Name...class............admno...........

121/1
MATHEMATICS
PAPER 1
July - 2014
2 ½ HOURS

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

INSTRUCTIONS TO CANDIDATES
1. Write your name, class and admno. in the spaces provided at the top of this page
2. The paper consists of two sections. Section I and Section II.
3. Answer ALL the questions in Section I and any FIVE from Section II.
4. All answers and working must be written on the question paper in the spaces provided below each question.
5. Show all the steps in your calculations giving your answer at each stage in the space below each question.
6. Marks may be given for correct working even if the answer is wrong.
7. Negligence and slovenly work will be penalized
8. Non programmable silent electronic calculator and KNEC Mathematical table may be used except where stated otherwise.

Section I   **FOR EXAMINER'S USE ONLY**

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

1. A piece of land is to be divided into 20 acres or 24 acres or 28 acres for farming and leave 7 acres for grazing. Determine the smallest size of such land. (2mks)

2. Evaluate without using tables or calculators (3mks)

$$\frac{\frac{6}{7} \, of \, \frac{14}{3} \div 80 \times -\frac{20}{3}}{-2 \times 5 + (14 \div 7) \times 3}$$

3. A two digit number is such that the sum of the ones and the tens digit is ten. If the digits are reversed, the new number formed exceeds the original number by 54. (3mks)

4. Use tables of square, cubes roots and reciprocals to find the value of x if (4 mks)

$$x = \sqrt[3]{\frac{1}{0.2365} + \frac{2}{(2.6228)^2}}$$

2

5   The circle below circumscribes a triangle ABC where AB = 6.3cm, BC = 5.7cm and AC = 4.8cm. Find the area of the shaded part.   (4 mks)
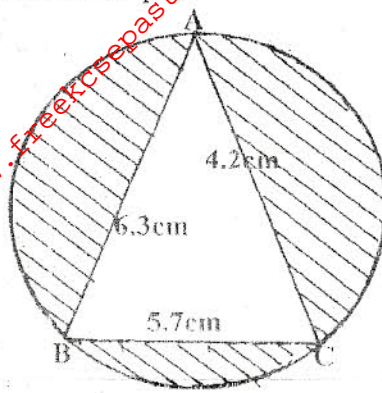
6   An 890kg culvert is made of a hollow cylindrical material with outer radius of 76cm and an inner radius of 64cm. It crosses a road of width 3m, determine the density of the material used in its construction in Kg/m^3 correct to 1 decimal place.   (3mks)

7   Solve for x: $49^x + 7^{2x} = 686$ (3mks)

8. Foreign exchange on 27/5/2010 was given as follows:.

Currency	Buying (Kshs)	Selling (Kshs)
1 Euro	119.45	121.26
1 Sterling pound	147.35	149.47

A tourist came to Kenya from London with 6000 Euros which he converted to Kenya shillings at a bank. While in Kenya he spent a total of Kshs.300,000 then converted the balance into sterling pounds at the Same bank. Calculate the amount in sterling pounds he received. (3mks)

9 Write down all the inequalities represented by the regions R.   (3mks)
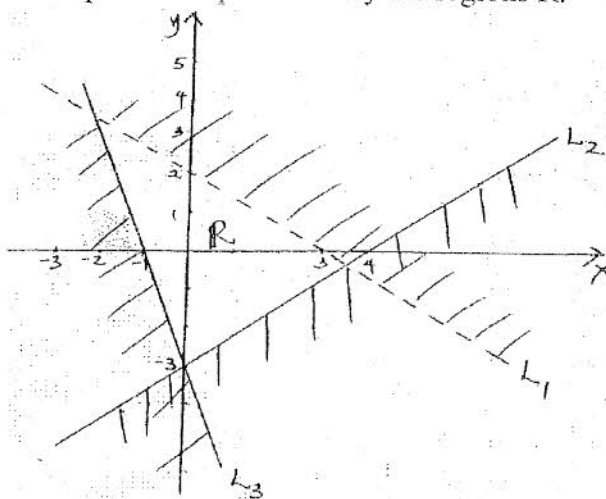
10. The sum of the interior angles of an **n**-sided polygon is 1260°. Find the value of **n** and hence name the polygon   (2mks)

4

11. From a point 20m away on a level ground the angle of elevation to the lower window line is 27^0 and the angle of elevation to the top line of the window is 32^0. Calculate the height of the window.

