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

121/1
MATHEMATICS
Paper 1
July/August 2016
Time: 2½ Hours

Candidate's Signature .....

Date .....

NYANDARUA SOUTH FORM FOUR JOINT EVALUATION

Kenya Certificate of Secondary Education

MATHEMATICS
Paper 1
July/August 2016
Time: 2½ Hours

INSTRUCTIONS TO CANDIDATES

1. Write your name and index number in spaces provided above.
2. This paper consists of two sections; Section I and Section II
3. Answer **all** the questions in section I and only **Five** questions in section II
4. All answers and working must be written on the question paper in the spaces provided below each question.
5. Show all the steps in your calculations giving your answers at each stage in the spaces below each question.
6. Marks may be given for correct working even if the answer is wrong.
7. Non-programmable electronic calculators and KNEC Mathematical tables may be used except where stated otherwise.

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	GRAND TOTAL	
Marks											

SECTION I : (50 MARKS)

Attempt all the questions in the spaces provided.

1. Evaluate without tables or calculator (3 marks)

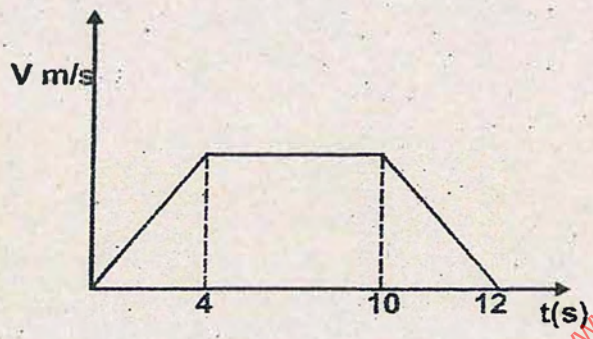
$$\sqrt{\frac{0.38 \times 0.23 \times 2.7}{0.114 \times 0.0575}}$$

2. Simplify : $\left[x + \frac{1}{y}\right]^2 - \left[x - \frac{1}{y}\right]^2$ (3 marks)

Given that $4x^2 - 32x - 20 + k$ is a perfect square, find k. (3 marks)

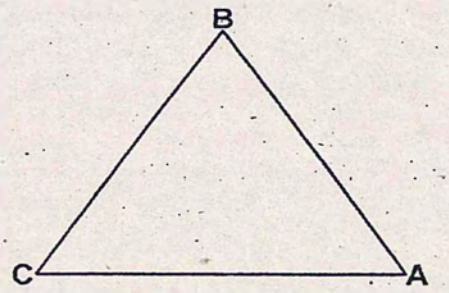
4. Solve the simultaneous inequalities and represent the solution on a number line (3 marks)
$4 - 2x < 8$ and $2 - 3x \geq -7$

5. The figure below shows the velocity-time graph of car. If the car travelled 32 metres in the first four seconds, calculate the average speed for the whole journey. (3 marks)



6. Find the greatest number which when divided into 179 and 234 leaves a remainder of 3 in each case. (3 marks)

7. The figure below shows a triangle ABC. Rotate the triangle through +40° about A. (3 marks)



8. Solve for x if $4 \sin x + 5 \cos x = 0$ for $0° \leq x \leq 360°$. (3 marks)

9. Simplify the expression $\frac{3x^2 - 4xy + y^2}{y^2 - 9x^2}$ (3 marks)

10. A straight line L cuts the x-axis at 45° and has a positive gradient. Find the equation of L_1 the line perpendicular to L passing through (6, 0) in the form $y = mx + c$. (3 marks)

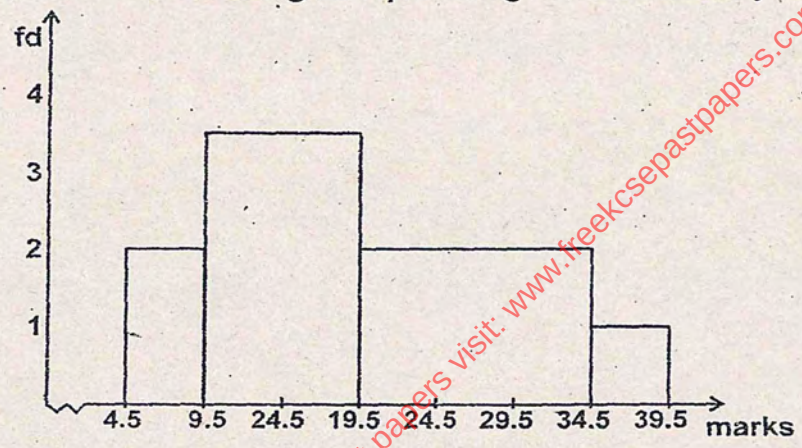
11. The size of an interior angle of a regular polygon is 3x while its corresponding exterior angle is x - 20. Find the number of sides of the polygon. (3 marks)

12. Use logarithms to evaluate: (4 marks)

$$\left(\frac{36.15 \times 0.02573}{1.938}\right)^{\frac{1}{4}}$$

13. The kick off of a soccer match was 1515hrs. The first half lasted 45 minutes. There was a 10 minutes interval at half time. The second half lasted 48 minute. When did the match finish ? (2 marks)

. The figure below shows a histogram representing marks obtained by 80 students in a test.



