NAME: ……………………………………………………………………

INDEX NO: …………………………

CANDIDATES SIGNATURE……

DATE:……………………………………

121/1
MATHEMATICS ALT A.
PAPER 1
JUNE / JULY 2013
2 ½ HOURS

Nakuru District Kenya Certificate of Secondary Education Trial Examination 2013

MATHEMATICS ALT. A.
PAPER 1
2½ HOURS

INSTRUCTIONS TO CANDIDATES

a) Write your name and index number in the spaces provided above.
b) Sign and write the date of examination in the spaces provided
c) This paper consists of two sections: **Section I and Section II.**
d) Answer all the questions in Section I and only five from section II
e) All answer and working must be written on the question paper in the spaces provided below each question.
f) Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
g) Marks may be given for correct working even if the answer is wrong.
h) Non- programmable silent electronic calculators **and KNEC** Mathematical tables may be used except where stated otherwise.
i) Candidates should check the question paper to ascertain that all the 24 questions are printed.

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 consist of 17 printed papers

SECTION 1 (50 MARKS)

ANSWER ALL THE QUESTIONS IN THIS SECTION IN THE SPACES PROVIDED

1. Without using mathematical tables or calculators, evaluate   (3 marks

$$\sqrt[3]{\frac{0.064 \times 0.125}{0.008 \times 0.001}}$$

2. Given that log 7 = 0.8451 and log 6 = 0.7782, find log 25.2   (3 marks)

3. Simplify the expression   (3 marks)

$$\frac{6b - 3ab - 2a + a^2}{a^2 + ab^2}$$

2

4. A van leaves town **X** at 6.45 am and travels towards town Y, 400km away at an average speed of 80km/hr. At 8.00 am, a truck left **Y** for **X** at an average speed of 60km/h. At what time will the two vehicles meet. (3 marks)

5. Find all the integral values of x which satisfy the inequalities

$$2x + 11 > 5x - 8 \geq \tfrac{1}{2}(5 + 3x)$$ (3 marks)

6. A spherical metal ball has a density of $10g/cm^3$. If it has a radius of 3.5cm, find the mass of the ball in kilograms (3 marks)

7. Anthony sold a T.V. set on behalf of a shop owner. He allowed a discount of 12½ % and was paid a Commission of 2% on his sale. Given that the marked price of the T.V. set was Kshs.7, 800, find the amount the shop owner received. (3 marks)

8. A line L_1, passes through the points A(1,-3) and B(-3,7). Determine the equation of the line L_2 which is a perpendicular bisector of line L_1, leaving the answer in the form $ax + by = c$ (4 marks)

9(a) Using a ruler and a pair of compasses only, construct triangle ABC such that AB = 4cm, AC = 8cm and $< BAC = 30^o$ (2 marks)

(b) By dropping a perpendicular from C to AB produced, determine the height of the triangle, hence find its area (2 marks)

10. Determine the Quartile Deviation for the following set of numbers.

   6, 2, 8, 4, 2, 5, 4, 3, 6, 7 and 9.   (3 marks)

11. P (-2, 3, 5) and Q (4, - 8, 10) are two points on a straight line. A point M divides PQ in the ratio of 2:3. Find the co-ordinates of point M.   (3 marks)

