

Name .....

Index No...../.....

School.....

Candidate's sign.....

Date.....

121/1  
MATHEMATICS  
PAPER 1  
JULY/AUGUST 2009  
2 ½ Hours

## MANGA DISTRICT JOINT EVALUATION TEST - 2009

*Kenya Certificate of Secondary Education (K.C.S.E)*

121/1  
MATHEMATICS  
PAPER 1  
JULY/AUGUST 2009  
2 ½ Hours

**Instructions to candidates:**

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. The paper contains two sections: Section I and section II.
4. Answer all the questions in section I and any **FIVE** questions from section II
5. All answers and working **must** be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations, giving your answer at each stage in the spaces provided below each question.
7. Marks may be given for correct working even if the answer is wrong.
8. Non-programmable silent electronic calculators and KNEC mathematical tables may be used.

**FOR EXAMINER'S USE ONLY.**

**SECTION I**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	TOTAL

**SECTION II**

17	18	19	20	21	22	23	24	TOTAL	GRAND TOTAL

*This paper consists of 16 printed pages. Candidates should check the questions to ensure that all pages are printed as indicated and no question(s) are missing*

**SECTION I (50 MARKS)**

*Answer all the questions in this section.*

1. Without using a calculator or mathematical tables, evaluate;

$$\frac{5}{6} - \frac{1}{3} \text{ of } \frac{27}{20} \div 2$$

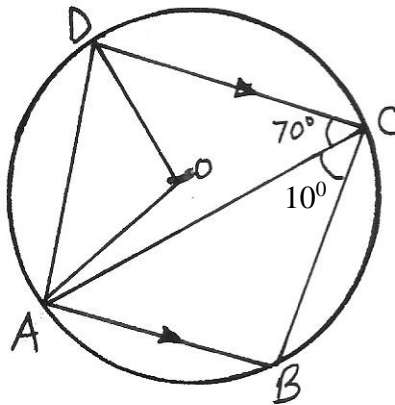
(4mks)

2. Find the equation of the perpendicular bisector of the line AB where the coordinates of A and B are (-3, 2) and (6, 4) respectively. (3mks)

3. Three bells P, Q and R are programmed to ring after an interval of 15 minutes, 25 minutes and 50 minutes respectively. If they all rang together at 8.45 a.m, when will they next ring together again. (4mks)

4. Simplify the expression  $\frac{x+4}{x-4} - \frac{3x+12}{x^2-16}$  (3mks)

5. O is the centre of the circle below and AB is parallel to DC. Angle ACD =  $70^\circ$  and angle ACB =  $10^\circ$ .

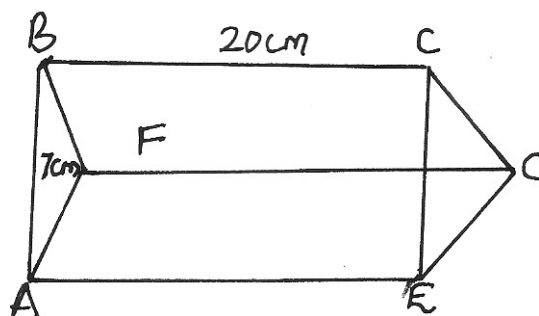


Calculate angles

- (i) ABC  
(ii) OAD

(4mks)

6. A prism of length 20cm is represented by the diagram below whose cross section is an equilateral triangle of side 7cm.



