Name …… Index Number ……/…….

121/2 Candidate's Signature ……..

MATHEMATICS ALT A Date: ……..

Paper 2

July/August 2018

2 ½ hours

Instructions to candidates

(a) Write your name and index number in the spaces provided above.
(b) Sign and write the date of the 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 questions from Section II.
(e) Show all the steps in your calculations, giving your answers 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 14 printed pages
(i) Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing.
(j) Candidate 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.

1. Use logarithm tables to evaluate the following to four significant figures. (4 marks)

$$\sqrt{\frac{4.562^2 \times 0.038}{6.82 \times 0.35}}$$

2. The fifth term of an arithmetic progression is 11 and twenty fifth terms is 51. Find the first term and common difference. (2 marks)

3. Given that matrices P, Q, R are such that P = QR and P = $\begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}$ and Q = $\begin{pmatrix} 4 & 0 \\ 2 & 1 \end{pmatrix}$.Find matrix R.

(3 marks)

4. Solve for x in the equation.

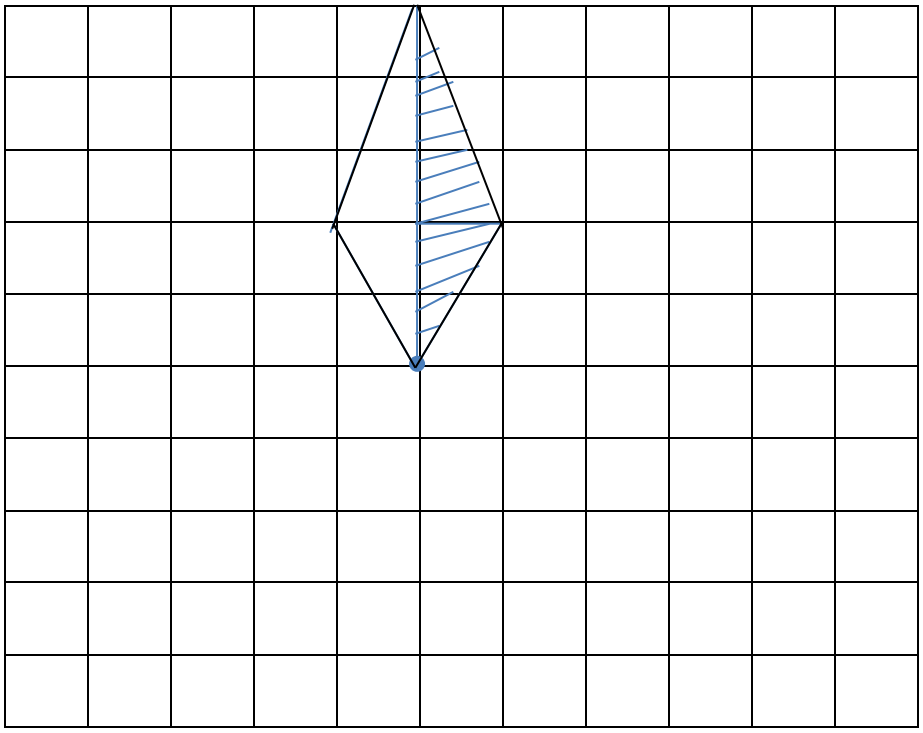
Log(x + 11) – 2log3 = log (9 – x) (3 marks)

5. Given that the mean 9, 8, 5, 5 and 8 is 7; find the standard deviation of the number to 2 d.p. (3 marks)

6. Find the equation of a straight line passing through (2, 1) and is Parallel to $3y=2x + 6$ in the form $ax + b + c =0$ (3 marks)

7. A bus travelling at 80km/h leave a station at 11.15pm. Another bus travelling at 75 km/h leaves the same station at 11.45 pm in the same direction as the first one. At what time will their distance apart be 55km? (3 marks)

