121/2
MATHEMATICS ALTA A
PAPER 2
JAN/FEB. 2013
2 ½ Hours

Name …………………………………………………………..Adm. No:………………..Class……………………………

School …………………………………………………..Candidate's signature …………………………………..

BUNYORE – MARANDA JOINT ENROLMENT EXAMINATIONS 2013
The secondary Certificate of Secondary education
MATHEMATICS
PAPER 2
2 ½ Hours

121/2- Mathematics Alt A paper 2	
Thursday	**7.00 a.m- 9.30 a.m**
31st January	**(morning)**

Instructions to candidates
  i.   Write your name, admission number, class and school in the spaces provided above.
  ii. This paper consists of TWO sections: Section I and section II.
  iii. Answer ALL the questions in SECTION 1 AND ONLY five questions from section II
  iv. All answers and workings must be written on the question paper in the spaces provide below each question.
  v.   Show all the steps in your calculations giving your answers at each stage in the spaces provided below each question.
  vi. Marks may be given for correct working even if the answer is wrong.
  vii. Non- programmable silent electronic calculators and KNEC mathematical tables may be used except where stated otherwise.
 viii. This paper consists of 20 printed pages.
  ix. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.

For examiner's use only

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

Answers all questions in this section in the spaces provided.

1. Use logarithm tables to evaluate   (3mks)

$$\sqrt[3]{\frac{6.071+68.2}{log21.54}}$$

2. Simplify the expression   (3mks)
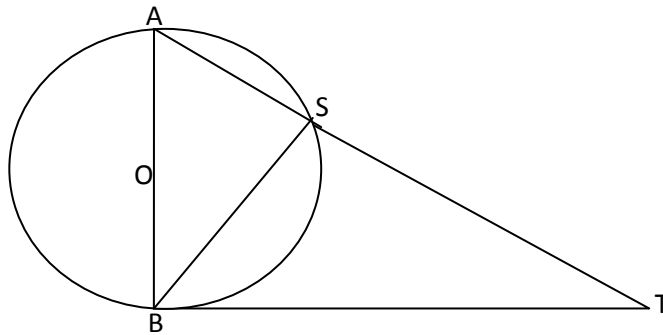
$$\frac{2x^2 - 3xy - 2y^2}{4x^2 - y^2} \div \frac{2y + x}{2x - y}$$

3. Make p the subject of the formula   (3mks)

$$\sqrt{YP^2 - X} = \frac{P}{Q}$$

4. Given that a=6.4cm, b=4.2cm and c=4.0cm, find the maximum value of $\frac{ab}{b-c}$ (2mks)

5. The diagram below shows a circle O and diameter AB. TB is tangent to the circle at B

Given that AB=10cm, BT=24cm and BS = 8cm, find the length ST   (3mks)

6. Ojwang deposited Ksh.50,000 in a financial institution in which interest is compounded quarterly. If at the end of the second year he received a total amount of Ksh. 79,695.42, calculate the rate of interest per annum. (3mks)

7. Determine the values of k for which $4x^2 - 4kx + (k + 20)$ is a perfect square (3mks)

8. Given that $x = \sqrt{5}$ and $y = \sqrt{2}$, simplify the expression $\frac{x}{x+y}$, without using a calculator or mathematical tables, leaving your answer in the form $a + b\sqrt{c}$ where a, b and c are rational numbers. (3mks)

11. The cost per kg of two brands of coffee A and B are sh.78, determine the ratio in which the two brands were mixed. (3mks)

12. Given that OA=3i+2j+4k and OB=6i+5i-2k and that a point P divides AB in the ratio 5:-2 determine:-
   (a) The position vector of p in terms of I,j and k (2mks)

   (b) The distance of point P from the origin, giving your answer to 2 decimal places (2mks)

13. A quantity p varies as Q and inversely as the square root of R. When Q is increased by 26%, R is reduced by 19%. Find the percentage change in the value of p. (3mks)

14. Use binomial expansion to evaluate $\left(3 - \sqrt{3}\right)^4 + \left(3 + \sqrt{3}\right)^4$ (3mks)

15. The matrices Q, S and T are such that Q = $\begin{pmatrix} 1 & 2 \\ 2 & -4 \end{pmatrix}$ S = $\begin{pmatrix} -10 & 10 \\ -10 & 20 \end{pmatrix}$ and TQ = S. determine the matrix T. (3mks)

16. The diagram below shows ΔABC on which a circle is circumscribed
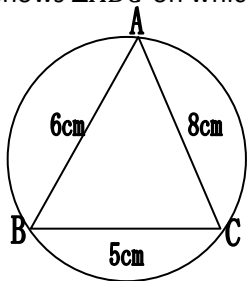
Given that AB=6cm, BC=5cm and CA=8cm, calculate the radius of the circumcircle, correct to one decimal place. (3mks)

SECTION II (50 MARKS)

Answer only five questions in this section in the spaces provided

17. A farmer bought some sheep for sh.27,000. Two of them died and he decided to sell the rest at sh. 300 per head more than what he paid for each. On the whole he gained 10% profits. Given that the original number of sheep bought was x;

