Name: ……………………………………………………………………………….Class: ………… Adm. No. …………… School: ………………………………………………………………

Date: ……………………………………… Sign: ………………………………………..

**FORM THREE TERM ONE**

**Mathematics Alt A**

**MARCH/ APRIL 2024**

**Time: 2½ hours**

**Instructions**

* *Write your name, class and admission number in spaces provided above.*
* *The paper contains* ***two*** *sections* ***A*** *and* ***B.***
* *Answer* ***ALL*** *questions in section* ***A*** *and* ***any five*** *from section* ***B*** *in the spaces provided below each question.*
* *Marks may be given for correct working even if the answer is wrong.*
* *Non-programmable silent electronic calculator and KNEC mathematical tables may be used, except where stated or otherwise.*

**For Examiner’s Use Only**

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

**SECTION A**

**SECTION B**

**GRAND**

**TOTAL**

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

**SECTION A (50 MARKS)**

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

1. Use logarithms to evaluate to 4 significant figures (3 marks)



1. Translation T is represented by the column vector and another translation U by column vector. A point P is mapped to a point Q by T and then Q is mapped to a point R by U. If R has coordinates determine the coordinates of P.

(3 marks)

1. Solve for x in log3 (4 + 3x) + 3log33 – 2 = log3(x + 6) (3 marks)

1. A family spent of their income on food, of the remainder on water bill and saved the rest. If sh. 1200 more is spent on food than water bill. Find how much they saved.

**(3 marks)**

1. Evaluate without using tables or calculator. **(2 marks)**
2. A DVD player whose cash price is sh. 15000 is bought on hire purchase by paying a deposit of sh 3000 and 12 monthly instalments of sh. 1250 each. Calculate the rate of interest per annum. (3 marks)
3. A hollow cylindrical alloy of length 40mm has a mass of 352g. If its internal radius is 3cm and its 0.01m thick; calculate the density of the metal used to make the alloy in kg/m3. Take pi as 22/7.  **(3 marks)**
4. A salesman dealing in iphones earns a basic salary and commission as follows.

|  |  |
| --- | --- |
| **Sales** | **Commission** |
| For sales up to ksh. 150,000 | 0% |
| For sales above ksh. 150,000 |  |
| * First ksh. 85,000 | 3% |
| * Next ksh. 85,000 | 4% |
| * Any amount above | 5% |

(a) In the month of December 2022, the salesman earned a basic salary of

ksh. 25,000 and he sold 100 iphones at a discount of 10%. Calculate;

(i) His total sales in the month of December if the iphones were marked

at Ksh. 5000.  **(1 mark)**

(ii) His total earnings that month.  **(3 marks)**

1. If C:\Users\KEVIN\AppData\Local\Temp\ksohtml7280\wps3.pngfind the values of **a, b, c** and **d** where they are rational numbers.

**(3 marks)**

1. Solve for x in the equation;

**(3 marks)**

1. Using completing the square method, solve (3 marks)

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1. Each side of a regular heptagon measures 11.2cm. What is the percentage error in calculating the heptagon’s perimeter? (3 marks)
2. A cone is made from a sector whose dimensions are given below. Calculate the volume of the cone. . OA = OB = 7cm radius of the sector and

Give your answer to 3 significant figures. **(4 marks)**

B

A

7cm

O

1200

1. Given that, , find leaving your answer in surd form. **(3 marks)**

15. Solve the inequality hence express the solution as a combined inequality. **(2 marks)**

16. Two trains T1 and T2 travelling in same direction, on parallel tracks, are just12m apart. Train T1 is 72m long and travelling at 108km/h. T2 is *x* mlong and travelling at 72km/h. Find the length of T2 in metres if they pass each other completely after 16.2s.  **(3 marks)**



**SECTION B (50 MARKS)**

*Answer any* ***FIVE*** *questions from this section in the space provided*

17. The frequency distribution table below shows the mass in kilograms (kg) of parcels delivered by a courier company to their office in Lubao.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Mass (kg) | 50 – 99 | 100 – 199 | 200 – 249 | 250 - 349 |
| Number of parcels | 380 | 230 | 160 | 170 |
| Frequency density |  |  |  |  |

(a) Complete the table above to 1dp.  **(2 marks)**

(b) On the grid provided below, draw a histogram to represent the information shown in the table above. **(3 marks)**

(c) Draw a vertical line in the histogram where the median lies. Show your calculations using the graph. **(3 marks)**

(d) Use the histogram to determine the number of parcels with a mass of 300kg or more delivered by the courier company. **(2 marks)**

18. A solid which comprises of a cylindrical solid and a base which is a frustum of a pyramid. The cylindrical part which is open at the top has a portion of the cylinder cut off along a dotted line as shown. Radius of the cylinder is 9cm and height 28cm.

r

r

16.8cm

B

A

4.9cm

4cm

3cm

D

F

E

C

7cm

24cm

H

G

Given that the original pyramid had slant edge of 32.5cm and HG = 24cm, GF = 7cm, BC = 4.9cm and AB = 16.8cm; Find to 1d.p;

(a) the surface are of the solid. **(6 marks)**

(b) the volume of the solid. **(4 marks)**

19. Point B is 110km on a bearing of S600E from point A. Point C is 90km on a bearing of065 from B. Point D is 075 from A and 3360 from C.

