BC} = 4m$. Find $\overline{AC}$ correct to two decimal laces
- 10 (a) A garden measuring 18 by 12 meters to have pedestrian pathway of equal width constructed all around it, increasing the total area to 520 square meters. What will be the width of the pathway?

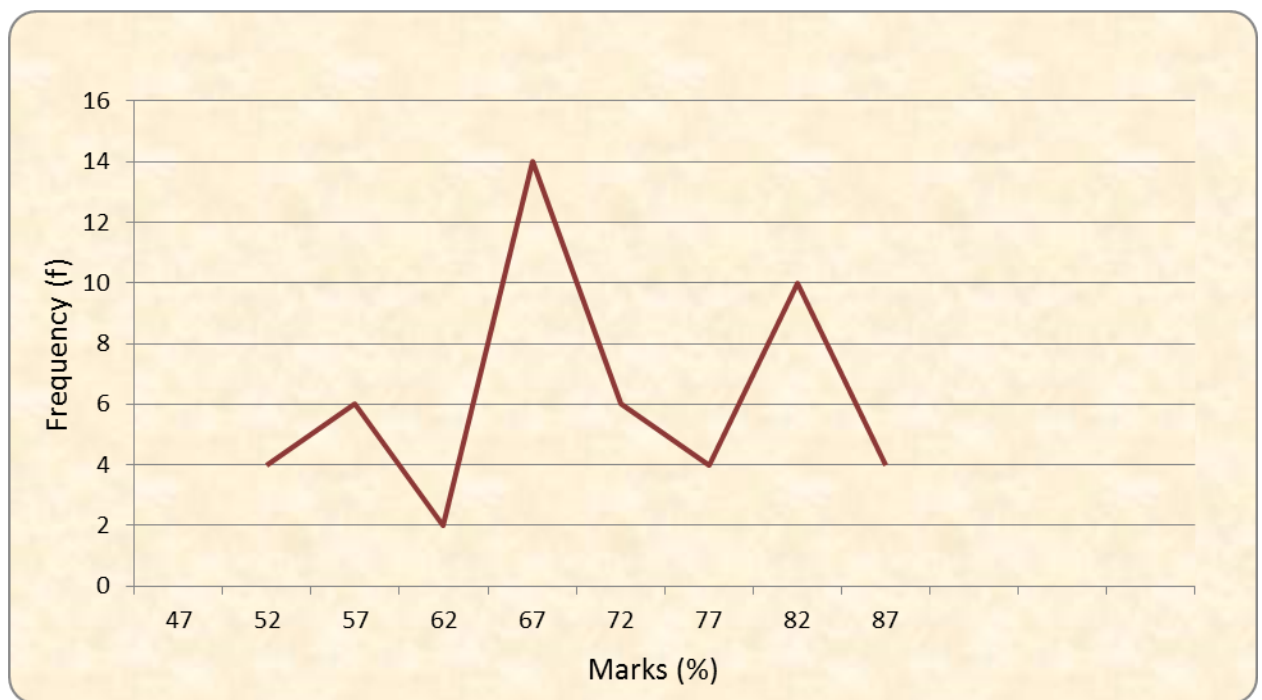
(b)

The function $f(x) = 3x^2 + tx + 12$, find the value t which will make it a perfect square,

SECTION B (40 % Marks)

Answer all four (4) questions from this section

11 (a) The graph represents marks scored by form four class from a mathematics test out of 100%

