Name..... Adm No.....Class.....

121/2
Mathematics
Paper 2
2 ½ Hours
June 2014

KASSU JOINT EVALUATION TEST (J.E.T)
Kenya Certificate of Secondary Education (K.C.S.E)

INSTRUCTIONS TO CANDIDATES

- Write your name and Admission number in the spaces provided at the top of this page.
- This paper consists of two sections: Section I and Section II.
- Answer ALL questions in section 1 and ONLY FIVE questions from section II
- All answers and workings must be written on the question paper in the spaces provided below each question.
- Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
- Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

FOR EXAMINERS 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

SECTION I (50 MARKS)

1. Use logarithm tables to solve; (4mks)

$$\sqrt[3]{\frac{45.23 \times 0.1122}{6394}}$$

2. Solve for θ in the equation $\sin(4\theta + 10^{\circ}) - \cos(\theta + 70^{\circ}) = 0$ (3mks)

3. A quantity K is partly constant and partly varies as M. When K = 45, M = 20, and when K = 87, M = 48

a) Find the formulae connecting K and M (1mk)

b) Find K when M = 36 (2mk)

4. (i) Expand $(2x-1)^5$ in ascending powers of x (1mk)

(ii) Hence use your expansion up to the third term to evaluate $(-0.98)^5$ (2mks)

5. Find the equation of the normal to the curve $y = x^2 + 4x - 3$ at point (1, 2). (3mks)

6. Using a ruler and a pair of compass only, construct triangle ABC in which BC is 6.6cm, AC=3.8cm and AB= 5.6cm. Locate point E inside triangle ABC which is equidistant fromponts A, and C such thatangle AEC=90^0. (3mks)

7. Solve the following trigonometric equation $2\cos 2(x+30) = 1$ for $0 \le x \le 360^0$ (3 mks)

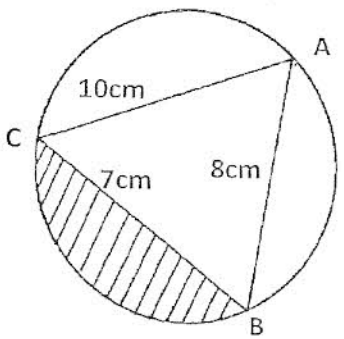
8. The position vectors of A and B are given as $\mathbf{a}= 2\mathbf{i}-3\mathbf{j}+4\mathbf{k}$ and $\mathbf{b}= -2\mathbf{i}-\mathbf{j}+2\mathbf{k}$ respectively. Find to 2decimal places, the length of the vector $\overrightarrow{AB}$. (3mks)

9. A TV set was bought on hire purchase. A down payment (deposit) of Ksh 5000 was paid and a 15 monthly installment of Kshs 1500 was required.

a) Calculate the total amount paid on hire purchase (1mks)

b) If the hire purchase payment is 20% than cash payment, find the cash price (2mks)

10. The figure below shows a triangle ABC inscribed in a circle. AC = 10cm, BC = 7cm and AB = 10cm. Find the radius of the circle.(Leave your answer to the nearest 1 decimal place) (3mks)



11. The floor of a rectangular room measures 4.8m by 3.2m. Estimate the percentage error in the area.

(3mks)

12. Simplify without using mathematical tables or a calculator (3mks)

$$\frac{\log 16 + \log 81}{\log 8 + \log 27}$$

13. Rationalize the denominator fully and simplify, leaving your answer in surd form. (3mks)

$$\frac{2}{\sqrt{5}+\sqrt{3}} - \frac{5}{\sqrt{7}-\sqrt{6}}$$

SECTION II (50 MARKS)

Answer any five questions from this section

17. Mr. Ouma is a civil servant on a basic salary of Kshs.18,000. On top of his salary, he gets a monthly house allowance of Kshs.14,000, medical allowance of Kshs. 3080 and a commuter allowance of Kshs. 4640. He has a life insurance policy for which he pays a premium of kshs.800 p.m and claims an insurance relief of shs 3 for every 20/= on the monthly premiums. He is entitled to a personal relief of kshs.1056 p.m

a) Using the tax table below calculate his PAYE

Income in K£ p.m	Rate %
1 – 484	10
485 – 940	15
941 – 1396	20
1397 – 1852	25
over 1852	30

b) In addition to PAYE the following deductions are made on his pay every month.
- Wcps at 2% of his basic salary
- NHIF of kshs. 400
- Loan repayment of kshs. 4000
- Co-op shares of kshs. 800

(i) Calculate his total monthly deductions in Kshs. (7mks)