8. The figure below shows part of a church badge which has a rotational symmetry of order 4 about the point marked with a dot. Draw the complete badge. (3 marks)



9. Simplify the expressions (3 marks)

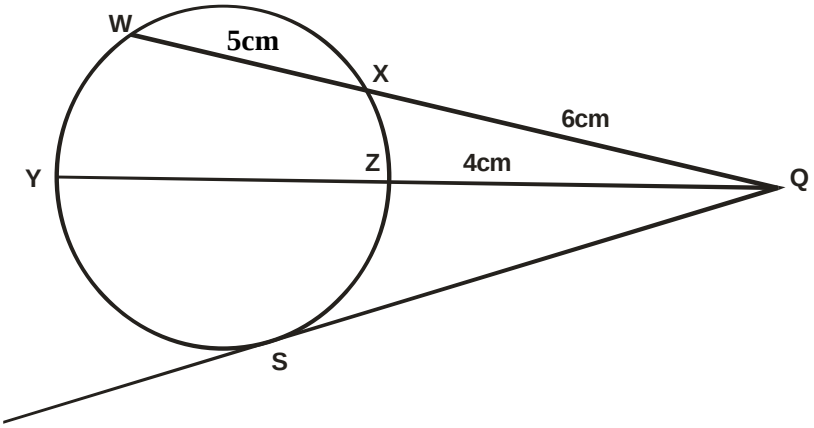
$$\frac{15t^2y - 10ty^2}{3t^2 - 5ty + 2y^2}$$

10. a) Expand and simplify $(2 - x)^5$ in ascending powers of x upto and including the term in x^3

(2 marks)

b) Hence approximate the values of $(1.98)^5$ to four significant figures. (2 marks)

11. Chord QX and YZ intersect externally at Q. The secant WQ =11cm and QX =6cm while ZQ=4cm



a) Calculate the length of chord YZ (2 marks)

b) Use the answer in i) above to find the length of the tangent SQ (2 marks)

12. Make **n** the subject of the formula in

$$S = \frac{a\,(1-r^n)}{1-r}$$ (3 marks)

13. A man deposits Sh. 500,000 in an investment which pays 12% per annum interest compounded quarterly. Find how many years it takes for the money to double. (3 marks)

14. A variable V varies jointly as the variable A and h. When A = 63 and h = 4, V = 84, find;

(a) The value of V when A = 9 and h = 7 (1 mark)

(b) The value of A when V = 4.5 and h = 0.5 (2 marks)

15. Rationalize and simplify

$$\frac{3\sqrt{5}}{\sqrt{45}+\sqrt{15}}$$ (3 marks)

16. Given that x, y and z are integers and that $8 \leq x \leq 10$, $5 \leq y \leq 7$, $4 \leq z \leq 6$.

Find the percentage error in $\frac{x+y}{z}$ (3 marks)

SECTION II (50 marks)

Answer any **Five (5) questions only** in this section.

17. (a.) Using the first Principles and a small increment h, determine the derivative of $y=3x^2 - 2$.

(4 marks)

b.) Find the equation to the normal of $3x^2 - y = 2$ at x=1 in the form y + mx=c. (4 marks)

c.) Determine the stationary point and identify the nature of point. (2 marks)

18. The table below shows marks obtained by 50 students in Mathematics Examination

32	64	68	55	52	68	37	46	65	26
45	87	44	58	39	54	21	44	76	23
65	42	82	87	75	44	47	48	52	32
23	76	74	91	28	33	27	48	56	66
45	56	98	21	34	31	83	65	77	76

(a.) Starting with 21 and using equal class intervals of 10, make a frequency distribution table. (2 marks)

(b.) On grid provided, draw the cumulative frequency curve for the data. (4 marks)

(c.) Using the graph (b.) above estimate:

(i.) The upper quartile (2 marks)

(ii.) The lower quartile (2 marks)

19. Linnet's basic salary is sh.100,000. She is housed by her employer and pays a nominal rent of sh.2000 which is deducted from her salary. She is entitled to an entertainment allowance of sh.5,000 and a responsibility allowance of sh.10,000. She has a bank loan and hire purchase repayments which she repays at the rate of sh.15,000 and sh.3,000 per month. She also makes cooperative share contributions of sh.5,000 per month. Calculate:

(a) Her gross salary (1 mark)

(b) Her taxable income in Ksh. (1 mark)

During that month, the table below was used to determine individual rate of income tax.

