

Name .....

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

School.....

Candidate's sign.....

Date.....

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

**MANGA DISTRICT JOINT EVALUATION TEST - 2009**  
*Kenya Certificate of Secondary Education (K.C.S.E)*

121/2  
MATHEMATICS  
PAPER 2  
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 A (50 MARKS)**

*Answer all the questions in this section in the spaces provided.*

1. Use logarithm tables only to evaluate  $\sqrt[3]{\frac{\sin 6^{\circ}38^1}{4.87 \times 0.03723}}$  (3mks)

2. Make N the subject of the formula

$$t = \frac{5P - N}{3N - P} \quad (2\text{mks})$$

3. Solve the simultaneous equations below.

$$4x + y - 5 = 0 \text{ and } x + 6y + 16 = 0 \quad (2\text{mks})$$

4. Expand  $(2+2y)^5$ . Hence find the value of  $(2.02)^5$ , correct to 4 decimal places when substitution for y is upto  $y^4$ . (4mks)

5. Without using calculators or mathematical tables. Express in surd form and simplify.

$$\frac{\cos 30}{\sin 45 + \tan 30}$$

(4mks)

6. Solve the given equation for values of  $0^\circ \leq x \leq 180^\circ$ .

(4mks)

$$4\cos^2 x - 3\cos x = 6.$$

7. There are three athletics A, B and C in a 100m race. A is twice as likely to win as B, while B is twice as likely to win as C. find the probability that:-

(a) A does not win the 100m race.

(2mks)

(b) Either B or C wins the 100m race.

(2mks)

8. The cost of printing a magazine is partly constant and partly varies as the number of pages of the magazine. A magazine has 100 pages and the cost is ksh. 250 and if it has 50 pages the cost is ksh 150. Find the cost of printing a magazine with 300 pages. (4mks)
9. The price of a Nissan matatu at the end of 2003 was ksh 840,000/=. If it depreciates in value by 14% and 13% in the first and second years respectively and then by 10% in the subsequent years. Calculate its value at the end of 2010 to 4 s.f. (4mks)
10. Taps A and B can fill a tank in 4 and 9 hours respectively. Both taps are turned on for 2 hours after which tap A is closed. Find how long tap B takes to fill the remaining part of the tank.(3mks)

11. Find the equation of a tangent to the curve  $y = 2x^2 - 5x + 2$  at  $x = 3$  (3mks)
12. Find the centre and radius of a circle whose equation is  $2x^2 + 2y^2 - 8x + 8y = 8$ . (3mks)
13. Solve for  $x$  in  $2 \log x + \log 6 = 2 + \log 9$  (2mks)
14. Indian type A of rice costs ksh. 70 per kilogram while Egyptian type B of rice costs ksh 84 per kilogram. A shopkeeper mixes the two types of rice in the ratio 4:3 respectively. At what price must he sell the mixture to make a profit of 26% per kilogram? (2mks)

15. Determine the amplitude, the period and phase angle of the graph  $y = -4\sin\left(\frac{x}{4} - 55\right)^\circ$  (3mks)

16. Calculate the interquartile range of the following numbers. 17, 34, 46, 58, 29, 78, 81, 85, 65, 77  
(3mks)

**SECTION II (50 MARKS)**

*Answer any five questions in this section.*

17. The  $n$ th term of the sequence is given by  $(3n+5)$ .
- (i) Write down the first six terms of the sequence. (2mks)
- (ii) Find the sum of the first 18 term of the series. (2mks)
- (iii) Show that the sum of  $n$  terms is given by  $S_n = \frac{1}{2}(13n + 3n^2)$  (2mks)
- (iv) Determine the least value of  $n$  for which  $S_n > 445$  (4mks)

18. Mr. John is a civil servant. He earns a basic monthly salary of ksh. 24 345, a house allowance of Ksh12,000 and medical allowance of ksh 2790, he is entitled to a personal relief of Ksh 1162 p.m, he has also an insurance scheme for which he pays premiums of Ksh 2300, he is entitled to a relief on the premiums at 15% of the premium paid. He is also a member of a cooperative society where he pays ksh 3000 towards his shares p.m.

Use the taxation table below to calculate his net salary per month, take to whole number.