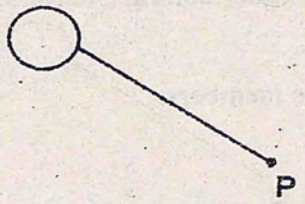
a) Make a frequency distribution table from the figure. (2 marks)

b) Use your table in (a) above to determine the

i) Modal class (1 mark)

ii) Median class (1 mark)

15. The figure below has a rotational symmetry of order 4 about point P. Complete the figure. (3 marks)



16. Half the sum of the present ages of a mother and her daughter is equal to the difference between their ages now. In ten years time, the mothers' age will be exactly twice the daughter's age. Calculate their present ages. (4 marks)

SECTION II :

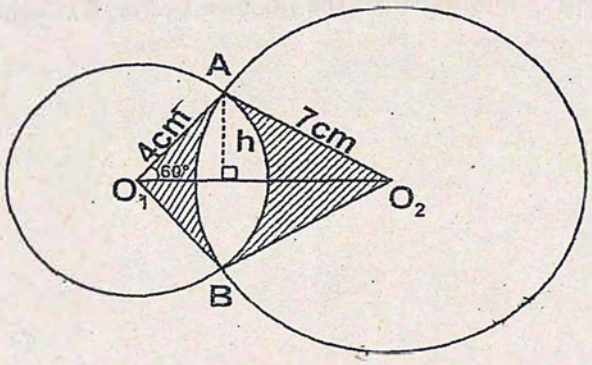
17. Five members of a welfare group; Abel, Beth, Cherono, Dan and Emily were given some amount of money to share amongst themselves. Abel got $^{3}/_{8}$ of the total amount while Beth got $^{2}/_{5}$ of the remainder. The remaining amount was shared equally among Cherono, Dan and Emily each of which received Ksh.6000.

a) How much money was shared among the five members. (3 marks)

b) How much did Beth get ? (2 marks)

c) Abel, Beth and Emily invested their money and earned a profit of Ksh.12000. A third of the profit was left to maintain the business and the rest was shared according to the ratio of their investments. Find how much each got. (5 marks)

18. In the figure below, O_1 and O_2 are the centres of the circles whose radii are 4cm and 7cm respectively. The circles intersect at A and B and angle $AO_1O_2 = 60^o$



Calculate :

a) the value of h (1 mark)

b) the value of angle AO_2O_1 (1 mark)

c) the area of quadrilateral AO_1BO_2 (3 marks)

d) the area of the shaded part (5 marks)

19. Three warships A, B and C are at sea such that ship B is 400km on a bearing of 030° from ship A. Ship C is 750km from B. The bearing of B from C is 300°. An enemy warship D is sighted 1000km due South of ship B.

a) By taking a scale of 1cm : 100km, locate the positions of A, B, C and D (6 marks)

b) Use your diagram in (a) above to determine :

i) the distance D from A (1 mark)

ii) the distance D from C (1 mark)

iii) the bearing of C from D (1 mark)

iv) the bearing of D from A (1 mark)

20. a) Find the values of x at which the curve $y = x^2 - 2x - 3$ crosses the x-axis. (2 marks)

b) Use the trapezium rule with 5 ordinates to calculate the area bounded by the x-axis and the lines $x = -1$ and $x = 3$. (4 marks)

c) Calculate the exact area of the region calculated in (b) above. (2 marks)

d) Find the percentage error in the estimation of the area. (2 marks)

21. A bus left Nairobi at 8.00a.m and travelled towards Mombasa at an average of 80km/hr. After half an hour, a car left Mombasa towards Nairobi at an average speed of 120km/hr. Given that the distance between Nairobi and Mombasa is 500km, determine :

a) the time the car arrived at Nairobi. (2 marks)

b) the time the two vehicles met (4 marks)

c) the distance from Nairobi to the point where the two vehicles met. (2 marks)

d) how far the bus was from Mombasa when the car arrived at Nairobi. (2 marks)

22. A TV dealer planned to buy some set top boxes from a wholesaler for sh.340,000. Before he could buy them, the price of each set-top box was increased by sh.300. After this increment, he realises that he can only afford to buy 30 set-top boxes less than he had planned to buy with the same amount of money. Taking the number of set-top boxes that he originally intended to buy as x

a) Write an expression in x for the cost of each set-top box

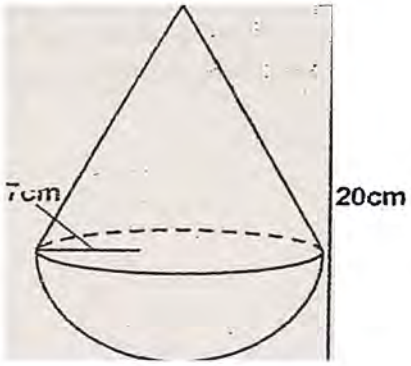
i) before the price was increased (1 mark)

ii) after the price was increased (1 mark)

b) Use the equations in (a) above or otherwise to determine the number of set top boxes that he had originally planned to buy. (6 marks)

c) Determine the new price of each set-top box. (2 marks)

23. The diagram below represents a conical solid which stands on a hemispherical base with a radius of 7cm. The solid has a perpendicular height of 20cm.

