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

**CLASS: ………………………….**

**DATE: ……………………………**

121/1

MATHEMATICS

PAPER 1

TERM 3, 2021

JANUARY 2021

TIME: 2 ½ HOURS

**MURANG’A EAST CLUSTER EXAMINATION**

**INSTRUCTION**

1. Write your name and index number in the spaces provided above.
2. Sign and write the date of the examination in the spaces provided above.
3. This paper consists of **TWO** sections: **section I** and **Section II.**
4. Answer **ALL t**he questions in **Section I** and only **five** questions from **section II.**
5. **Show all the steps in your calculations, giving your answers at each stage in the stage in the spaces below each question.**
6. Marks may be given for correct working even if the answer is wrong.
7. **Non-programmable** silent electronic calculators **and** KNEC mathematical tables may be used, except where stated otherwise.

**FOR EXAMINER’S USE ONLY**

**Section I**

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

**Section II**

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

**Grand Total**

**SECTION 1: (50 MARKS) ANSWER ALL THE QUESTIONS**

1. Simplify completely (4 mks)

**2x2 – 98 ÷ x + 7**

**3x2 – 16x – 35 3x + 5**

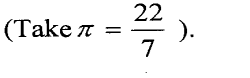
2. Given that **x: y=1:2** and **y: z=3:2** find the value of (3mks)

3. Solve the simultaneous inequalities given below and list all the integral values

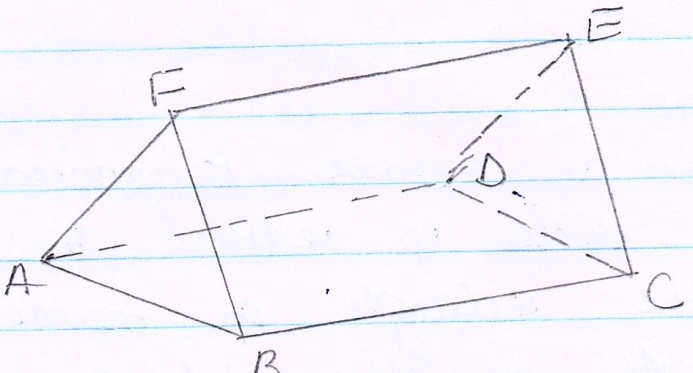
of **x**. **(3mks)**

4. The sum of **K** terms of sequence **3,9,15,21............is 7500**. Determine the value of K. (3mks)

5. The length of a rectangle is **(3x + 1) cm**, its width is **3 cm** shorter than its length. Given that the area of the rectangle is **28cm2**, find its length. **(3 mks)**

6. The curved surface area of a cylindrical container is 1980cm2. If the radius of the container is 21cm, calculate to one decimal place the capacity of the container in litres. **(4 mks)**

7. The figure below is a triangular prism ABCDEF with sides AB = BF =AF = 3cm and BC = AD = EF = 5cm.



* 1. Draw the net of the solid. **(2mks)**
  2. Calculate the surface area of the solid. **(2mks)**

**8** .Two similar containers hold 2000cm3 and 6.75litres respectively. If the smaller container has a diameter of 15.50cm, what is the radius of the larger container correct to one decimal place**. (3mks)**

9 . A tourist on holiday in Kenya had Us£7500. She changed all the amount into Kenya Shillings at the rate of Us$ 1 = kshs. 80.04, While in Kenya she spent two thirds of the money and changed the remainder back to Us $ at Us $1 = kshs. 80.50. How much to the nearest Us dollars did she get? **(3mks)**

10. Determine the **quartile deviation** of the following data. (**2mks)**

**4,9,5,4,7,6,2,1,6,7,8,3**

11. A farmer has a piece of land measuring 840m by 396m. He divides it into square plots of equal size. Find the maximum area of one plot. **(3 mks)**

12. A seven sided polygon has two of its interior angles as 140o and 160o and the remaining angles are equal. Find the size of one of the equal angles. **(3mks)**

13. If. Find the value of **y** . **(3 mks)**

14. Find the value of **x** if. **(3 mks)**

**=**

15 .Use reciprocal and square tables to evaluate, **to 4 significant figures**, the expression. **(3 mks)**

**–**

16. The following were recorded on a field note book by a surveyor. Taking the base line as **550M** find the area in **M².** (3 mks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | B |  |  |  |
|  |  | 550 | 120 | TO | A |
| C | 150 | 450 |  |  |  |
|  |  | 250 | 90 | T O | D |
| E | 60 | 40 |  |  |  |
|  |  | F |  |  |  |

