NAME.....ADM NO.....CLASS.....

121/1
MATHEMATICS
PAPER 1
TIME: 2 ½ HOURS

END OF TERM 1 2019 EXAMINATIONS
FORM 4 MATHEMATICS PAPER 1

INSTRUCTIONS TO CANDIDATES

(a) Write your name and index number in the spaces provided.
(b) This paper consists of two sections **I** and **II**
(c) Answer all the questions in section **I** and **ONLY FIVE** questions in section II.
(d) All answers and working must be written on the question paper in the spaces provided below each question.
(e) Show all the steps in your calculation giving your answer at each stage in the space below each question.
(f) Marks are given for correct working even if the answer is wrong.
(g) Use calculators and KNEC mathematical tables except where stated otherwise.

FOR EXAMINER'S USE ONLY

SECTION

TOTAL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

SECTION II

17	18	19	20	21	22	23	24	TOTAL

GRAND TOTAL

SECTION I (50 MARKS)
ANSWER ALL QUESTIONS IN THIS SECTION

1. Evaluate (3marks)

$$\frac{11 + (-2) \times (-6) \div 3}{11 - 40 \div (2 \times 4)}$$

2. Express the numbers: 935 and 19845 as a product of their prime factors; hence evaluate $\frac{935}{19845}$ leaving your answer in prime factor form. (3marks)

3. Two special grades of baking flour costing ksh. 200 and ksh. 250 per kg respectively are mixed in the ratio 3:5 by mass. The mixture is then sold at ksh. 240 per kg. Find the percentage profit on the cost correct to 1 d.p. (3marks)

4. A prism of length 15cm has a uniform triangular cross-section of sides measuring 8cm, 7cm and 5cm. Determine the volume of the prism. (4marks)

5. The size of each interior angle of a regular polygon is four times the size of the exterior angle. Find the number of the polygon. (3marks)

6. Use logarithms to 4 decimal places to evaluate; (4marks)

$$\frac{0.784 \times \sqrt{0.1356}}{\log 84.92}$$

7. A straight line L1 is perpendicular to another line L2 whose equation is $3y + 4x = 12$. If the two lines meet at point P which lies on the x-axis, find:-

(i) the coordinators of point P. (1mark)

(ii) The equation of line L1 in the form $y = mx + c$ (3marks)

8. Convert 154.50^0 into radians and write your answer in terms of π^c (2marks)

9. Given that $\tan\theta^0 = 3\frac{3}{7}$ find Cos (90 - θ) as a decimal. (2marks)

10. Solve the simultaneous inequalities given below and list all the integral values of x. (3marks)

$$\frac{3-x}{2} \geq \frac{1+1}{3} \geq \frac{2x+1}{-3}$$

11. Solve the following equation for x:-

$9^x + 3^{2x-1} - 1 = 107$ (3marks)

12. A Kenyan bank buys and sells foreign currency as shown below.

	Buying (ksh)	Selling (ksh)
1 US dollar ($)	100.00	101.20
1UK pound (£)	145.00	145.95

A tourist arrived in Kenya with 9600 which he converted into ksh. at a commission of 5%. He later used ¾ of the money before changing the balance of dollars at no commission. Calculate to the nearest dollar, the amount he received. (4marks)

13. Simplify the expression. (3marks)

$$\frac{8x - 18x^3}{3x^2 - 4x - 4}$$

14. Given that $\underset{\sim}{a} = 2\underset{\sim}{i} + 3\underset{\sim}{j}$ and $\underset{\sim}{b} = \underset{\sim}{i} - 5\underset{\sim}{j} + 7\underset{\sim}{k}$, evaluate $|2\underset{\sim}{a} + \underset{\sim}{b}|$ (3marks)

15. A train of length 80 m crosses a bridge 24m long in 5 seconds. Calculate the average speed of the train in km/h. (3marks)

16. Below is part of a sketch of a solid cuboid ABCDEFGH. Complete the sketch.(3marks)

SECTION II (50 MARKS)
ANSWER ONLY FIVE QUESTIONS IN THIS SECTION.

