

Name: Index no

School: Candidate's sign

Date:

121/1
MATHEMATICS
PAPER 1
JULY/AUGUST 2011
TIME: 2 ½ HOURS

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MUMIAS DISTRICT JOINT EVALUATION EXAM

Kenya Certificate of Secondary Education (K.C.S.E.)

Mathematics
Paper 1

INSTRUCTIONS TO CANDIDATES:

- Write your **name**, and **index number** in the spaces provided above.
- **Sign** and write **date** of examination in the spaces provided
- The paper contains **two** sections: Section I and Section II.
- Answer **ALL** the questions in section I and strictly **five** questions in section II.
- Answers and working must be written on the question paper in the spaces provided below each question.
- Show all steps in your calculations giving your answer at each stage in the spaces below.
- Marks may be given for correct working even if the answer is wrong.
- Non-programmable silent electronic calculators and KNEC Mathematical tables may be used.

FOR 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									

Grand Total

This paper consists of 15 printed pages. Candidates should check to ascertain that all papers are printed as indicated and that no questions are missing

SECTION I (50 MARKS)

Answer all the questions in this section in the spaces provided.

1. Simplify completely.

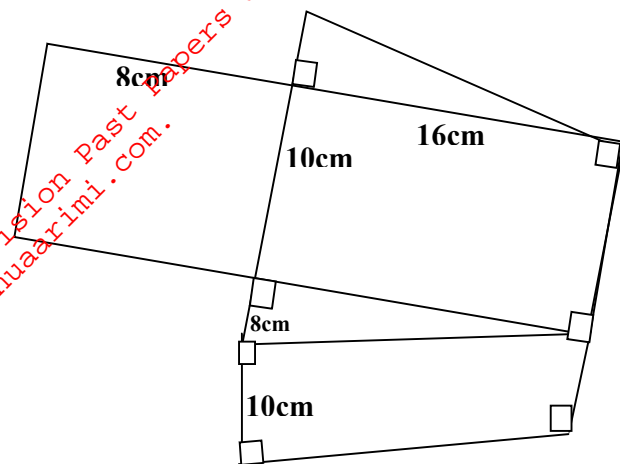
$$\frac{8C^2-2}{2C^2+C^2-1} \div \frac{2C-2}{C+1}$$

(3mks)

2. A straight line passing through the point (-3,4) is perpendicular to the line whose equation is $2y-3x=11$ and intersects the x-axis and y-axis at points P and Q respectively. Find P. (3mks)

3. Two beakers of exactly similar shape can hold 250ml and 200ml of liquid respectively. If the surface area of the larger beaker is 400cm^2 , calculate the surface area of the smaller one. (4mks)

4. The figure below is a cut out net of a wedge. Draw the solid and find its volume. (3mks)



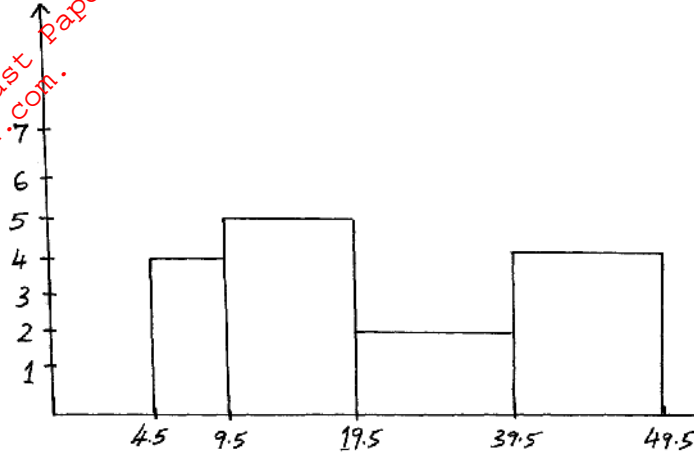
5. Without using a calculator evaluate leaving the answer as a fraction in its simplest form.

$$\frac{3\frac{1}{4} + \frac{3}{5} \div \frac{5}{17} \text{ of } 3\frac{2}{5}}{1\frac{7}{10}} \quad (3\text{mks})$$

6. Solve for x in the equation.

$$\log_5 5 + \log_{16} x = 3 \quad (2\text{mks})$$

7. The diagram below shows a histogram representing marks obtained in a certain test.
Develop a frequency distribution table. (2mks)



8. Solve for x and y:

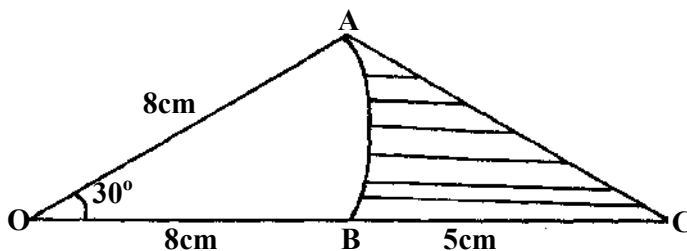
$$3^{2x-y} = 27 \text{ and } 4^x \div 16^y = 1$$

