

SECTION I (50 MARKS)

Answer ALL questions in this section

1. Evaluate;

$$\frac{4 + \frac{1}{3} \text{ of } 27 \div 9 (-6 \times -2)}{2x - (-50) - 54 \div 9 \times 12}$$

(3

marks)

2. Solve for x in $3^{x-3} \times 15^x = 15^x$

(3

marks)

3. Two translations T_1 and T_2 are represented by the vectors $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and $\begin{pmatrix} 4 \\ -6 \end{pmatrix}$ respectively.

Triangle ABC whose vertices are A (2, 3), B (4, 6) and C (3, 5) is mapped onto triangle $A^1B^1C^1$ under the combined translation T_2T_1 . Determine the co-ordinates of A^1B^1 and C^1 . (3 marks)

Turn Over

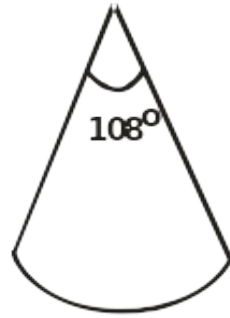
4. Two similar containers have base area of 750cm^2 and 120cm^2 respectively. Calculate the volume of the larger container in litres given that the volume of the smaller one is 400cm^3 . (3 marks)

5. a) Solve for x. (2 marks)

$$\frac{4+x}{-3} \leq 3x - 2 < x - \frac{13}{2}$$

- b) Illustrate your solution in (a) above on a number line. (1 mark)

6. A cone of slant height 8cm is formed from a circle sector of angle 108° as shown below. Find the volume of the cone. (4 marks)



7. Train A and B moving in the same direction are 10m apart. Train A is 3m long and moves at 100km/hr while train B is 10m long and moves at 50km/hr. Find how long it will take a train A to overtake train B.
(3 marks)

8. The longest side of a right angled triangle is $(9x - 2)$ cm. The other two sides are $8x$ cm and $(2x + 1)$ cm long. Find x and hence the lengths of the triangle.
(4 marks)

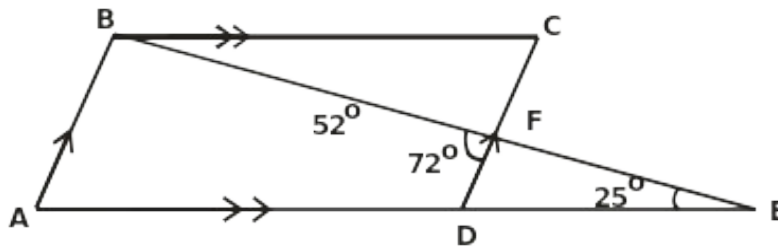
9. Jane spent $\frac{2}{3}$ of her April salary on school fees for her children and $\frac{2}{5}$ of the remainder on food. If she was left with sh.6000, what was her net pay?
(3 marks)

10. Solve for x without using tables.

$$\sin(2x - 30^\circ) - \cos 4x = 0 \text{ for } 0^\circ \leq x \leq 90^\circ. \quad (3 \text{ marks})$$

11. The interior angle of a regular polygon is 20° more than three times the exterior angle. Determine the number of sides of the polygon.
(3 marks)

12. In the diagram below, ABCD is a parallelogram AD is produced to E and BE and CD meet at F.



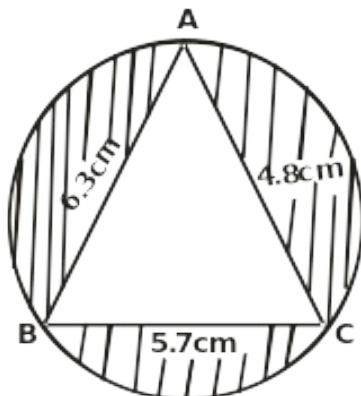
- If $\angle DEF = 25^\circ$ and $\angle BFD = 70^\circ$, find the size of angle ABF.
(3 marks)

13. On a day when the currency exchange rate was 100 Japanese Yen = Ksh 72.50 a Japanese tourist exchanged all his money and received Ksh. 34,800. If the bank charged him a commission of 4% on the transaction, calculate the number of Japanese Yen he exchanged.
(3 marks)

14. Find the equation of a perpendicular bisector to line AB given that A (2, 3) and B (-6, 5). Give your answer in the form $y = mx + C$.
(3 marks)

15. If $a = \begin{pmatrix} 4 \\ -3 \end{pmatrix}$, and $\begin{pmatrix} 14 \\ 1 \end{pmatrix}$, find the scalars m and n if $ma = nb = \begin{pmatrix} 16 \\ 11 \end{pmatrix}$.
(3 marks)

16. The circle below whose area is 18.05cm^2 circumscribes a triangle ABC where $AB = 6.3\text{cm}$, $BC = 5.7\text{cm}$ and $AC = 4.8\text{cm}$. Find the area of the shaded part to 2 d.p.
(4 marks)



SECTION B (50 MARKS)

Answer only five questions from this section in the spaces provided

17. Three submarine fighters P, Q, R are such that Q is 400 km on a bearing of 030° from fighter P. Fighter R is 750km from fighter Q on a bearing of 120° . Another submarine fighter S is 1000km due south of fighter Q.
- a) Taking a scale of 1cm to represent 100km locate the position of fighters P, Q, R and S. (4 marks)

b) Find the compass bearing of;

i) Jet P from jet S. (1
mark)

ii) Jet S from Jet R. (1
mark)

c) Use the scale drawing to determine;

i) The distance of S from P (1
mark)

ii) The distance of R from S

d) Find the bearing of;

i) Q from R

ii) P from R

18. The table below shows the length of 40 carrot seedlings.

Length (mm)	Frequency
118 - 126	3
127 - 135	4
136 - 144	10
145 - 153	12
154 - 162	5
163 - 171	4
172 - 180	2

a) Determine the;

i) Modal class.