12. A student made a hemispherical solid of diameter 21cm from a piece of wood. Calculate its surface area.   (3 marks)
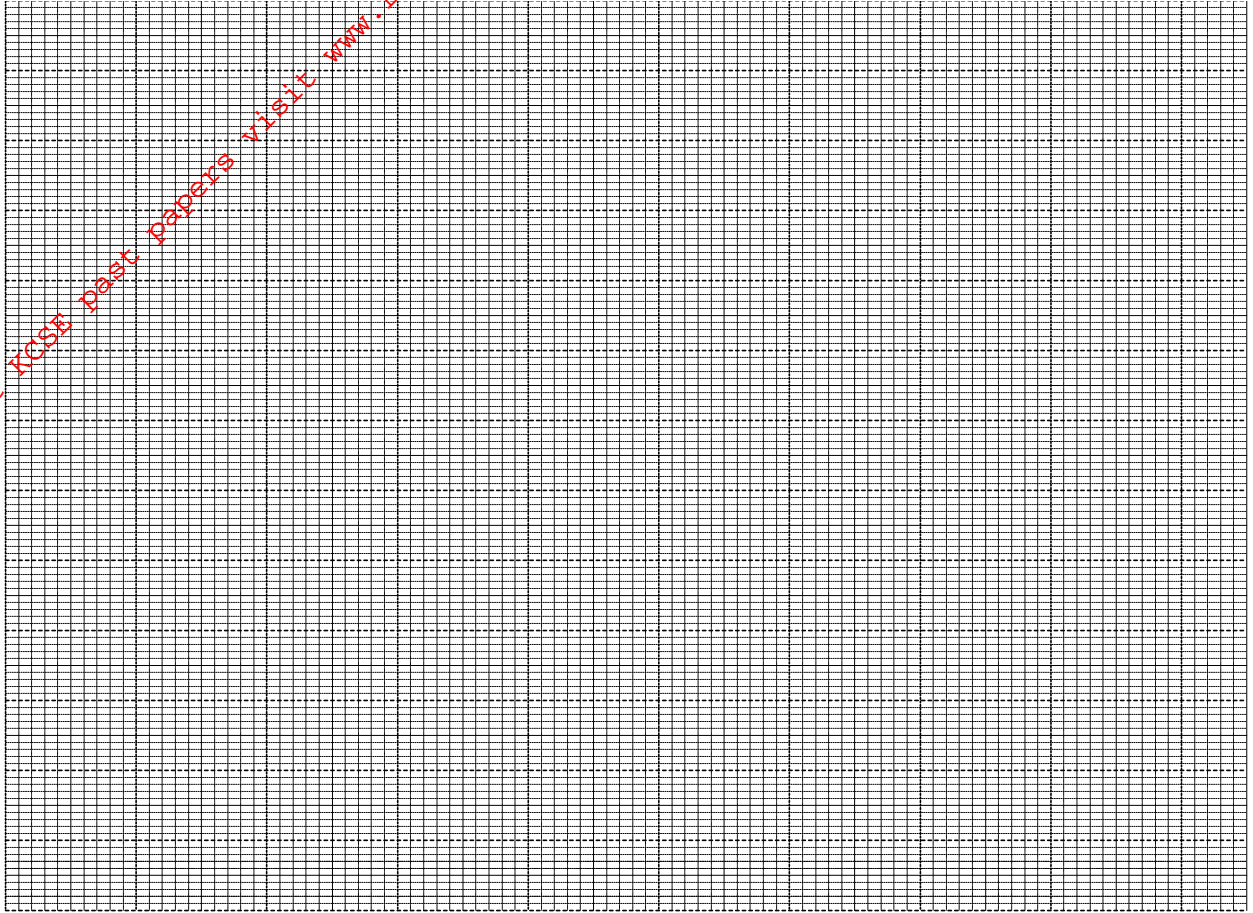
13. Complete the square for the quadratic expression $3x^2 + 6x - 1$ expressing the answer in the form $P(x + q)^2 + r$ where p, q and r are constants. Hence determine the value of p, q and r   (3marks)

14. The figure below shows a polygon A B C D E F with the interior angles indicated. Find the value of the greatest angle in the polygon.   (3 marks)
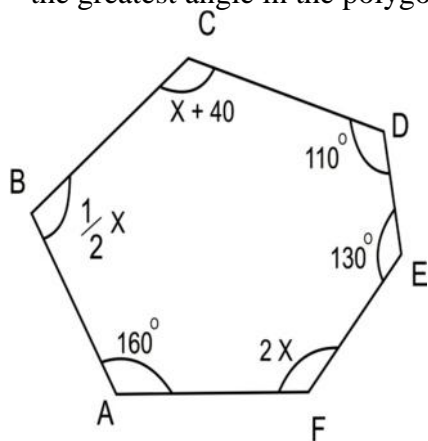
15. Velocity of a particle moving on a straight line is given by V = (2t + 10) m/s, where t is the time taken in seconds.   Find the distance covered in the third second.   (3marks)

16. A^1 (2 ,4) and B^1(4, 4) are the images of points A(-1, 1) and B(-2, 1), under an enlargement. By construction, find the centre of enlargement and the scale factor. (3 marks)

ANSWER ONLY FIVE QUESTIONS IN THIS SECTION IN THE SPACES PROVIDED

17. A transport company owns three lorries **A,B** and **C**. Lorry **A** has a capacity of 7 tonnes and consumes a litre of fuel per every 12km. Lorry B has a capacity of 5 tonnes and consumes a litre of fuel for every 14km, while Lorry **C** has a capacity of 2 tonnes and consumes a litre of fuel for every 15km. The company intends to transport materials, with Lorry A making 3 trips. Lorry **B** 7 trips and Lorry **C** 9 trips.