   (a) Write an expression in x for   (1mk)
       i.   The original cost of each sheep

       ii.   The selling price of each sheep   (1mk)

   (b) (i) Form an equation in x and simplify it to the lowest form   (2mks)

       (ii) Solve the equation formed in (b) (i) above, hence find the number of sheep bought by the farmer.   (3mks)

   Determine:

   (i) The cost of each sheep   (2mks)

   (ii) The selling price of each sheep   (1mk)

18. (a) The nth term of a sequence is given by $3^{n+1} - 2n$. Find the 5th term of the sequence (2mks)

(c) Juma was employed by an NGO on contract for a certain number of years. His basic annual salary for the first year was KSh. 576,000. His basic annual salary was Ksh. 620,100. By the end of the contract he had earned a total basic salary of Ksh. 4,784,400. If the annual increment was constant, calculate:

(i)   The period of the contract   (2mks)

(ii)   The annual increment   (2mks)

(iii)   His monthly basic salary in the third year of the contract   (2mks)

(d) If Juma decided to invest all his basic annual salary at the end of the first year in a financial institution that pays 12% simple interest, how much would he withdraw by the end of the contract period?

19. The diagram below shows triangle A(-4,2), B(2,2) and C(4,6) and its triangle A"(-16,-6), B"(8,6) and C"(16,14), under a combined transformation represented by matrix V.
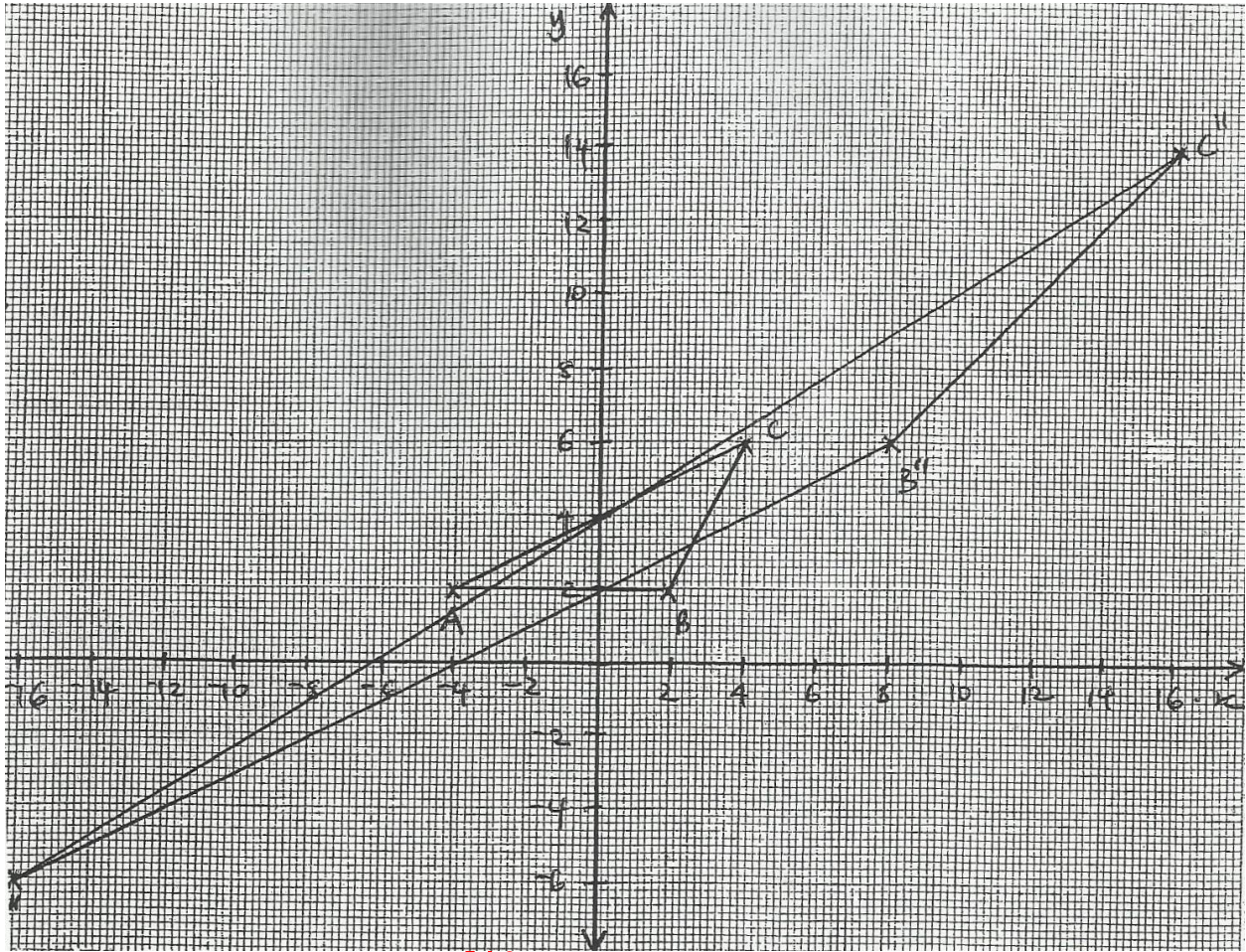
(a)   Determine the matrix V   (3mks)

