**Name……………………………………………………………………….. Adm No………………………Class………**

121/2

**Mathematics**

Paper 2

2 ½ Hours

June 2018

**DAKU SECONDARY SCHOOL**

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

## INSTRUCTIONS TO CANDIDATES

* Write your name and Admission number in the spaces provided at the top of this page.
* This paper consists of two sections: Section I and Section II.
* Answer ALL questions in section 1 and ONLY FIVE questions from section II
* All answers and workings must be written on the question paper in the spaces provided below each question.
* Show all the steps in your calculation, giving your answer at each stage in the spaces below each question.
* Non – Programmable silent electronic calculators and KNEC mathematical tables may be used, except where stated otherwise.

**FOR EXAMINERS USE ONLY**

**SECTION I**

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

 **SECTION II GRAND TOTAL**

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

**SECTION I (50 MARKS)**

1. Use logarithm tables to solve; (4 Marks)

 

1. Solve for θ in the equation sin ( 4θ + 10o)- cos(θ+70o) = 0 (3 Marks)
2. A quantity K is partly constant and partly varies as M. When K = 45, M = 20, and when K = 87,

M = 48

a) Find the formulae connecting K and M (1 Mark)

1. Find K when M = 36 (2Marks)
2. Find the radius and Centre of the circle whose equation is

 *3x2 + 3y2 – 12x + 18y – 9 = 0.* (3Marks)

1. Find the equation of the normal to the curve y = *x2* + 4*x* – 3 at point (1, 2). (3mks)
2. Using a ruler and a pair of compass only, construct triangle ABC in which BC is 6.6cm, AC=3.8cm and AB= 5.6cm. Locate point E inside triangle ABC which is equidistant from ponts A, and C such that angle AEC=900. (3 Marks)
3. Solve the following trigonometric equation for  (3 Marks)
4. The position vectors of A and B are given as a= 2i-3j+4k and b= -2i-j+2k respectively. Find to 2 decimal places, the length of the vector AB. (3Marks)

9. A T.V set was bought on hire purchase. A down payment (deposit) of Ksh 5000 was paid and a 15 monthly installment of Kshs 1500 was required.

 a) Calculate the total amount paid on hire purchase (1 Marks)

b) If the hire purchase payment is 20% than cash payment, find the cash price (2 Marks)

1. The figure below shows a triangle ABC inscribed in a circle. AC = 10cm, BC = 7cm and

 AB = 10cm. Find the radius of the circle.( Leave your answer to the nearest 1 decimal place)

 (3Marks)

**10cm**

 **B**

**C**

**A**

  **8cm**

**7cm**

1. The floor of a rectangular room measures 4.8m by 3.2m. Estimate the percentage error in the area.

 (3 Marks)

12. Simplify without using mathematical tables or a calculator (3 Marks)

13. Rationalize the denominator fully and simplify, leaving your answer in surd form. (3 Marks)

 

1. A man invests Ksh 90,000 in an account which pays 20% interest p.a. The interest is compounded quarterly. Find the interest earned after 1 ¾ years to the nearest shilling. (3 Marks)
2. Solve the equation by completing square method + 3x – 5 = 0 (3Marks)
3. Find the area bounded by the curve y = x3 + x2 – 2x and the x-axis . (4Marks)

**SECTION II ( 50 MARKS)**

**Answer any five questions from this section**

1. Mr. Ouma is a civil servant on a basic salary of Kshs.18,000. On top of his salary, he gets a monthly house allowance of Kshs.14,000, medical allowance of Kshs. 3080 and a commuter allowance of Kshs. 4640. He has a life insurance policy for which he pays a premium of kshs.800 p.m and claims an insurance relief of shs 3 for every 20/= on the monthly premiums. He is entitled to a personal relief of kshs.1056 p.m

a) Using the tax table below calculate his PAYE

|  |  |
| --- | --- |
|  Income in K£ p.m | Rate % |
| 1 – 484485 – 940941 – 13961397 – 1852over 1852 | 1015202530 |

 b) In addition to PAYE the following deductions are made on his pay every month.

 - Wcps at 2% of his basic salary

 - NHIF of kshs. 400

 - Loan repayment of kshs. 4000

 - Co-op shares of kshs. 800

 (i) Calculate his total monthly taxable income (2 Marks)

 (ii) calculate the total net monthly tax (5 Marks)

 (iii) Calculate his net monthly pay in Kshs. (3 Marks)

1. The figure below shows solid frustum of a pyramid with a rectangular top of side 6cm by 4 cm and a rectangular base of side 10cm by 8 cm. The slant edge of the frustum is 8cm.

**C**

**D**

**A**

**F**

**E**

**B**

**G**

**H**

**4cm**

**6cm**

**8cm**

**8cm**

**10cm**

 a) Calculate the height of the frustrum (3Marks)

 b) Calculate the volume of the solid frustum. (3 Marks)

 c) Calculate the angle between the line FC and the plane FGHE (2 Marks)

 d) Calculate the angle between the planes **BCHG** and the base **EFGH**. (2mks)

1. The 2nd and 5th terms of an arithmetic progression are 8 and 17 respectively. The 2nd, 10th and 42nd terms of the A.P. form the first three terms of a geometric progression. Find

(a) the 1st term and the common difference. (3 Marks)

(b) the first three terms of the G.P and the 10th term of the G.P. (4 Marks)

(c) The sum of the first 10 terms of the G.P. (3 Marks)

1. The position of two towns **X** and **Y** are given to the nearest degree as **X** (450 N, 1100 W) and **Y** (450 N, 700 E)**.** Take π 3.142, **R** = 6370km.Find:
2. The distance between the two towns along the parallel of latitude in km. (2 Marks)

(b) The distance between the towns along a parallel of latitude in nautical miles (2 Marks)

(c) A plane flew from **X** to **Y** taking the shortest distance possible. It took the plane 15hrs to

 move from **X** and **Y**. Calculate its speed in Knots. (3 Marks)

1. Complete the table below for the functions y = 3 sin (3θ) and y = 2 Cos (θ + 400) (2 Marks)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| θ0 | 00 | 100 | 200 | 300 | 400 | 500 | 600 | 700 | 800 | 900 |
| 3Sin (3θ) | 0 | 1.50 |  | 3.00 |  |  | 0.00 |  |  | -3.0 |
| 2 Cos (θ + 400) | 1.53 | 1.29 |  |  | 0.35 |  |  | -0.69 |  | -1.29 |

(a) On the grid provided, draw the graphs of Y = 3 Sin 3θ and y = 2 Cos (θ + 400) on the same axis.

Take 1 cm to represent 100 on the x-axis and 4 cm to represent 2 unit on the y – axis. (5 marks)





(b) From the graph find the roots of the equation.

 (i) 3Sin 3θ = 2 Cos (θ + 400) (2 Marks)

(ii) 2 Cos (0 + 400) = 0 in the range 0 ≤ θ≤ 900 (1 Mark)