

Name: Index no

School: Candidate's sign

Date:

121/2
MATHEMATICS
PAPER 2
MARCH/APRIL 2011
TIME: 2 ½ HOURS

BUTERE EAST ZONE JOINT EXAMINATION

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

Mathematics
Paper 2

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, index **number**, **Signature** and write date of examination in the spaces provided
- The paper contains two sections. Section I and Section II.
- Answer **ALL** the questions in section I and any Five questions in section II.
- Answers and working **must** be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations below each question.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTION II

Question	17	18	19	20	21	22	23	24	TOTAL
Marks									

Grand Total

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This paper consists of 8 printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are missing

SECTION I (50MARKS)

Answer ALL questions in this section.

1. Use logarithm tables only to evaluate (4mks)

$$\sqrt[3]{\frac{4.68 \times 0.1324^2}{5 \log 7}}$$

2. The position vectors of points A and B are $\underline{a} = -2\underline{i} + \underline{j} - 8\underline{k}$ and $\underline{b} = -3\underline{i} + 2\underline{j} - 2\underline{k}$ respectively
Find the length of AB (3mks)
3. In a hurry to complete homework a student incorrectly expanded $(a-b)^2$ as $a^2 - b^2$. Find the percentage error if $a = 3$ and $b = -2$
4. Given that $A = 4 + \sqrt{2}$ and $B = 2 + 2\sqrt{2}$ and that $A = a + b\sqrt{c}$ where a, b and c are scalars, Find the values of a, b and c (3mks)
5. Solve for x in the equation below. (3mks)
 $2 \log x 8 - \log 4 = -2$
6. An object is mapped by a transformation matrix $\begin{pmatrix} 2 & -2 \\ -3 & -2 \end{pmatrix}$ to its image whose area is given as 60cm^2 .
Find the area of the object (3mks)
7. Make b the subject of the formular $t = \sqrt{\frac{kb^2 - \ell^2}{3b^2}}$ (3mks)
8. The fourth term of a G.P is 48 and the seventh term is 384. find the common ratio and hence calculate the sum of the first six term. (4mks)
9. a) Expand and simplify the binominal expression $(2 - \frac{1}{2}y)^5$ (2mks)
b) Use the first four terms in the simplified expression in (a) above to evaluate to 5 s.f $(1.98)^5$ (2mks)
10. Given that $4x^2 + 25x + k$ is a perfect square determine the value of K . (2mks)
11. Find the radius and the co-ordinate of the centre of a circle whose equation is
 $3x^2 + 3y^2 - 18x + 12y - 9 = 0$ (3mks)
12. Three quantities P,Q and R are such that P varies directly as the cube of Q and inversely as the square of R given that $P = 16$ when $Q = 2$ and $R = 3$. Determine the value of R when $P = 288$ and $Q = 4$ (3mks)
13. The sum of Ksh 100,000 is invested at the rate of 12.6 % p.a compounded semi- annually. Calculate how long it will take for the investment to amount to Kshs. 266,000 (4mks)
14. Three angles are given in radians as follows; $\theta = \frac{5\pi c}{6}$, $\alpha = 2\frac{\pi c}{3}$ and $\beta = \frac{\pi c}{4}$
By converting to degrees or otherwise, find the value of $\sin \theta - \cos \alpha + \tan \beta$ (3mks)
15. A shopkeeper mixed a Sudanese sugar costing sh. 80 per kg with a mumias sugar costing sh .120 per kg. Find the ration in which the two types of sugar should be mixed so that a Kg of the mixture is sold at Kshs. 110 at a profit of 20% (3mks)
16. Given the matrices. $A = \begin{pmatrix} 2 & -1 \\ -3 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} -3 & 4 \\ -2 & -1 \end{pmatrix}$ and $C = A^2 - B$, write down the inverse of C. (3mks)

SECTION II (50MARKS)

Answer any five questions in this section.

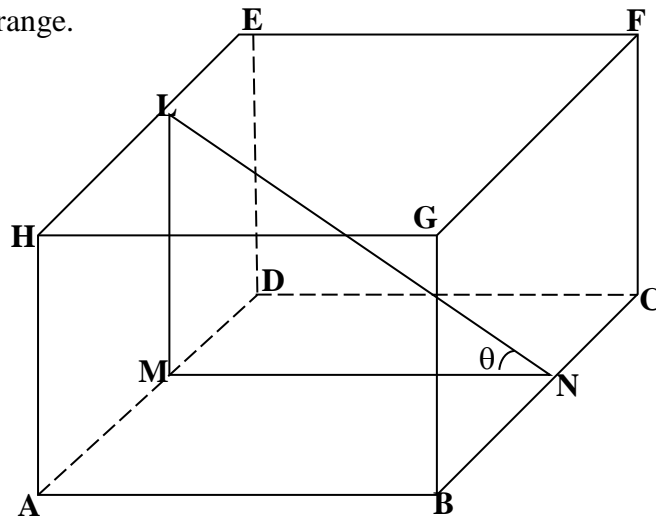
17. Revia invested shs. 15,000 at r % per annum and Shs 20,000 at s % per annum both simple interest. His investment earned him a total interest of shs. 11,400 after three years. If he had invested all his money at the average rate. $(r + s)$ % per annum simple interest, his investement would have earned him shs. 150 more than it did.
Determine the value of r and s . (10mks)
18. The table below shows the masses (measured to the nearest Kg) of 200 people.

