

Name:Index No.....

School.....sign.....Date.....

HOLIDAY MATHEMATICS ASSESSMENT
FORM 4 JAN 2023 **12/01/2023**
Empowering generations through mathematics

121
MATHEMATICS ALT A.
COMPOSITE PAPER (pp1 and pp2)
JAN 2023
TIME : 2HRS 30MINS

INSTRUCTIONS TO CANDIDATES

- a) Write your **Name, Index Number** and **School** in the spaces provided at the top of this page.
- b) **Sign** and write the **date** of examination in the spaces provided above.
- c) This paper contains **TWO** sections: section I and section II
- d) Answer **all** the questions in section I and any **FIVE** questions from section II.
- e) **All** answers and **working must** be written on the question paper in the spaces provided below each question.
- f) Show **all** the steps in your calculations, giving your answers at each stage in the spaces provided below each question.
- g) **Marks** may be given for **correct** working even if the answer is wrong.
- h) 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

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This paper consists of 15 printed pages. Candidates should ascertain that all the pages are printed

SECTION I (50 marks)
Answer all questions in this section

1. Evaluate without using a calculator $\frac{\left(2\frac{3}{7} - 1\frac{5}{6}\right) \div \frac{5}{6}}{\frac{2}{3} \text{ of } 2\frac{1}{4} - 1\frac{1}{7}}$ (3mks)

2. A line **AB** is the diameter of a circle such that the co-ordinates of **A** and **B** are **(-1, 1)** and **(5,1)** respectively.

a) Determine the centre and the radius of the circle (2mk)

b) Hence ,state the equation of the circle in the form $(x - a)^2 + (y - b)^2 = r^2$ (1mk)

2. Given that $x: y=1:2$ and $y: z=3:2$ find the value of $\frac{x+y}{2z+5x}$ (3mks)

3. Simplify completely $\frac{2x^2-98}{3x^2-16x-35} \div \frac{x+7}{3x-5}$ (4mks)

4. Solve the inequalities $2x - 5 > -11$ and $3 + 2x \leq 13$, giving the answer as a combined inequality then list all the integral values of x (3mks)

5. Solve for x in the equation. (3mks)

$$\text{Log}_2(x + 6) - \text{Log}_2(x - 3) = 2$$

6. Use tables of cubes, cube roots and reciprocal to find the value of

(4mks)

$$\frac{4}{(8.68)^3} + \left(\frac{5}{34.96}\right)^{\frac{1}{3}}$$

7. Given that $\mathbf{OA} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\mathbf{OB} = \begin{pmatrix} -4 \\ 5 \end{pmatrix}$. Find the midpoint M of \mathbf{AB}

(2mks)

8. Line L_1 passes through the points A (1, -2) and B (3, -4). Find the equation of the perpendicular bisector of AB, leaving your answer in the form $ax + by + c = 0$.

(3marks)

9. Use logarithm table to evaluate.

(4 marks)

$$3\sqrt{\frac{(0.0246)^2 \times 142}{0.002 \times 1.14}}$$

10. A man was born in 1956. His father was born in 1928 and the mother three years later. If the man's daughter was born in 1992 and the son 5 years earlier, find the difference between the age of the man's mother and that of his son. (3marks)

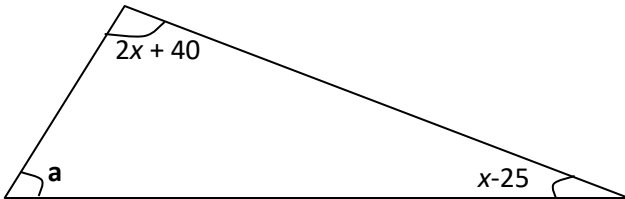
11. Three litres of water (density 1g/cm^3) is added to ten litres of alcohol (density 0.8g/cm^3). Calculate the density of the mixture. (3marks)

