Name ..... Index No. .....

Candidates signature .....

121/1 Date .....

MATHEMATICS
Paper 1

July/August 2016

Time 2½ hours

NTIMA, NYAKI AND MUNICIPALITY CLUSTER EVALUATION - 2016

Kenya Certificate of Secondary Education

MATHEMATICS

Paper - 121/1

July/August 2016

Time: 2½ hours

INSTRUCTIONS TO CANDIDATES

1. Write your name and Index number in the spaces above.
2. Sign and write the date of the examination in the spaces provided above.
3. This paper contains two sections. Section I and II.
4. Answer all questions in section I and ONLY five in section II.
5. All answers and working must be written on the question paper in the spaces provided below each question.
6. Show all the steps in your calculations giving your answer at each stage in the spaces provided below each question.
7. Marks may be awarded for correct working even if the answer is wrong.
8. Non-programmable silent calculators may be used and KNEC Mathematical tables may be used, except where stated otherwise.
9. Candidates should check the questions paper to ascertain that all the pages are printed as indicated and that no questions are missing.

EXAMINER'S USE ONLY

Section I

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

Section II

Question	17	18	19	20	21	22	23	24	TOTAL
Marks									

This paper consists of 15 printed pages

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

Grand Total

SECTION 1 (50 MARKS)
Answer all the questions in this section in the spaces provided.

1. Evaluate the following. (3 marks)

$$\frac{\frac{1}{2}of18\div-3+2\frac{1}{2}\times\frac{3}{-5}}{\frac{1}{2}+3\frac{3}{4}\div\frac{3}{4}}$$

2. The exterior angle of a regular polygon is equal to one-third of the interior angle. Calculate the number of sides of the polygon. (3 marks)

3. Simplify (3 marks)

$$\frac{x+2y}{3}-\frac{3x-y}{5}$$

4. The currency exchange rates of a given bank are as follows:

A tourist arrived in Kenya with 7000 Us dollars which he converted to Kenya shillings upon arrival. He spent ksh 332,790 and converted the remaining to sterling pounds. How many pounds did he receive (3 marks)

Currency	Buying (Sh)	Selling (sh)
1 Sterling pound	145.80	146.20
1 US dollar	100.80	101.00

5. A worker in a construction site is paid sh 12 an hour for the normal working hours and sh 15 for each hour worked overtime. In one week the worker worked for a total of 81 hours and was paid sh 1071 in total. Determine the number of hours worked overtime and normal. (4 marks)

6. Solve the following inequality and state the integral values. (3 marks)

$2x - 1 < 7 + x \leq 3x + 2$

7. A solid sphere is made of a metal which has a density of $8.9 g/cm^3$. Given that its radius is 4.5cm, calculate the mass of the sphere in grams to the nearest whole number. Take $\pi = 3.142$. (3 marks)

8. Simplify (3 marks)

$$\frac{2x^2 - 5xy + 2y^2}{x^2 - 4y^2}$$

9. Determine the equation of a line passing through point $(3, -\frac{1}{3})$ and perpendicular to a line whose equation is (3 marks)

$$y=\frac{3}{2}x-\frac{4}{3}$$

10. Solve the y in the equation. (3 marks)

$27^{y} + 3^{3y} - 5 = 49$

11. Solve the following quadratic equation by completing the square. (3 marks)

$2y^{2} - 7y + 6 = 0$

12 The circle whose arc length is 2.2m subtends an angle of 60° at the centre. Calculate the area of the minor segment of the circle. Take $\pi = {}^{22}/_{7}$ (4 marks)

13. A boy walks directly from a point *M* towards the bottom of a tree 200m away. After covering 150m, he observes that the angle of elevation of the top of the tree is 40°. Determine the angle of elevation of the top of the tree from *M*. (3 marks)