Mass	40-49	50 - 59	60 - 69	70 -79	80 -89	90- 99	100-109
No of people	9	27	70	50	26	12	6

- a) Draw accumulation frequency curve for the above date. (4mks)
b) Use your graph to estimate;
i) The median. (1mk)

- ii) The number of people whose mass lies between 70.5kg and 75.5 kg. (1mk)
- c) From your graph, find;
- i) The lower quartile (1mk)
- ii) The upper quartile. (1mk)
- iii) The inter quartile range. (2mks)

19.



The figure above shows a cuboid ABCDEFGH with a square base. The points L, M and N are the mid-points of EH, AD and BC respectively. $AC = 7.5\text{cm}$ and $CF = 10\text{cm}$. (3mks)

Calculate to one decimal place

- a) The length of BC
- b) The length of LN (2mks)
- c) the size of the angle between plane EHBC and the horizontal plane ABDC. (3mks)
- d) the size of the angle between line AF and the plane ABCD (2mks)

20. Veterinary researchers were experimenting with a new drug on fowls in a research station. A sample of fowls which were known to have the disease was used. In this sample 30 fowls were treated with the drug and the remaining 18 fowls were not treated.

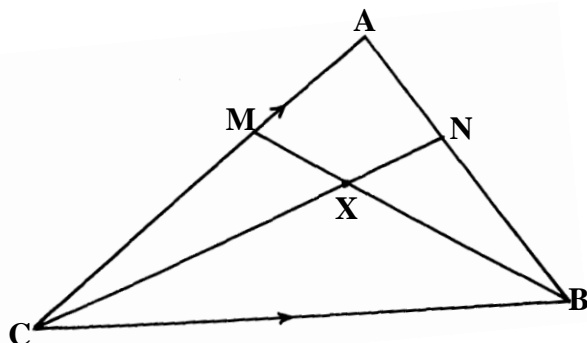
Calculate the probability that a fowl selected at random from the sample is

- i) Treated with the drug (1mk)
- ii) Not treated with drug (1mk)
- b) The probability that a fowl treated with the drug will die is $\frac{1}{10}$ while the probability that one which is not treated will die is $\frac{1}{10}$

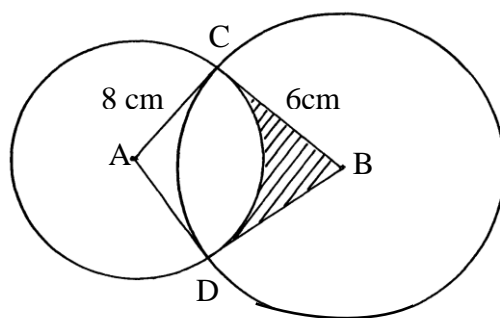
Calculate the probability that a fowl picked at random from the sample is

- (i) Treated with the drug and will die. (2mks)
- (ii) Not treated with the drug and will die (2mks)
- (iii) Treated with the drug and will not die. (2mks)
- (iv) Not treated with the drug and will not die. (2mks)

21. The diagram shows triangle OAB in which N is the mid – point of A – B and M is a point on OA such that OM: MA = 2: 1. Lines ON and BM meet at X such that $\vec{OX} = h\vec{ON}$ and $\vec{MX} = k\vec{MB}$.



- a) Given that $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$ express \vec{AB} , \vec{ON} and \vec{BM} in terms of \mathbf{a} and \mathbf{b} (4mks)
 b) By expressing \vec{OX} in two different ways determine the values of h and k (6mks).
22. In the figure below shows two circles intersecting at C and D. the centres are A and B with radius 8 cm and 6 cm respectively. AB = 10cm.



Determine:

- a) The size of angle DBC (2mks)
 b) The size of angle DAC (2mks)
 c) The area of the sector ACD. (3mks)
 d) The area of the shaded region (3mks)

23. a) complete the following table for the equation $y = 2x^3 + 3x^2 - 6x - 4$ (2mks)

X	-4	-3	-2	-1	0	1	2
$2x^3$	-128		-16		0	2	16
$3x^2$	48	27			0		12
$-6x$	24		-12		0		-12
-4	-4	-4	-4	-4	-4	-4	-4
Y	-60		-4		-4		12

- b) On the grid paper provided draw the graph of $y = 2x^3 + 3x^2 - 6x - 4$ (3mks)
 c) By drawing a suitable straight line. Use your graph to solve the equation.
 i) $2x^3 + 3x^2 - 6x - 4 = 0$ (2mks)
 ii) $2x^3 + 3x^2 - 4x - 2 = 0$

24. A farmer uses two tractors to harvest wheat on his farm. One of the his harvesters is a Ferguson and the other is a Honda. It normally takes both harvesters working together 3 hours and 20 minutes to complete the work. On one occasion both harvesters started working together, but after 40 minute, the Ferguson broke alone, it took a further 4 hours to complete the work. Determine how long it would take each harvester working alone to complete the job in hours. (10mks)