Income K£ p.m.			Rate (sh. per £)
1	-	484	2
485	-	940	4
941	-	1396	6
1397	-	1852	7
Over 1852			9

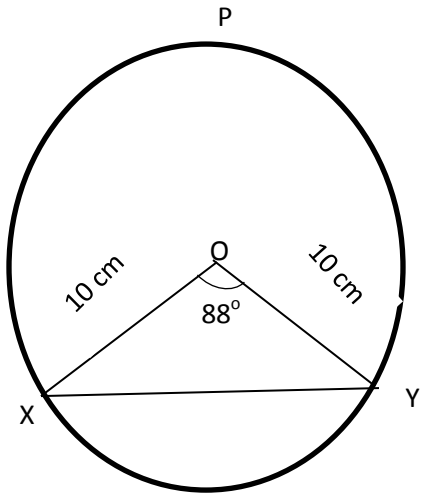
(c) Use the table to determine;

(i) Her monthly gross tax (5 marks)

(ii) Her net tax given that she is entitled to a tax relief of sh.1056 per month. (1 mark)

(iii) Her net salary. (2 marks)

20. The Chord XY subtends an angle of 88^{o} at the centre O. If the radius of the circle is 10cm, calculate:



(i) The area of the circle. (2 marks)

(ii) The area of the major sector XPY, (3 marks)

(iii) The area of triangle OXY (2 marks)

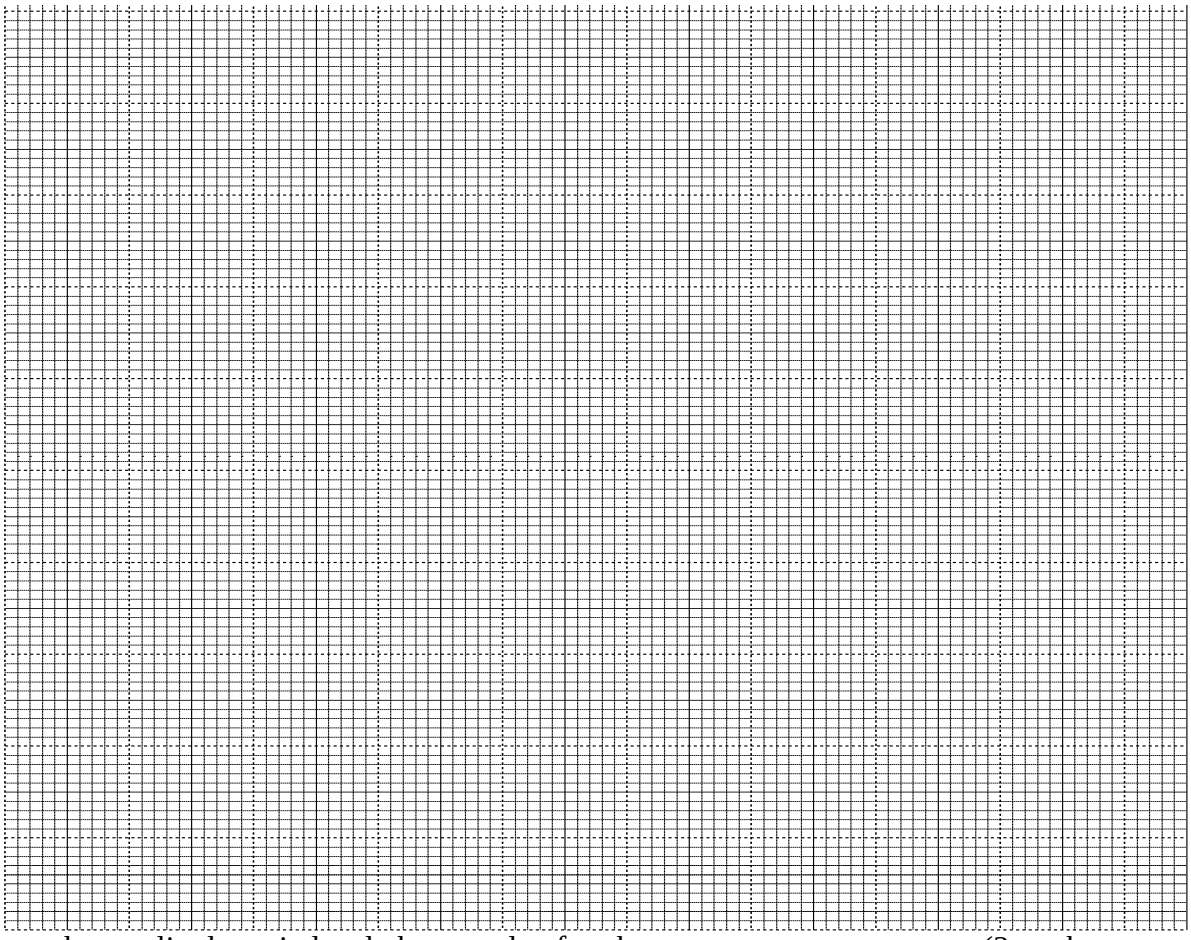
(iv) The area of major segment (2 marks)