14. A translation vector maps a point A(4, 6) onto $A^1(9, 12)$. Find the values of x and y. (3 marks)

$$\begin{pmatrix} x-1 \\ 2-y \end{pmatrix}$$

15. Find the mean, mode and median of the following numbers. (3 marks)

5, 9, 4, 7, 9, 6, 10, 8, 3, 9, 6, 8

16. The figure below is a triangular prism ABCDEF with sides AB = BF =AF = 3cm and BC = AD = EF = 5cm

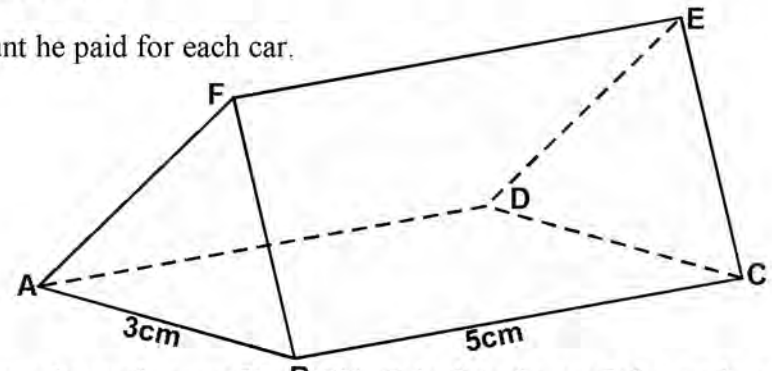
a) Draw the net of the solid. (2 marks)

b) Measure length AC (1 mark)

SECTION II (50 MARKS)
Answer ANY FIVE questions from this section in the spaces provided.

17. Mr. Kinyua bought three cars A, B and C for a total of shs 1,500,000. The amounts he paid for those cars were in the ratio 3 : 5 : 7.

a) Calculate the amount he paid for each car. (3 marks)



b) When he sold the cars, he made a profit of 12%. Calculate the profit he made on the sale of the cars. (1 mark)

c) When he sold the cars he made a profit of 25% on car A and a loss of 10% on B. Calculate:

i) the profit he made on car A. (1 mark)

ii) the percentage profit he made on car C. (5 marks)

18. A particle moves along a straight line so that after t seconds, its velocity is given by $v = 2t^2 - 3t - 5$

a) Find the velocity of the body at $t = 3$. (2 marks)

b) Find the value of t when the body is momentarily at rest. (3 marks)

c) Find the acceleration of the body at $t = 2$sec. (2 marks)

d) Find the distance travelled by the body during the third second. (3 marks)

19. A cyclist leaves Kerugoya town for Sagana town at 11.30am and travels at an average speed of 15km/h. 30 minutes later, a bus leaves Kerugoya from Sagana arriving there at 12.30pm. Kerugoya is 30km from Sagana.

a) Determine the average speed of the bus. (2 marks)

b) Determine

i) The distance from Kerugoya where the cyclist met the bus. (4 marks)

ii) the time they met. (2 marks)

c) Find the time when the cyclist arrived in Sagana. (2 marks)

20. The figure below represents a model of a world cup in the shape of a cuboid base and a frustum of a cone with a hemispherical top. The diameter of the hemispherical part is 15cm and the base diameter is 9cm with a slant height of 30cm.

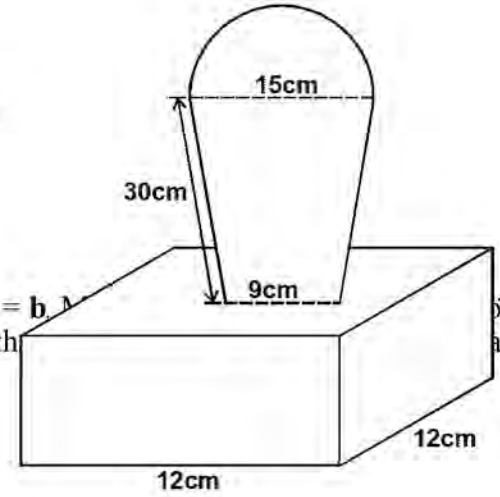
Calculate the following giving your answer to 2.d.p (take $\pi = 3.142$)

a) Volume of the hemispherical part. (2 marks)

b) i) The slant height of the cone from which the frustrum was cut. (2 marks)

ii) The volume of the conical frustum (4 marks)

c) The total volume of the solid. (2 marks)



21. In triangle OAB, OA = **a**, OB = **b**, M ... point on AB such that OP = $^2/_5$ OB and Q is a point on OA such th... at X.

