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

SCHOOL .... SIGN ....

ADM NO... DATE..........................

121/2
MATHEMATICS PAPER 2
JULY 2018
TIME: 2 ½ HOURS.

OCTAGON JOINT EXAM-2018

Kenya Certificate of Secondary Education (K.C.S.E)

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INSTRUCTIONS TO CANDIDATE'S

i. Write your name and index number in the spaces provided at the top of this page.
ii. This paper consists of two sections: Section **I** and Section **II.**
iii. Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.
iv. Answer **ALL** questions in section **1** and ONLY **five** questions from section **II**
v. Show all the steps in your Calculations, giving your answers at each stage in the spaces 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 tablets may be used.

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 consists of 1 printed pages. Candidates should check the question paper to ensure** that **all the pages are printed as indicated and no questions are missing.

1. Use logarithm to evaluate $\sqrt[3]{\frac{(1.654)^2}{45.73\ x\ 0.56}}$ (4marks)

2. Without using a calculator or mathematical tables, express $\frac{\sqrt{3}}{1-Cos\ 30^0}$ in surd form and simplify (3 Marks)

3. Solve for x: $(\log_3 x)^2 - \frac{1}{2}\log 3x = \frac{3}{2}$ (3 marks)

4. (a) Expand the expression $\left(1+\frac{1}{2}x\right)^5$ in ascending order powers of x, leaving the coefficients as fractions in their simplest form.

(2 Marks)

(b)Use the first three terms of the expansion in (a) above to estimate the value of $(1.05)^5$

(2 Marks)

5. Make P the subject of the formula in $L=\frac{2}{3}\sqrt{\frac{x^2-PT}{y}}$ (3 Marks)

6. Quantity P is partly constant and partly varies as the square of Q when Q = 2, P = 40 and Q = 3, P = 65. Determine the value of P when Q = 4 (3 Marks)

7. By rounding each number to the nearest tens, approximate the value of $\frac{2454\ x\ 396}{66}$
Hence, calculate the percentage error arising from this approximation to 4 significant figures. (3 Marks)

8. The price of a new car is Shs. 800,000. If it depreciates at a constant rate to Shs. 550,000 within 4 years, find the annual rate of depreciation. (3 marks)

9. A trader stocks two brands of rice A and rice B .The rice is packed in packets of the same size. The trader intends to order fresh suppliers but his stock can accommodate a maximum of 500 packets. He orders at least twice as many packets of A as of B. He requires at least 50 packets of B and more than 250 packets of A . if he orders x packets of A and y packets of B, write inequalities in terms of x and y which satisfy the above information. (3 marks)

10. Solve the following simultaneous equations using Matrix Method. (3 marks)

4a+3b=120

2a+5b=130

11. The second and fifth terms of a geometric progression are 16 and 2 respectively. Determine the common ratio and the first term. (3 Marks)

12. The equation of a circle is given by $2x^2+16x+2y^2-4y-2=0$. Determine the radius and centre of the circle. (3 marks)

13. The equation is given as $y=2x^3+\frac{9}{2}x^2-15x+3$. Find the equation of a tangent to the curve at $x=2$. (3marks)

14. Solve for x in the equation

$2\ \mathrm{Sin}^2 x - 1 = \mathrm{Cos}^2 x + \mathrm{Sin}\ x$, where $0^0 \leq x \leq 360^0$. (4 Marks)

15. A cold water tap can fill a bath in 10 minutes while a hot water tap can fill it in 8 minutes. The drainage pipe can empty it in 5 minutes. The cold water and hot water taps are opened for 4 minutes. After four minutes all the three taps are opened. Find how long it takes to fill the bath. (3 Marks)

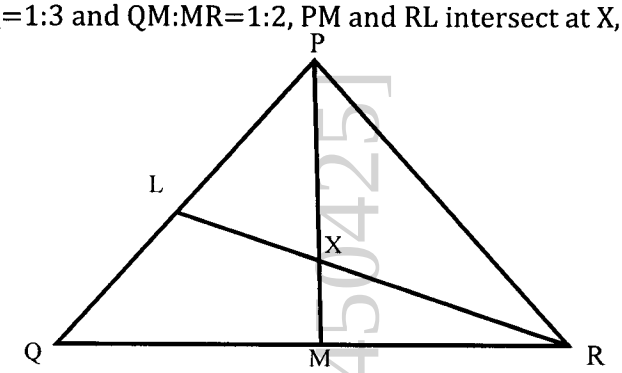
16. A two digit number is formed from the first four prime numbers.

(a) Draw the table to show the possible outcomes. (1 Mark)

(b) Calculate the probability that a number chosen from the two digit numbers is an even number. (1 Mark)

SECTION II. (50 MARKS)
Answer any five questions in this section.

17. In the triangle PQR below L and M are points on PQ and QR respectively such that PL:LQ=1:3 and QM:MR=1:2, PM and RL intersect at X, given that PQ = **b** and PR = **c**,



(a) Express the following vectors in terms of **b** and **c**

(i) **QR**

(1mark)

(ii) **PM**

(1mark)

(iii) **RL**

(1mark)

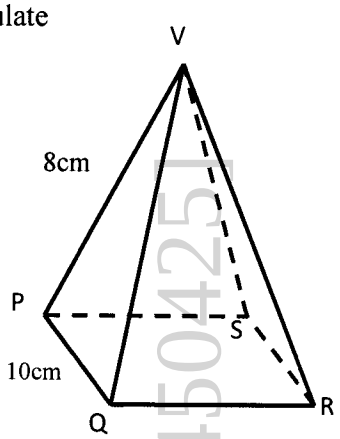
(b) By taking **PX** = h**PM** and **RX** = k**RL** where h and k are constants find two expressions of **PX** in terms of h, k, **b** and **c**. Hence determine the values of the constant h and k.

(6marks)

(c) Determine the ratio LX:XR

(1mark)

18. PQRSV is a right pyramid on a horizontal square base of side 10cm. The slant edges are all 8cm long. Calculate



(a) The height of the pyramid (2 Marks)

(b) The angle between

(i) Line VP and the base PQRS (2 Marks)

(ii) Line VP and line RS (2 Marks)

(iii) Planes VPQ and the base PQRS (2 Marks)

(a) Volume of the pyramid (2 Marks)

21. A plane leaves an airport P (10^0S, 62^0E) and flies due north at 800km/h.
(a) Find its position after 2 hours (3 Marks)

(b) The plane turns and flies at the same speed due west. It reaches longitude Q, 12^0W.
(i) Find the distance it has traveled in nautical miles. (3 Marks)

(ii) Find the time it has taken (Take $\pi = \frac{22}{7}$, the radius of the earth to be 6370km and 1 nautical mile to be 1.853km) (2 Marks)

(c) If the local time at P was 1300 hours when it reached Q, find the local time at Q when it landed at Q (2 Marks)