

Name..... Index No.....

121/1
MATHEMATICS
Paper 1
July/August, 2011
Time: 2½ hours

Adm Class

Candidate's Signature.....

Date.....

BARINGO COUNTY EDUCATIONAL IMPROVEMENT EXAMINATION 2011

Kenya Certificate of Secondary Education

INSTRUCTIONS TO CANDIDATES:

1. Write your name, admission and class in the spaces provided at the top of this page.
2. Sign and Write the date of examination in the spaces provided above.
3. This paper consists of 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 calculation, 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 except where stated otherwise.

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

GRAND TOTAL

17	18	19	20	21	22	23	24	TOTAL

This paper consists of sixteen printed pages.

Candidates should check the question paper to ensure that all the pages are printed indicated and no questions are missing.

SECTION I: (50 MARKS)

Answer ALL questions in this section:

1. Use logarithms to evaluate to 4s.f.

$$\frac{0.0367 \times (1.456)^2}{\sqrt[3]{0.02198}} \quad (4\text{mks})$$

2. Given that the numbers a, b and c are in the ratio of 3 : 5 : 2 respectively, find the value of

$$\frac{3a - b}{4b - c} \quad (3\text{mks})$$

3. If it takes 5 men 21 days to build a wall 80m long, how many more men working at the same rate, will be needed to construct 240m of wall in the same period? (3mks)

4. Determine the standard deviation for the following set of numbers. (3mks)
2, 1, 6, 7, 4, 5, 9, 8, 3

5. Simplify: $\frac{12x^2 + ax - 6a^2}{9x^2 - 4a^2}$ (3mks)

6. Rewrite as a simple fraction leaving it in a simplified form with a rational denominator. (3mks)

$$\frac{2}{\sqrt{3}-1} + \frac{1}{\sqrt{3}+1}$$

7. Find the value of y if: $\text{Log } y^2 - 3 \log 2 = \log \frac{1}{32}$ (3mks)

8. The surface area of two similar spherical solids is 12cm^2 and 108cm^2 respectively. The mass of the larger one is 810 grams. Find the mass of the smaller sphere. (3mks)

9. The cost of maize flour and millet flour is Ksh.40 and Ksh.52 respectively. Calculate the ratio in which they were mixed if a profit of 15% was made by selling the mixture at Ksh.52.90 per kilogram. (3mks)
10. A quantity P varies partly as T and partly as the square root of R.
- (a) Using constants a and b write down an equation connecting P and R. (1mk)
- (b) If $R = 9$ when $P = 33$ and $R = 4$ when $P = 18$, find the values of the constants a and b. (2mks)
11. Solve the equation $2 \sin^2 \chi = 3 \cos \chi$ where $0^\circ \leq \chi \leq 360^\circ$. (4mks)
12. Two places A and B are at $(36^\circ\text{N}, 55^\circ\text{E})$ and $(36^\circ\text{N}, 125^\circ\text{W})$ respectively. Calculate the distance in nautical miles between A and B measured along the great circle through the North pole. (3mks)

13. The equation of a circle is given by $x^2 - 4x + y^2 - 10y + 4 = 0$. Find the radius and the centre of the circle. (3mks)
14. Koe is standing at a point P south of a tall tree, 60m from the foot of the tree. From point P the angle of elevation of the top of the tree is 47° . Calculate the height of the tree. (2mks)
15. Use matrix method to find the point of intersection between the lines.
 $y = 19 - 5x$ and $y = \frac{1}{3}x + 3$ (4mks)
16. Expand $\left(2 - \frac{1}{2}x\right)^6$ upto the term with x^4 . Hence find the value of $(1.98)^6$ correct to 4s.f. (3mks)

SECTION II (50 MARKS)

Answer only FIVE questions in this section:

17. (a) On the grid provided and using an appropriate scale, draw the graph of $y = 2x^2 + 4x - 9$ for the range of values $-4 \leq x \leq 3$. (3mks)
- (b) Write down the co-ordinates of the turning point of the curve. (3mks)
- (c) Use your graph to solve the equations:-
- (i) $2x^2 + 2x - 12 = 0$ (2mks)
- (ii) $2x^2 + 2x - 9 = -3$ (2mks)

GRAPH

18. The table below shows how income tax was charged on income earned in a certain year.

Taxable income per year (Kenya pounds)	Rate Shillings per Kenya pound
1 – 3630	2
3631 – 7260	3
7261 – 10890	4
10891 – 14520	5

Koe earns a salary of sh.15200 per month.

He is housed by the company.

He is a married man and is entitled to a family relief sh.450 per month.

He pays a nominal rent of sh.1050 per month.

- (a) Calculate his taxable income in K£ p.a. (2mks)
- (b) Calculate his gross tax per month. (4mks)
- (c) Calculate his net tax per month. (2mks)
- (d) Calculate his net salary per month. (2mks)

GRAPH

19. The table below shows marks scored by 50 students in a Mathematics class.

Marks	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99
Number of students	4	4	5	8	14	6	4	3	2

- (a) Calculate the mean mark. (2mks)
- (b) Draw a cumulative frequency curve (ogive). (4mks)

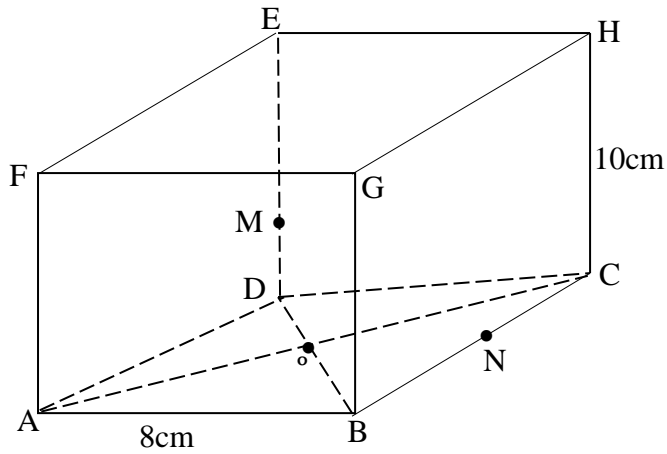
From your graph:-

- (i) Estimate the median mark. (1mk)
- (ii) Find the quartile deviation. (2mks)
- (iii) If 60% of the students are to pass, find the pass mark. (1mk)

GRAPH

20. The probability that Tembai travels by a motorcycle is $\frac{3}{5}$. If he travels by a motorcycle, the probability that the motorcycle is not compliant to the traffic rules is $\frac{3}{4}$ and the probability that he uses other means of transport that is compliant is $\frac{2}{3}$. The probability that the motorcyclist takes long greeting the road officers met on the way is $\frac{4}{7}$ and of Tembai uses other means, the probability of taking long on greeting the road officers is $\frac{1}{2}$. Using a probability tree diagram, calculate
- (a) the probability that Tembai uses a motorcycle and takes long on greeting the road officers. (4mks)
 - (b) the probability that Tembai does not take long with the road officers after using a non-compliant means of transport. (3mks)
 - (c) the probability that Tembai takes long on the way. (3mks)