(a) Draw a sketch net of the prism and label it correctly. (1mk)

(b) Calculate

(i) The area of the triangular end

(ii) The total surface area of the prism

(iii) The volume of the prism. (3mks)

7. Solve the following inequalities and represent the solutions on a single number line:

$$2 - 2x < 4$$

$$-6 - 3x \geq -15$$

(3mks)

8. Solve for n in

$$\left(\frac{1}{49}\right)^n \times (343)^{-1} = 7$$

(2mks)

9. Solve the simultaneous equations

$$\log_4(2x + 3y) = 2$$

$$\log_2(4x - y) = 2$$

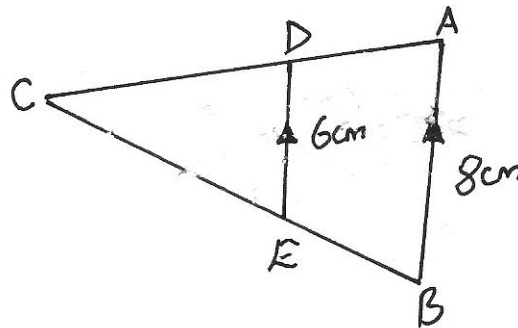
(3mks)

10. In 2007 parliamentary election, only 55% of the voters in a constituency of 85,000 cast their votes. Of the votes cast, A received 48%, B received 32% and C received the remainder. How many votes did C receive. (3mks)

11. If each interior angle of a regular polygon is  $150^\circ$ , how many sides does the polygon have?(2mks)

12. The expression  $1 - \frac{x}{2}$  is taken as an approximation for  $\sqrt{1-x}$ . Calculate the percentage error in doing so when  $x = \frac{7}{16}$ . (3mks)

13. (a) In the diagram below find the length of EC if BC = 12 cm.



- (b) Given that the area of triangle DCE is  $27 \text{ cm}^2$ , find the area of ABECD. (4mks)

14. Point T is the midpoint of a straight line AB. Given that the position vectors of A and T are  $-i + j - k$  and  $3i + 4j$  respectively, find the position vector of B in terms of  $i, j$  and  $k$ . (2mks)

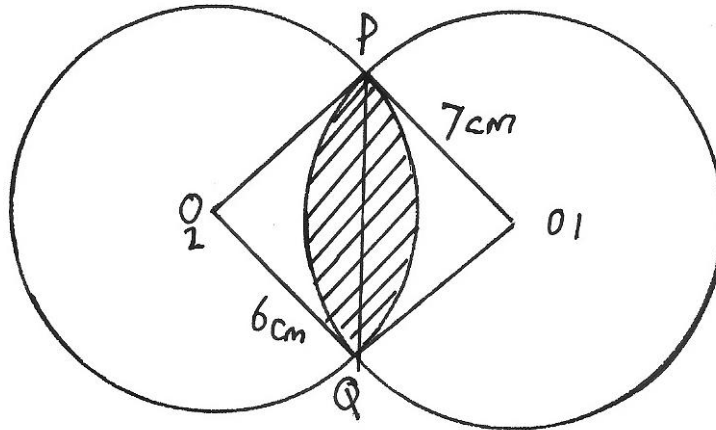
15. Given the coordinates of P, Q and R as (2, -1), (3, 4) and (6, 2) respectively, find the coordinates of  $P^1$ ,  $Q^1$  and  $R^1$  the images of P, Q and R under a transformation represented by the matrix  $\begin{pmatrix} -1 & 2 \\ 3 & 1 \end{pmatrix}$ . (3mks)

16. Given that  $\theta$  is an acute angle and  $\sin \theta = \frac{2\sqrt{3}}{5}$ , find without using calculators or mathematical table,  $\tan(90 - \theta)^\circ$ . (3mks)

**SECTION II (50 MARKS)**

*Answer any five questions from this section.*

17. Two circles with centres  $O_1$  and  $O_2$ , have radii 7cm and 6cm respectively. The two circles intersect at P and Q and the length of the common chord PQ is 10cm.