(3 marks)

12. Find the angle θ in degrees from the figure below (3mks)

$2x - 3y + 6 = 0$
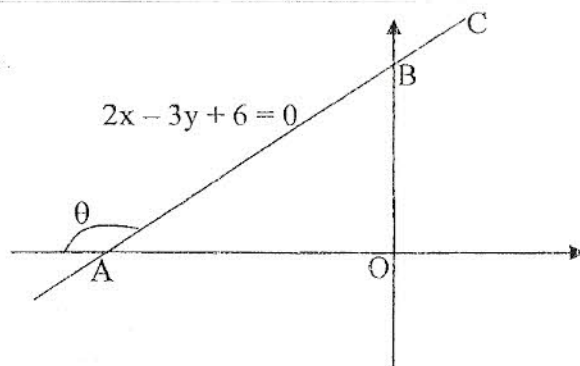
13 The product of a and $\sqrt[3]{b}$ is 31.59. Given that logarithm of a is 2.6182. Find using logarithm the value of b. to 4 significant figures. (4mks)

14. A straight line passing through point (-3,4) is perpendicular to the line whose equation is $2y-5x=11$ and intersects the x-axis and y-axis at the points P and Q respectively. Find the co-ordinates of P and Q (3mks)

5

15   If $\cos \theta = \dfrac{-15}{17}$ and θ is obtuse, find without using tables the values of

    a) $\tan \theta$.   (2mks)

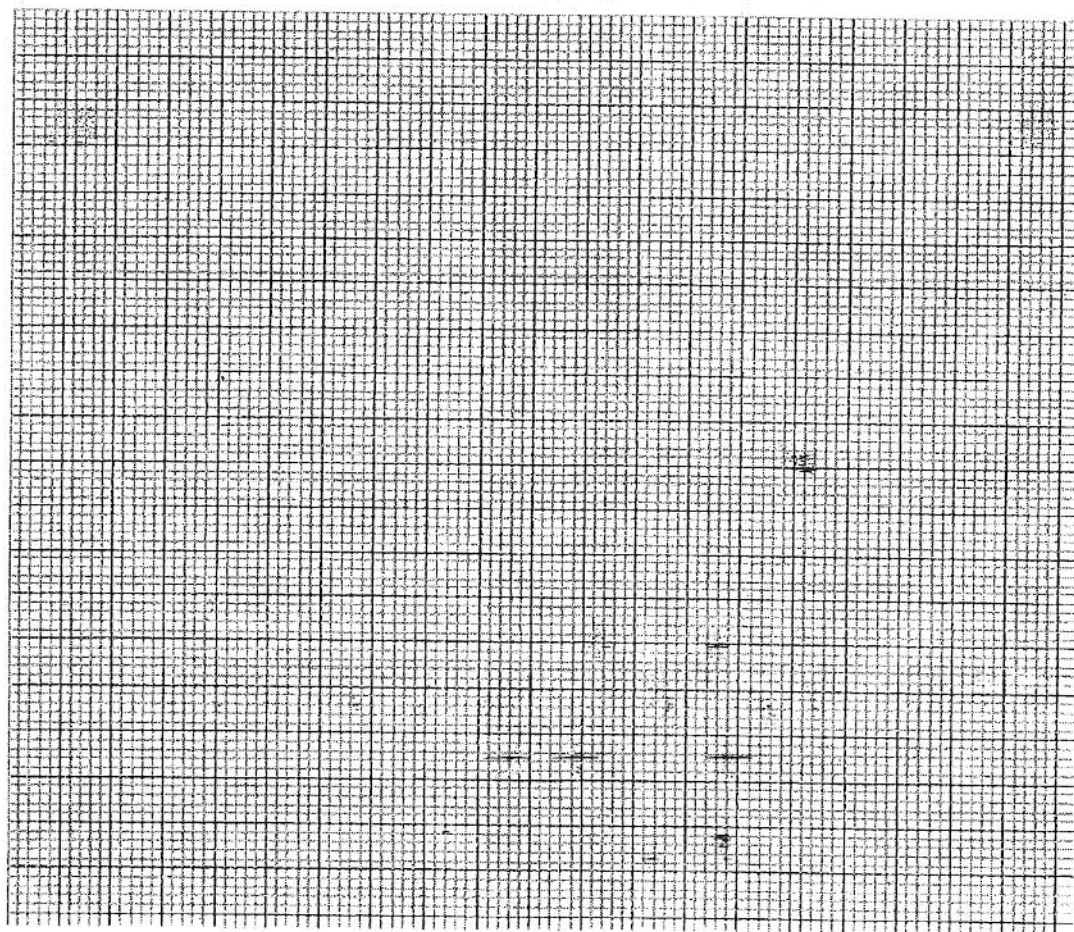   b) $\sin(180^\circ - \theta)$ (1mk)