(3mks)

9. An aircraft left Abidjan at 2215h and arrived in Entebbe at 0330h. It departed from Entebbe at 0450h and arrived in Nairobi at 0645h. Assuming the times quoted are all Kenyan time, find how long the journey was from Abidjan to Nairobi? (3mks)

10. Ocampo bought a Maasai elders suit for Ksh.3600. This price was such that the salesman had allowed a discount of 10% on the marked price in order to make a profit of 20%. Calculate both the marked price of the suit and the buying price. (4mks)

11. In the figure below AB is an arc centre O. Given that angle $AOC=30^\circ$, $OA=OB=8\text{cm}$ and $BC=5\text{cm}$: Calculate the shaded area to 2 d.p. (Take $\pi=3.142$) (3mks)



12. A cylindrical solid of length 20cm and radius 6cm is melted to form 12 similar conical solids of height 8cm. Determine the radius of each conical solid. (3mks)

13. A train 20m long is moving at an average speed of 52km/hr. Another train 30m long is moving in the opposite direction at an average speed of 48km/hr. How long do the trains take to completely pass each other. Leave your answer in seconds. (3mks)

14. Find the exact value of:
 $2.\dot{4}\dot{1} - 0.\dot{3}\dot{2}$ (3mks)

15. 1 kg of sugar density 1.1g/cm^3 and 0.25kg of salt density 1.2g/cm^3 are mixed together for a certain experiment. What is the density of the mixture. (Give the answer to 4. s.f) (4mks)

16. Solve for x . Hence state the integral values that satisfy the inequalities. (3mks)

$$3x+1 \leq 4x+5 \leq x+13$$

SECTION II (50 MARKS)

Answer only and ONLY five questions in this section in the spaces provided.

17. A solid is partly a cone and partly a hemisphere. The radius of the hemisphere is 5cm. the height of the solid is 17cm. Determine:
- (a) The volume of the cone. (1mk)
- (b) The volume of the hemispherical part. (1mk)
- (c) The volume of the solid. (2mks)
- (d) The curved surface area of the cone. (2mks)
- (e) The curved surface area of the hemisphere. (2mks)
- (f) The total surface area of the solid. (2mks)

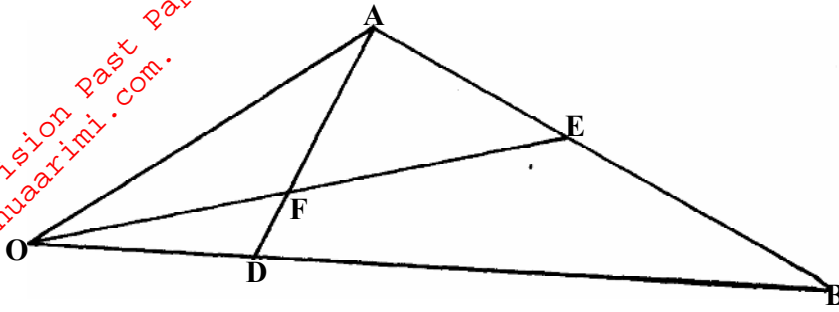
18. (a) Draw x and y axes for values of x from -8 to 16 and y from -10 to 16 using a scale of 1cm to 2 units. On your graph draw a triangle with vertices P (6,-8), Q(2,14) and R(9,13) (2mks)

- (b) Triangle $P^1Q^1R^1$ is the image of PQR under a transformation whose matrix is $\begin{pmatrix} 0.28 & 0.96 \\ 0.96 & -0.28 \end{pmatrix}$

Write down the coordinates of $P^1Q^1R^1$. Hence describe the transformation mapping PQR onto $P^1Q^1R^1$. (5mks)

- (c) A reflection of PQR in the line $x=0$ gives triangle $P^{11}Q^{11}R^{11}$. If $P^1Q^1R^1$ is mapped onto $P^{11}Q^{11}R^{11}$ by a rotation about (0,0). Find the angle of rotation. (3mks)

19. 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 $\mathbf{OA} = \mathbf{a}$ and $\mathbf{OB} = \mathbf{b}$, express in terms of \mathbf{a} and \mathbf{b} :

(i) \mathbf{OE}

(ii) \mathbf{AD}

(2mks)

(b) Given further that $\mathbf{AF} = t \mathbf{AD}$ and $\mathbf{OF} = s \mathbf{OE}$, find the values of s and t .

(5mks)

(c) Hence show that **O**, **F** and **E** are collinear.

(3mks)

20. Two ships leave a harbor K at the same time. One ship takes a course of 030° over a distance of 60km to a position P. The other ship sails 100km on a bearing of 110° to position Q.

(a) Calculate:

(i) Distance PQ. (3mks)

(ii) Angle PQ. (3mks)

(iii) The bearing of Q from P. (2mks)

(b) Both ships take t hours to reach their destinations. The speed of the faster ship is 20km/hr.

