GATAGA SUB COUNTY FORM FOUR END OF TERM II EXAMINATION 2016
Kenya Certificate of Secondary Education (K.C.S.E)

121/1
MATHEMATICS
PAPER 1
JULY / AUGUST 2016
2 ½ HOURS

Section 1 (50 mks)
Answer all questions in this section in the spaces provided.

1. Given that

$$\frac{{}^3/_5 \text{ of } 60 - 2{}^2/_3 \times 1{}^1/_2}{5{}^5/_8 + 1{}^7/_9 - {}^5/_2 \text{ of } {}^{12}/_5 + 2{}^4/_5 . {}^7/_{10}} = \frac{p}{q}$$

   find ${}^p/_q$ (3 mks)

2. X (4, -3) and Y (-3, -2) are points on a straight line. Find the equation of the perpendicular bisector xy, write your answer in the form $\frac{x}{a} + \frac{y}{b} = 1$

3. A two digit number is such that the sum of its digit is ten. If the digits are reversed the number formed exceeds the original number by 18. Find the number. (3 mks)

4. The figure below represents a field where PQ and ST are two parallel fences. If the area of the field STR is 648cm². Calculate the area enclosed by PQTS. (4 mks)
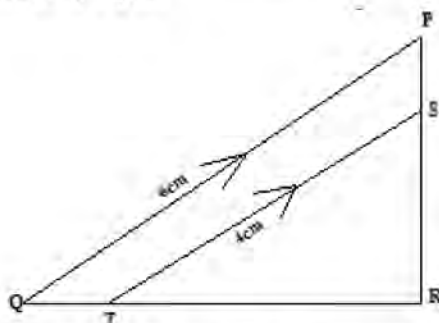
5. Water and ethanol are mixed such that the ratio of the volume of water to that of ethanol; is 3:1. Taking the density of water as 1g/cm³ and that of ethanol as 1.2g/cm³, find the mass in grams of 2.5 litres of the mixture. (3 mks)

6. Given the inequalities x - 5 ≤ 3x - 8 < 2x - 3,
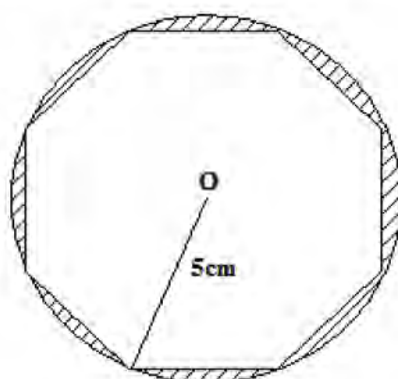a) Solve the inequalities and represent the solution on a number line. (3 mks)

7. Use the tables of squares, cubes, cuberoots and reciprocals to evaluate

$$\frac{5}{(0.293)^3} - \sqrt[3]{(4.125)^2}$$

   (4 mks)

8. A regular octagon is inscribed in a circle of radius 5cm as shown in the diagram below. Find the area of the shaded region to 1d.p. (4 mks)

9. Simplify the expression. (3 mks)

$$\frac{2x - 2}{6x^2 - x - 12} \div \frac{x - 1}{2x - 3}$$

10. Mike paid sh. 180 for a shirt after getting a discount of 10%. The shopkeeper made a profit of 20% on the sale of the shirt. What percentage profit would the shopkeeper have made if no discount was allowed?

   (3 mks)

11. Determine the semi-interquartile range for the following set of data. (3 mks)
9, 4, 5, 7, 4, 6, 1, 2, 6, 8, 7

12. Find the value of n in (3 mks)
$4^{n+1} + 2^{2n+1} = 384$

13. Given that a = 3i - 2j + k and b = 4i + j - 3k find the magnitude of c if c = 3a + 2b to 4 significant figures. (3 mks)

14. ABC is an isosceles triangle such that AB = BC and angle BAC = 120^0. The perpendicular distance from A to BC is $\sqrt{3}$ cm. Calculate the dimensions of triangle. (3 mks)

15. Without using tables or calculators evaluate (3 mks)
$$\frac{0.015 + 0.45 \div 1.5}{-4.9 \times 0.2 + 0.07}$$

16. To fence a shamba it requires 3 men working 8 hours a day for 5 days. How long will it take 10 men working 6 hours a day if they work at the same rate? (2 mks)

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

17. 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:-
i) Volume of the wood used in constructing the box in cm^3. (4 mks)
ii) Mass of the box in kilograms. Give answer to one decimal place. (2 mks)
b) Identical cylindrical tins of diameter 10cm, height 20cm with a mass of 120g each, were packed into the box. Calculate:-
i) the maximum number of the tins that can be packed. (2 mks)
ii) The total mass of box and the tins in kg. (2 mks)