16.   Six weeks after planting, the height of maize plants were measured correct to the nearest centimeter. The frequency distribution is given in the table below:

Height (x)	$0 \le x < 5$	$5 \le x < 15$	$15 \le x < 20$	$20 \le x < 35$	$35 \le x < 55$
Frequency	3	8	19	15	30

Draw a histogram to represent the above information   (4 maks)

SECTION II (50 MARKS)

17. Jane is a sales executive earning a salary of Ksh. 20,000 and a commission of 8% for the sales in excess of Ksh 100,000. If in January 2010 she earned a total of Ksh.48, 000 in salaries and commissions.

    a) Determine the amount of sales she made in that month   (4 mks)

    b) If the total sales in the month of February and March increased by 18% and then dropped by 25% respectively. Calculate

        (i) Jane's commission in the month of February   (3 mks)

        (ii) Her total earning in the month of March   (3 mks)

18. Four towns P, Q, R and S are such that town Q is 120km due east of town P. Town R is 160km due North of town Q. Town S is on a bearing of 330° from P and on a bearing S 80 °W from R. use a ruler and a pair of compasses only for all your constructions.

a) Using a scale of 1cm to represent 20km, construct a scale drawing showing the positions P, Q, R and S. (4mks)

b) Use the scale to determine
   i. The distance from town S to town R. (1 mk)
   ii. The bearing of town S from town Q. (1mk)

c) A town T is due north of P and the distance TQ = TR. Locate T by construction and find the bearing and distance of T from R (4mks)

19   Mr. Barmuriat has a triangular field ABC the ratio of the length AB: AC = 6:7. If BC = 40m and the perimeter of the field is 118m.

a)   Calculate the length AB and the area of the field.   (5mks)

b)   A water tap is installed inside the field such that the tap is equidistant from each of the vertices of the plot. Calculate the distance of the tap from vertex A.   (3mks)

c)   Find the size of the acute angles between the edges AB and BC.   (2mks)

20   A rally driver is required to cover the distance between two check points A and B in a given time. If he travels at 90km/h he will reach check point B, 10 minutes earlier than expected. If he travels at 75km/h, he will reach check point B, 6 minutes later than expected. Calculate

(a) The distance between A and B.   (7 marks)

(b) The required time to travel between A and B.   (3 marks)

21   Muindi bought 6 cows and 15 goats at an auction and spent a total of sh. 97500. His
      friend Mueni bought one cow less and five goats more than Muindi and spent sh. 5000
      less.

      (a) If both bought each animal at the same price, determine the price of each animal at
           the auction.   (4 marks)

      (b) Muindi sold all his animals at a profit of 40% per cow and 50% per goat while Mueni
           sold all his animals at a profit of 50% per cow and 40% per goat. Determine who
           made more profit and by how much.   (4 marks)

      (c) The cost of a goat was decreased in the ratio 2 : 3. Find the loss made by Mueni in
           buying and selling goats only.   (2 marks)

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22 A cylindrical water tank can be filled to a depth of 2.1 meters by a pipe P in 2 hours. Pipe Q takes 7 hours to fill the tank to the same depth. Pipe R can empty this amount of water in 6 hours.

a) i) Starting with the tank empty, P runs alone for one hour. How many centimeters deep will the water in the tank be? (3mks)

ii) If pipe P is now turned off and pipe R left open for one hour what depth of water will remain in the tank? (3mks)

b) If the tank is initially empty, and pipe P and Q are both running and pipe R is left open, how long will it take to fill the tank to a depth of 2 meters? (4mks)

23   Draw the quadrilateral A = (-6, -1), B(-6,-4),C(3,-7) and D (3,2).   (1mk)
      On the same grid draw the image.

   a) $A^1 B^1 C^1 D^1$ under an enlargement centre (O,-1) scale factor $^1/_3$ (2mks).

