Name: ………………………………………………………………………… **IndexNo:** ……………………………………

School:…………………………………………………………………………………… **Adm no:**………………………………

Date………………………………………

121/1
MATHEMATICS ALT A
Paper 1
May 2019
2½ hours

HOMABAY COUNTY MATHEMATICS ASSOCIATION

Form four term II examination

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 above.
*(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 answers 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) This paper consists of 16 printed pages.
(j) Candidates should check the question papers 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

SectionII

17	18	19	20	21	22	23	24	Total

Grand Total	

SECTION I (50 Marks)

Answer all questions in this section

1. Without using a calculator, evaluate in its simplest form $\frac{4\ of\ 20+10\div5-3\times6}{6\times9-4\div2+12\ of 6}$ (3 marks)

2. Use the table of reciprocals and square roots only to evaluate to 4 significant figures

$\frac{3}{0.41936}+\sqrt{0.37879}$ (3marks)

3. The size of an interior angle of a regular polygon is $3x$ while its exterior is $(x+20)°$. Find the number of triangles that makes the polygon (3 marks)

4. Given that **OA**$= 3\boldsymbol{i} + 2\boldsymbol{j}$ and **OB**$= -2\boldsymbol{i} + 3\boldsymbol{j}$. Find $\frac{1}{2}|\mathbf{AB}|$ to one decimal place (3 marks)

5. A customer paid ksh.5880 for a suit after she was allowed a discount of 2% on the selling price. If the discount had not been allowed, the shopkeeper would have made a profit of 20% on the sales of this suit. Calculate the price at which the shopkeeper bought the suit. (3 marks)

6. Use logarithms to evaluate to 4 significant figures (4 marks)

$$\sqrt{\frac{52.14 \times 2.78^2}{21.49}}$$

7. Find the value of t in the equation: (3 marks)

$$(\frac{1}{64})^t \times (512)^{\frac{10}{9}} = 4096$$

8. Simplify

$$\frac{2y^2 - 3xy - 2x^2}{4y^2 - x^2}$$

(3 marks)

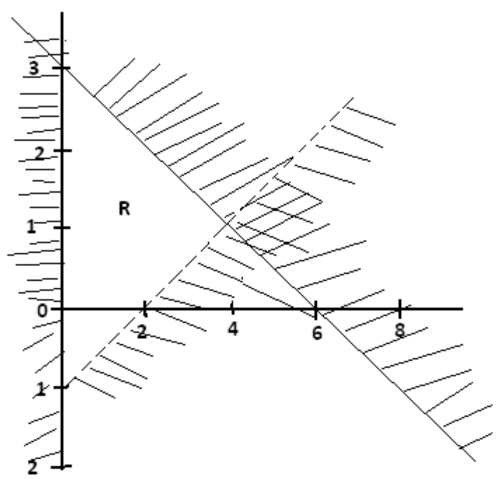
9. Given $Sin\ \theta = \frac{1}{\sqrt{5}}$ and θ is an acute angle, find without using tables and calculators $Cos\ \theta + \tan(90 - \theta)^0$, leaving your answer in the form $a + b\sqrt{c}$. (4 marks)

10. Kenyan Bank buys and sells foreign currency as shown below.

	Buying (ksh)	Selling (ksh)
1 Euro	116.38	116.62
1US Dollar	88.31	88.48

Mariga arrived in Kenya from Italy with foreign currency in Euros. He converted all the Euros to Kenyan shillings at the bank .While in Kenya he spent a total of ksh. 289850 and then converted the remaining amount to US Dollars at the bank. If he received a total of 1628 US Dollars, calculate the amount to the nearest Euros he arrived with in Kenya from Italy. (3marks)

11. Find the inequalities L_1,L_2 and L_3 that define the region R (3 marks)



12. The masses of two similar containers are 180g and 240g respectively. The surface area of a smaller container is 160cm.Determine the surface area of the larger one (3marks)