**SECTION II (50 MARKS)**

**Answer ONLY FIVE questions in this section**

17. A tank has two water taps P and Q and another tap R. When empty the tank be filled by tap P alone in 5 hours or by tap Q in 3 hours .When full the tank can be emptied in 8 hours by tap R

a)The tank is initially empty . Find how long it would take to fill up the tank

i) If tap R is closed and taps P and Q are opened at the same time **(2mks)**

ii) If all the three taps are opened at the same time .Giving your answer to the nearest minute **(2mks)**

b) Assume the tank initially empty and the three taps are opened as follows

P at 8:00 am

Q at 9:00 am

R at 9:00 am

1. Find the fraction of the time that would be filled by 10:00 am. **(3mks)**

ii) Find the time the tank would be fully filled up. Give your answer to the nearest minute. **(3mks)**

18. A straight line **L1** has a gradient **ˉ½** and passes through point

**P (-1, 3).** Another line **L2** passes through the points **Q (1, -3)** and

**R (3, 5).** Find.

(a) The equation of **L1**. (2mks)

(b) The equation of **L2** in the from **ax+by+c =0.** (2mks)

(c) The equation of a line passing through a point **S (0, 1.5)** and is perpendicular to **L2**. (3mks)

d) The point of intersection of a line passing through **S and L2.** (3mks)

**19.**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)**

20. Four towns P, R, T and S are such that R is 80km directly to the north of P and T is on a bearing of 290° from P at a distance of 65km. S is on a bearing of 330° from T and a distance of 30 km. Using a scale of 1cm to represent 10km, make an accurate scale drawing to show the relative position of the towns. **(4mks)**

Find:

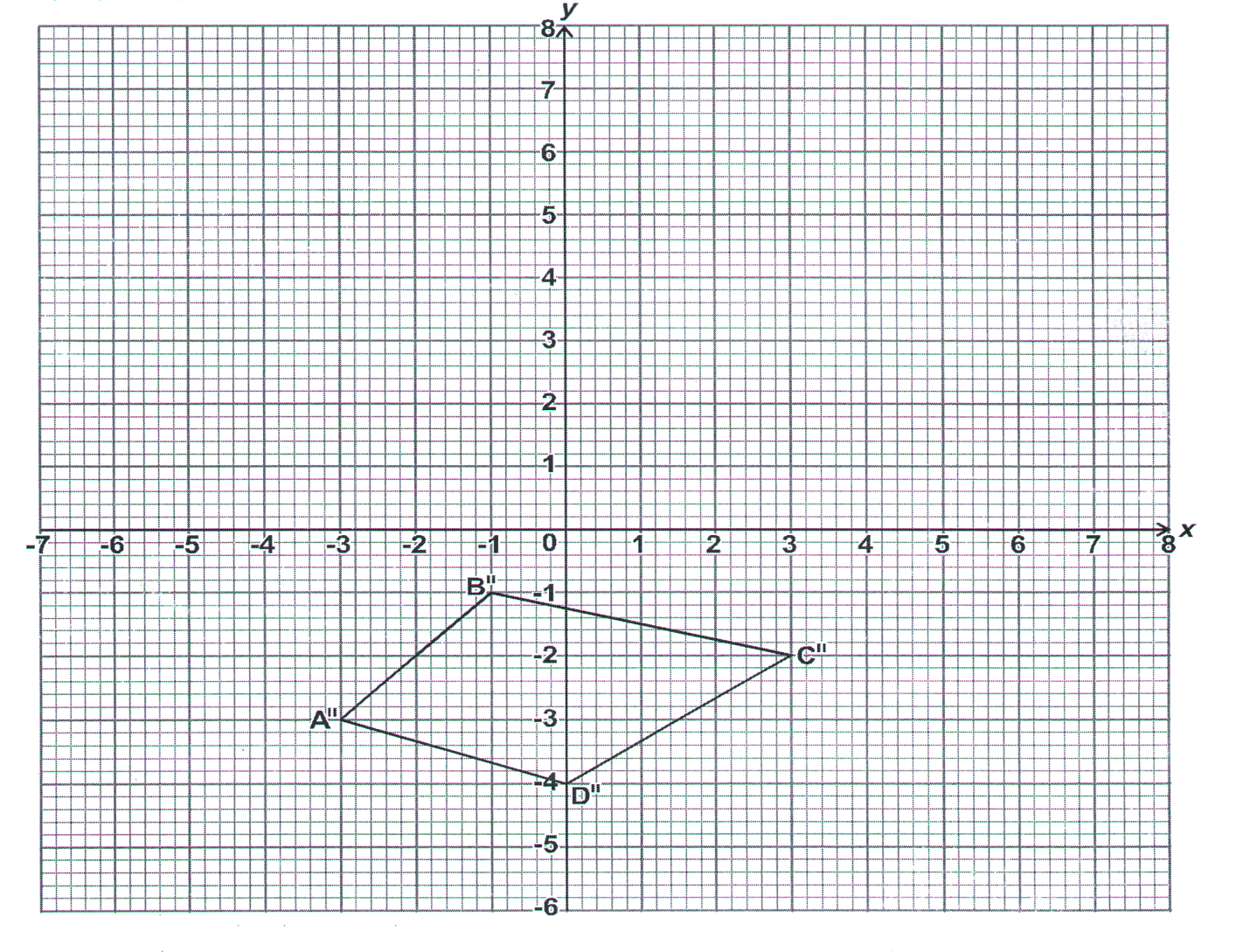
(a) The distance and the bearing of R from T. **(3mks)**