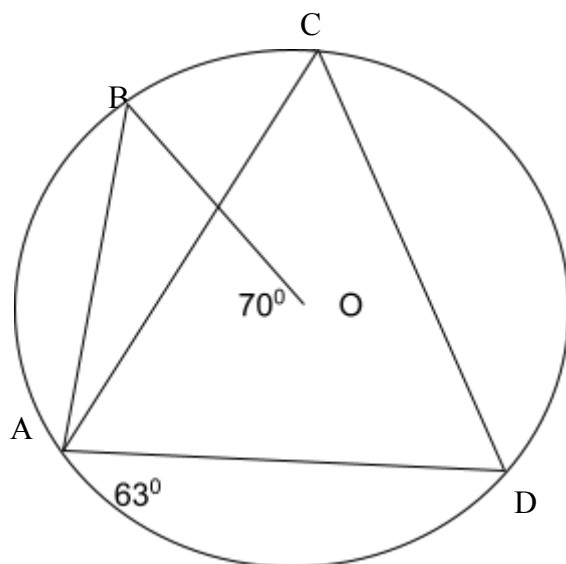


(i) Draw cumulative frequency polygon and use it to estimate the median

(ii) Calculate mode

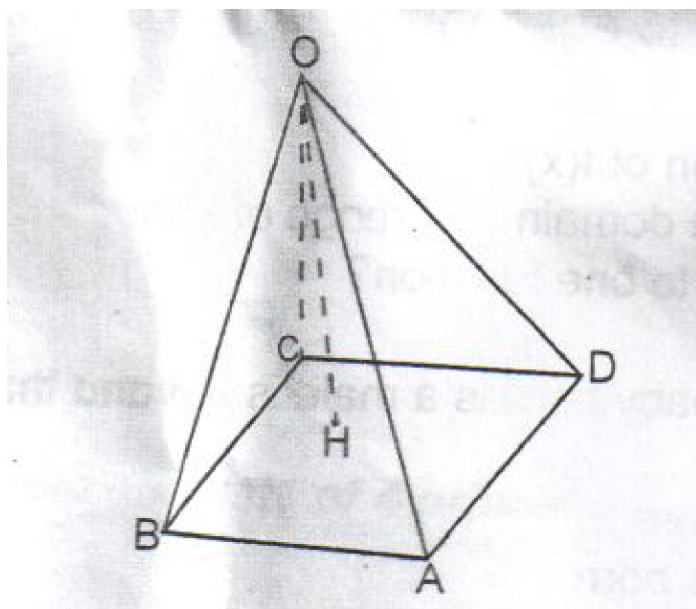
(b)

In diagram O is the center of a circle,
calculate the angle BAC and CAO



12 (a) The figure below represented a Pyramid with a square base $ABCD$ of side $5m$.

$\overline{OA} = \overline{OB} = \overline{OC} = \overline{OD} = 8m$. Calculate the height of a pyramid



- (b) A speed boat travelling from Zanzibar $(6^{\circ}S, 45^{\circ}E)$ to Mtwara $(4^{\circ}S, 45^{\circ}E)$ using 30 Knots left Zanzibar at 11: 30 a.m. at what time did it reach Mtwara
- (c) Find the radius of a circle of latitude $60^{\circ}N$

- 13 (a) Find n given that $\begin{pmatrix} 8n+6 & 5n+3 \\ 7n+4 & 4n+3 \end{pmatrix} \begin{pmatrix} 8n+6 & 5n+3 \\ 7n+4 & 4n+3 \end{pmatrix}$ cannot be used to solve simultaneous equations
- (b) Find the image of the point $(5, 2)$ under a rotation of 90° followed by another rotation of 180° anticlockwise.
- (c) For his family of 3 adults and 2 children, Abdallah paid 5,800 shillings to travel from town A to town B. Zuena paid a total sum of 6,800 shillings for his 5 children, his wife and himself for the same journey. Using the matrix method, find
- How much did a ticket for an adult cost?
 - How much did Zuena pay for his five children?
- 14 (a) Given the relation $R = \{(x, y): y + 2x \leq 6 \text{ and } x \geq -2\}$
- $$R = \{(x, y): y + 2x \leq 6 \text{ and } x \geq -2\}$$
- Draw the graph of inverse of relation R and shade the required region
 - State domain and range of the inverse relation
- (b) A firm makes curtain which are either ordinary or deluxe. Each ordinary curtain takes 3 hours to produce and use 6 meters of materials and each deluxe curtain use 6 hours to produce and 7 meters of materials. The worker of the firm can work a total of 60 hours and there is 90 meters of materials available. If the profit on ordinary and deluxe is 400/= and 600/= respectively, find how many of each should be made to maximize profit.