(v) The area of the Minor segment (1 mark)

21. a) Complete the table below for the curves y =3cos2x and y = 2sin(2x + 30)° (2 marks)

x	0	15	30	45	60	75	90	105	120	135	150	165	180
3cos2x	3	2.598	1.5	0	-1.5		-3	-2.598	-1.5	0		2.598	3
2sin(2x+30)°	1		2						-2	-1.732	-1		1

b) On a graph paper, draw on the same axes the graph of y=3cos2x and y=2sin(2x+30)° for $0° \leq x \leq 180°$ (4 marks)



a) State the amplitude period and phase angle of each curve (2 marks

b) Use your graph to:-

i) Estimate the value of x for which 3cos2x – 2sin(2x+30)° =0 (1 mark)

ii) Estimate the range of values of x for which 3cos2x<2sin(2x+30)° (1 mark)

22. Mungai, Koskei and Kandie are participating in an athletic competition. The probability that Mungai, Koskei, and Kandie completes the race in $\frac{3}{5}$, $\frac{1}{6}$, and $\frac{4}{7}$ respectively. Find the;

Probability that in a competition.

(a) Only one of them completes the race. (3 marks)

(b) All the three completes the race. (1 mark)

(c) None of them completes the race. (1 mark)

(d) Two of them completes the race. (3 marks)

(e) At least one completes the race. (2 marks)

23. Use a pair of compasses and a ruler only in this question.

(a) Construct triangle ABC in which AB = 5.8cm, AC = 4.2cm and <BAC = 45^0.
Measure BC. (3 marks)

(b) (i) Draw escribed (external) circle of triangle ABC which touches BC.
(3 marks)

