

NAME..... INDEX NO.....

121/1
MATHEMATICS
PAPER I
JULY/AUGUST 2010
TIME: 2 ½ hours

KENYA CERTIFICATE OF SECONDARY EDUCATION
FORM FOUR EVALUATION EXAMINATION

INSTRUCTIONS TO CANDIDATES

- a) Write your name and index number in the spaces provided.
- b) This paper consists of two sections I and II.
- c) Answer all the questions in section I and only five from section II.
- d) All answers and working must be written on the question paper in the space provided below each question.
- e) Show all the steps in your calculations giving your answer at each stage in the space below each question.
- f) Marks may be given for correct working even if the answer is wrong.
- g) Use calculators and KNEC mathematical tables except where stated otherwise.

FOR EXAMINERS USE ONLY

SECTION I

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

SECTION II

17	18	19	20	21	22	23	24	TOTAL

SECTION A

Answer all questions in this section in space provided.

1. Use logarithm table to evaluate. (4 marks)

$$\sqrt[3]{\frac{(0.0246)^2 \times 142}{0.002 \times 1.14}}$$

2. A two digit number is such that the sum of the ones and the tens digit is ten. If the digits are reversed, the new number formed exceeds the original number by 54. Find the number. (3 marks)

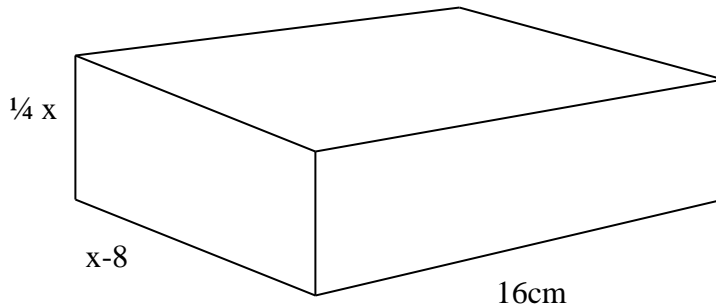
3. A straight line L_1 passes through $P(2,1)$ and is perpendicular to straight line L_2 , whose equation is $2y - x + 4 = 0$. Find the equation of L_1 . (3 marks)

4. Alice chepchumba on her cycling practice cycled on a bearing of 120° for 5.5km, then on a bearing of 200° for 8km finally he turned northwards for 13.5km, by scale drawing determine her final position from starting point. (4 marks)

5. Make t the subject of the formula. (3 marks)

$$x = \sqrt{\frac{1 + kt}{kt - 1}}$$

6. The volume of a rectangular tank is 256cm^3 . The dimensions are as in the figure.



Find the value of x (3 marks)

7. Solve for x

$$125^{-x} \times 5^{2(x-2)} = 25^{(x+2)} \quad (3 \text{ marks})$$

8. Find the equation of the normal to the curve

$$X^2 = 4y \quad \text{at the point } (6,9) \quad (3 \text{ marks})$$

9. The acceleration of a particle in M5^{-2} is given by the expressions $3t - 4$

Find:-

(i) an expression for velocity Vms^1 (1 mark)

(ii) an expression for distance 5 metres from a fixed point O. Given that $S=0$ when $V=3$ and $t=0$ (2 marks)

10 On Monday this currency exchange rate was

$$1 \text{ Euro (E)} = \text{Kshs.}95.65$$

$$1 \text{ US dollar(\$)} = \text{Ksh.}76.50$$

A gentle man Tourist decided to exchange half of his 2400E into Dollars.

Calculate to 2 decimal places the number of dollars he received. (3 marks)

11. Two coils which are made by winding copper wire of different gauges and length have the same mass. The first coil is made by winding 270 metres of wire with cross sectional diameter 2.8mm while the second coil is made by winding a certain length of wire with cross-sectional diameter 2.1mm. Find the length of wire in the second coil . (4 marks)

12. a) Find the greatest common divisor of the term. (1 mark)

$$144x^3y^2 \text{ and } 81xy^4$$

- b) Hence factorise completely this expression $144x^3y^2 - 81xy^4$ (2 marks)

13. a) Find the range of values x which satisfied the following inequalities simultaneously. (2 marks)

$$\begin{aligned} 4x - 9 &\leq 6 + x \\ 8 - 3x &\leq x + 4 \end{aligned}$$

- b) Represent the range of values of x on a number line. (1 mark)

14. Find the value of x in the equation.

$$\cos(3x - 180^\circ) = \frac{\sqrt{3}}{2} \quad \text{in the range } 0^\circ \leq x \leq 180^\circ \quad (3 \text{ marks})$$

15. The length and width of a rectangle are stated as 18.5cm and 12.4cm respectively. Both measurements are given to the nearest 0.1cm.

a) Determine the lower and upper limit of each measurement. (1 mark)

b) Calculate the percentage error in the area of the rectangle. (3 marks)

