

NAME:.....INDEXDATE.....

SCHOOL:.....SIGNATURE.....

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST, 2010
2½ HOURS

KISUMU NORTH AND EAST DISTRICTS JOINT TEST Kenya Certificate of Secondary Education 2010

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST 2010

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided above.
2. This paper consists of two sections: **Section I and Section II.**
3. Answer **all** questions in **section I** and **only five** questions from **Section II.**
4. All answers and working **must** be done on the question paper in the spaces provided below each question.
5. Marks may be given for correct working even if the answer is wrong.
6. 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 pages. Candidates should check the question paper to ensure that all the pages are printed as indicated and no questions are missing.

SECTION I (Answer all questions in this section - 50 marks)

1. Using logarithm tables, evaluate: (4mks)

$$\left(\frac{\log 7}{78.91 \times 0.0567} \right)^{-\frac{1}{3}}$$

2. Make Q the subject of the formula (3mks)

$$T = P \sqrt{\frac{Q}{Q-1}}$$

3. In what ratio should sugar costing ksh.46 per kg and ksh.74 per kg be mixed to produce a sugar blend costing ksh.60 per kg after making a profit of 20% (3mks)

4. (a) Find the first 3 terms in ascending powers of x of $(2 - x)^5$ (2mks)

- (b) Hence find the value of the constant K, for which the coefficient of x in the expansion of $(K + x)(2 - x)^5$ is -8 (2mks)

5. Simplify $\frac{2\sqrt{5}}{\sqrt{3-\sqrt{5}}}$, leaving the answer in the form $a + b\sqrt{c}$, where a, b and c are rational numbers (2mks)

6. The cost, C of water is partly constant and partly varies as the number of litres L, consumed. Mary paid ksh.128.75 for 3 litres in March and sh.136.25 for 49 litres in February. Calculate

- (a) Charge per unit and fixed charge (1mk)

- (b) Bill for January if she consumed 23 litres (2mks)

7. Solve for x in the equation (3mks)

$$\log_{10}(2x-1) + \log_{10}3 - \log(8x+1) = 0$$

8. The coordinates of the points A and B are (2, -3) and (-10, 8) respectively. A point T divides AB in the ratio 5:-2. Find the coordinates of T. (2mks)

9. Calculate the variance of the numbers 7, 8, 7, 4, 6, 9, 8 (3mks)

10. A wire model of the earth has a radius of 7m, find the shortest distance between points A ($22^{\circ}N, 111^{\circ}E$) and point B ($48^{\circ}N, 69^{\circ}W$) on the model, give your answers to 3 decimal places. $\left(use \Pi = \frac{22}{7} \right)$ (3mks)

11. The 2nd, 4th and 7th terms of A.P are the first 3 consecutive terms of a G.P. Find:

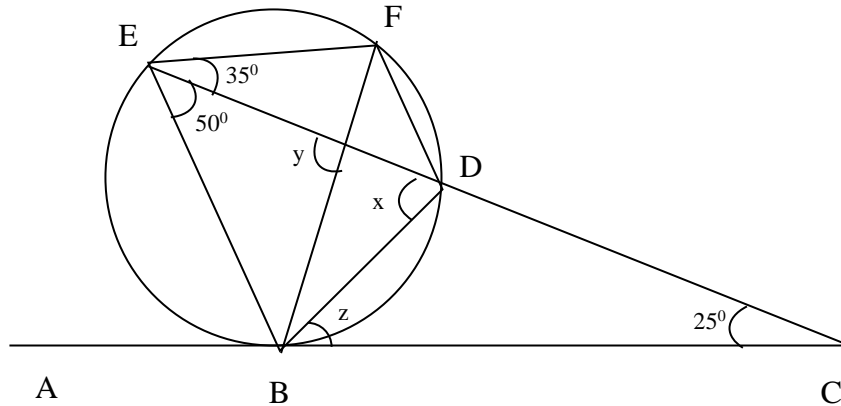
(a) The common ratio (2mks)

(b) The sum of the first eight terms of the G.P if the common difference of the A.P is 2. (2mks)

12. Given that $\begin{pmatrix} x & y \\ 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 2 \end{pmatrix}$, find the possible values of x and y. (4mks)

13. In the figure below, ABC is a tangent at B and CDE is a straight line.

$\angle BED = 50^\circ$, $\angle DEF = 35^\circ$ and $\angle ECB = 25^\circ$



Calculate the values of x, y and z. (3mks)

14. A machine depreciated from Ksh.500, 000 to Ksh.350, 000 in 3 years. What was the yearly rate of depreciation? (2mks)

15. The velocity of a particle (m/s) t seconds after rest is given by $v = 3t^2 - t - 4$.

Calculate:

(a) The time when the particle was momentarily at rest (2mks)

(b) The displacement during the third second. (2mks)

16. Find the center and radius of a circle whose equation is $x^2 + y^2 + 6y - 8x - 24 = 0$ (3mks)

SECTION II (Answer ONLY five questions in this section – 50 marks)

