Name _____ Index No. _____
Date _____

Candidate's signature _____

121/2
MATHEMATICS
PAPER 2
JULY / AUGUST 2014
TIME : 2 ½ HOURS

KANGUNDO DISTRICT FORM IV MULTILATERAL EXAMINATION 2014
Kenya Certificate of Secondary Education
Mathematics
Paper 2
2 ½ hours

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in the spaces provided at the top of this page.
2. The paper consists two sections: Section I and II.
3. Answer all the questions in section I and ONLY 5 in section II.
4. Show all the steps in your calculations giving your answers at each stage in the spaces below each question.
5. Marks may be given for correct working even if the answer is wrong.
6. Non-programmable silent electronic calculator 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

17	18	19	20	21	22	23	24	Total

GRAND TOTAL

This paper consists of 16 printed pages

SECTION I (50 MARKS)

Answer all the questions in this section

1. Find the value of x that satisfies the equation.
   Log (x + 5) = log 4 – log (x + 2) (3marks)

2. If x = 3.1 , y =7.4 and z = 6.8, find the percentage error of $\frac{z^3yx}{x + z}$ (3 marks)

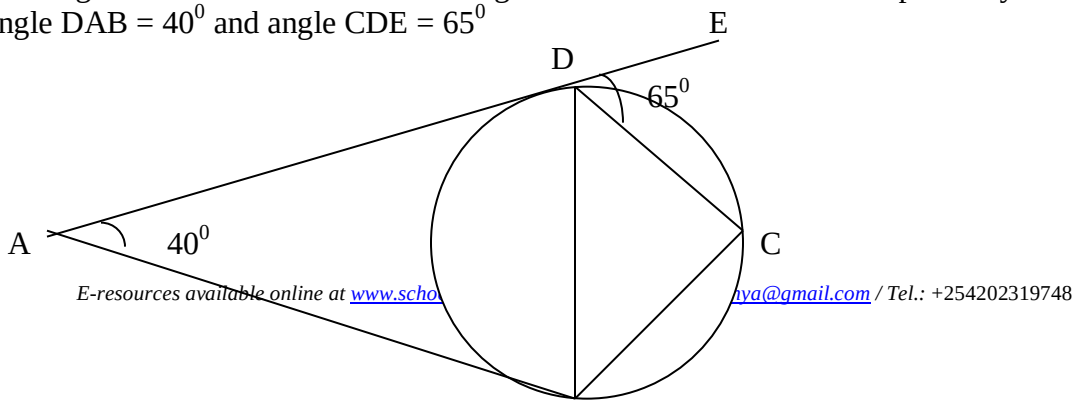
3. Two fruit juices A and B are mixed together. Juice A cost sh. 50 per litre, and juice B cost sh. 80 per litre. What is the ratio if the cost is sh. 59 per litre of the mixture. (3 marks)

4. Expand $(1 + {}^{3}/_{x})^{5}$ upto the fifth term. (2 marks)

(ii) Hence use your expansion to calculate $(2.5)^{5}$ to 3 decimal places. (2 marks)

5. Find the centre and radius of the circle $x^2 + y^2 - 2x + 4y + 1 = 0$. (3 marks)

6. In the figure below ADE and AB are tangent to the circle at D and B respectively.
Angle DAB = 40^0 and angle CDE = 65^0



B

3

Giving a reason for your answers, find the size of

(a) $\angle ADB$ (1 mark)

(b) $\angle$ ABC (2 marks)

7. Express $\frac{1 + \sqrt{3}}{2 - \sqrt{3}}$ in the form $a + b\sqrt{c}$ where a, b and c are whole numbers. (3marks)

8. Change the subject of $f = \frac{1}{2\pi\sqrt{LC}}$ to L (4 marks)

9. Solve for the values of $0 \leq x \leq 360^0$ in the equation given by
$4 - 5 \cos x - 2 \sin^2 x = 0$ (3 marks)

10. If $a = 3i + 2j + 5k$ and $b = i - j - k$ find $|2a - 3b|$ (3 marks)

11. Use logarithm tables to evaluate

$$\sqrt[3]{\frac{74.93 \log 8.61}{(10.14 + 2.42)^2}}$$ (4 marks)

12. Find the standard deviation of the given data

Marks out of 20	1 – 5	6 – 10	11 – 15	16 – 20
No. of students	3	7	6	4

(4 marks)