17. The following data was obtained from masses of pregnant women in a maternity clinic.

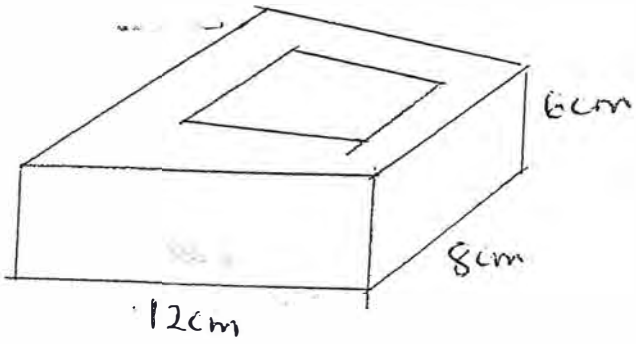
Masses (kg)	$1.5 \leq x < 5.5$	$5.5 \leq x < 7.5$	$7.5 \leq x < 13.5$	$13.5 \leq x < 15.5$	$15.5 \leq x < 20.5$
No. of women	16	20	18	14	15

(a) Represent the information on a histogram, on the g rid provided. (4marks)

(b) Use the information in the table above to estimate
(i) the mean mass (4marks)

(c) the median mass (2marks)

18. The figure below shows an open tank whose external dimensions are 12m by 8m by 6m. The materials making the tank has a thickness of 0.5m.



(a) Calculate the amount of liquid it can hold when full. (2marks)

(b) Find the volume of the material making the tank. (4marks)

(c) If the tank can be emptied at a rate of 20 litres per minute by an outlet pipe, how long would it take to empty a full tank? (4marks)

19. Four towns P, Q, R and S are such that Q is 168km from P on a bearing of 063^0. R is 288 km on a bearing of S 30^0E from Q. S is due west of R on a bearing of 161^0. Using the scale of 1cm to represent 40km.

(a) Show the relative position of P, Q, R and S. (4marks)

(b) From the diagram, find

(i) The bearing of S from Q (1mark)

(ii) The bearing of P from R (1mark)

(iii) The distance of PS and SR (4marks)

20. A certain number of form four students agreed to contribute equally to buy a gift worth sh. 1200 for their class prefect's birthday. Five students pulled out and so the others agreed to contribute an extra sh. 10. Their contribution enabled them to buy a gift worth sh. 200 more than they originally expected.

(a) If the original number of students was x, write an expression of how much each was originally going to contribute. (1mark)

(b) Write down two expressions of how much each contributed after the five students pulled out. (2marks)

(c) Calculate how many students made the contribution. (5marks)

(d) Find how much each contributed.

21. (a) The points A(2,6), B (1,1), C(3,4) and D (5,3) are the vertices of a quadrilateral ABCD. Plot points A,B,C and D on the grid provided and join them to form quadrilateral ABCD.
(2marks)

(b) Locate and write down the co-ordinates of point $A^1B^1C^1D^1$ image of ABCD under a rotation of positive 90^0 about the origin. On the same grid draw image quadrilateral $A^1B^1C^1D^1$ (3marks)

(d) Reflect $A^1B^1C^1D^1$ on the x-axis and draw the second image of the quadrilateral $A^{11}B^{11}C^{11}D^{11}$
(3marks)

(d) Draw the mirror line M for the reflection of ABCD whose image is $A^{11}B^{11}C^{11}D^{11}$ (2marks)

22. A, B, C and D is a rhombus. The equation of line AB is y=x+3 and that of AD is y+x=5. The coordinate of C is (1, -2).

Find,

(i) The coordinate of A, B and D (6marks)

(ii) The coordinate of the mid point AB. (2marks)

(iii) The length of AC correct to 2 d.p. (1mark)

(iv) The equation of BD. (1mark)

23. OABC is a trapezium such that the coordinates of O, A, B and C are (0, 0), (2,-1) (4,3) and (0,y).

(a) find the value of y (2marks)

(b) M is the mid-point of AB and N is the mid point of OM. Find in column form .

(i) The vector $\underset{\sim}{AN}$ (3marks)

(ii) The vector $\underset{\sim}{NC}$ (2marks)

(iii) Vector $\underset{\sim}{AC}$ (1mark)

(c) Hence show that A,N and C are collinear (2marks)

23. Given that $y=x^2 + 5x - 4$, complete the table below. (2marks)

x	-6	-5	-4	-3	-2	-1	0	1	2
y									

(b) On the grid provided draw the graph of
$y=x^2 + 5x - 4$ for $-6 \leq x \leq 2$ (3marks)

(c) Use your graph to solve the following equations.
(i) $x^2 + 5x - 4 = 0$ (2marks)

(ii) $x^2 + 6x = 0$