12. Foreign exchange on 27/5/2020 was given as follows:.

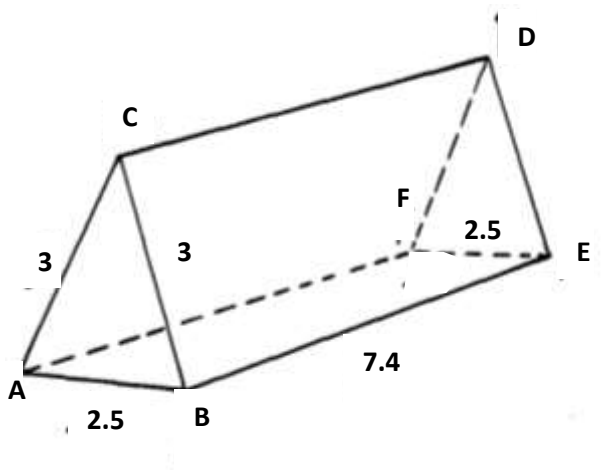
Currency	Buying (Kshs)	Selling (Kshs)
1 Euro	84.15	84.26
1 Sterling pound	118.35	121.47

A tourist came to Kenya from London with 6000 Euros which he converted to Kenya shillings at a bank. While in Kenya he spent a total of Kshs.300,000 then converted the balance into sterling pounds at the Same bank. Calculate the amount in sterling pounds he received (3mks)

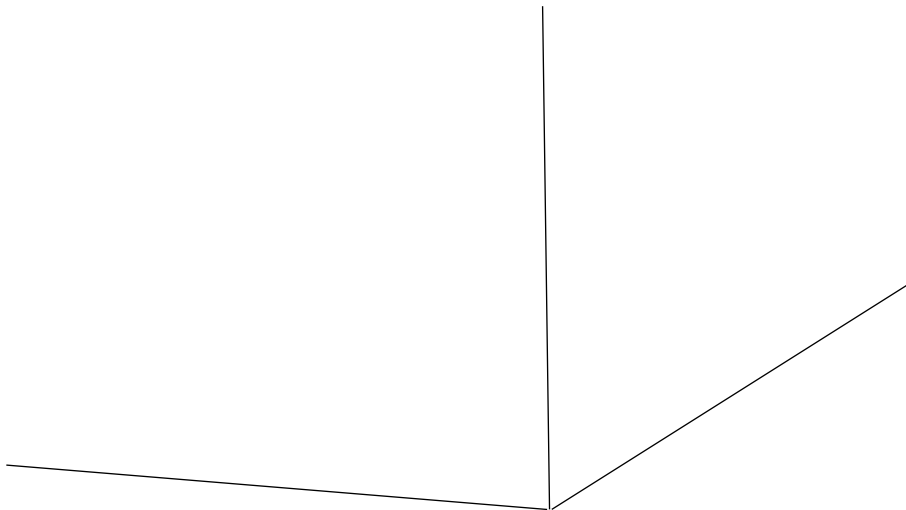
13. In the figure below, angle **a** is half the sum of the other angles. Evaluate the triangle (3mks)



14. Sketch the net of the solid shown in the figure below, measurements are in centimeters (3mks)



15. Complete the solid below to make cuboid ABCDEF (4mks)



SECTION II (50 marks)

Answer only five questions

16. A youth group decided to raise Ksh 480,000 to buy a piece of land costing Ksh. 80,000 per hectare. Before the actual payment was made, four of the members pulled out and each of those remaining had to pay an additional Kshs. 20,000.

(a) If the original number of the group members was x , write down;

(i) An expression of how much each was to contribute originally. (1mk)

(ii) An expression of how the remaining members were to contribute after the four pulled out.(1mk)

(b) Determine the number of members who actually contributed towards the purchase of the land. (4mks)

(c) Calculate the ratio of the supposed original contribution to the new contribution. (2mks)

(d) If the land was sub-divided equally, find the size of land each member got. (2mks)

17. ABCD is a parallelogram with vertices A (1,1) and C(8,10). AB has the equation $4x - 5y = -1$ and BC has the equation $5x - 2y = 20$. Determine by calculation;

(a) the co-ordinates of the point M where the diagonals meet (1mk)

(b) Determine the equation of AD (2mks)