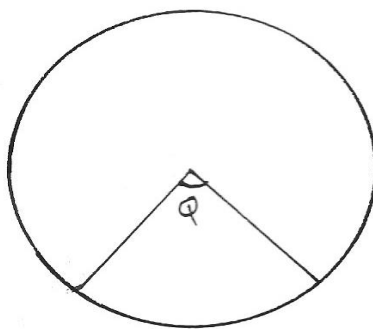


Calculate the area of the shaded region in the above diagram to 4 significant figures. (10mks)



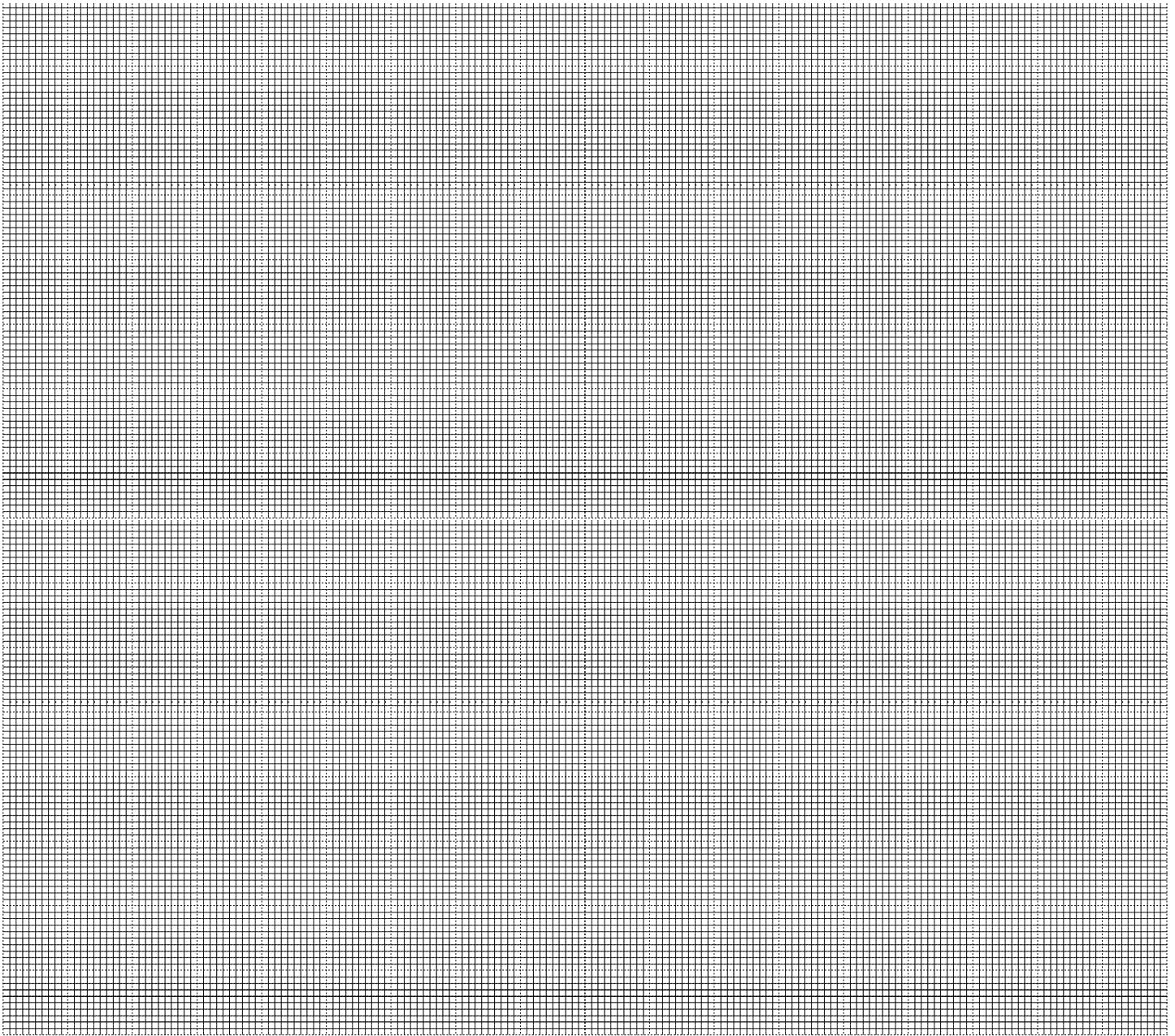
18. On some day, Mr. Makori bought some oranges worth ksh. 45. On another day of the same week, Mrs Makori spent the same amount of money but bought the oranges at a discount of 75 cents per orange.
- (a) If Mr. Makori bought an orange at sh  $x$ , write down a simplified expression for the total number of oranges bought by the two in the week. (3mks)
- (b) If Mrs. Makori bought 2 oranges more than her husband, find how much each spent on an orange. (5mks)
- (c) Find the number of oranges bought for the family that week. (2mks)