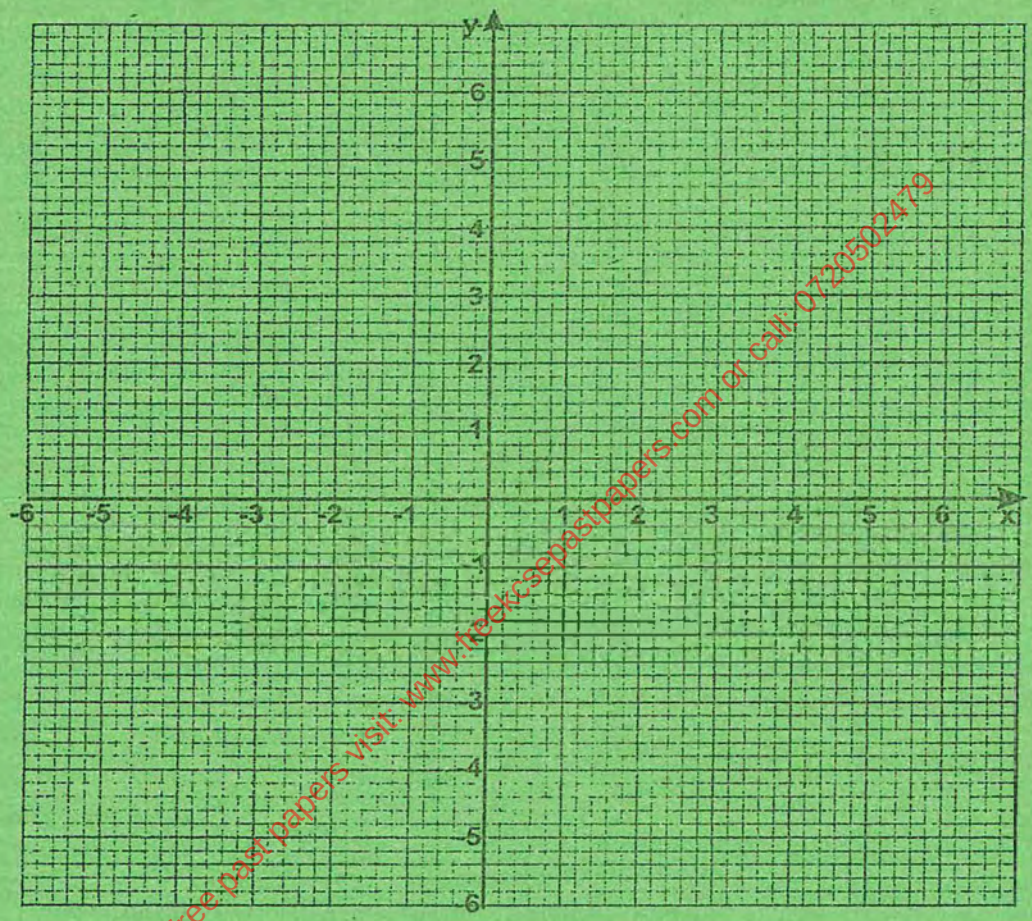


a) Calculate the surface area of the solid. (5 marks)

b) If the solid is immersed in a cylindrical container full of water with a volume of $4000cm^3$, calculate the amount of water displaced. (5 marks)

24. A triangle has vertices A(-4, -2), B(-2, -2) and C(-4, -5). The triangle is then rotated through -90° about the origin to obtain the image $A^{I}B^{I}C^{I}$. Triangle $A^{I}B^{I}C^{I}$ is then reflected on the line $y + x = 0$ to get triangle $A^{II}B^{II}C^{II}$.

a) Use the grid provided below to draw the triangles ABC, $A^{I}B^{I}C^{I}$ and $A^{II}B^{II}C^{II}$ and state the coordinates of $A^{I}B^{I}C^{I}$ and $A^{II}B^{II}C^{II}$ (5 marks)



b) State the single transformation that maps ABC onto $A^{II}B^{II}C^{II}$ (2 marks)

c) Triangle ABC undergoes a stretch of scale factor 2 and parallel to the x-axis to get triangle $A^{III}B^{III}C^{III}$. On the same axes draw triangle $A^{III}B^{III}C^{III}$ and state its coordinates. (3 marks)