**Name: ………………………………………….. Class: ……..…..............................................**

**Date: …………………………………………Adm No: ……………………………………..**

**121/1**

**MATHEMATICS**

**PAPER 1**

**TIME: 2 HOURS 30 MINUTES**

**MWALIMU OGEKE YOUTUBE CHANNEL**

 **MARCH 2022 KCSE PREDICTOR SERIES1 EXAMS**

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

**FORM FOUR**

**INSTRUCTIONS TO CANDIDATES:**

* Write your **name**, **admission numbe**r , **Signature** 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 any **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 below each question.
* Marks may be given for correct working even if the answer is wrong.
* Non programmable silent electronic calculators and KNEC mathematical table may be used, except where stated otherwise.

**FOR EXAMINERS 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**

 **GRAND TOTAL**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Question**  | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | **TOTAL** |
| **Marks**  |  |  |  |  |  |  |  |  |  |

**SECTION I (50 MARKS)**

***Answer all the questions from this section***

1. Without using a calculator evaluate (3 Marks**)**

$$\frac{\left(3\frac{1}{3}+1\frac{1}{9}\right) ÷1\frac{1}{3}}{\left(4\frac{2}{9}- 2\frac{5}{9}\right)x \frac{2}{3}}$$

1. (a) use mathematical tables to find the:
2. The square of 86.46 (1 mark)
3. The reciprocal of 27.56 (1 mark)

(b) Hence or otherwise calculate the value of; (2 marks)

 $\frac{86.46^{2}}{27.56}$

1. The sum of the interior angles of an n – sided polygon is 14400. Find the value of n and hence deduce the name of the polygon. (3 marks)
2. Solve for x and y in the equation. (3 Marks)

$2^{(5y+1) }$x $5^{(2x+2)}$= 1250

1. The region R in the figure below is defined by the inequalities L1, L2 and L3.

**2**

**4**

**6**

**8**

**-2**

**-1**

**0**

**1**

**2**

**3**

**x axis**

**y axis**

**IR**

Find the three inequalities (3 Marks)

1. Two boys and a girl shared some money. The elder boy got $\frac{4}{9}$ of it, the younger boy got $\frac{2}{5}$ of the remainder and the girl got the rest. Find the percentage share of the younger boy to the girl’s share. (3Marks)
2. The figure below is a velocity – time graph for a car. (not drawn to scale).

80

y

4

24

20

x

80

Time (seconds)

Velocity (m/s)

1. Find the total distance traveled by the car? (2 Mks)

1. Calculate the deceleration of the car. (2 Marks)
2. Two containers have base areas of 750cm2 and 120cm2 respectively. Calculate the volume of the larger container in litres given that the volume of the smaller container is 400cm3. (3 marks)
3. Given that the column vectors $a= \left(\begin{matrix}-1\\ 4\end{matrix}\right), b= \left(\begin{matrix}-3\\-2\end{matrix}\right) and c= \left(\begin{matrix}-2\\-1\end{matrix}\right)$ and that $P=2a-4b+3c$. Express P as a column vector. (3 marks)
4. Simplify the following expression by reducing it to a single fraction. (3 marks)

$$\frac{2x-3}{3}- \frac{x-2}{2}- \frac{1-x}{4}$$

1. Thirty men working at a rate of 10 hours a day can complete a job in 14 days. Find how long it would take 40 men working at the rate of 7 hours a day to complete the same job. (3 marks)
2. A car uses 1 litre of petrol for every 8 kilometres. The car was to travel 480 kilometres and had 15 litre of petrol at the beginning of the journey. Each litre of petrol cost sh. 112.00. How much did it cost for the extra petrol added? (3mks)
3. (a) Find the greatest common divisor of the terms $9x^{3}y^{2}$ and $4xy^{4}$(1 mark)

(b) Hence factorize completely the expression (2 marks)

 $9x^{3}y^{2}-4xy^{4}$

1. A rectangular block is 50cm long and 15 cm wide. If its mass is 18kg and its density is 2.4g/cm3, find its height. (3 marks)
2. Use the prime factors of 1764 and 2744 to evaluate (3 marks)

$$\frac{\sqrt{1764}}{\sqrt[3]{2744}}$$

1. The figure below shows a circle centre O and radius 6cm. sector OAB subtends an angle of 1000 at the centre of the circle as shown.