19. A cone is made by cutting off a sector as shown below from a circle and gluing the straight edges of the sector. The cone formed has slant height 14cm and circular base of perimeter 11cm  
(take  $\pi = \frac{22}{7}$ )



- (a) Calculate the value of  $\theta$ . (2mks)
- (b) The radius of the cone's circular base (2mks)
- (c) The height of the cone. (3mks)
- (d) The cone is cut uniformly on a horizontal plane 1cm below the apex. Calculate the slant height of the frustum so formed correct to 2 decimal places. (3mks)

20. (a) Draw the graph of  $y = 2 + 3x - x^2$  in the range of  $-3 \leq x \leq 6$  on the grid provided.(5mks)



b) From your graph:-

(i) Find the value of  $x$  if  $x^2 - 4x = 0$

(3mks)

(ii) Determine the value of  $x$  for which  $y$  is the greatest.

(1mk)

(iii) Determine the range of values of  $x$  for which  $y$  is positive.

(1mk)

21. A Kenyan businesswoman wants to pay a company she owes US\$ 100,000 in the united states of America. The woman can either pay through her account in Kenya or through her account in the united kingdom.

(a) If the exchange rate is;

1 US Dollar = 28.74 Kenya shillings

1 Sterling Pound = 1.79 US Dollars

1 Sterling Pound = 50.80 Kenya shillings,

Which method is cheaper and by how much? Give your answer in Kenya shillings.(4mks)

(b) Three years ago, Joseph was three times older than Agnes. In two years time the sum of their ages will be 75. Determine their present ages. (3mks)

(c) By use of reciprocals, evaluate the following and give answer to 3 decimal places

$$\frac{3}{0.0416} + \frac{5}{49.27}$$

(3mks)

