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Index Number...../.....

Candidate's Signature.....

Date.....

121/2
MATHEMATICS
Paper 2
JULY/AUGUST 2013
2 ½ hours

SUBUKIA DISTRICT JOINT ASSESSMENT
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 above.
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 **only 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 calculations, giving your answers at each stage in the spaces 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.
9. This paper consists of 12 printed pages.
10. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

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

SECTION A 50 MARKS

Answer all the questions in this section

1. Use logarithms table to evaluate.

(4mks)

$$\left(\frac{6.792 \times 0.7343}{\log 4} \right)^{-\frac{1}{2}}$$

2. By rationalizing the denominator, evaluate the following surds

(3mks)

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

3. Make H the subject of the formula

3mks

$$\frac{f\sqrt{H}}{d} = \sqrt{\frac{a^2 - k}{H}}$$

4. Ken was asked to truncate $\frac{7}{9}$ to 3 decimal places. He truncated it instead to 3 decimal places.. Calculate the percentage error resulting from the truncating. (3mks)

5. Two bags M and N are on a desk. Bag M contains 6 red pens and 4 black pens; bag N contains 2 red pens and 8 black pens. A bag is chosen at random and two pens drawn from it, one at a time without replacement. Find the probability of picking two pens of the same colour. 3mks

6. Expand $(1 + 3x)^7$ up to x^3 , hence use the expansion to estimate the value of $(1.3)^7$ correct to three decimal places. 3mks

7. If the length of a rectangle is increased in the ratio 7:3 and the width decreased in the 2:5, **find** whether the area is increased, and what ratio. (4marks)

8. The points A and B are (2,10) and (-4,8) respectively. If AB is a diameter of the circle, find the equation of this circle. 3mks

9. A circle of radius 15cm is divided into ten equal sectors. In each sector, **find**:

a. The area of the triangle

(2mks)

b. The area of the segment

(2mks)

10. (a) **Find** the inverse of the Matrix $\begin{pmatrix} 3 & 1 \\ 2 & -1 \end{pmatrix}$

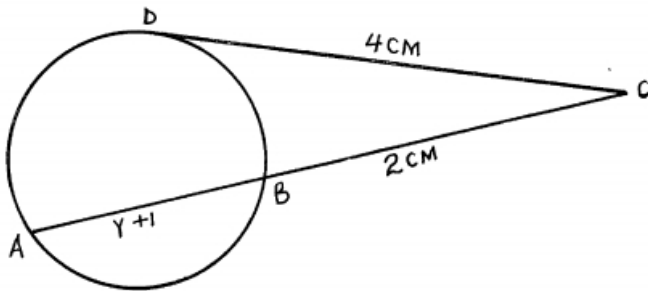
(1mark)

(b) Hence **solve** for x and y using the matrix method given that $\begin{matrix} 3x + y = 4 \\ 2x - y = 1 \end{matrix}$ (3 marks)

11. A particle moves in a straight line such that its velocity v m/s is given by $v=32 + 4t - t^2$ after t seconds.
Calculate the distance covered by the particle in the 7th second. (3mks)

12. Solve the following equations for values of θ from 0° to 360°
 $3 \cos^2\theta - 7 \cos \theta = 6.$ 3mks

13. Find the value of y in the figure below. (2mks)



14. Find the sum to 20 terms of the series

$$\text{Log}2 + \text{Log} 4 + \text{Log} 8 + \text{Log} 16 + \dots\dots$$

Give your answer to 3 significant figures.

(3mks)

15. A quantity **P** is partly constant and partly varies as the cube of **Q**. When **Q**=1, **P**=23 and when **Q** =2, **P**= 44.

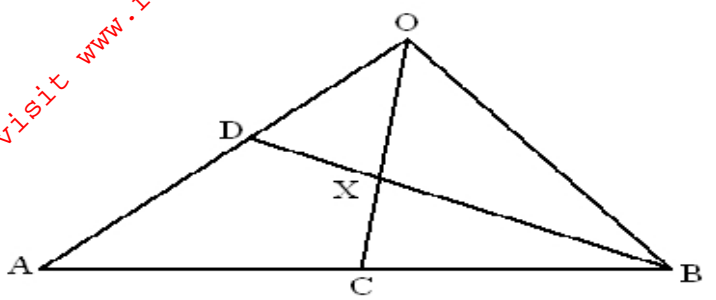
Find the value of **P** when **Q** = 5.

3mks

16. Grade A tea costs Ksh 100 per kg while grade B costs ksh 150 per kg. Find the ratio in which the two grades should be mixed to get a mixture worth ksh.140 per kg.