   (a) Calculate the amount of material to be transported   (3marks)

   (b) The materials are to be transported to a shop 46km from the company's premises. Find the amount of fuel to be used.   (3 marks)

   (c) The company's expenses are as follows.
   i)   Fuel at kshs.109.10 per litre
   ii)   Labour cost- Kshs.90,000
   iii)   Tear and wear – Kshs.64,000
   The Lorry owner is to pay Kshs.40,000 per drip for Lorry **A**, Kshs.25,000 per trip for Lorry **B** and Kshs.10,000/= per trip for Lorry **C.** Calculate the company's percentage profit in this venture (to 1 decimal place)   (4 Marks)

18. The figure below shows two circles ABEF and BCDE intersecting at B and E. ABC and FED are straight lines. The line AEG is a tangent to the circle BCDE at E. O is the centre of circle ABEF. AE and BF intersect at K while BD and CE intersect at L. Angle AEF = 42° and angle BDE = 38°
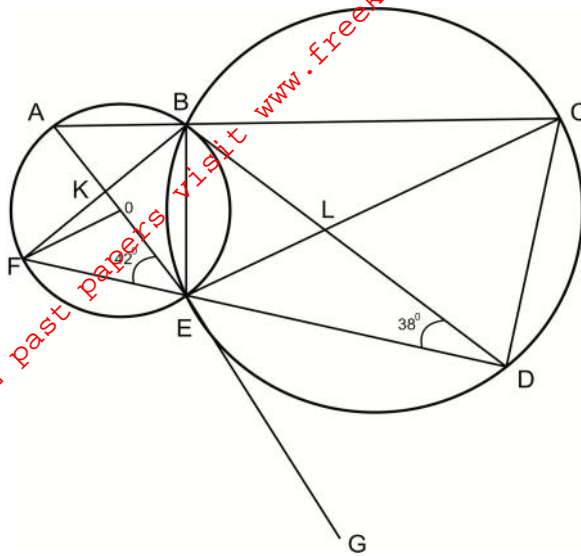
Find the size of the following angles, stating the reasons in each case

   (a) B C E   (2 Marks)

   (b) B E F   (2marks)

   (c) F B E   (2marks)

   (d) E L D   (2 marks)

   (e) K F O   (2 marks)

9

19. Mr, Ngetich commutes to school either by walking or riding on a bodaboda. If he walks, the probability that he will be late is ¼ while if he rides on a bodaboda, the probability that he will be late is $1/9$. Suppose he tosses a coin to decide whether to walk or ride on a boda boda to school.

(a) Determine the probability that he will be late on any given day. (5 marks)

(b) If he walks to school for four successive days, determine the probability that he will be late
   (i)   Every day (2 marks)

   (ii)   On any three days (3 marks)

20. Data collected from an experiment involving two variables X and Y was recorded as shown in the table below

x	10	15	20	25	30
Y	3.6	6.5	9.0	11	13
$\sqrt{x}$					

The variables are known to satisfy a relation of the form y= a $\sqrt{x}$ + b where a and b are constants

(a) Fill in the table above for the values of $\sqrt{x}$ (to 1 dp) (2 marks)

(b) On the grid provided, draw a suitable straight line graph. (Use a scale of 2cm to rep. 1 unit) on the x -axis and 1cm rep 1 unit on the y-axis). (3marks)

(c)(i) Estimate the values of a and b. (3 marks)

(ii) Determine the equation connecting y and x (1 mark)

(iii) Find the value of y when $\sqrt{x} = 3.5$ (2 marks)

