NAME.....INDEX NO.....

CANDIDATE'S

SIGN.....

DATE.....

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121/2
MATHEMATICS ALT A
PAPER 2
OCTOBER, 2019
TIME: $2\frac{1}{2}$ HOURS

PANGANI GIRLS SCHOOL POST MOCK EXAMINATION - 2019
Kenya Certificate of Secondary Education
MATHEMATICS ALT A
PAPER 2
TIME: $2\frac{1}{2}$ HOURS

INSTRUCTION TO CANDIDATE'S:

(a) Write your name, index number and school in the spaces provided at the top of this page.
(b) Sign and write the date of examination in spaces provided above.
*(c) This paper consists of **TWO** sections: **Section I** and **Section II**.*
*(d) Answer **ALL** the questions in **Section I** and any **five** questions from Section **II**.*
*(e) **Show all the steps in your calculation, giving your answer at each stage in the spaces provided below each question**.*
(f) Marks may be given for correct working even if the answer is wrong.
*(g) **Non-programmable** silent electronic calculators and **KNEC** Mathematical tables may be used, except where stated otherwise.*
(h) ***This paper consists of 15 printed pages.***
*(i) **Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing**.*
*(j) **Candidates should answer the questions in English**.*

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 I (50 MARKS)

Answer ***all*** the questions in this section in the spaces provided.

1. Without using Mathematical tables or a calculator evaluate the following: $5\log_2 \sqrt[3]{512} - 7\log_5 \sqrt[5]{3125}$ (3 marks)

2. Given that $3 \leq a \leq 5$ and $1 \leq b \leq 3$ find the maximum possible value of $\frac{a-b}{a+b}$ (3 marks)

3. Solve the following trigonometric equation $\sqrt{3}\,\text{Sin}\,\theta = \text{Cos}\,\theta$ in the range $0° \leq \theta \leq 360°$ (4 marks)

4. Given that $a=\frac{1}{\sqrt{11}}$ and $c=\sqrt{5}$ express $3\sqrt{11}-2\sqrt{55}$ in terms of a and c and simplify the answer. (3 marks)

5. M r Otieno bought a car valued at k sh 1,000,000 the value of the car depreciated at 7.5% semi- annually. How long would it take its value to depreciate to k sh 500 000. (3marks)

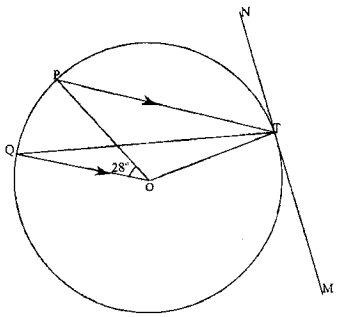
6. Make x the subject of the expression: $\frac{2x}{y-1}+\frac{5x}{2y-2}=\frac{2}{y-2}$ (3marks)

7. The effort (E) applied on a lever to lift a load (L) is partly constant and partly varies as L. When L = 3, E = 4 and when L = 15, E = 10. Find the equation connecting E and L.
(3 marks)

8. In an increasing AP the first term is a and the common difference is d .The A. P is such that the 3^{rd}, 9^{th} and 25^{th} terms form the first 3 consecutive terms of a GP. The difference between the 6^{th} term and the 2^{nd} term of the AP is 15. Find the common difference and the first term of the A.P.
(3marks)

9. An object has an area of $16cm^2$. It is transformed using the matrix $\begin{pmatrix} 1 & 2 \\ 3 & 2 \end{pmatrix}$ find the area of the image formed.
(3marks)

10. O is the centre of circle PQT shown below. PO and QT intersect each other at R and PT is parallel to QO. $\angle QOP = 28^0$ and line NTM is a tangent to the circle at T. Calculate the size of angle PTN. (3 marks)



11. A point T (3, 2) divides a line AB internally. Given that A is (9, -1) and B is (-1, 4), find the ratio in which T divides AB. (4 marks)

12. The table below shows tax rates in the year 2012.

Income K£ p.a	Rates of tax in (%)
1 - 5208	10
5209 - 9744	15
9745 - 14292	20
14293 - 18840	25
Over 18840	30

Give Mrs. Mwangi paid Kshs.5,400 as PAYE in the month of June. Find Mrs. Mwangi taxable income in Kenya pounds (K£per annum). (4marks)