2mks

18. In the figure below C is a point on AB such that $\vec{BA} = 3\vec{BC}$ and D is the mid-point of OA. OC and BD intersect at X Given that $\vec{OA} = a$ and $\vec{OB} = b$



(a) Write down in terms of a and b the vectors.

(i) \vec{AB} (1mk)

(ii) \vec{OC} (2mks)

(iii) \vec{BD} (1mk)

(b) If $\vec{BX} = h \cdot \vec{BD}$, express \vec{OX} in terms of a , b and h (1mk)

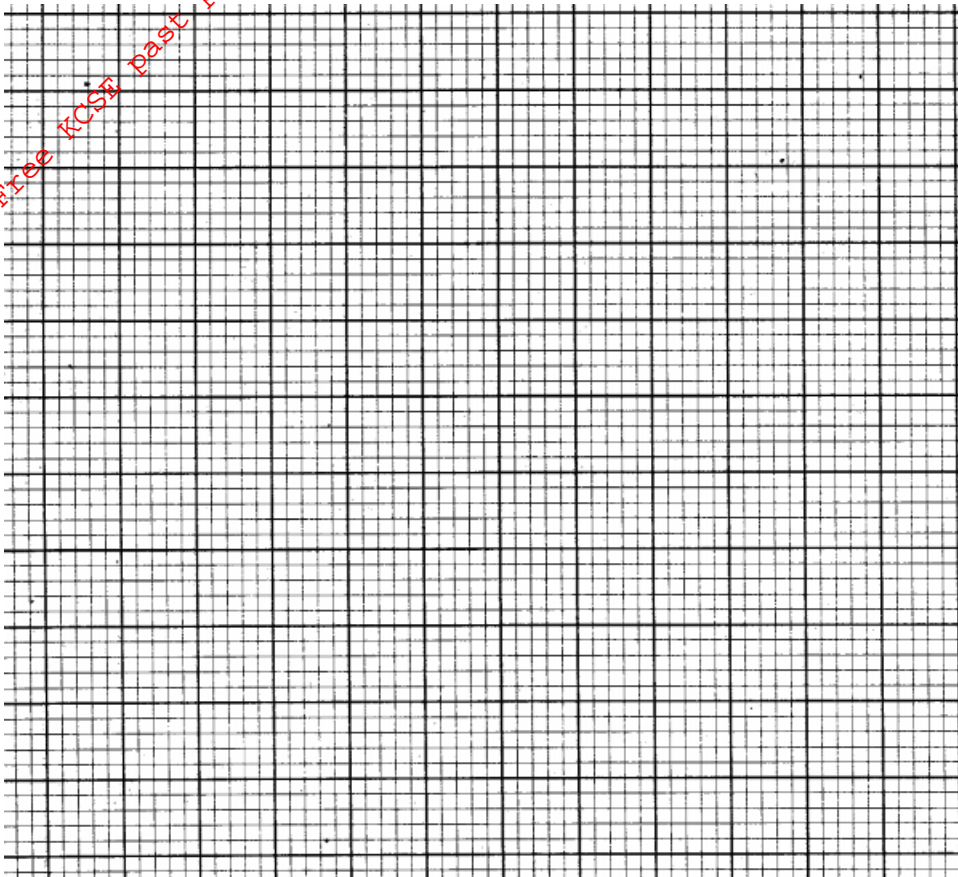
(c) If $\vec{OX} = k \vec{OC}$, find h and k (4mks)

(d) Hence express \vec{OX} in terms of a and b only. (1mk)

19. a) Fill the blank spaces in the table below for the curve $y = -x + 4x^2 - 6 + x^3$ for $-5 \leq x \leq 2$. (2mks)

x	-5	-4	-3	-2	-1	0	1	2
-x	5	4	3	2	1	0	-1	-2
$4x^2$		64	36	16	4	0		16
-6	-6	-6	-6	-6	-6	-6	-6	-6
x^3	-125		27		-1	0	1	8
y			6		-2	-6		16

b) a) Draw the graph of $y = -x + 4x^2 - 6 + x^3$ for $-5 \leq x \leq 3$. (3mks)



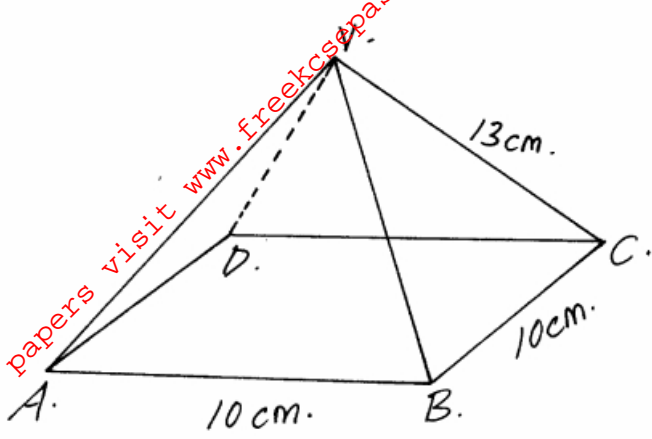
b) Use your graph to solve the following equations

i) $x^3 + 4x^2 - x - 6 = 0$ (1mk)

ii) $-3x^3 - 12x^2 + 15 = 0$ (2mks)

iii) $-x^3 - 4x^2 + 2x + 9 = 0$ (2mks)

