**NAME……………………………………………………………….. INDEX. NO …………………………...**

**SCHOOL: …………………………………………………………… DATE: ………………….………………**

**CANDIDATE’S SIGN…………………….………………………..**

**121/1**

**MATHEMATICS**

 **PAPER 1**

 **June 2018**

 **TIME: 21/2 HOURS**

**DAKU SECONDARY SCHOOL**

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

**MATHEMATICS**

**PAPER 1**

 **2 ½ hours**

**INSTRUCTIONS TO THE CANDIDATES**

* *Write* ***your name*** and ***school*** *and* ***index number*** *in the spaces provided above*
* *This paper contains* ***two*** *sections;* ***Section 1*** *and* ***Section 11****.*
* *Answer* ***all*** *the questions in* ***section 1*** *and any* ***five*** *questions from* ***Section 11***
* *All necessary workings and answers* ***must be*** *written on the question paper in the spaces provided below each question.*
* *Marks may be given for correct working* ***even if*** *the answer is wrong.*
* *Non-calculators and KNEC Mathematical tables may be used* ***EXCEP****T where stated otherwise.*
* *Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.*

**FOR EXAMINERS’S USE ONLY**

**Section 1**

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

**Section 1I** **GRAND TOTAL**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Question | 17 | 18 | 19 | 20 | 21 | 22 | 13 | 24 | **Total** |
| Marks |  |  |  |  |  |  |  |  |  |

*This paper consists of 14 printed pages. Candidates should check carefully to ascertain that all the pages are printed as indicated and no questions are missing.*

**SECTION A (50 MARKS)**

***Answer all questions in this section***

1. Evaluate without using a calculator

 ¼ + 1/5 ÷ ½ of 1/3 (3mks)

 ½ of (4/5 – ¾ + ½)

1. Simplify completely.

 3a2 + 5ab – 2b2  (3 Marks)

 b2 – 9a2

1. An artisan has 63kg of metal of density 7000kg/m3. He intends to use it to make a rectangular pipe with external dimensions 12cm by 15cm and internal dimensions 10cm by 12 cm. Calculate the length of the pipe in metres. (3 Marks)
2. Given that *Sin θ = 2/3* and *θ*  is an acute angle, find without using tables or calculators

 (a) *tan θ,* giving your answer in surd form. (2 Marks)

1. *Cos (90 - θ)*  (1 Mark)
2. Four machines give out signals at intervals of 24, 27, 30 and 50 seconds respectively. At 5.00pm all the four machines give out a signal simultaneously. Find the time this will happen again. (3 Marks)

1. Two pipes **A** and **B** can fill an empty tank in 3hrs and 5hrs respectively. Pipe **C** can empty the full tank in 4 hours. If the three pipes **A**, **B**, and **C** are opened at the same time, find how long it will take for the tank to be full. (3 Marks)
2. A tourist arrived in Kenya with sterling pound (£) 4680 all of which he exchanged into Kenyan money. He spent Ksh. 51,790 while in Kenya and converted the rest of the money into U.S dollars. Calculate the amount he received in U.S dollars. The exchange rates were as follows.

 **Buying Selling.**

 US $ 65.20 69.10

 Sterling Pound (£) 123.40 131.80 (4 Marks)

1. The gradient of a straight line **L1** passing through the points **P** (3, 4) and **Q** (a, b) is -3/2. A line **L2** is perpendicular to line **L1** and passes through the points **Q** and **R** (2, -1). Determine the values of **a** and **b.** (4 Marks)
2. The distance from a fixed point of a particle in motion at any time **t** seconds is given by

 *S = t3 –* $\frac{5}{2} $ *t2+ 2t + 5* metres

 Find it’s;

1. Acceleration after **t** seconds (1mk)
2. Velocity when acceleration is zero. (2 Marks)
3. Find the number of sides of a regular polygon whose interior angle is five times the exterior angle. (3 Marks)
4. Solve for x in the equation given by cos 2x = sin 36 $O\leq x\leq 360$ (3 Marks)
5. Find the possible values of X in the equation $9^{X^{2}}$ = 27(2X + 12) (3 Marks)
6. Two similar solids have surface areas of 48cm2 and 108cm2 respectively. Find the volume of the smaller solid if the bigger one has a volume of 162cm3. (3 Marks)
7. Use the inequality below to find the integral values of x that satisfy the inequality and show the solution on the number line. (4 Marks)