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

i) **OM** (1 mark)

ii) **BQ** (1 mark)

iii) **AP** (1 mark)

b) Given that AX = kAP and BX = tBQ, express OX in terms of

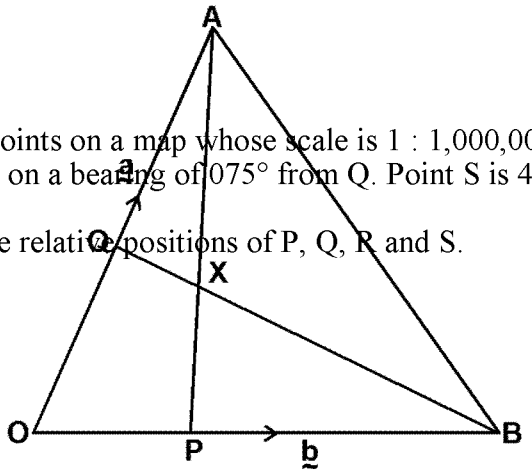
i) **a, b** and t

ii) **a, b** and k

iii) hence find the numerical values of k and t.

c) Determine the ratio AX : XP. (1 mark)

22. Points P, Q, R and S are points on a map whose scale is 1 : 1,000,000. Q is 74km on a bearing of 300° from P. Point R is 110km on a bearing of 075° from Q. Point S is 46 km due south of P.



a) Show by scale drawing the relative positions of P, Q, R and S. (4 marks)

b) Using the figure in (a) above. Find the:-

i) Distance RS (2 marks)

ii) Bearing of S from R. (1 mark)

c) Determine the shortest distance between points Q and S. (2 marks)

d) Find the distance on the map between points P and R. (1 mark)

23. The figure below shows a circle centre O. FAE is a tangent to the circle. ABCGD are points on the circumference. Angle BAE = 30°, angle ABC =115° and angle ACD = 40°

Find the following angles giving the reasons in each case.

a) ∠BCA (2 marks)

b) ∠ADC (2 marks)

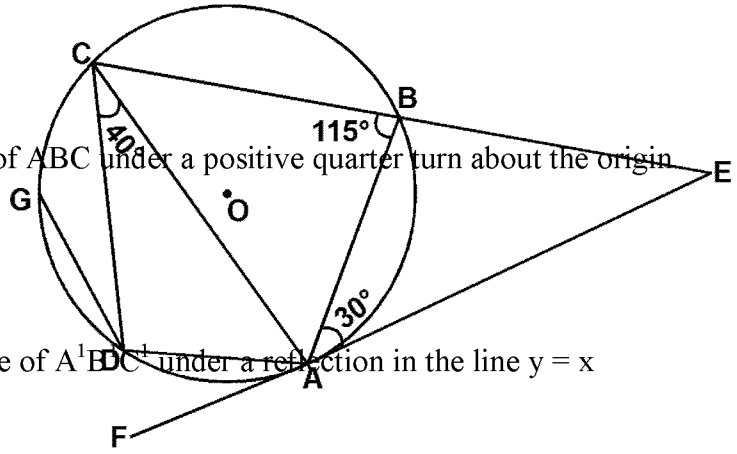
c) ∠COB (2 marks)

d) ∠DGA (2 marks)

e) ∠BEA (2 marks)

24. The vertices of a triangle are A(2, 4), B(1,2) and C(5,2). On the grid provided draw.

a) Triangle ABC (1 mark)



b) Triangle $A^1B^1C^1$ the image of ABC under a positive quarter turn about the origin (2 marks)

c) Triangle $A^{11}B^{11}C^{11}$ the image of $A^1B^1C^1$ under a reflection in the line y = x (2 marks)

d) Triangle $A^{111}B^{111}C^{111}$ the image of $A^{11}B^{11}C^{11}$ under an enlargement scale factor -2 about (1, -3) and state its coordinates. (3 marks)

e) Describe fully a single transformation that maps triangle ABC onto triangle $A^{11}B^{11}C^{11}$ (2 marks)