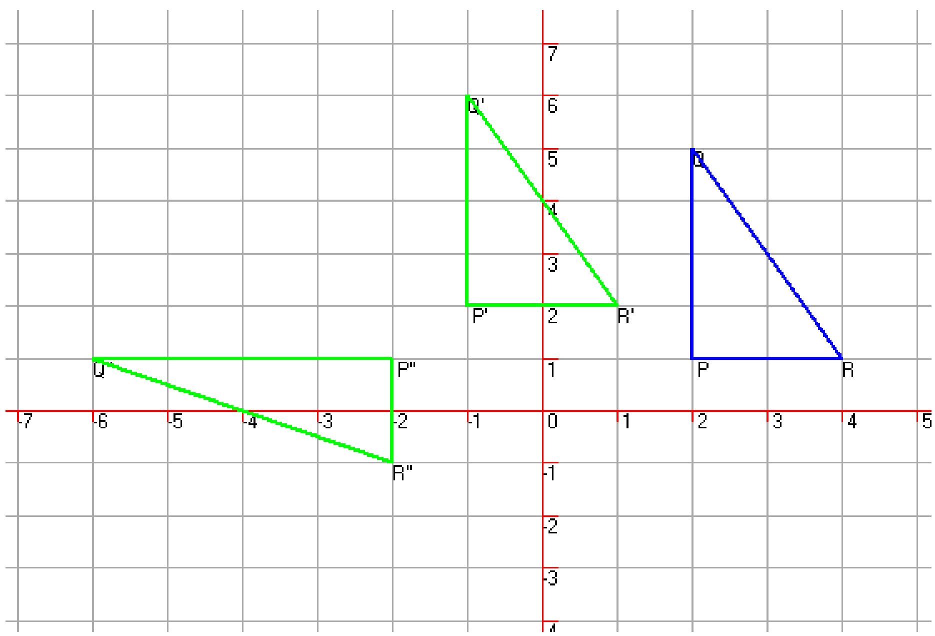
13. A school is sponsoring 42 students for a mathematics contest; the ratio of boys to girls is 5:2. Find the number of girls required to join the 42 students so that the ratio of boys to girls becomes 3:2. (3 marks)

14. Find the quadratic equation whose roots are $\frac{-3}{4}$ *and* $\frac{2}{3}$ and write it in the form $ax^2 + bx + c = 0$ where a, b and c are integers. (2 marks)

15. A two digit number is such that the sum of twice its tens digit and the ones digit is 11. When the digits are reversed the new number is greater than the original one by 45. Find the number.

(3 marks)

16. The figure below shows triangles PQR, $P^IQ^IR^I$ and $P^{II}Q^{II}R^{II}$.



Describe fully;

(a) the transformation that maps PQR onto $P^IQ^IR^I$ (2marks)

(b) the transformation which maps $P^IQ^IR^I$ onto $P^{II}Q^{II}R^{II}$. (2marks)

SECTION I (50 Marks)

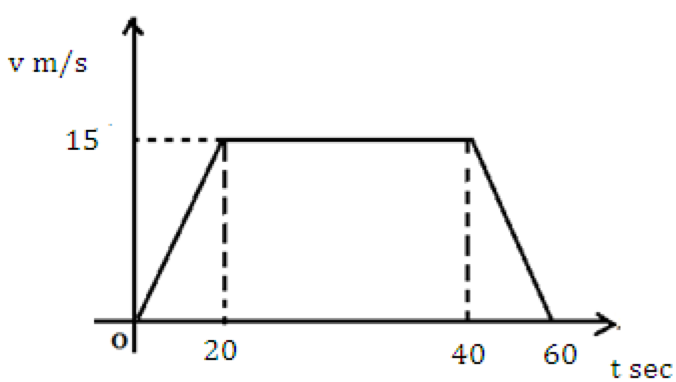
*Answer **only five** questions in this section*

17. (a) Two trains A and B are travelling in opposite direction. Train A is moving a speed of 72km/h and is 20m long. Train B has a speed of 54km/h. The trains took 9 seconds to pass each completely.

(i) Find the length of train B (4 marks)

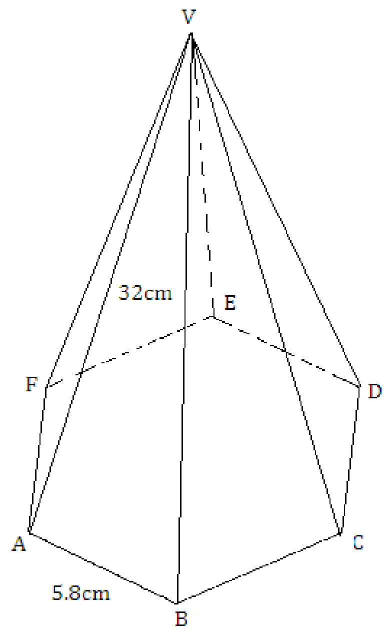
(ii) Calculate the distance between them after 4 hours (3 mark)

(b) The diagram below shows the graph of a moving vehicle from one market centre to the other



Calculate the distance covered by the vehicle in the duration shown in the graph (3 marks)

18. In the figure below, VABCDEF is a right pyramid with a hexagonal base, sides 5.8cm. the length AV=32cm.



(a) Find the:

(i) base area of the pyramid (2 marks)

(ii) the vertical height, h of the pyramid (2 marks)

