NAME: ……. **INDEX NO:……..……**

SCHOOL…… **Date: ……..……**

Candidate's signature: ……..

121/1
MATHEMATICS
Paper 1
July/August 2017
Time: 2 ½ Hours

SCHOOL BASED FORM 4 EXAM JULY-AUGUST 2017

Kenya Certificate of Secondary Education (K.C.S.E)
MATHEMATICS
Paper 1
July/August 2017
Time :2 ½ Hours

INSTRUCTIONS TO CANDIDATES

(a) Write your **NAME** and **INDEX** number in the spaces provided above.
(b) 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** questions 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) Candidates should check the question paper to ascertain that all the papers are printed as indicated and that no questions are missing.

FOR EXAMINER'S USE ONLY
SECTION 1

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 16 printed pages.

SECTION I (50 MARKS)

1. (a) Evaluate 94344 – 36425 ÷ 5 (1 mk)

(b) Write the total value of the digit in the thousands place of the result obtained in (a) above (1 mk)

2. In a game park $\frac{1}{5}$ of the animals are rhinos and ¾ of them are zebras. $\frac{2}{3}$ of the remaining animals are lions and the rest are warthogs. Find the fraction of warthogs in the game park. (3 mks)

3. The volume of a cube is 2744cm3. Calculate the length of the diagonal of a face of the cube giving your answer in surd form. (3 mks)

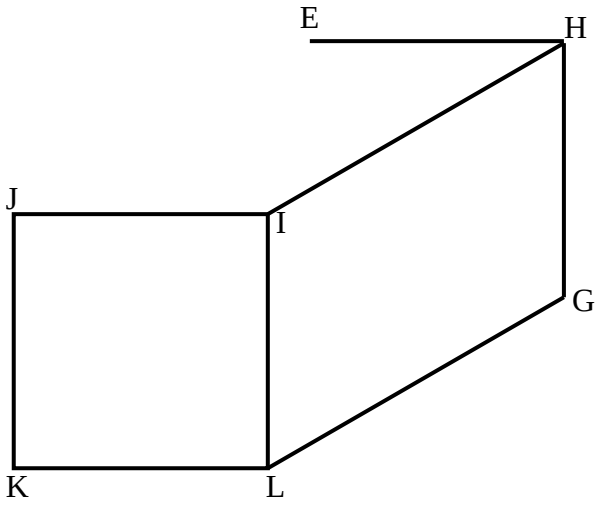
4. Use logarithms correct to four significant figures to evaluate: (3 mks)

$$\sqrt[3]{\frac{24.36\ x\ 0.066547}{(1.48)^2}}$$

5. A piece of copper wire is bent in the shape of an isosceles triangle. The vertical angle is 40^0 and the altitude of the triangle is 5cm. Find the length of the copper wire correct to 1 decimal place. (3 mks)

6. An empty specimen bottle has a capacity of 300ml and a mass of 280g. Calculate the mass of the bottle when it is full of a liquid whose density is 1.2g/cm3. (3 mks)

7. The figure below shows a sketch of a solid cuboid EFGHIJKL. Complete the sketch. (2 mks)



8. Find the rate per annum at which a certain amount doubles after being invested for a period of 5 years compound semi-annually (3 mks)

9. The sum of the interior angles of a regular polygon is 40 times the size if the exterior angle.
   (a) Find the number of sides of the polygon. (2 mks)

   (b) Name the polygon (1 mk)

10. The data below shows the number of pupils in Nairutia Primary School

42	43	48	40	46	42	44	48	39	40	42
41	47	46	45	49	45	42	40	38	39	40
46	47	42	40	41	43	44	45	46	48	

(a) Using a class size of 2 organize the data in a grouped frequency table. (2 mks)

(b) Determine the mean of the data. (2 mks)

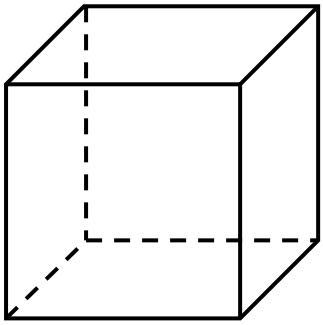
11. Given that $\underset{\sim}{q} = 5\underset{\sim}{t} - 3\underset{\sim}{f}$ where $\underset{\sim}{t} = \begin{pmatrix} -2 \\ -3 \end{pmatrix}$ and $\underset{\sim}{f} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$ find:

(a) the column vector $\underset{\sim}{q}$ (2 mks)

(b) Given that T^{I} (3,2) is the image of T (0,-2) under a translation, find the translation. (1 mk)