(1 mark)

ii) Median class.

(2

marks)

b) calculate;

i) The mean length of the seedlings.

(4

marks)

ii) The median of the seedlings.

(3

marks)

19. The length of a room is 3m longer than its width. A carpet whose area is 18m^2 is laid in the middle of the room leaving a margin of 0.5m wide between the carpet and the wall all round the room.

a) If the width of the room is x , write an expression for the dimensions of the carpet in terms of x .

(2 marks)

b) Express the area of the carpet in terms of x .

(2 marks)

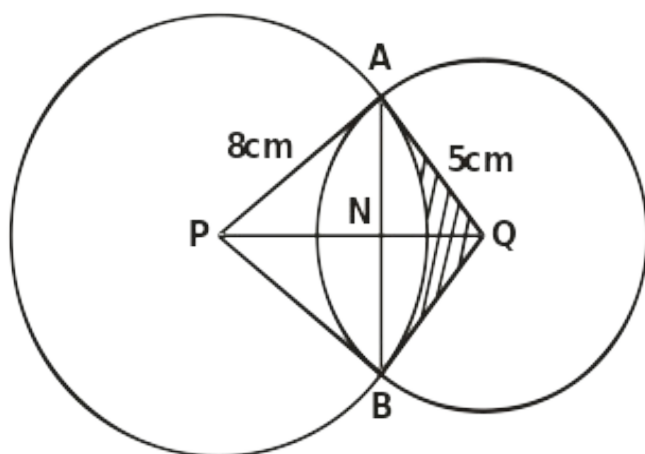
c) Determine the dimensions of the room.
marks)

(3

d) Determine the space between the carpet and the wall is covered by a material which costs sh 245 per square metre. Find the cost of the material required.

(3 marks)

20. In the figure below P and Q are centres of two circles intersecting at A and B. The radii are 5cm and 8cm as shown in the diagram. Length of AB = 8cm.



Determine;

- a) Length PQ
(3 marks)

(3)

- b) The size of angle APB
(3 marks)

(3)

- c) The area of the shaded region.
(4 marks)

(4)

21. Using a ruler and a pair of compasses only,

- i) Construct a quadrilateral ABCD with $AB = 6\text{cm}$, $BC = 5\text{cm}$, $CD = 8\text{cm}$, $AD = 7\text{cm}$ and angle $ABC = 150^\circ$
(5 marks)
- ii) Construct a circle that will pass through points A, D and C.
(3 marks)
- iii) Find the shortest distance from the centre of the circle to side AB.
(1 mark)
- iv) Measure the length constructed in (iii) above.
(1 mark)

22. A rectangular tank whose internal dimensions are 1.7m by 1.4m by 2.2m is three quarters full of milk.

a) Calculate the volume of milk in litres. (3 marks)

b) The milk is packed in small packets in a shape of a right pyramid with an equilateral base triangle of side 16cm. The height of each packet is 13.6cm. Full packets obtained are sold at ksh.25 per packet.

i) The volume in cm^3 of each packet to the nearest whole number.
(3 marks)

ii) The number of full packets of milk. (2 marks)

iii) The amount of money realized from the sell of milk. (2 marks)

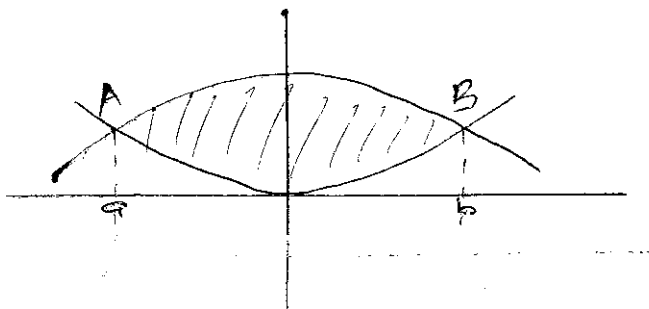
23. Three businessmen Mutuku, Mutiso and Kitili decided to buy a bus. The market price of the bus was sh2,800,000. The men could pay a deposit of 60% of the money and the rest to be paid within one year. Mutuku, Mutiso and Kitili raised the deposit in the ratio 3:2:5 respectively. The balance was to be paid to the dealer from the proceeds of the bus in the same deposits. During the year the bus realized sh.2,080,000

a) How much deposit did each contribute? (4 marks)

b) How much of the remaining amount did Kitili pay at the end of the year?
(2 marks)

c) After paying the remaining amount at the end of the year, how much money was Mutuku left with?
(4 marks)

24. The diagram below shows the sketch of the curve $y = x^2$ and $y = -x^2 + 8$ intersecting at A and B.



a) Find the value of a and b hence find the co-ordinates of A and B.
(2 marks)

b) Find the area enclosed by $x = a$ and $x = b$, The x axis and

i) The curve $y = x^2$ (3 marks)

ii) the curve $y = -x^2 + 8$ (3 marks)

c) Find the area of the shaded region.
(2 marks)