(b) Calculate the volume of the pyramid correct to 2d.p (3 marks)

(c) Find the total surface area of the pyramid (3 marks)

19. A particle moves along a straight line such that its displacement s in metres is given by $S = 2t^3 - 5t^2 + 4t + 2$, where t is time in seconds. Find:

(a) the displacement of the particle when t = 4 seconds. (2 marks)

(b) the velocity of the particle when t = 4 seconds. (3 marks)

(c) the value of t when the particle is momentarily at rest. (3 marks)

(d) the acceleration of the particle when t = 2seconds. (2 marks)

20. The equation of a curve is given by $y = x^2 + 4x + 1$.

(a) Using a scale of 1cm representing 1 unit in the x-axis and 1cm representing 2 units on the y-axis; plot the curve of the function $y = x^2 + 4x + 1$ in the range $-3 \leq x \leq 2$ (3 marks)

(b) Estimate the area enclosed by the curve $y = x^2 + 4x + 1$, the x-axis the lines $x = -3$ and $x = 2$ by the mid-ordinate rule with 5 ordinates (3 marks)

(c) Obtain the exact area enclosed by the curve $y = x^2 + 4x + 1$ between $= -3$ and $x = 2$ (2 marks)

(d) Find the relative error associated with the estimation in (b) above (2 marks)

21. Use ruler and compasses for all construction in this question

a) Construct a quadrilateral PQRS such that the base PQ = 5cm, PS = 5cm and SR = 4.5cm. Angle SPQ = 75^o and angle PSR = 90^o (4 marks)

b) Drop a perpendicular from point S to meet line PQ at N. measure SN. (2 marks)

c) Construct a circle passing through vertices P, Q and R of the quadrilateral PQRS. Measure the radius of the circle. (2 marks)

d) Determine the area of the quadrilateral PQRS. (2 marks)

22. A line L_1 passes through the points A $(4, -5)$ and B $(6, 3)$.

(a) Find the gradient of L_1 (1 mark)

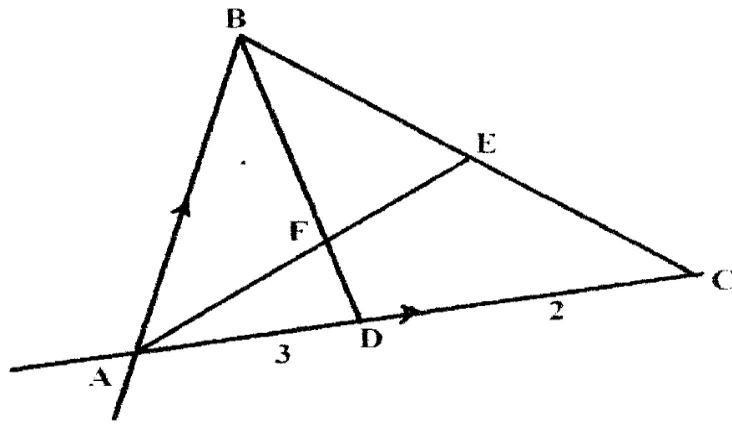
(b) A second line L_2 is the perpendicular bisector of L_1 at C. Find the equation of L_2 in the form $ax + by + c = 0$ (4 marks)

(c) A third line L_3 is parallel to L_1 and passes through the point D (-2, -3). Find:

(i) The equation of L_3 in the form $\frac{x}{a} + \frac{y}{b} = 1$ (2 marks)

(ii) The coordinates of the point K at which L_2 intersects L_3 (3 marks)

23. In the figure below E is the mid-point of BC. The point D divides AC internally such that AD:DC3:2



If **AB**= **b** and **AC** = **c.**

(a) Express in terms of **b** and **c**:

(i) BD (1 mark)

(ii) AE (1 mark)

(b) The lines BD and AE intersect at F such that **BF** = s**BD** and **AF** = t**AE** where s and t are scalers. Express **BF** in two different ways and hence find the value of t and n. (5 marks)

(c) State the ratio of AE to AF hence show that the points A, F and E are collinear (3 marks)

24. The marks scored by 50 students in a HOCMA mathematics exams are as listed below;

70,56,49,42,10,38,14,42,23,10,57,41,40,73,37,61,23,29,43,49,51,60,45,75,26,61,47,61,62,68,71,66,59,68,16,59,62,40,20,36,28,12,38,51,72,20,44,78,69,30

(a) Using the class interval of 10 and starting with the least mark, form a frequency distribution table for the data (2 marks)

(b) Determine

(i) the mean mark (3 marks)

(ii) the new mark if every student was added 2 marks (1 mark)

(c) On the grid below on the same axes, draw a histogram and a frequency polygon (4 marks)