12. Given that a = -5 b = 3 and c = $-\frac{1}{3}$, evaluate: $\frac{5a^2-2b-4c}{\frac{1}{3}(b^2+2a)}$ (3 mks)

14. The figure below represents a skeleton cuboid on a square base of side xcm and is made from 36cm of copper wire.



Find the height of the box in terms of x and hence show that the volume, V of the cuboid is given by V = $(9 - 2x)\,x^2$ (3 mks)

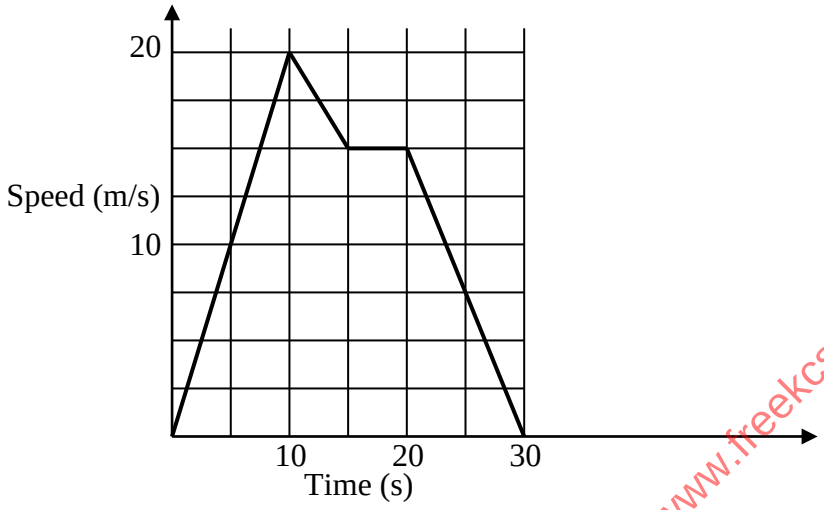
14 (a) Find the inverse of the matrix $\begin{bmatrix} 4 & 3 \\ 2 & -1 \end{bmatrix}$ (1 mk)

(b) Hence solve the simultaneous equations below. (3 mks)

$3y + 4x = 8$

$2x - y = 9$

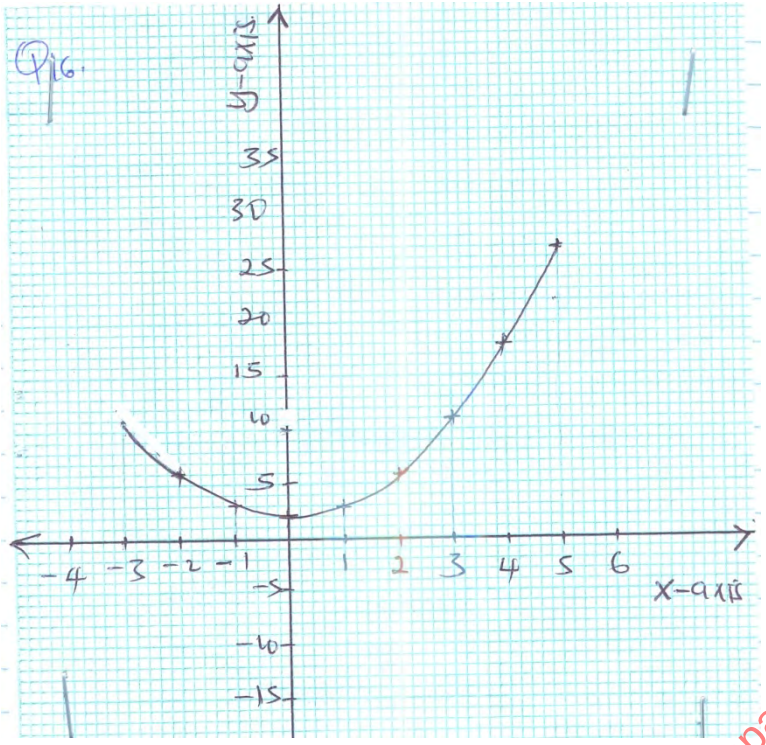
15. The figure below represents the speed-time graph of a tuktuk. Use it to answer the questions (a) and (b)



(a) Calculate the acceleration of the tuktuk. (2 mks)

(b) Find the total distance travelled for the whole journey (2 mks)

16. The figure below represents the curve of an equation. Use the trapezium rule with four strips to estimate the area bounded by the curve, the lines y = 0, x = -3 and x = 5. (3 mks)



SECTION (50 MARKS)

Answer any five questions in this section in the spaces provided.

17. In the year 2001 the price of a sofa set in a shop was KSh. 12,000

(a) Calculate the amount received from the sales of 240 sofa sets that year (2 mks)

(b) In the year 2002 the price of each sofa set increased by 25% while the number of sets sold decreased by 10%.