13. Find the equation of a curve whose gradient function is $\frac{dy}{dx} = 6x - 5$ and passes through (1,1) (3marks)

14. Expand $\left(1 - \frac{1}{4}x\right)^5$ up to the 4th term hence use the expansion to find the approximate values of $(1.25)^5$ (4marks)

15. Determine the amplitude, the period and the phase angle for the graph of

$-\frac{2}{3}y+4\text{Sin}(\frac{2}{3}x+40)=0$ (3marks)

16. Points A (-6,-2) and B (2,-4) are the ends of a diameter of a circle centre O.

(a) Find the co-ordinates of centre O. (1 mark)

(b) Find the equation of the circle expressing it in the form $x^2+y^2+ax+by+c=0$ where a, b and c are constants. (3 marks)

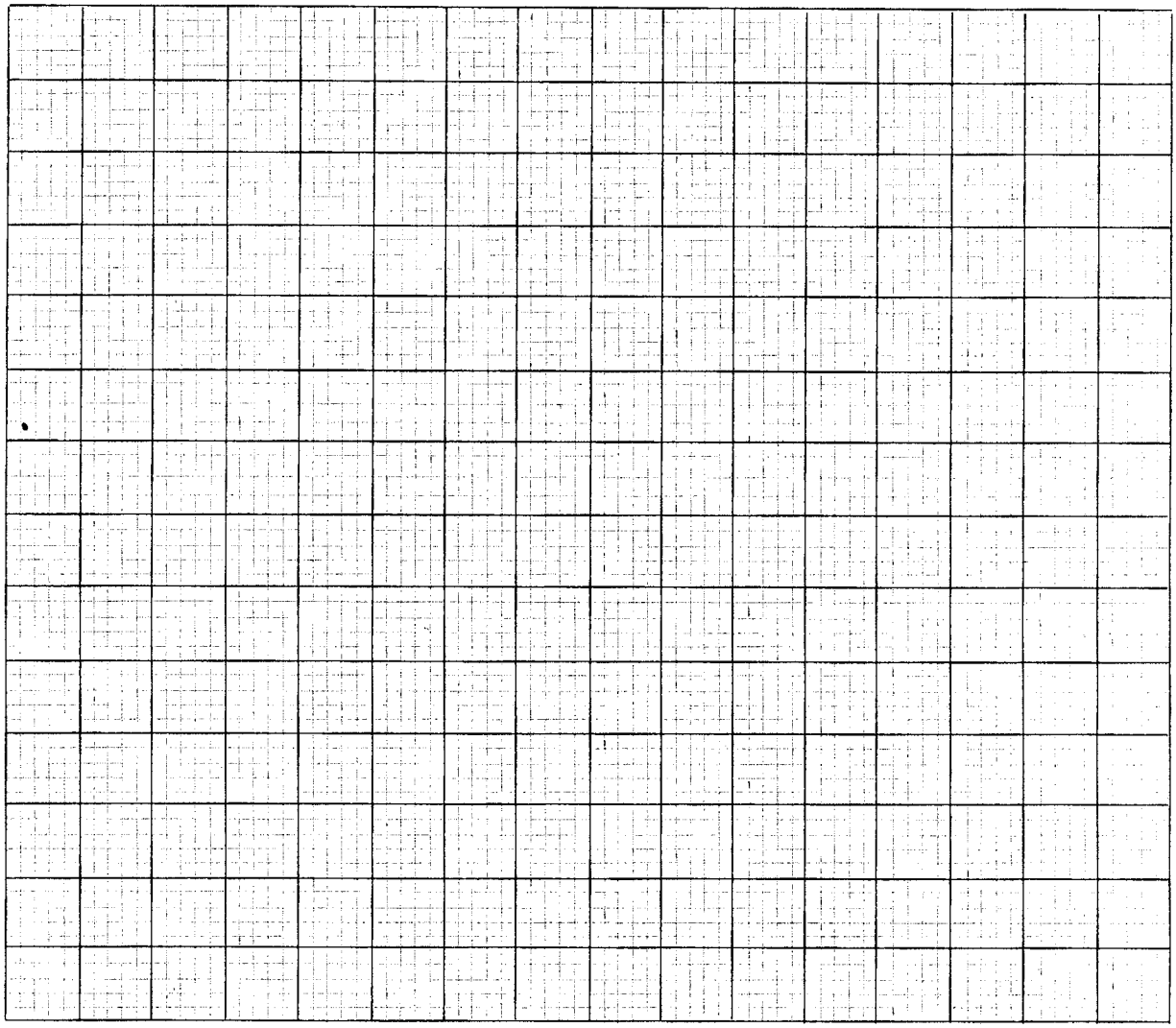
SECTION II (50 MARKS)