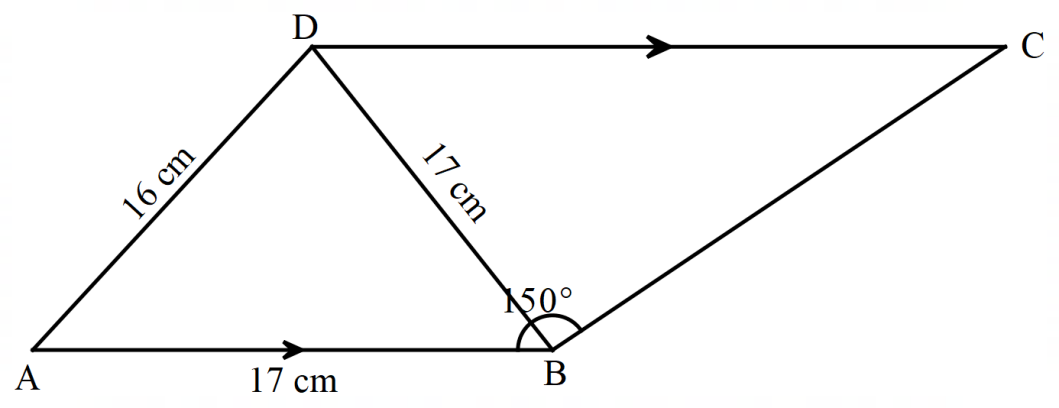
(a) Using a scale of 1cm to represent 20km, draw a diagram to show the relative positions of A, B, C and D. **(5 marks)**

(b) Use your diagram to determine;

(i) the distance and the bearing of B from D. **(2 marks)**

(ii) the distance and compass bearing of A from C. **(3 marks)**

20. In the figure below, ABCD is a quadrilateral in which , and angle . is parallel to and .



Calculate correct to 2 decimal places;

1. The length of BC. **(3 marks)**
2. The length of AC. **(2 marks)**
3. The size of angle ACD. **(3 marks)**
4. Area of the quadrilateral. **(2 marks)**

21. Manu and Harry entered into a business partnership in which they contributed

ksh. 120,000 and ksh. 150,000 every year respectively. After one year Cindy joined the business and contributed ksh. 90,000.

(a) Calculate the ratio of their investment after 3 years of business. **(3 marks)**

(b) It was agreed that 30% of the profits after 3 years be used to cater for the cost of running the business, while the remaining would be shared proportionally. Calculate each person’s share, if the profit made after three years has ksh. 187,000.  **(4 marks)**

(c) If each of them invested their shares back in the business, find their new individual investments at the beginning of the fourth year. **(3 marks)**

22. The table below shows the income tax rates in a certain year.

|  |  |
| --- | --- |
| Total income in  k£per annum | Rate in shs  per pound |
| 1-3900  3901-7800  7801-11,700  11701-15600  15601-19500  Over 19500 | 2  3  4  5  7  7.5 |

Mrs. Masau earned a basic salary of ksh18600 per month and allowances amounting to ksh 7800 per month. She claimed a personal relief of ksh 1080 per month.

***Calculate:***

1. Total taxable income in k£ p.a (2 marks)

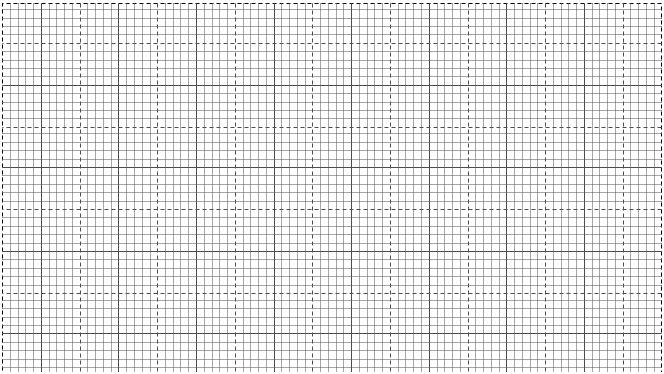
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1. i) the tax payable in ksh per month without relief (4marks)

ii)the tax payable in ksh per month after relief (2marks)

1. Mrs. Musau’s net monthly income (2marks)
2. (a) Complete the below for the function y=2x2-3x-5 for -2 ≤ x ≤ 3. (2 marks)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X | -2 | -1 | 0 | 1 | 2 | 3 |
| Y |  |  |  |  |  |  |

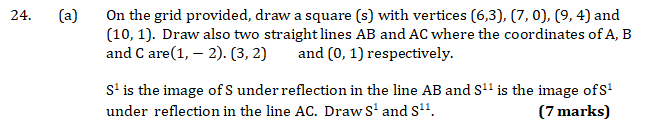
 (b) On the grid provided, draw the graph of y=2x2-3x-5 for -2 ≤ x ≤ 3. (3 marks)

(c ) Use your graph to find the roots of the equation 2x2 -3x – 5 = 0 (1 mark)

(d) (i) On the same axes, draw the graph of y= -2x – 2 (1 mark)

(ii) From your graphs, find the values of x that satisfy the simultaneous equations y= -2x – 2 and y=2x2-3x-5. (1 mark)

(iii) Hence write the quadratic equation in the form ax2 + bx + c = 0 satisfied by the values of x where the two graphs intersect, where a, b and c are integers. (2 marks)





(b) Describe the transformation which maps S onto S11 if the transformation is;

(i) Translation **(1 mark)**

(ii) Rotation **(2 marks)**

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