 3x + 1 ≤ 4x + 5 ≤x + 13

1. Simplify without using tables (2 marks)

 $\frac{Log 125 – log 25}{Log 25+log5}$

1. Express the 512 and 10752 as a product of their prime numbers and hence evaluate $\frac{10 752}{512}$

 ( 4 Marks)

**SECTION II (50 MARKS)**

***Answer any five questions in this section.***

1. (a) Complete the table below for the equation *y = x2 + 3x – 6* given -6 ≤ x ≤ 4 (2mks)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***x*** | -6 | -5 | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| ***y*** |  |  |  |  |  |  |  |  |  |  |  |

(b) Using a scale of 1cm to represent 2 units in both axes; draw the graph of *y = x2 + 3x – 6* (3 Marks)

(c) Use your graph to solve the quadratic equations.

1. x2 + 3x – 6 = 0 (2mks)
2. x2 + 3x – 2 = 0 (3mks)
3. (a) Plot a triangle **ABC** with coordinates **A**(-2,6) **B**(2,3) and **C**(-2, 3) (1mk)

(b) Reflect **ΔABC** in the line *x = -3*. Plot **Δ AIBIC1** the image of **ΔABC** under this transformation.

 (2mks)

1. Translate **AI, BI, CI**through 10 Label the image **A2B2C2** and write down the

2

coordinates of the points **A2**, **B2**, **C2** (3 Marks)

 (d) **A3** (6, -6), **B3** (2, -3) and **C3** (6, -3) is the image of **A2 B2 C2** after a transformation **P** plot **A3B3C3** and describe the transformation. (2 Marks)

 (e) Describe fully a single transformation that would have mapped **ABC** to **A3B3C3**. (2Marks)

1. In the figure below **OB** = **b** , **OC** = 3**OB** and **OA** = **a**

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1. Given that **OD** = 1/3 **OA** and **AN** = ½ **AC, CD** and **AB** meet at **M**. Determine in terms of **a** and **b**

**N**

 **C**

**~**

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**B**

**O**

 **M**

**D**

**A**

1. **AB**  (1mk)
2. **CD** (1mk)
3. Given that **CM** = **k CD** and **AM** = **h** **AB** determine the values of the scalars **k** and **h** (5mks)
4. Show that **O**, **M** and **N** are collinear. (3mks)
5. a) Complete the table below for the function $y=2x^{3}+5x^{2}-x-6$ (2 Marks)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 |
| 2x3 | -128 | -54 |  |  | 0 | 2 | 16 |
| 5x2 | 80 | 45 | 20 | 5 | 0 | 5 | 20 |
| -x | 4 | 3 |  |  | 0 | -1 |  |
| -6 | -6 | -6 | -6 | -6 | -6 | -6 | -6 |
| y | -50 |  |  |  | -6 | 0 |  |

(b) On the grid provided draw the graph $y=2x^{3}+5x^{2}-x-6$ for.

 Use 2cm to represent 1 unit on the x-axis and 1 cm to represent 5 units on the y – axis (4 Marks)

(c) By drawing a suitable line, use the graph in (b) to solve the equations:

1.  (2 Marks)
2.  (2 Marks)
3. A parent has two children whose age difference is 5 years. Twice the sum of the ages of two children is equal to the age of the parent.
4. Taking x to be age of the elder child, write an expression for
5. The age of the younger child. (1 Mark)
6. The age of the parent. (1 Mark)
7. In twenty years time, the product of the children’s age will be 15 times the age of their parent.
8. Form an equation in x and hence determine the present ages of the elder child. (4 Marks)
9. Find the present possible ages of the parent. (2 Marks)
10. Determine the possible ages of the younger child in 20 years time (2 Marks)