(i) Calculate the percentage increase in the amount received from the sales (3 mks)

(ii) If at the end of the year 2002, the price of each sofa set changed in the ratio 16:15. Calculate the price of each sofa set in the year 2003. (2 mks)

(c) The number of sofa sets sold in the year 2003 was p% less than the number sold in the year 2002. Calculate the value of P given that the amount received from the sales in the year were equal. (3 mks)

18. (a) Find the inverse of the matrix (2 mks)

$$\begin{bmatrix} 2 & 5 \\ 4 & 3 \end{bmatrix}$$

(b) A transport company has two types of vehicles for hire: Lorries and buses. The vehicles are hired per day. The cost of hiring two lorries and five buses is Sh. 156,000 and that of hiring 4 lorries and three buses is Sh. 137,000.

(i) Form two equations to represent the above information. (2 mks)

(ii) Use matrix method to determine the cost of hiring a lorry and that of hiring a bus. (3 mks)

(c) Find the value of x given that $\begin{bmatrix} 2x-1 & 1 \\ x^2 & 1 \end{bmatrix}$ is a singular matrix (3 mks)

19. Without using a set square or a protractor construct.

(a) Triangle ABC such that AB = 8cm, BC = 6cm and $\angle ABC = 30^0$. (2 mks)

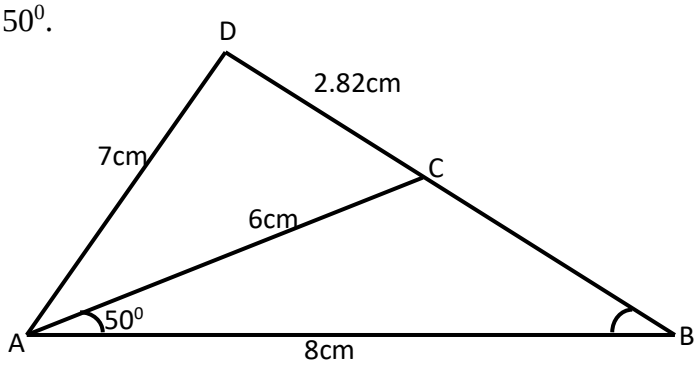
(b) Measure the length AC (1 mk)

(c) Draw a circle that touches sides AB, BC and AC (3 mks)

(d) Measure the radius of the circle (1 mk)

(e) Hence or otherwise calculate the area in the triangle but not in the circle. (3 mks)

20. In the figure below (not drawn to scale) AB = 8cm, AC = 6cm, AD = 7cm, CD = 2.82cm and angle CAB = 50^0.



Calculate to 2 decimal places

(a) the length BC (3 mks)

(b) the size of angle ABC (2 mks)

(c) the size of angle CAD (3 mks)

(d) the area of triangle ACD (2 mks)

21. A line L passes through points (-2,3) and (-1,6) and is perpendicular to a line P at (-1,6)

(a) Find the equation of L. (2 mks)

(b) Find the equation P in the form ax + by = c where a, b and c are constants. (2 mks)

(c) Given that another line Q is parallel to L and passes through point (1,2), find the x and y - intercepts of Q (3 mks)

(d) Find the point of intersection of lines P and Q (3 mks)

22. ABCD is a quadrilateral with vertices A (3,1), B(2,4), C(4,3) D (5,1)

(a) Draw the image $A^IB^IC^ID^I$ image of ABCD under transformation matrix $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ and write down the co-ordinates. (3 mks)

(b) A transformation represented by $\begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$ maps $A^IB^IC^ID^I$ onto $A^{II}B^{II}C^{II}D^{II}$ determine the coordinates of the image and draw $A^{II}B^{II}C^{II}D^{II}$. (3 mks)

(c) Determine the single matrix transformation which maps ABCD onto $A^{II}B^{II}C^{II}D^{II}$ and describe the transformation. (3 mks)

23. A carpenter constructed a closed wooden box with internal measurements 1.5m long 0.8m wide and 0.4m high. The wood used in constructing the box was 1.0cm thick and had a density of 0.6g/cm^3.

(a) Determine the:

(i) volume in cm^3 of the wood used in constructing the box. (3 mks)

(ii) mass of the box in kg correct to 1 d.p (2 mks)

(b) Identical cylindrical tins of diameter 10cm height 20cm with a mass of 120g each were packed in the box. Calculate the:

(i) maximum number of tins that were packed (3 mks)

(ii) Total mass of the box with the tins (2 mks)

24. (a) (i) Find the co-ordinates of the stationary points of the curve $y = x^3 - 3x + 2$ (4 mks)

(ii) For each stationary point determine its nature (2 mks)

(b) Determine the y-intercept (2 mks)

(c) In the space provided sketch the graph of the function $y = x^3 - 3x + 2$ (2 mks)