   b) $A^2 B^2 C^2 D^2$ the image of $A^1 B^1 C^1 D^1$ under a rotation centre (1,0) through an
         angle of 90^0 (2mks)

   c) $A^3 B^3 C^3 D^3$ the image of $A^2 B^2 C^2 D^2$ under a reflection in the line
         y = x.   (2mks)

   d) $A^4 B^4 C^4 D^4$ the image of $A^3 B^3 C^3 D^3$ under a translation $\begin{pmatrix} -2 \\ 3 \end{pmatrix}$ and write

         down the co -- ordinates of the final image.   (3mks)
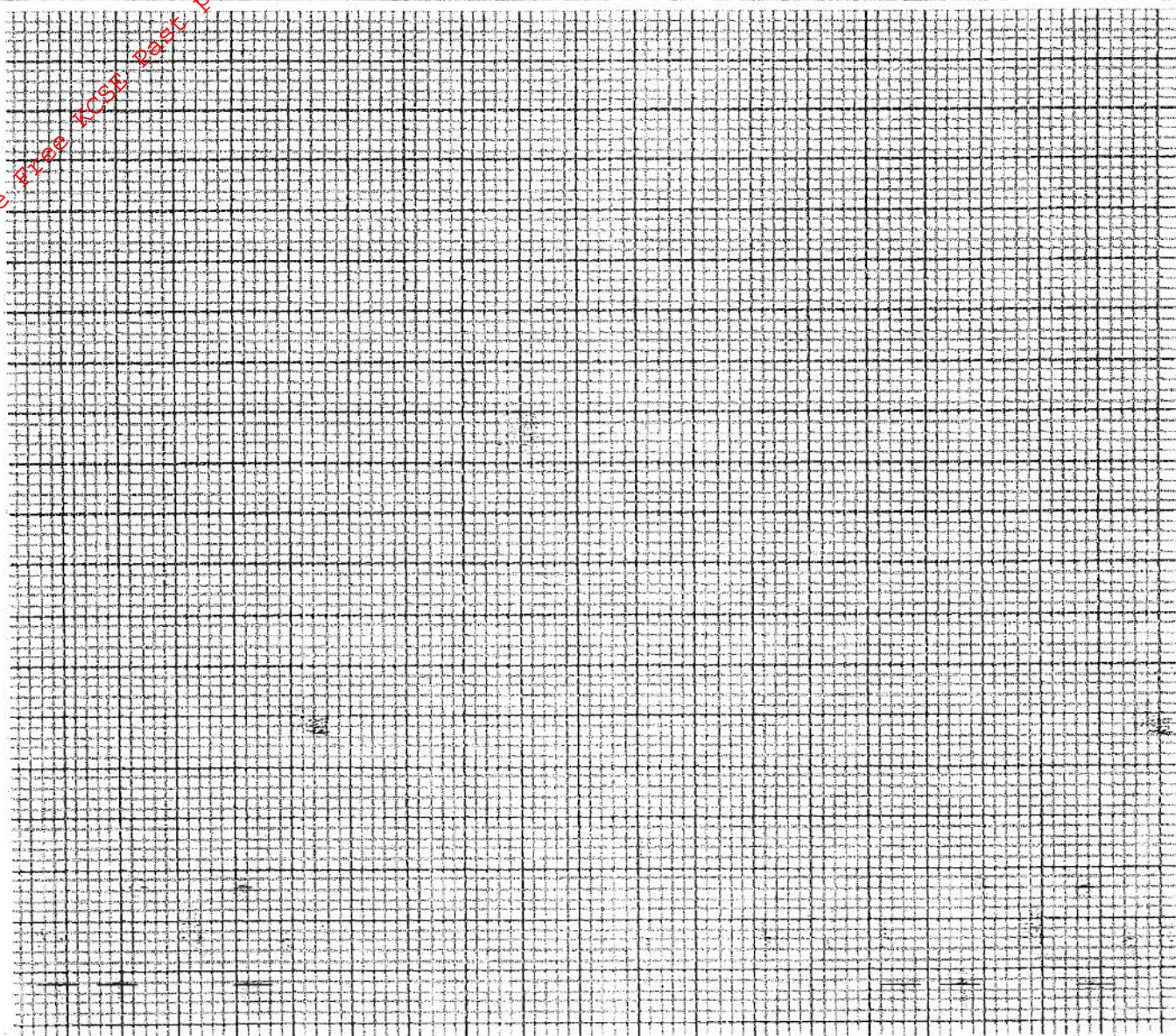
24. The displacement S, metres from a fixed point of a moving particle after t seconds is given by $S = t^3 - 6t^2 + 9t + 5$

(a) Calculate the gradient to the curve at $t = 0.25s$. (3 mks)

(b) Determine the values of S at the maximum and minimum turning points of the curve. (4mks)

(c) On the space below sketch the curve of $S = t^3 - 6t^2 + 9t + 5$ (3mks)

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