20. The figure below shows a square ABCD point V is vertically above middle of the base ABCD. AB = 10cm and



VC = 13cm.

Find;

(a) the length of diagonal AC (2mks)

(b) the height of the pyramid (2mks)

(c) the acute angle between VB and base ABCD. (2mks)

d) the acute angle between BVA and ABCD. (2mks)

e) the angle between AVB and DVC. (2mks)

21. The positions of two towns on the surface of the earth are given as A(30°S , 20°W) and B(30°S , 80°E)

Find

a) the difference in longitude 2mks

a) the distance between the two towns along a parallel of latitude in

(i) km (take the radius of the earth as 6370km and $\pi = \frac{22}{7}$) 3mks

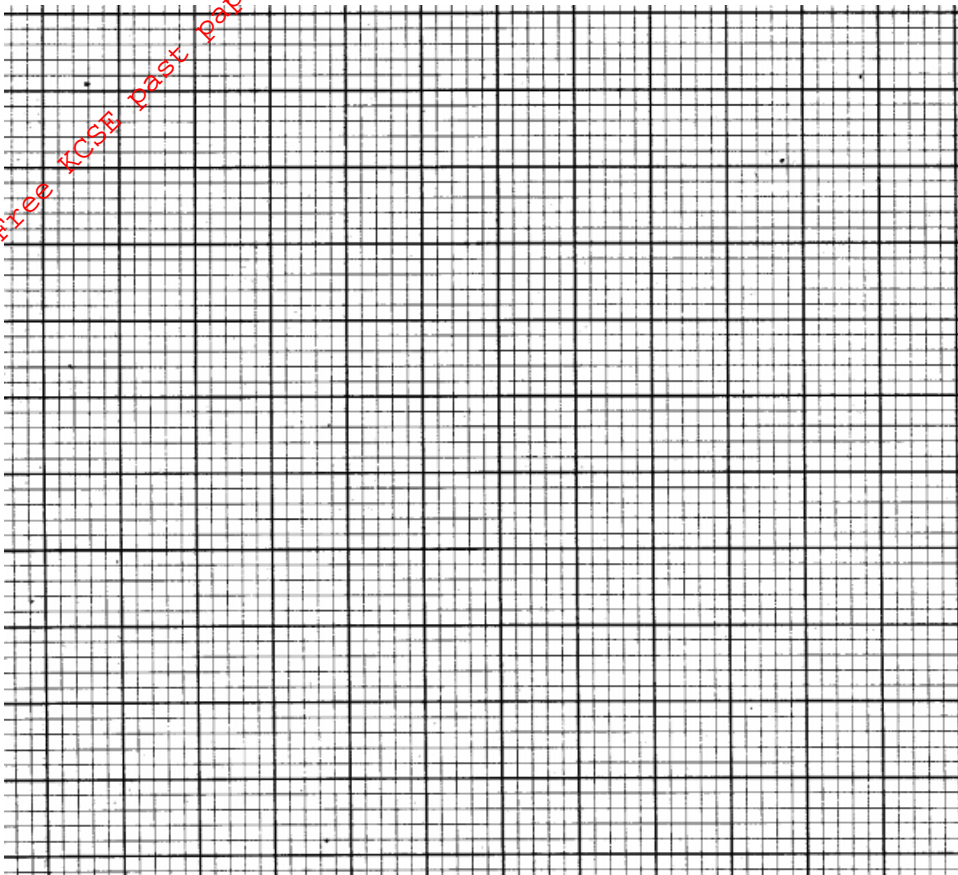
(ii) nm 2mks

c) Find the local time in town B when it is 1:45pm in town A. 3mks

22. The marks of 50 students in a mathematics test were taken from a form 4 class and recorded in the table below.

Mark (%)	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Frequency	2	5	7	9	11	8	5	3

- (a) On the grid provided, **draw** a cumulative frequency curve of the data. (3mks)
 Take: 1cm to represent 5 students on the vertical scale and 1cm to represent 10 marks on the horizontal scale.