(c) Determine the equation of DC (2mks)

(d) The co-ordinates of the vertices B and D (3mks)

(c) the length of AB correct to 4 significant figures (2mks)

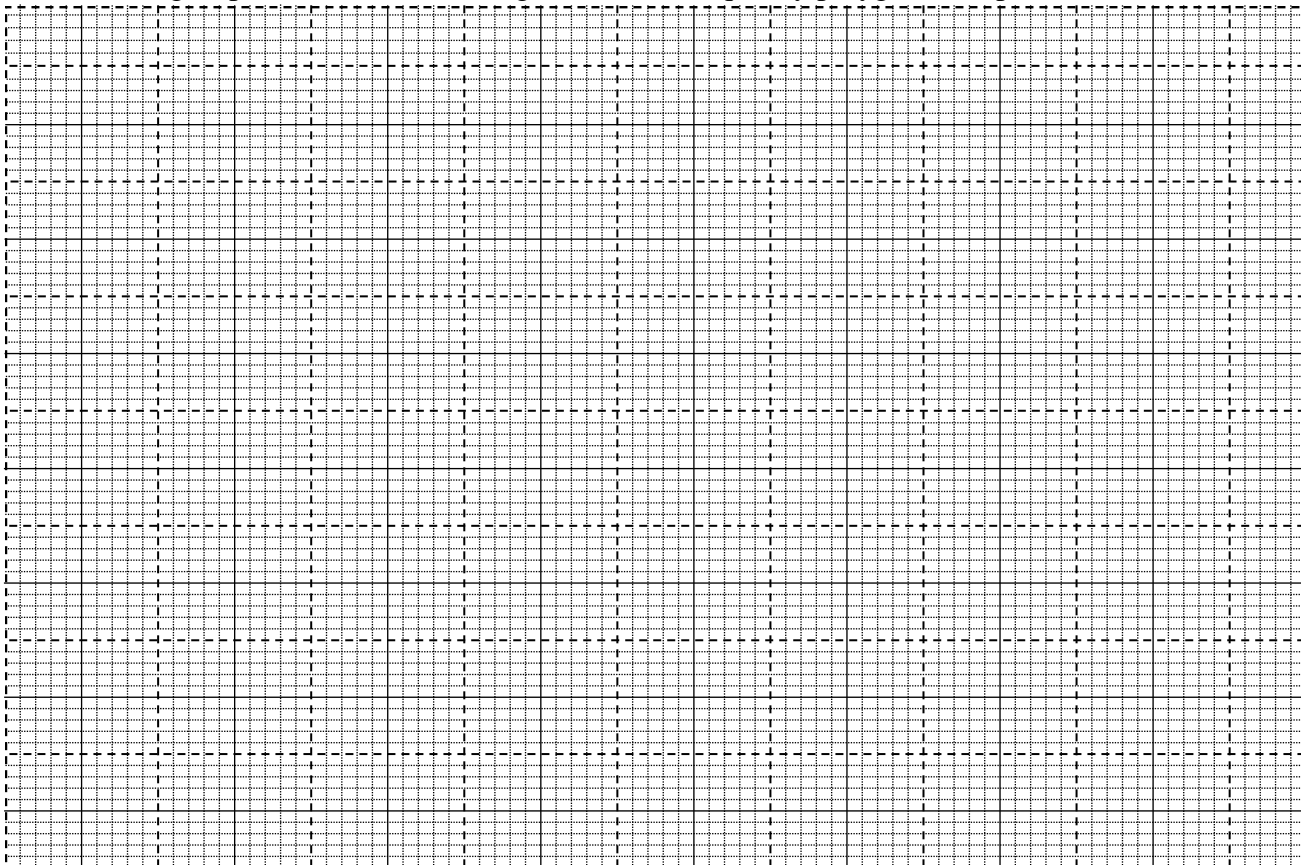
18. The table below shows the number of letters collected from the post office by a school messenger during a school year.