13. Use $\sqrt{5} = 2.236$ to evaluate to 3 dp ,

$$\frac{8}{\sqrt{5} - 1}$$

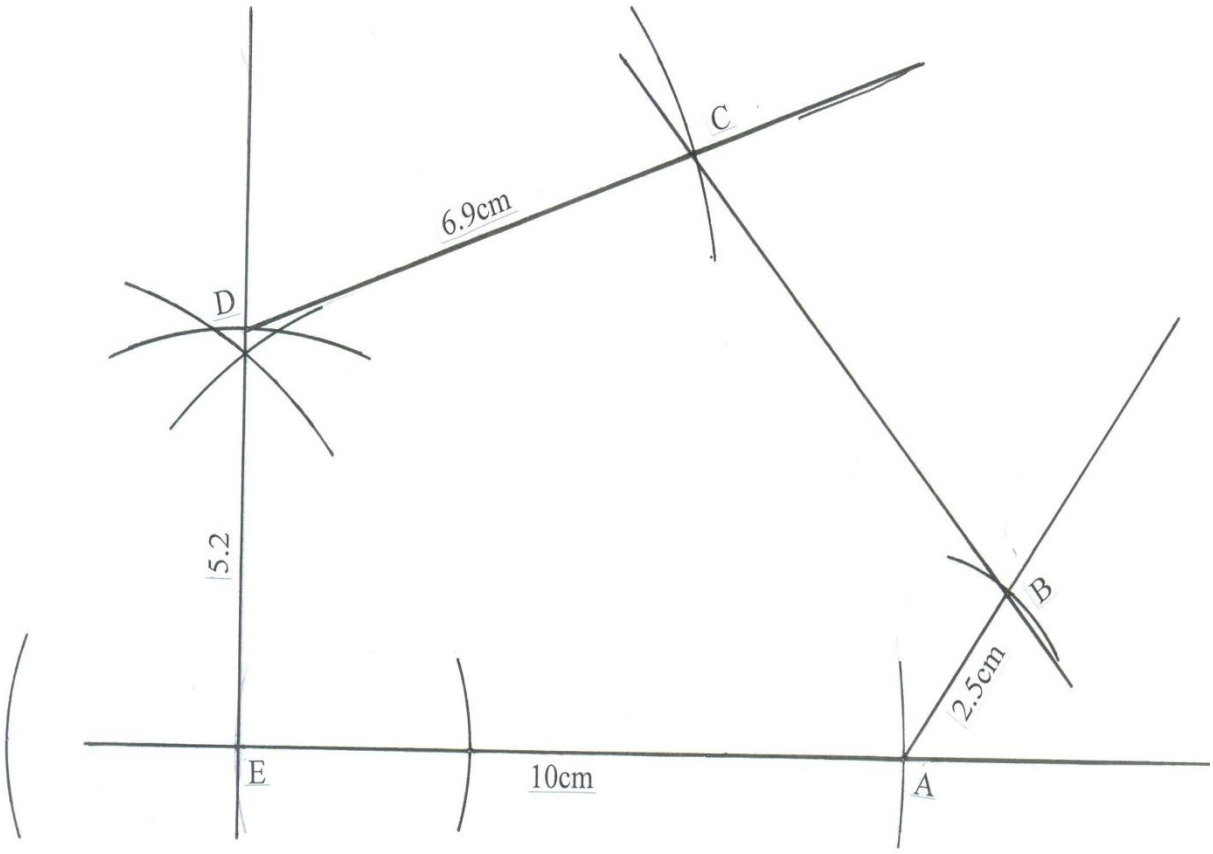
(2 marks)

14. The first four terms of a GP are 81, m, n, 3. Find the values of m and n. (3 marks)

6

15. If $x = \begin{pmatrix} 2 & 1 \\ 0 & -4 \end{pmatrix}$, find $x^2 + 2x$ (3 marks)

16 . In the figure below ABCDE, AB =2.5cm, AE = 10cm, ED =5.2cm and DC =6.9cm



Construct the locus of points equidistant from CD and CB. (2 marks)

SECTION II (50 MARKS)

Answer any five questions

17. Use 6371 km for the radius of the earth.

(a) Find the distance from A (45^0N, 63^0N) to C (45^0N, 107^0E) in

(i) km (4 marks)

(ii) nm (2 marks)

(13) Two pilots X and Y started from A at the same time. X flew to C at a speed of 600km/h while Y flew to B at a speed of 400km/h. Who arrived first at their destination and by how many hours ? (4 marks)

18. The figure below is a frustum of a rectangular pyramid with AB = 12cm, EF = 8cm, BC = 9cm and height of 6cm

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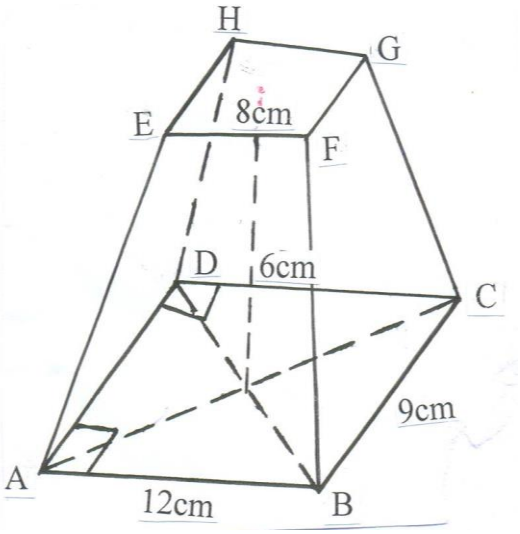