(b)   Given that V is a combination of two matrices; R followed by Q and that

        $Q = \begin{pmatrix} 4 & 0 \\ 0 & 1 \end{pmatrix}$, determine matrix R.   (3mks)

(c) on the same diagram, draw triangle $A^1B^1C^1$, the image of triangle ABC under transformation represented by the matrix R   (2mks)

(d) Describe fully the transformation represented by the matrix R   (2MKS)

20. The figure below shows triangle OAB in which OA=a and OB = b. M is the midpoint of OA and a point Q divides OB externally in the ratio 5:2. MQ intersects with AB at N.
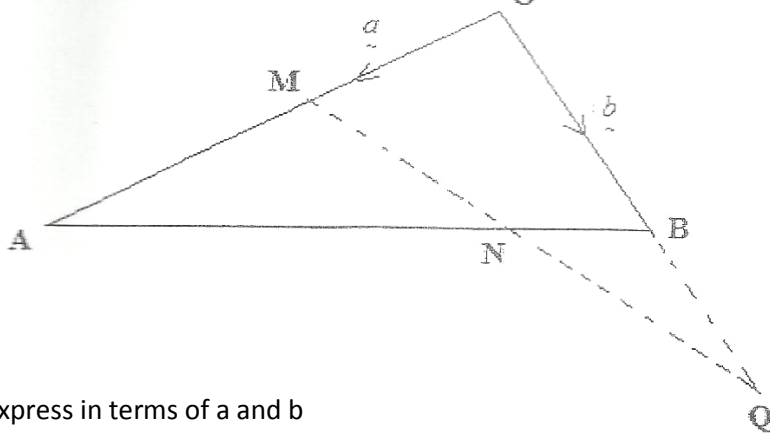
(a) Express in terms of a and b
   (i)   AB   (1mk)

   (ii)   OQ   (1mk)

   (iii) MQ   (1mk)

(b) Given that AN=kAB and MN = hMQ, where k and h are scalars;
    Write down two expressions of AN in term of:
   (i)   a, b and k   (1mk)

   (ii)   a, b and h   (1mks)

   (iii) find the values of k and h   (4mks)

(c) State the ratio in which divides N and AB   (1MK)

21. Agesa works with Kenya women Finance Trust and earns a monthly basic salary of Ksh.15, 000. She is also given a house allowance of Ksh.6, 000 commuter allowance of Ksh.2, 000 and medical allowance of Ksh.2, 500. The table below shows taxation schedule for that year.

Monthly taxable income (Ksh)	Rate of Tax Ksh. Per K£
1-8,900	2
8,901-13,450	3
13,451-18,000	4
18,001-22,800	5
22,801-27,600	6
Excess over 27,600	8

(a) Calculate Agesa's taxable income.   (2mks)

(b) If Agesa is entitled to a personal relief of Ksh.1,200 per month, calculate her P.A.Y.E (4mks)

(c) If Agesa was given 40% increase in her monthly basic salary the following year, calculate the percentage increase in her P.A.Y.E, giving your answer correct to one decimal place   (4mks)

22.(a) Complete the table for the function $y=x^3+4x^2+x+6$ for $-2\leq x\leq 5$ using a scale of 2cm to represent 1 unit on the x-axis and 1cm to represent 5 units on the y-axis   (3mks)

X	-2	-1	0	1	2	3	4	5
Y								

(b) On the grid provided, draw the graph of $y = x^3 - 4x^2 + x + 6 \, for - 2 \leq x \leq 5$ using a scale of: 2cm to represent 1 unit on the x-axis and 1 cm to represent 5 units on the y-axis

(c) Use your graph to solve the equations: (2mks)

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

(ii) $x^3 - 4x^2 x+6=0$ (3mks)

23. Two biased pentahedral dice have their faces numbered 1,2,3,4 and 5. The probability that one of the die shows a particular face when tossed is shown below:

Face	1	2	3	4	5
probability	$\frac{1}{5}$	$\frac{1}{10}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{3}{10}$

(a) A die is tossed once. What is the probability that the die

(i) Shows an odd number   (2mks)

(ii) Shows a number less than 3   (2mks)

(b) Two dice are thrown at once. Find the probability that:-

(i) The two dice show the same number.   (3mks)

(ii) The sum on the two faces is equal to 5   (3mks)

24. The table below shows the age of patients in Vihiga District hospital during the month of December.

Age in years	1-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45
Number of patients	3	4	6	9	8	8	5	4	3

(a) On the grid provided, draw a cumulative frequency curve. (4mks)

(b) Use the cumulative frequency curve to find: (1mk)

(i) The median

(ii) The semi inter quartile range (3mks)

(c) If any patient above that age of 35 years can share bed with another, determine the number of patients who can share beds in the hospital. (2mks)