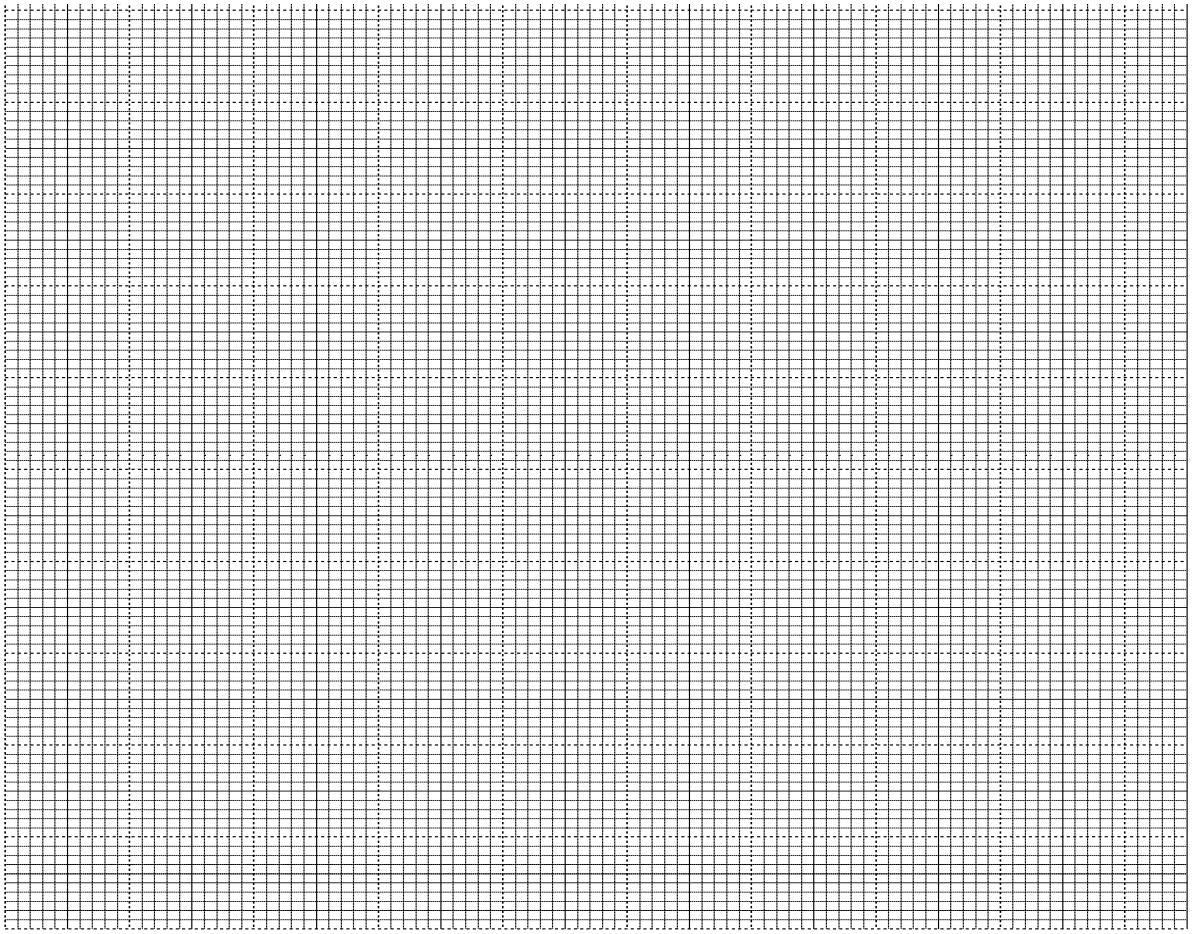
(ii) Draw P_1 the locus of points which move such that the area of triangle APB is half the area of triangle ABC. (3 marks)

(i) Mark $P_1$and P_2 the points where P and the circle meet. Measure $P_1 P_2$.
(1 mark)

24. A potter wants to make and sell serving bowls and plates. A bowl uses 5 kg of clay. A plate uses 4 kg of clay. The potter has 40 kg of clay and wants to make at least 4 bowls. The profit a bowl is ksh 35 and the profit on a plate is ksh. 30.

(a.) Form all the inequalities. (3 marks)

(b.) On the grid provided draw the inequalities (4 marks)



(c.) How many bowls and how many plates should the potter make in order to maximize profit?

(3 marks)