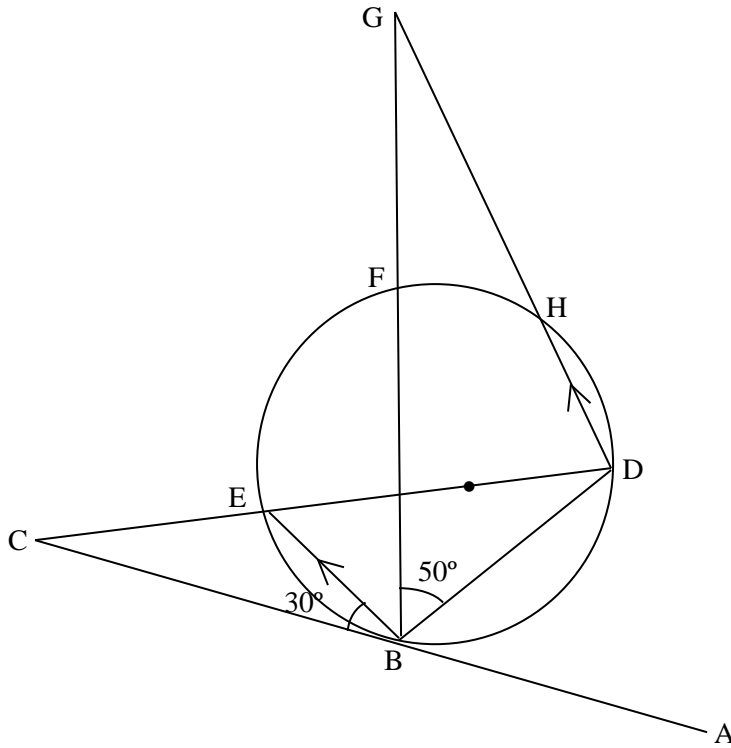
21. ABCDEFGH is a cuboids with $AB = BC = 8\text{cm}$ and $CH = 10\text{cm}$. M, N and O are the midpoints of DE, BC and AC respectively.



Calculate

- | | | |
|-----|---|--------|
| (a) | the length AC. | (2mks) |
| (b) | the length NM. | (2mks) |
| (c) | the angle between the line EN and the plane ABCD. | (3mks) |
| (d) | the angle between the plane AMC and the plane ABCD. | (3mks) |

22. In the figure below ABC is a tangent to the circle at B. DE is a diameter and DEC and BFG are straight lines. BE is parallel to DG. Angle EBC = 30° and angle DBG = 50° .

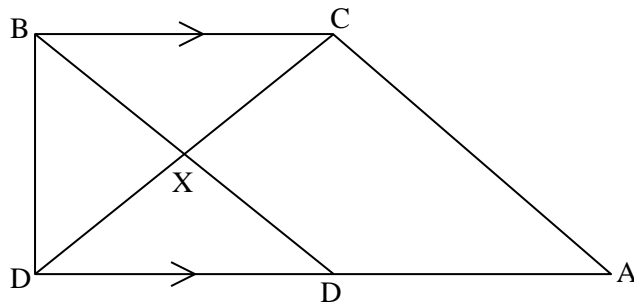


Find the following angles, giving reasons for each answer.

- | | | |
|-----|------|--------|
| (a) | BDE. | (2mks) |
| (b) | BCE. | (2mks) |
| (c) | BGD. | (2mks) |
| (d) | FDG. | (2mks) |
| (e) | BED. | (2mks) |

23. (a) Sketch the graph of $y = x^2 - 4$. (2mks)
- (b) Estimate the area bounded by the curve $y = X^2 - 4$, the X-axis, line $X = 1$ and line $X = 4$ by using the trapezoidal rule with 6 equal strips. (3mks)
- (c) Calculate the exact area in (b) above using the method of integration. (3mks)
- (d) Find the percentage error in the area found in (b) above. (3mks)

24. The diagram OACB below is a trapezium in which OA is parallel to BC. D is a point on OA such that $OD : DA = 2 : 1$ and $OA = 3BC$. The lines OC and BD meet at X such that $\vec{OX} = M\vec{OC}$ and $\vec{BX} = n\vec{BD}$.



- (a) Given that $\vec{OB} = \underline{b}$ and $\vec{BC} = \underline{a}$, express the following vectors in terms of \underline{a} and \underline{b} .
- (i) \vec{OC} . (1mk)
- (ii) \vec{BD} . (1mk)
- (b) By writing \vec{OX} in two different ways, find the values of M and n. (7mks)
- (c) Find the ratio BX : XD. (1mk)