(10mks)

Income (K£P.a)	Rate.(%)
1 -5808	10
5809 – 11280	15
11281 – 16752	20
16753 – 22224	25
Above 22224	30



19. Four schools A, B, C and D are such that B is 94Km due North of A and C is an a bearing of  $295^\circ$  from A at a distance of 60km D is on a bearing of  $310^\circ$  from C and a distance of 42km. using a scale of 2cm to 20km, make an accurate scale drawing to show the relative positions of the schools. (4mks)

Find:

- (i) The distance and the bearing of B from C (2mks)

- (ii) The distance and the bearing of D from B. (2mks)

- (iii) The bearing of A from D (2mks)

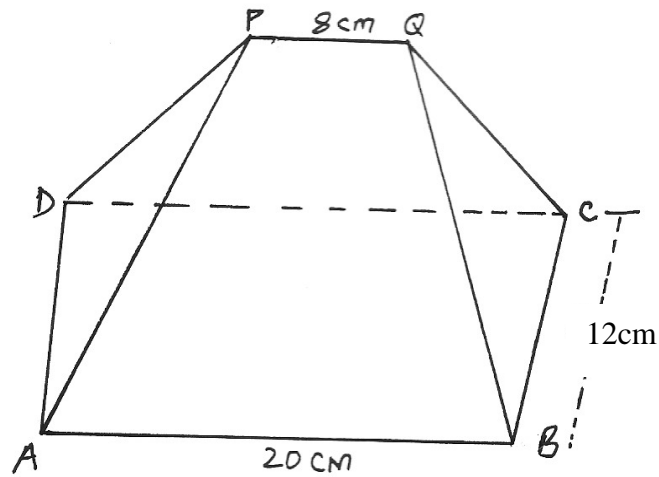
20. (a) Using a trapezoidal rule of 8 ordinates, estimate the area bounded by the curve  $y = 3x^2 + 4$  and the line  $x = 1$ ,  $x = 5$  and the  $x$  – axis. (4mks)

(b) Find the exact area by integration in (a) above (3mks)

(c) Determine the percentage error in area estimation in (a) above. (3mks)

21. Construct triangle FGH with  $FG = 7\text{cm}$ ,  $FH = 6.5\text{ cm}$  and  $GH = 5.2\text{cm}$
- (i) Construct the circum circle of triangle FGH and measure its radius. (6mks)
- (ii) In the same triangle FGH, the point Y moves such that it is at least 4.7cm from F and closer to GH than to GF. It lies within the confines of the triangle FGH. Indicate clearly the region in which Y must lie. (4mks)

22. The figure below shows a plan of a roof with a rectangular base ABCD.  $AB = 20\text{cm}$  and  $BC = 12\text{cm}$ . the ridge  $PQ = 8\text{cm}$  and is centrally placed. The faces ADP and BCQ are equilateral triangles. N is the midpoint of BC.