18. a) On the grid provided draw triangle QRS given Q(0, 0), R(2, 0) and S(2, 1). (1 mk)
b) Triangle QRS is reflected in the line y = x to give triangle $Q^1R^1S^1$. Draw $Q^1R^1S^1$ on the same axes and state its coordinates. (3 mks)
c) Triangle $Q^1R^1S^1$ is then rotated 180^0 centre (0,0) to give triangle $Q^{11}R^{11}S^{11}$. Find its coordinates and hence plot the image. (1 mk)
d) Find a single matrix of transformation that would map triangle $Q^{11}R^{11}S^{11}$ onto triangle QRS. (3 mks)
e) What type of congruency is existing between triangle $Q^{11}R^{11}S^{11}$ and triangle $Q^1R^1S^1$. (1 mk)

19. Three towns X, Y and Z are such that Y is 150km from X on a bearing of 060^0. The bearing of Z from X is 125^0. The bearing of Z from Y is 160^0. Using a scale of 1cm represents 30km.
a) Show the relative positions of towns X, Y and Z. (3 mks)
b) Determine the distance between towns X and Z. (2 mks)
c) A plane flies from town X on a bearing of 340^0 at 300km/hr. After 45 minutes of flying to another town P the pilot decides to fly directly to town Z. Determine.
i) the time it would take to reach town Z from town P. (3 mks)
ii) The bearing of town Z from P. (1 mk)

20. Nairobi and Eldoret are 600km apart. At 9.20a.m a lorry leaves for Nairobi at a speed of 60km/hr. At 10.00a.m a car leaves Eldoret for Nairobi along the same route at 120km/hr.
a) Calculate the time the lorry arrived at Nairobi. (2 mks)
b) Find the time when the car overtakes the lorry. (4 mks)
c) Find the distance from Nairobi to the overtaking point. (2 mks)
d) Calculate how far the lorry is from Eldoret when the car arrives at Nairobi. (2 mks)

21. In the figure below, E is the midpoint of AB, OD:DB = 2:3 and F is the point of intersection of OE and AD.
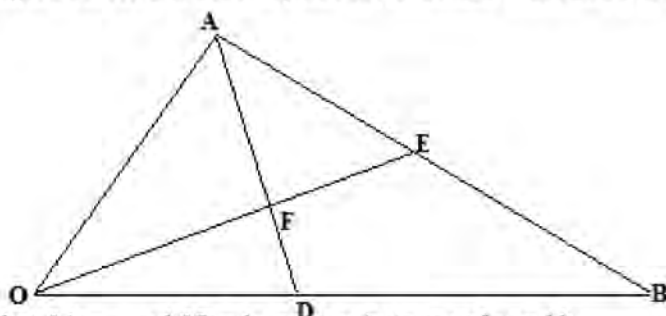
a) Given that OA = a and OB = b, express in terms of a and b. (2 mks)
i) OE

ii) AD

b) Given further DF = tDA OF = sOE

    i) Express OF in two ways. (3mks)

    ii) Hence find the values of S amd t. (3mks)

c) Show that O, F and E are collinear. (2 mks)

21. a) Complete the table below for the function $y = 2x^2 - 4x - 9$ in range $-4 \le x \le 5$. (3 mks)

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

    b) On the grid provided draw the graph of $y = 2x^2 - 4x - 9$ (3 mks)

c) Use the graph in (b) above to solve the quadratic equations.

i) $2x^2 - 4x - 9 = 0$ (1 mk)

ii) $2x^2 - 6x - 12 = 0$ (2 mks)

d) Determine the coordinates of the turning point of the curve by calculation. (2 mks)

22. A particle moves along a straight line OS, Such that its distance S meters from the point O at time t seconds is given by $S = t^3 - 9t^2 + 15t$. Find:-

a) Where the particle is at t = 1 (2 mks)

b) At what time the particle is momentarily at rest. (3 mks)

c) The acceleration at t = 2. (3 mks)

d) The maximum velocity attained by the particle. (2 mks)

23.

a) Using a ruler and a pair of compasses only. Construct triangle ABC in which AB = 7cm, BC = 6.5cm and angle BAC = 60^0. (3 mks)

b) On the same side of AB as C.

Determine the locus of a point P such that angle APB = 60^0 and AP = 4cm. (4 mks)

c) Locate a point T on AB such that the angle ATC is 90^0. Hence calculate the area of triangle ABC. (3mks)