- (b) From your curve in (a) above
- (i) **Estimate** the median mark. (1mk)
 - (ii) **Determine** the Interquartile deviation. (2mks)
 - (iii) **Determine** the 10th to 90th percentile range. (2mks)
- (c) It is given that students who score over 45 marks pass the test. Use your graph in (a) above to **estimate** the percentage of students that pass. (2mks)

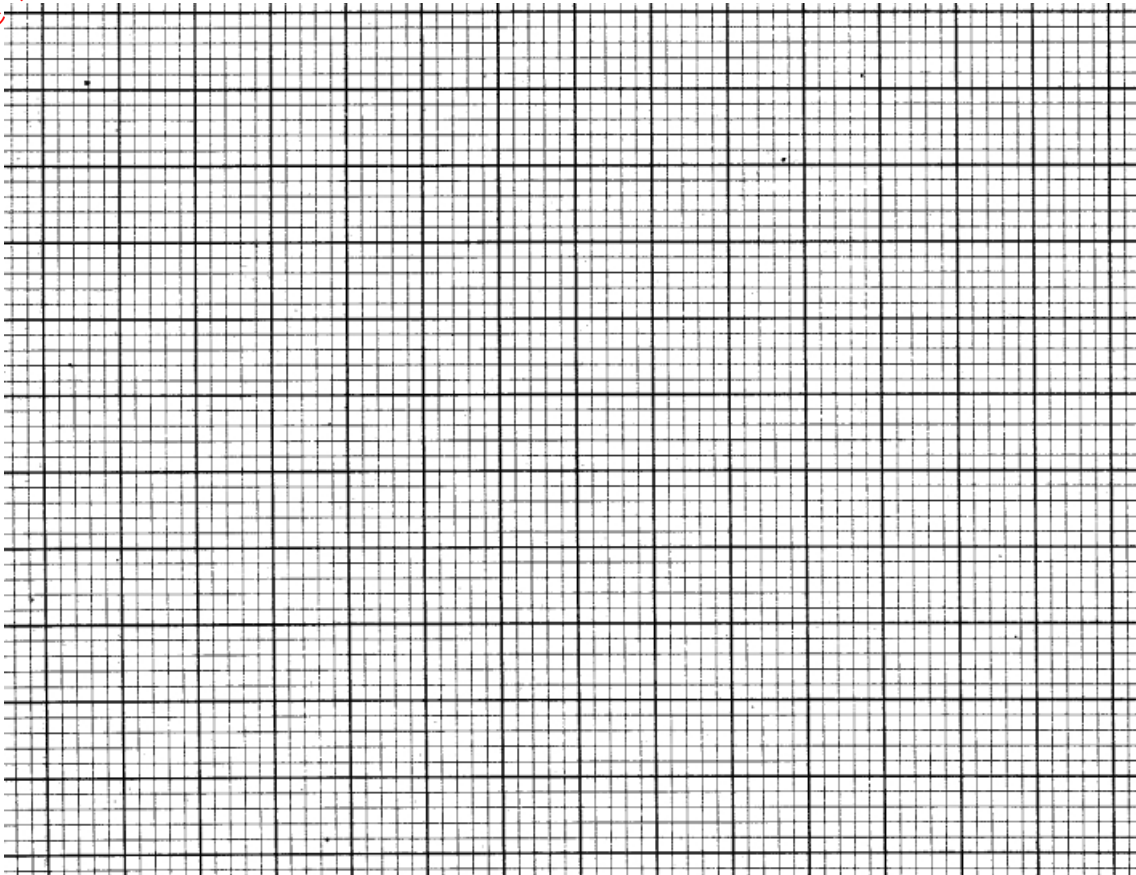
23. Use ruler and a pair of compasses only in this question

- a) Construct triangle ABC such that $AB = 6\text{cm}$, $AC=BC$ and angle $ACB = 135^\circ$ 4mks
- b) On one side only construct the locus of P such that:
- i) $\angle APB = 67.5^\circ$ 1mk
- ii) area of triangle $APB = 9\text{cm}^2$ 3mks
- c) i) Locate P_1 and P_2 the two possible positions of P which satisfy the two conditions above 1mk
- ii) Measure the distance between P_1 and P_2 . 1mk

24. A transport company required to transport 720 passengers. It has two kinds of vehicles, Buses which carry 60 passengers each, and lorries which can carry 90 passengers each. Only 10 buses and 8 Lorries are available.

a) Write down the inequalities that satisfy the facts given above. Let x be the number of buses and y be the number of lorries. (3mks)

b) (i) represent the inequalities formed graphically. (3mks)



(ii) Given that the cost of running a bus is Ksh. 1,000 and that of a lorry is Ksh. 200, What is the least number of vehicles that can be used. (2mks)

(iii) What is the minimum cost of transporting these passengers? (2mks)