(b) The distance and the bearing of S from R. **(2mks)**

(c) The bearing of P from S **(l mk)**

21. On the Cartesian plane given below, draw the quadrilateral ABCD with

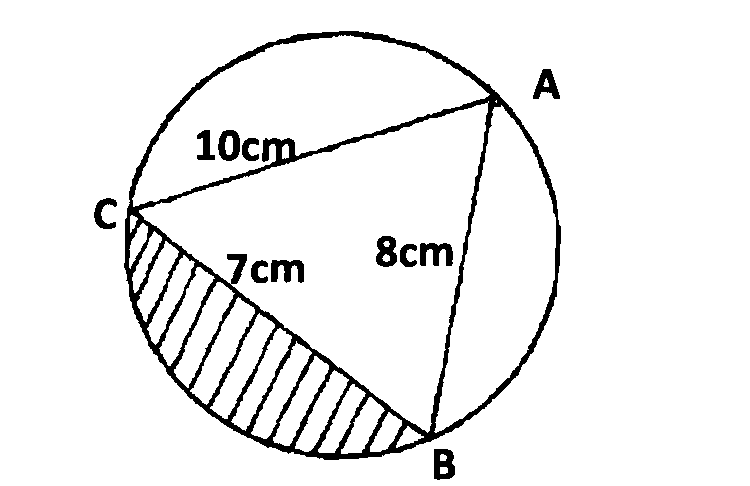
vertices A(6,6)B(2,2)C(4,-6) and D(8,0). **(1mk)**



1. Draw the image A1B1C1D1 of ABCD under enlargement scale factor,centre origin. State the coordinate of A1B1C1D1 **(3mks)**
2. Describe the transformation that maps A1B1C1D1 onto the given image A11B11C11D11 **(2mks)**
3. Rotate A11B11C11D11 with center (-2,-1) through a positive quarter turn to get A111B111C111D111 .state the coordinate of A111B111C111D111.**(3mks)**
4. State a pair of quadrilateral that are oppositely congruent. **(1mk)**

22. The figure below shows a triangle **ABC** inscribed in a circle.**AC** = 10cm,

BC = 7cm and **AB** = 10cm.

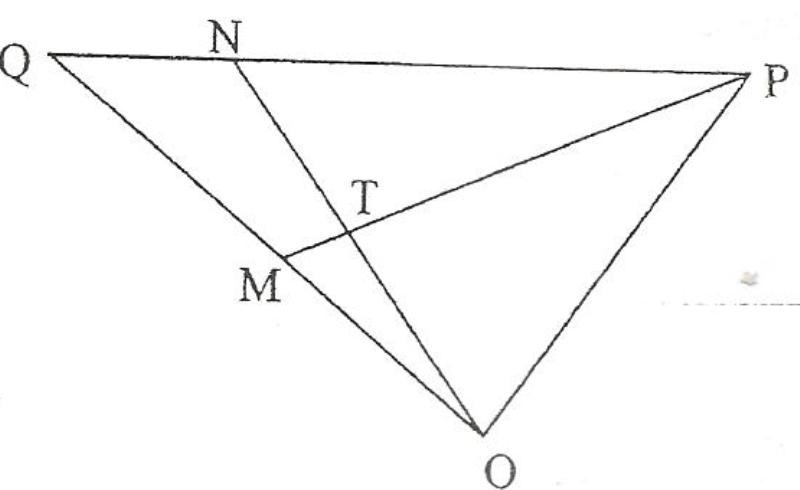


(a) Find the size of angle **BAC**. **(3 mks)**

(b) Find the radius of the circle. **(2 mks)**

(c) Hence calculate the area of the shaded region. **(5 mks)**

23. The diagram below shows a triangle OPQ in which **QN:NP = 1:2, OT:TN =** **3:2** and **M** is the midpoint of **OQ.**



1. Given that **OP = p** and **OP = q,** Express the following vectors in terms of **p** and **q**
2. **PQ** **(1 mk)**
3. **ON** **(2 mks)**
4. **PT** **(2 mks)**
5. **PM** **(1 mk)**
6. (i) Show that point **P, T and M** are collinear. **(3 mks)**

(ii) Determine the ratio **MT: TP.** **(1 mk)**

**24.** A school in Murang’a East 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)**

b) Form an equation in x and hence determine the number of

Calculators the school bought. **(5mks)**

c) Calculate the discount offered to the school as a percentage. **(3mks)**