16. A surveyor recorded the measurement of field in a field book using lines $AB = 260\text{m}$ as shown below.

	B	
	130	R40
	70	Q10
	50	P20
S50	10	
	A	

a) Use a suitable scale to draw the map of the field. (2 marks)

b) Find the area of the field. (2 marks)

SECTION B (50 MARKS)

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

17. A trader sold an article at sh.4800 after allowing his customer a 12% discount on the marked price of the article. In so doing he made a profit of 45% .

a) Calculate

(i) the marked price of the article. (3 marks)

(ii) the price at which the trader had bought the article (2 marks)

b) If the trader had sold the same article without giving a discount. Calculate the percentage profit he would have made. (3 marks)

c) To clear his stock, the trader decided to sell the remaining articles at a loss of 12.5% (Calculate the price at which he sold each article. (2 marks)

18. Three quantities P, Q and R are such that P varies directly as the cube of Q and inversely as the square of R.

a) Given that $P = 16$ when $Q = 2$ and $R = 3$. Determine the value of R when $P = 288$ and $Q = 4$ (5 marks)

b) Q decreases by 30% while R increases by 40%. Find the percentage decrease or increase in P. (5 marks)

19. All employees of silver springs enterprises pay income tax at the rate shown in the table below.

Taxable income (p.a)	Rate sh. Per K£
1 – 3780	2
3781-7560	3
7561-11,340	4
11,341-OVER	5

Mr. Mooka earns a basic salary of sh.12,150 and a house allowance of sh.2800 per month. He is entitled to a family relief of sh.450 per month. Apart from income tax the following deductions are also made from his monthly pay.

a) Servicing loan payment sh.450

b) Hospital fund sh.260

c) Sacco contribution sh.120

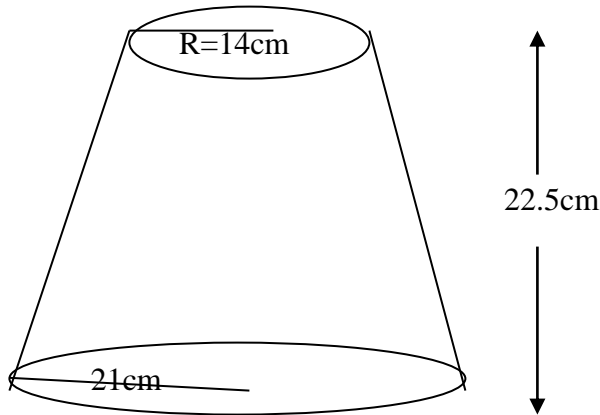
Determine Mr. Mooka's net monthly income. (10 marks)

20. A passenger train travelling at 25km/h is moving in the same direction as a truck travelling at 30km/h. The railway line runs parallel to the road and the truck takes 1 ½ minutes to over take the train completely.

a) Given that the truck is 5 metres long determine the length of the train in metres. (6 marks)

b) The truck and the train continue moving parallel to each other at their original speeds. Calculate the distance between them 4 minutes and 48 seconds after the truck overtakes this train. (4 marks)

21.



The diagram represent a solid frustum with base radius 21cm and top radius 14cm. The frustum is 22.5cm high and is made of a metal whose density is 3g/cm^3 $\pi = 22/7$.

a) Calculate
 (i) the volume of the metal in the frustum. (5 marks)

(ii) the mass of the frustum in kg. (2 marks)

b) The frustum is melted down and recast into a solid cube. In the process 20% of the metal is lost. Calculate to 2 decimal places the length of each side of the cube. (3 marks)

22. The table below shows the masses to the nearest kg of all the students of marigu-ini secondary. School.

Masses (kg)	No. of students
30-34	5
35-39	7
40-44	10
45-49	10
50-54	19
55-59	20
60-64	20
65-69	6
70-74	2
75-79	1

a) Taking the assumed mean $A=52\text{kg}$
Calculate:

(i) the actual mean mass of the students. (3 marks)

(ii) the standard deviation of the distribution. (3 marks)

b) Draw a cumulative frequency curve and use it to estimate the number of students whose masses lie between 44.5kg and 64.6 (4 mks)

23. a) Given the transformation matrices

$$T_1 = \begin{pmatrix} 2 & 1 \\ -1 & -2 \end{pmatrix} \quad \text{and} \quad T_2 = \begin{pmatrix} 3 & 1 \\ 1 & 3 \end{pmatrix}$$

and that transformation T_1 followed by T_2 can be replaced by a single transformation T , write down the matrix for T . (3 marks)

b) Find the inverse of matrix T (2 marks)

- c) The points $A^{11}(7,-11)$, $B^{11}(-7,-13)$, $C^{11}(-8,16)$ and $D^{11}(8,8)$ are the images of points A, B, C and D respectively under transformation T_1 followed by T_2 . Write down the co-ordinates of A, B, C, and D. (5 marks)

24. Draw the graph of

$y = 2x^2 + x - 2$ and use it to solve the equations

(10 marks)

a) $2x^2 + x - 2 = 5$

b) $2x^2 + x - 5 = 0$

c) $2x^2 + 2x - 3 = 0$