11

21. A wooden model of a hut consists of a cone of height 3 cm mounted on a cylinder of height 7 cm. The cone and cylinder have a common radius of 5cm
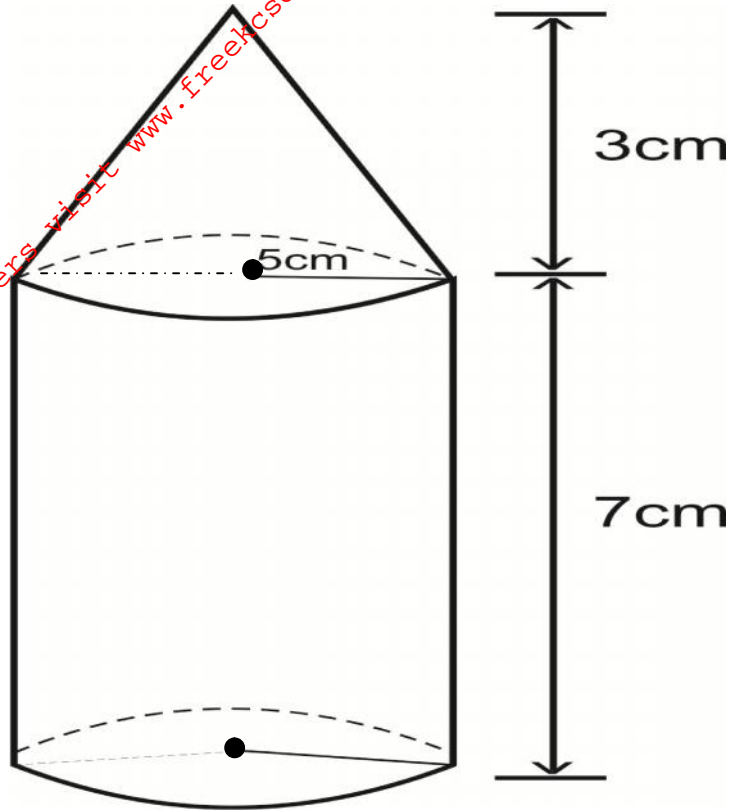
(a) Determine the volume of the model in cubic metres (4 marks)

(b) Calculate the curved surface area of the model (3 marks)

(c) The model is melted down and recast into a solid sphere. Calculate the radius of the sphere

(3 marks)

22. A plot of land is in the shape of a triangle with the corners at P, Q and R.   P Q = 36m, P R=44m and the angle at P is 68°. Calculate

(a)   Length Q R   (3marks)

(b) The angles at

(i)   R   (3marks)

(ii)   Q   (2marks)

(c) The area of the plot   (2 marks)

23. (a) Given that the matrix $P = \begin{pmatrix} 3 & 7 \\ 5 & 4 \end{pmatrix}$, find, P^{-1} the inverse of P (2marks)

(b) In a certain county election campaign Mr. Seneta has to hire helicopters to transport the County and hire Lorries to ferry his supporters to his campaign rallies. A helicopter is hired per hour while a lorry is hired per day. The cost of hiring 3 helicopters and 7 Lorries is shs.758 000 while that of hiring 5 such helicopters and 4 Lorries is shs. 926 000.

(i) Form two equations to represent the information above (1mark)

(ii) Use matrix method to find the cost of hiring a helicopter per hour and that of hiring a lorry per day. (4 marks)

c) On a certain day Mr. Seneta hired 2 such helicopters from 0815h to 1715h and 8 such Lorries. If a discount of 3% was allowed on each lorry, calculate the total amount paid by Mr. Seneta (3 marks)

24 (a) Complete the table below for the function y = sin (x + 30) and y = 2 cos x (2marks)

nPlet $\frac{o}{x}$	0	30	60	90	120	150	180	210	240	270	300	330	360
Sin (x +30)	0.5		1.0			0	-0.5			-0.87			
2 cos x	2			0	-1			-1.73					2

(b) On the grid provided, draw the graphs of Y = sin (x + 30°) and y = 2 cos x for O^o ≤ x ≤ 360° on the same axes. (Use the scale 1cm Rep.30° on the x-axis, 1cm rep.0.5 units on the y-axis) (5 marks)

(c) Use the graph to solve sin (x + 30°) – 2cos x= 0 (1 mark)

(d) State the amplitudes of the functions
(i) Y=sin (x + 30°) (1mark)

(ii) Y= 2cos x (1mark)