(a) Calculate the full height of the pyramid. (2marks)

(b) Find the angle that the plane ABFE makes with the base ABCD. (2 marks)

(c) Find the angle that AG makes with the base ABCD. (3 marks)

(d) Find the angle that AC makes with line EF. (1 mark)

(e) Find the angle that plane BCGF makes with the base ABCD. (2 marks)

19. (a) x varies as the cube of y and inversely as the square root of z, and x = 6 when y = 3 and z = 35. Find the equation connecting x, y and z. (2 marks)

(i) Find x when y = 7 and z = 9 (2 marks)

(ii) Find y when x = 8 and z = 16 (2 marks)

(b) If y is increased by 20% and z decreased by 36%, find the % increase in x. (4 marks)

20. A married couple intends to have 3 children. They consult an expert who tells them that the probability of a male birth is 0.55.

(a) Draw a tree diagram to represent this occurrence. (2 marks)

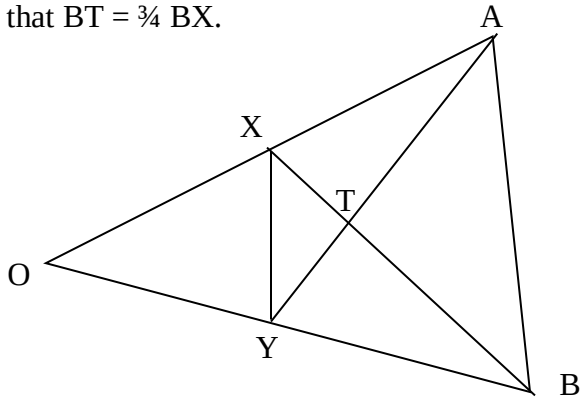
(b) Find the probability that

(i) All the three children will be female. (2 marks)

(ii) At least a male is born. (2 marks)

(iii) At least 2 will be females, giving your answer to 3 s.f. (4 marks)

21. In the figure below OAB is a triangle in which OX = $^1/_3$ OA and OY = $^1/_3$ OB.
T is a point on BX such that BT = ¾ BX.



(a) Given that OA = a and OB = b, express the following vectors in terms of a and b. (6 marks)

(i) XY (1 mark)

(ii) BX (1 mark)

(iii) AT (2marks)

(iv) TY (2 marks)

(b) Hence or otherwise show that A, T and Y are collinear. (4 marks)

22 A triangle formed by A(1, 3), B(3, 1) and C (2, -1) is rotated through a positive quarter about (1, 1). Find the coordinates of the resulting triangle $A^1B^1C^1$. (3 marks)

(b) Triangle $A^1B^1C^1$ is transformed by the matrix $\begin{pmatrix} 1 & 2 \\ -1 & 3 \end{pmatrix}$ into $A^{11}B^{11}C^{11}$.

Find the coordinate of$A^{11}B^{11}C^{11}$. (3 marks)

(c) Draw accurately all the three triangles. (4 marks)

23. Use the taxation rates table below to answer the questions that follow.

Taxable income in K£ p.a	Rate % per K£
1 – 4500	10%
4501 – 7500	15%
7501 – 10500	20%
10501 – 13500	25%
13501 – 16500	30%
Over 16500	40%

A civil servant is entitled to a monthly personal relief of Kshs. 3000 and her tax (PAYE) is Ksh. 9000 per month. She is deducted NHIF Ksh.350 per month. WCPS Kshs. 800 and co-op shares Kshs. 1200 per month. Calculate

(a) The civil servant's total deduction per month. (1 mark)

(b) Total tax per month. (1 mark)

(c) The civil servant's annual gross salary. (6 marks)

(d) The civil servant's basic salary if her monthly house allowance and medical allowances are Kshs. 10,000 and Ksh. 2000 respectively. (2 marks)

24. The displacement in metres of a particle from a point O after t seconds is given by $s = t (t – 2) (t – 1)$ find:-

(a) The speed of the particle when t =2 seconds. (3 marks)

(b) Its minimum speed. (2 marks)

(c) The time when the particle is momentarily at rest. (3 marks)

(d) Its acceleration when t = 3 seconds. (2 marks)

ANSWERS:

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