Calculate to 2 decimal places the area of the shaded region. (Take π = $\frac{22}{7}$) (3 marks)

**SECTION II (50 MARKS)**

***Answer FIVE questions ONLY from this section***

* 1. Three vertices of a parallelogram ABCD are A(7,3), B(1, 1) and C(5,1) . On the grid provided, draw the parallelogram ABCD. (2mks)
	2. Determine:
		1. the gradient of line AB.(2mks)
		2. the equation of line AB in the form *y*  *mx*  *c* , where m and are constants.(2mks)
	3. Another line L is perpendicular to CD and passes through the point (1, 3). Determine:
		1. the equation of L in the form *ax*  *by*  *c* where a, b and c are constants (3 marks)
		2. the coordinates of the y-intercept of line L. (1 mark)
1. On the grid provided, Using a scale of 1cm to represent 5 units on each axis and taking values of x from -40 to 40 and values of y from -10 to 40.
	1. Draw triangle PQR with vertices P(15, 5), Q(30, 10) and R(35, 20) (2 marks)



* 1. Draw triangle P’Q’R’, the image of triangle PQR under reflection in the line y = 2x. (3 marks)
	2. Draw triangle P”Q”R”, the image of triangle P’Q’R’ under a reflection in the line y + x = 0.

 (2 marks)

* 1. Determine by construction, the centre and the angle of rotation that maps triangle P”Q”R” onto triangle PQR. (3 marks)
1. The figure below shows a velocity – time graph of a car journey.

22

Velocity (m/s)

 O t 40 T time(s)

The car starts from rest and accelerates at 2.75m/s2 for t seconds until its speed is 22m/s. It then travels at this velocity until 40 seconds after starting. Its breaks bring it uniformly to rest. The total journey is 847m long and takes T seconds.

Calculate the

1. Value of t (3mks)
2. Distance travelled during the first t seconds (2mks)
3. Value of T (3mks)
4. Final deceleration (2mks
5. A school in Meru Central decided to buy x calculators for its students for a total cost of ksh. 16,200. The supplier agreed to offer a discount of ksh. 60 per calculator. The school was then able to get three extra calculators for the same amount of money.

(a) Write an expression in terms of x , for the

(i) Original price of each calculator (1mk)

(ii) Price of each calculator after the discount (1mk)

1. Form an equation in x and hence determine the number of calculators the school bought (5mks)
2. Calculate the discount offered to the school as a percentage (3mks)
3. A solid is made up of a conical frustum and a hemispherical top. The slant height of the frustum is 8cm and its base radius is 3.5cm. If the radius of the hemispherical top is 4.2cm.
4. Find the area of:

 (i) The circular base. (2 Marks)

(ii) The curved surface of the frustum (3 Marks)

 (iii) The hemispherical surface (3 Marks)

1. A similar solid has a total surface area of 81.51cm2. Determine the radius of its base. (2 Marks)
2. The table below shows the amount in shillings of pocket money given to students in a particular school.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pocket money (Kshs) | 201 – 219 | 220 – 229 | 230 – 239 | 240 – 249 | 250 – 259 | 260 – 269 | 270 – 279 | 280 – 289 | 290 – 299 |
| No. of students | 5 | 13 | 23 | 32 | 26 | 20 | 15 | 12 | 4 |

1. State the modal class. (1 mk)
2. Calculate the mean amount of pocket money given to these students to the nearest shilling. (4 mks)
3. Calculate the median amount of money given to a student. (5 mks)
4. The figure below shows triangle XYZ in which line XY = 5cm, line YZ = 13.4cm and the size of angle XYZ=57.70



1. Calculate the length of line XZ (4 marks)
2. Calculate the size of angle XZY (4 marks)
3. Calculate the size of angle YXZ to 4 significant figures (2 marks)
4. The equation of a curve is *y*  2*x*3  9*x*2 12*x*  9 .find:
5. The gradient of the curve when x = 3. (3 marks)
6. i) The turning points of the curve. (3 marks)

 ii)The nature of the turning point b(i) above. (2 marks)

1. Sketch the curve. (2 marks)