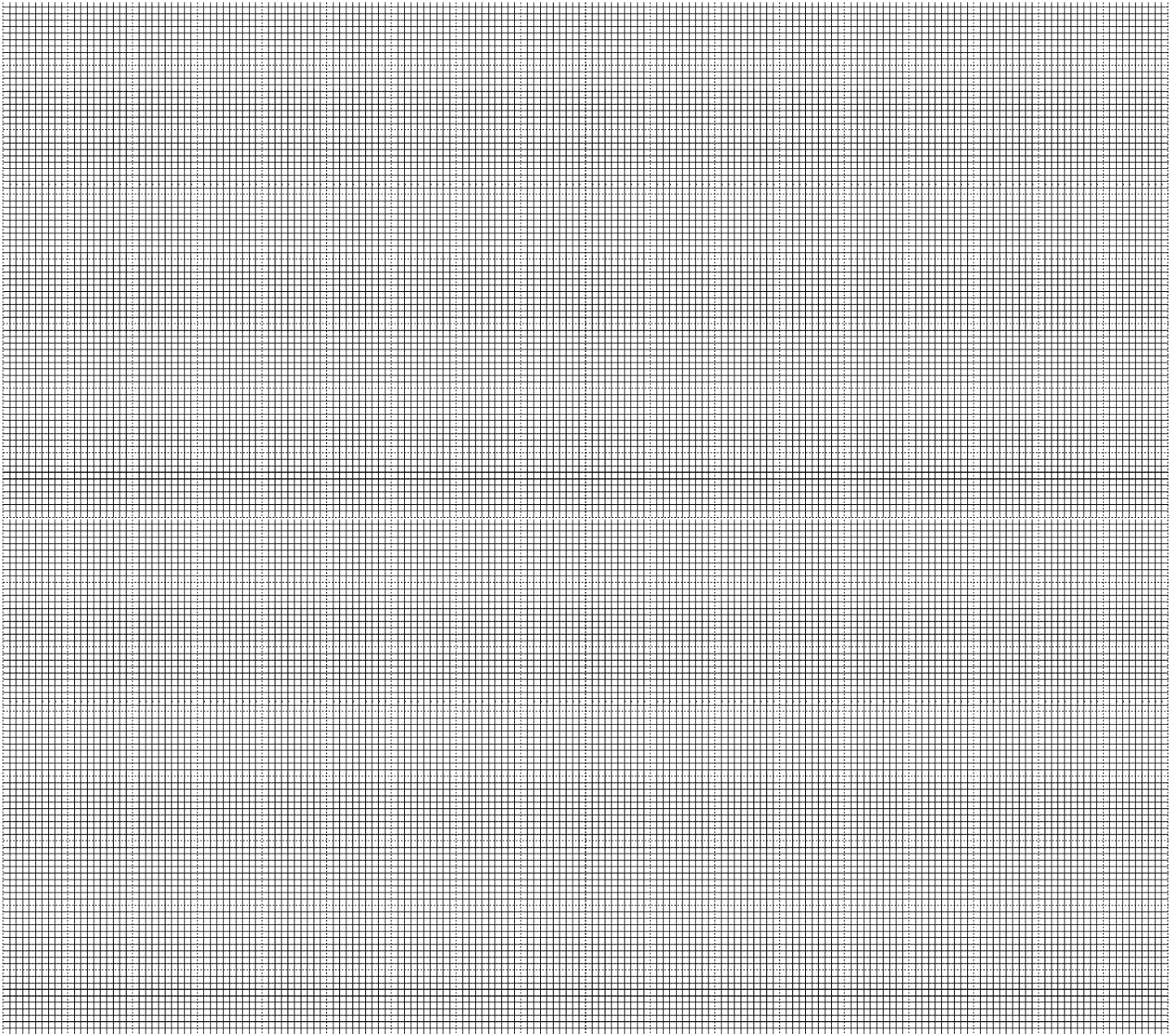
Calculate:

- (a) The length of QN (2mks)
- (b) The altitude of P above the base. (3mks)
- (c) The angle between the planes ABQP and ABCD. (3mks)
- (d) The obtuse angle between the lines PQ and DB (2mks)

23. Mokaya has 20 acres of land on which to grow maize and beans. For maize he has to employ one worker per acre and for beans he employs two workers per acre. The number of workers must not exceed 30. The total cost of growing beans is ksh 600 per acre and ksh 1000 per acre for maize. He cannot spend more than ksh 15000 altogether. He approximates the profit of maize to be ksh 400 per acre and ksh 600 per acre of beans.

(a) Form all the inequalities to represent the information above. Take  $x$  to represent acres for maize and  $y$  beans. (4mks)

(b) On the grid provided, draw the inequalities to show the wanted region. (4mks)



- (c) Use your graph in (b) above to determine the number of acre of maize and beans he has to plant in order to maximize the profit and find the profit. (2mks)

24. The position of two cities P and Q are  $(39^{\circ}\text{S}, 41^{\circ}\text{E})$  and  $(39^{\circ}\text{S}, 129^{\circ}\text{W})$  respectively.
- (a) Find the difference in longitude between P and Q. (2mks)
- (b) Given that the radius of the earth is 6370km, calculate the distance between P and Q
- (i) In kilometers (take  $\pi = \frac{22}{7}$ ) (3mks)
- (ii) In nautical miles (1mk)
- (c) Another city R is 870km east of city Q and on the same latitude as cities P and Q. Find the longitude of city C. (4mks)