17. P varies directly as the square of Q and inversely as R.

(a) If Q increases by 5% and R decreases by 10%, find the percentage change in P
(5mks)

(b) Given that $P=2$ when $R=5$ and $Q=4$, find the positive value of Q when $P=4.5$ and $R=5$
(5mks)

18. The frequency distribution of marks of 110 students is given in the table below.

Marks	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	2	5	9	12	25	37	11	6	2	1

(a) Draw an ogive to illustrate the data (4mks)

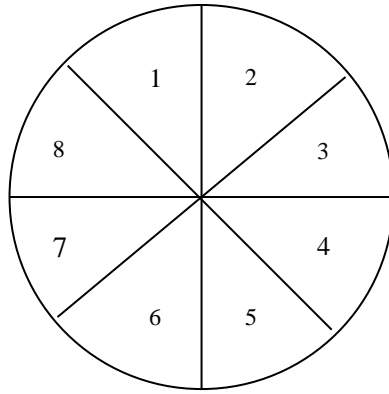
(b) From your graph estimate

(i) The median mark (1mk)

(ii) The interquartile range (2mks)

(iii) The pass mark, if 68% of the students are to pass (3mks)

19. A circular board has eight equal sectors marked on it. When the arrow on the spinner is spun, it is equally likely to stop in any of the sectors marked 1 to 8, as shown in the diagram below. The spinner is spun once.



(a) What is the probability that the score will be

i. A square number (2mks)

ii. A prime number, or more than six, or both? (2mks)

(b) When the spinner is spun twice, find the probability that:

i. The sum of two scores will be 8 (3mks)

ii. The difference of the two scores will be 3 (3mks)

20. Two straight lines l_1 and l_2 intersect at a point P. Q and R are on the lines l_1 and l_2 respectively such that $PQ = 5\text{cm}$, $PR = 7\text{cm}$ and $\angle RPQ = 50^\circ$

(a) Draw the two lines

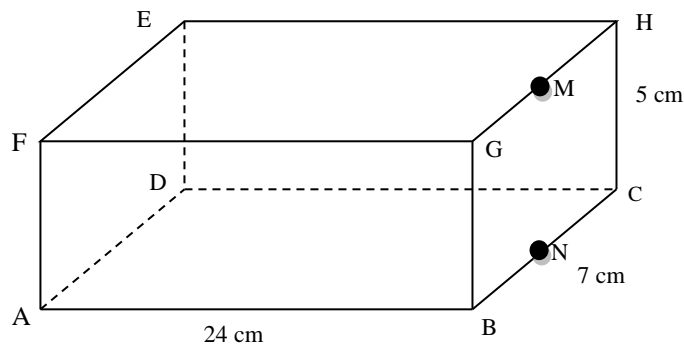
(b) Using a ruler and pair of compasses only, draw a circle which is tangent to line PR at R and passes through Q.

(c) The line l_1 cuts the circle again at point S. Mark the point S and measure QS.

(d) Locate a point T on the minor arc such that $QT = TS$

(10mks)

21.



The figure above shows a cuboid in which $AB = 24\text{cm}$, $BC = 7\text{cm}$ and $CH = 5\text{cm}$. M and N are the mid points of GH and BC respectively.

(a) Find the length of AC, AH and EM

(4mks)

(b) Find the angle between

(i) AH and FH

(4mks)

(ii) The line MD and the plane ABCD

(2mks)

22. On the grid provided in the next page, draw the graph of $y = 2\sin x + \cos \frac{1}{2}x$ for

$0^\circ \leq x \leq 360^\circ$ (6mks)

(a) Find the value of x for which the function reaches its maximum (1mk)

(b) Use your graph to solve the equation $2\left(2\sin x + \cos \frac{1}{2}x\right) = 1$ (3mks)

23. The table below shows income tax rates

Monthly income in Kenya shillings (K£)	Tax rates percentage (%) in each shilling
Up to 10164	10
From 10165 to 19740	15
From 19741 to 29320	20
From 29321 to 37040	25
From 37041 and above	30

In one year, Mr. Kamau's monthly earning was as follows:

Basic salary	20,000
House allowance	12,000
Medical allowance	2,808
Transport allowance	1,764

(a) Calculate:

(i) Mr. Kamau's taxable income

(ii) Tax charged on Mr. Kamau's earning

(b) Mr. Kamau was entitled to the following tax reliefs

(i) Monthly personal relief of Ksh.1,162

(ii) Monthly insurance relief at the rate of 15% of the premium paid. If Mr.

Kamau paid a monthly premium of Ksh. 2,500 and a cooperative shares of

Ksh.5, 000 per month, calculate his net salary.

(10mks)

24. A small – scale farmer wishes to buy some sheep and goats for rearing. A sheep costs sh.400 and a goat sh.300. The farmer has enough space for only 20 animals and many spend at most sh.6800. The number of goats should not exceed twice the number of sheep.

(a) By representing the number of sheep he buys by x and the numbers of goats by y write down all the possible inequalities and graph them. (grid on the next page)

(7mks)

(b) From your graph, find the maximum number of animals that he can buy for the lowest cost

(3mks)