*Answer **only five** questions in this section in the spaces provided.*

17. The table below shows the number of goals scored in handball matches during a tournament.

Number of	0 - 9	10 - 19	20 - 29	30 - 39	40 - 49
Number of	2	14	24	12	8

(a) Draw a cumulative frequency curve on the grid provided. (5 marks)



(b) Using the curve drawn in (a) above determine:

(i) the median; (1mark)

(ii) the number of matches in which goals scored were not more than 37; (1mark)

(iii) the inter-quartile range. (3marks)

18. Given the points A, B and C

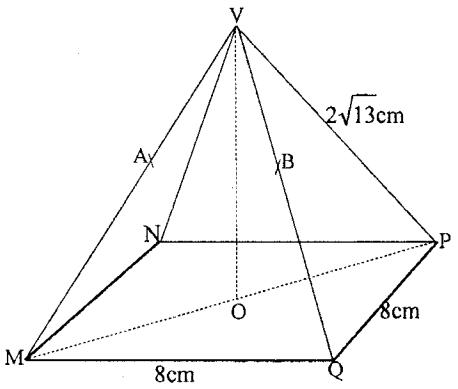
(a) construct:-

(i) The locus of points N such that BN = AN. (1 mark)

(ii) The locus of a point M such that M lies on the same side of BC as the point A and $\angle BMC = 60^0$. (4 marks)

(b) A point P is at the intersection of the locus of M and that of N, and is nearer to B than to C. A treasurer is hidden in part BPC. It is guaranteed that someone within part BPC will see the treasurer. One will however not see it while outside BPC. Find the probability that someone in the area bounded by the locus of M and BC will see the treasure. (5 marks)

19. The figure below represents a solid right pyramid VMPQ with a square base MNPQ of side 8cm. its slant edges VM, VN, VP and VQ are $2\sqrt{13}$cm long.



(a) Find:-

(i) The perpendicular height of the pyramid. (3 marks)

(ii) The angle between plane VPQ and base MNPQ. (2 marks)

(b) A and B are midpoints of edges VM and VQ respectively. Find the angle between plane ABPN and base MNPQ. (3 marks)

(c) Calculate the volume of the pyramid. (2 marks)

20. Two points P and Q on the earth's surface have positions (53^0S,147^0W) and (53^0S, 168^0E) respectively.

(a) If the local time at P is 9.30 p.m. on Wednesday, find the local time at Q. (3 marks)

(b) Find the distance from P to Q. (Take R = 6370km and $\pi = \frac{22}{7}$). (3 marks)

(c) Another point R is 950km due West of P.