(ii) Calculate his net monthly pay in Kshs. (3mks)

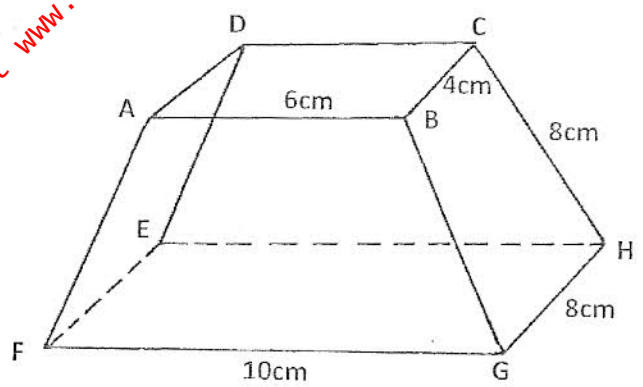
18. The points $A^1B^1C^1$ are images of ABC A (1, 4), B (-2, 0), C (4, -2) respectively under a transformation N presented by the matrix $N = \begin{pmatrix} 3 & 1 \\ 4 & 0 \end{pmatrix}$.

a) Write down the co-ordinates of $A^1B^1C^1$ (3mks)

b) $A^{11}B^{11}C^{11}$ are the images of $A^1B^1C^1$ under a transformation represented by matrix $M = \begin{pmatrix} 2 & -2 \\ 1 & 0 \end{pmatrix}$. Write down the co-ordinates of $A^{11}B^{11}C^{11}$. (3mks)

c) A transformation N followed by M can be represented by a single transformation K. Determine the matrix K (4mks)

19. The figure below shows a solid frustum of a pyramid with a rectangular top of side 6cm by 4 cm and a rectangular base of side 10cm by 8 cm. The slant edge of the frustum is 8cm.



a) Calculate the height of the frustrum (3mks)

b) Calculate the volume of the solid frustum. (3mks)

c) Calculate the angle between the line FC and the plane FGHE (2mks)

d) Calculate the angle between the planes BCHG and the base EFGH. (2mks)

20. The 2^{nd} and 5^{th} terms of an arithmetic progression are 8 and 17 respectively. The 2^{nd}, 10^{th} and 42^{nd} terms of the A.P. form the first three terms of a geometric progression. Find

(a) the 1^{st} term and the common difference. (3mks)

(b) the first three terms of the G.P and the 10^{th} term of the G.P. (4mks)

(c) The sum of the first 10 terms of the G.P. (3mks)

21. Hospital records indicating the maternity patients that stayed in a hospital for a number of days are as shown in the table below.

No of days stayed	Frequency (No of patients)
3	15
4	22
5	56
6	19
7	5

Find the probability that

a) A patient stayed exactly 5 days (2mks)

b) A patient stayed less than 6 days (2mks)

c) A patient stayed at most 4 days (2mks)

d) A patient stayed at least 5 days (2mks)

e) A patient stayed less than 7 days but more than 4days (2mks)

22. The position of two towns **X** and **Y** are given to the nearest degree as **X** (45^0 N, 110^0 W) and **Y** (45^0 N, 70^0 E). Take $\pi = 3.142$, **R** = 6370km, find:

(a) The distance between the two towns along the parallel of latitude in km. (3mks)

(b) The distance between the towns along a parallel of latitude in nautical miles. (3mks)

(c) A plane flew from **X** to **Y** taking the shortest distance possible. It took the plane 15hrs to move from **X** and **Y**. Calculate its speed in Knots. (4mks)

23. A transporter has a van and a pick-up available for trips to the nearest town. He can allow atmost 120 litres of petrol and 4 litres of oil to be used each day. Each trip.the van uses 10litres of petrol and 0.2 litres of oil. Each trip the pick-up uses 6 litres of petrol and 0.8 litres of oil. The profit made on each trip by the van is shs. 60 and on each trip by the pick-up is shs. 80. If he makes x trips in the van and y trips in the pick-up;

a) Write down four inequalities which must be satisfied by x and y (4marks)

b) Represent the inequalities above graphically using a scale of 1cm to represent 2 units in both axes, and then determine the number of trips made by each vehicle to give maximum profit by use of a search line. Then give the maximum profit. (6marks)

24. A stone is thrown straight up from the edge of a roof, 80m above the ground, at a speed of 10m/s. Given that the acceleration due to gravity is 10m/s^2

a) How far is the stone 3 seconds later? (5mks)

b) What time does it hit the ground? (3mks)

c) What is the velocity of the stone when it hits the ground? (2mks)