Find:

(i) The value of t (1mk)

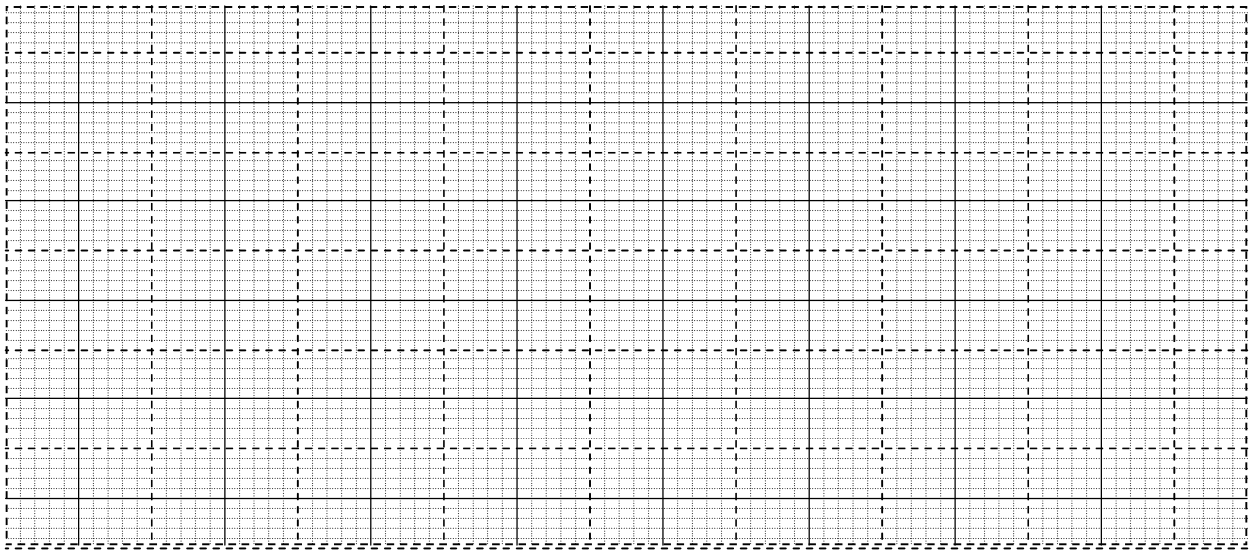
(ii) the speed of the slower ship. (1mk)

21. (a) Complete the table given below for $y=x^3-4x^2+x+6$ for $-2 \leq x \leq 4$. (2mks)

x	-2	-1	0	1	2	3	4
x^3		-1	0	1			64
$-4x^2$			0	-4		-36	
x	-2	-1	0	1	2	3	4
6	6	6	6	6	6	6	6
y	-20		6	4		0	

- (b) On the grid provided draw the graph of $y=x^3-4x^2+x+6$. Use a scale of 1cm to represent 2 units of the y-axis and 2cm to represent 1 unit on the x-axis. (3mks)

INSERT FULL GRAPH PAPER



- (c) Use your graph to solve the equation.

$$x^3 - 4x^2 + x = -6 \quad (1mk)$$

- (d) By drawing a suitable straight line on the same axis estimate the roots of the equation.

$$3x^3 - 12x^2 - 15x + 21 = 0 \quad (4mks)$$

22. The table below shows monthly income tax rates.

Income(Kt p.m)	Rate
1-435	10
436-870	15
871-1305	20
1306-1740	25
1741 and above	30

Mrs. Wanjala earns a monthly salary of Ksh.15,000 and a taxable travel allowance of Ksh. 5,000 per month. She is also provided with a house by the institution for which she pays a nominal rent of Ksh.1000 per month.

(a) Calculate the employees taxable income every month. (2mks)

(b) Calculate the employees monthly total tax payable. (4mks)

(c) If the employee is entitled to a personal relief of Ksh.900 per month and a non taxable medical allowance of Ksh.2,000. Calculate her net monthly income. (3mks)

23. Using a ruler and a pair of compasses only:

(a) Construct a triangle ABC in which $AB = 7.4\text{cm}$, $AC = 8.2\text{cm}$ and angle $BAC = 45^\circ$. (2mks)

(b) On the same diagram, construct triangle ACD such that D and B are on the opposite sides of line AC, D is equidistant from A and C and $BD = 8.5\text{cm}$. Measure AD. (2mks)

(c) Draw the locus of Q which passes through C and is parallel to BD. (1mk)

(d) The normal from C meets BD at N. Mark the points M_1 and M_2 on the locus of Q such that $M_1N = M_2N = 4.1\text{ cm}$. Measure the lengths M_1M_2 and CN. (3mks)

(e) Find the area of triangle BM_1M_2 . (2mks)

24. (a) Draw the graph of $y=3x(4-x)$ for $x=1$ to $x=5$.

(3mks)



(b) Hence use mid-ordinate rule with 5 ordinates to estimate the area bounded by the curve, the x-axis and the lines $x=1$ and $x=5$.

(2mks)

(c) Find the exact area and use it to find the percentage error in the area.

(5mks)