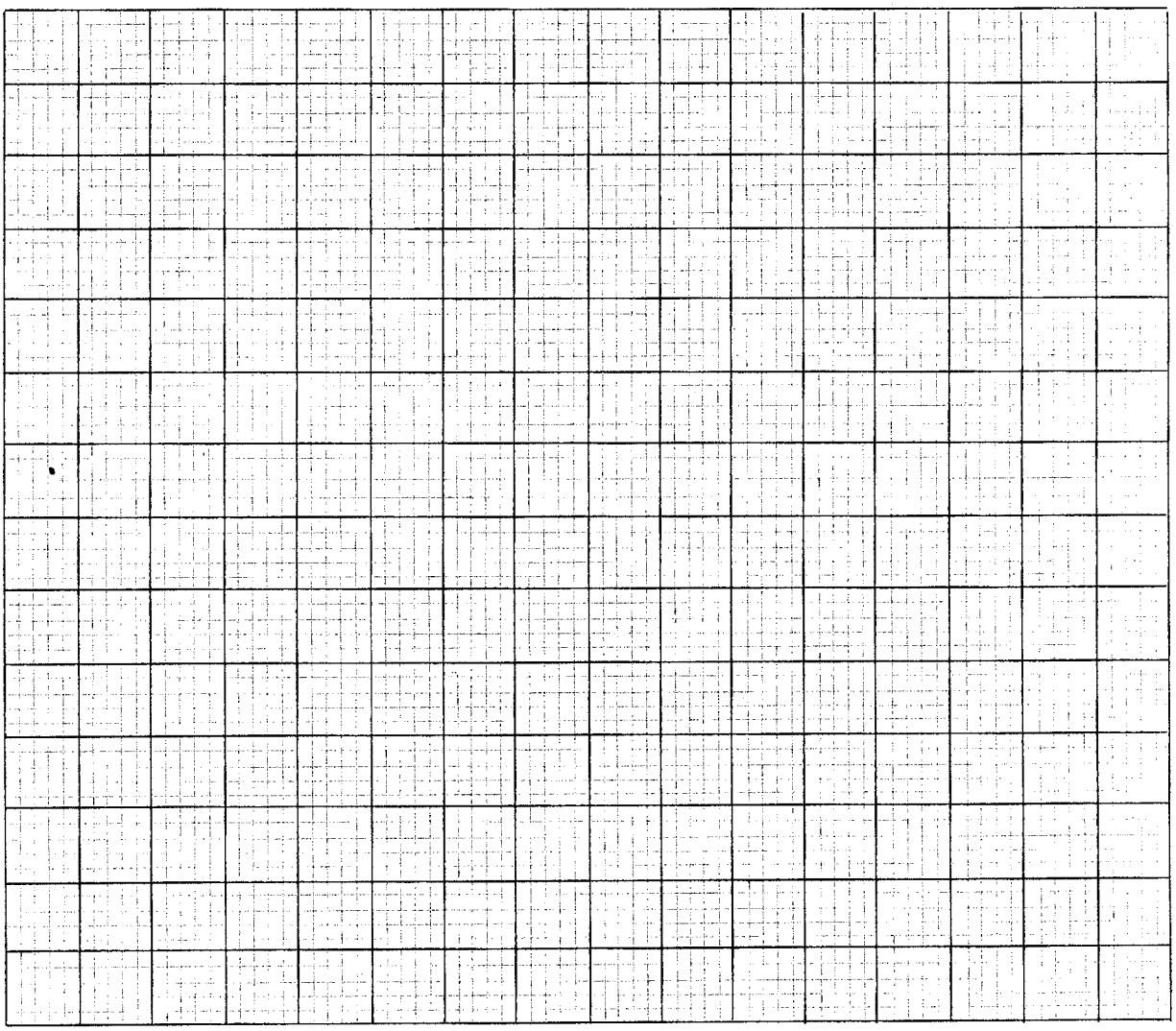
(i) Determine the longitude of point R. (2marks)

(ii) Determine the local time at R. (2 marks)

21. A tailor spends 6 hours to make a shirt and 4 hours to make a dress. It takes the tailor atleast 240 hours to make x shirts and y dresses. The labour cost of making a shirt is Kshs. 60 and that of a dress is Kshs. 70. The total labour cost should not exceed Kshs. 4,200. The tailor must make at least 20 shirts and more than 16 dresses.

(a) Write down four inequalities representing the information above. (3 marks)

(b) Represent the inequalities in (a) above in a graph. (4 marks)



(c) If the tailor makes a profit of Kshs. 140 on a shirt and Kshs. 180 on a dress, use the graph in (b) above to determine the maximum profit that the tailor can make.(3 marks)

22. In an examination room 68 candidates were taking Art: 40 Music and 36 French. Previous result indicated 75% would pass art, 65% music and 50% French. If a candidate had picked at random.

(a) Find the probability that he took art.

(i) He took music and failed. (2marks)

(ii) He took French and passed. (2marks)

(iii) He passed. (3marks)

(b) Find out how many candidates were expected to fail the examination. (3marks)

23. Cherop has 240 kg of maize and beans mixture that is made up of 40% maize and 60% beans.

(a) If the percentage of maize in a new second mixture drops to 30% when n kg of beans are added to the first mixture, determine the value of n. (4 marks)

(b) Cherop adds 40 kg maize to the second mixture. Find the percentage of beans in this third mixture. (2 marks)