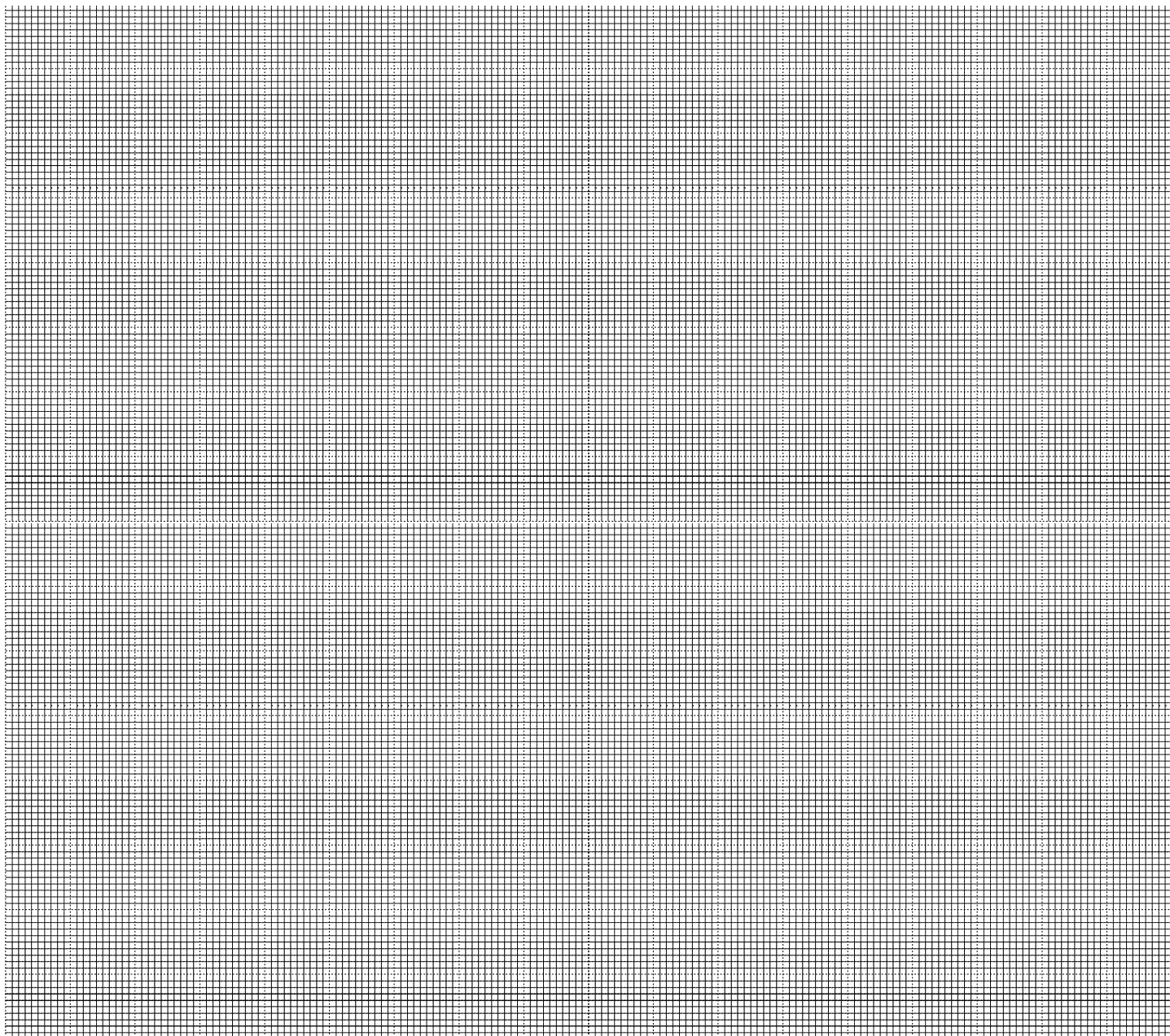
22. A circular path of width 14 metres surrounds a field of diameter 70 metres. The path is to be carpeted and the field to have a concrete slab with an exception of four rectangular holes each measuring 4 metres by 3 metres. A contractor estimated the cost of carpeting the path at sh. 300 per square metre and the cost of putting the concrete slab at sh. 400 per square metre. He then made a quotation which was 15% more than the total estimate. After completing the job, he realizes that 20% of the quotation was not spent.
- (a) How much money was not spent? (8mks)

- (b) Find the actual cost of the contract (2mks)

23. A transformation represents by the matrix  $\begin{pmatrix} 2 & 0 \\ 0 & 2 \end{pmatrix}$  maps A(1, 3), B(3, 3) and C(2, 1) onto

$A^1B^1$  and  $C^1$  respectively.

(a) (i) On the grid provided, draw the triangle ABC and its image  $A^1B^1C^1$  on the same axes. (3mks)



(ii) Hence or otherwise determine the area of the triangle  $A^1B^1C^1$  (2mks)

(b) Another transformation represented by the matrix  $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$  maps  $A^1B^1C^1$  onto  $A^{11}B^{11}C^{11}$ .  
(i) Plot triangle  $A^{11}B^{11}C^{11}$  on the same axes. (2mks)

(ii) Describe the transformation represented by the matrix  $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$  (1mk)

(c) Determine the matrix of the single transformation which maps  $A^{11}B^{11}C^{11}$  onto  $ABC$ . (2mks)



24. The table below shows the height of tree in Manga forest in metres.

<b>Height (m)</b>	0-9	10-19	20-29	30-39	40-49	50-59	60-69
<b>No of trees</b>	50	35	30	32	16	10	7

Using an assumed mean of 34.5, calculate:-

(a) The mean

(4mks)

(b) The median

(3mks)

(c) The standard deviation

(3mks)