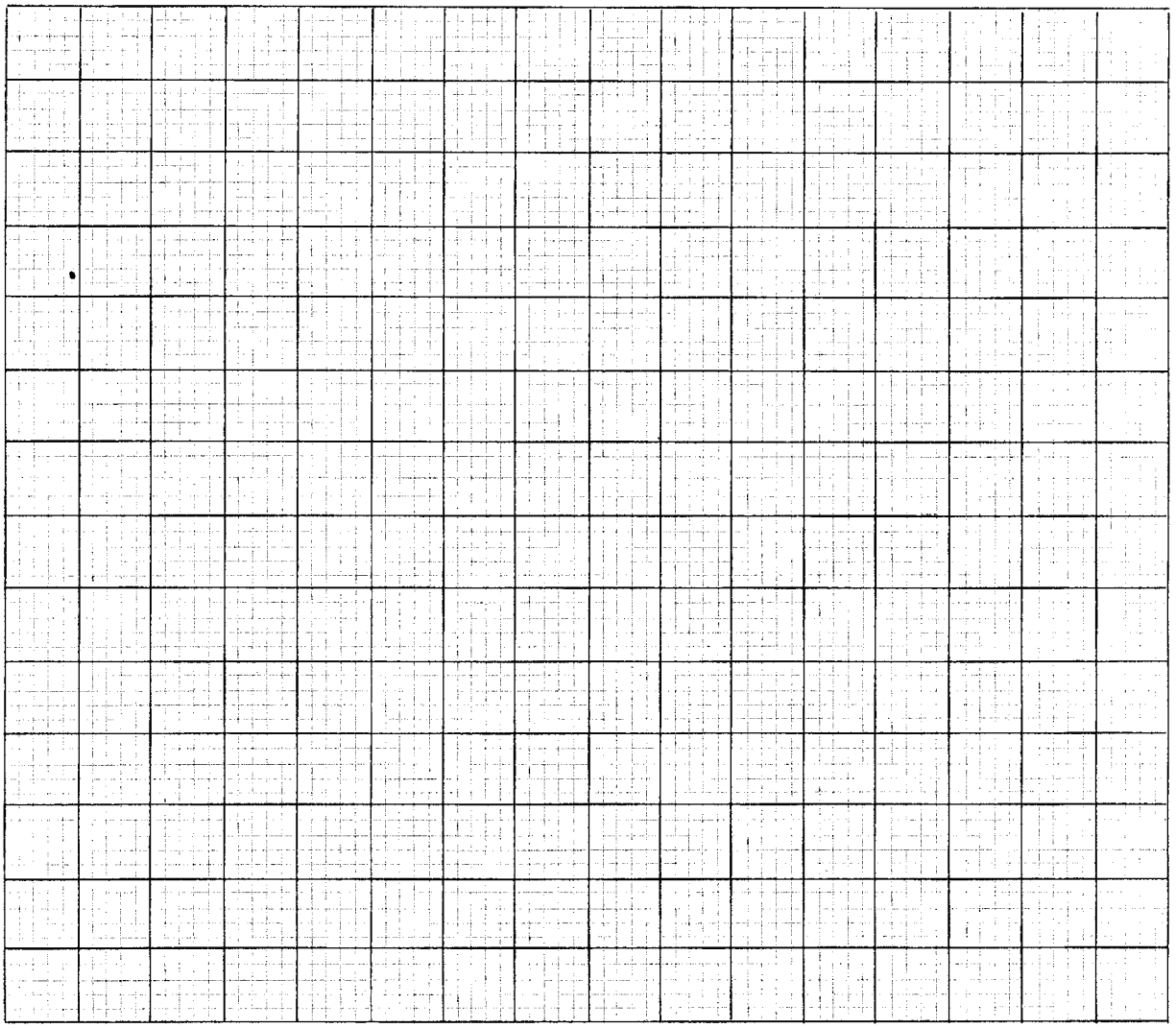
(c) She takes 30 kg of the first mixture and adds it to 18kg of the third mixture. Find the ratio of maize to beans in the resulting mixture. (4 marks)

24. The table below gives corresponding values of x and y which obey the law of $y = ax^2 + bx$ where a and b are constants.

x	0.52	2.58	5.25	8.00	9.5
y	4.6	38.5	121.3	235.1	324.5

(a) State linear equation connecting x and y (2marks)

(b) Draw a suitable linear graph and hence estimate the values of a and b (7marks)



(c) Hence state the law connecting x and y (1mark)