Letters per day	6 – 10	11 – 15	16 – 20	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45	46 – 50	51 – 55
Frequency	5	19	21	23	25	27	20	25	13	12

(i) Estimate the mean of this data. (3mks)

(ii) Estimate the median of this data. (3 mks)

(iii) On the grid provided, draw a histogram and a frequency polygon to represent this data. (4 mks)



19. A bus left Nairobi at 8:00a.m and traveled towards Kisumu at an average speed of 80km/h. At 8.30a.m, a car left Kisumu towards Nairobi at an average speed of 120km/h. Given that the distance between Nairobi and Kisumu is 400km, Calculate:-

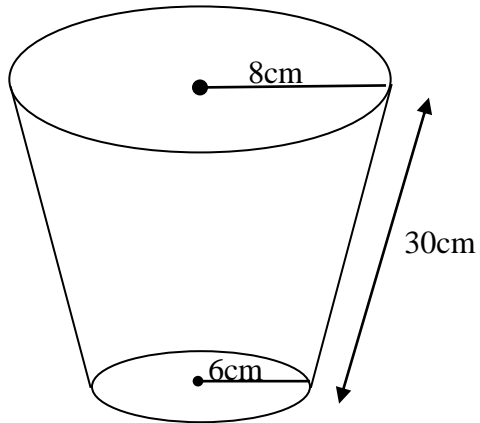
(a) The time the car arrived in Nairobi (2mks)

(b) The time the two vehicles met (4mks)

(c) The distance from Nairobi to the meeting point (2mks)

(d) The distance of the bus from Kisumu when the car arrived in Nairobi (3mks)

20. A pail is in the shape of a container frustrum with base radius 6cm and top radius 8cm. The slant height of the pail is 30cm as shown below. The pail is full of water.

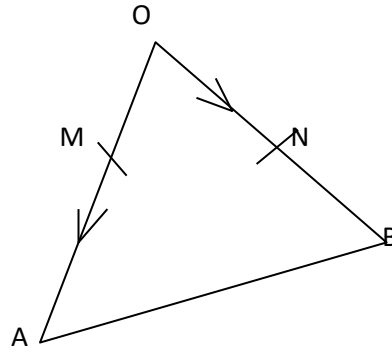


- (a) Calculate the volume of water in the pail.

(6mks)

- (b) All the water is poured into a cylindrical container of circular radius 7cm, if the cylinder has the height of 35cm, calculate the surface area of the cylinder which is not in contact with water. (4mks)

21. In a triangle OAB , M and N are points on OA and OB respectively, such that $OM:MA = 2:3$ and $ON:NB = 2:1$. AN and BM intersect at X . Given that $OA = a$ and $OB = b$



- (a) Express in terms of a and b

(i) \vec{BM} (1mk)

(ii) \vec{AN} (1mk)

- (b) By taking $\vec{BX} = t\vec{BM}$ and $\vec{AX} = h\vec{AN}$, where t and h are scalars, express \vec{OX} in two different ways (2mks)

- (c) Find the values of the scalars t and h (4mks)

- (d) Determine the ratios in which X divides :-

(i) \vec{BM} (1mk)

(ii) \vec{AN} (1mk)

22. The probability that a pupil goes to school by a boda-boda is $\frac{2}{3}$ and by a matatu is $\frac{1}{4}$. If he uses a boda-boda the probability that he is late is $\frac{2}{5}$ and if he uses matatu the probability of being late is $\frac{3}{10}$. If he uses other means of transport the probability of being late is $\frac{3}{20}$.

a. Draw a tree diagram to represent this information. (3mks)

b. Find the probability that he will be late for school. (3mks)

c. Find the probability that he will be late for school if he does not use a matatu. (2mks)

d. What is the probability that he will not be late to school? (2mks)

23. An arithmetic progression (AP) has the first term a and the common difference d .

(a) Write down the third, ninth and twenty fifth terms of the AP in terms of a and d . (1mark)

(b) The AP above is increasing and the third, ninth and twenty fifth terms form the first three consecutive terms of a Geometric Progression (G.P) The sum of the seventh and twice the sixth terms of the AP is

78. Calculate:

(i) the first term and common difference of the AP. (5marks)

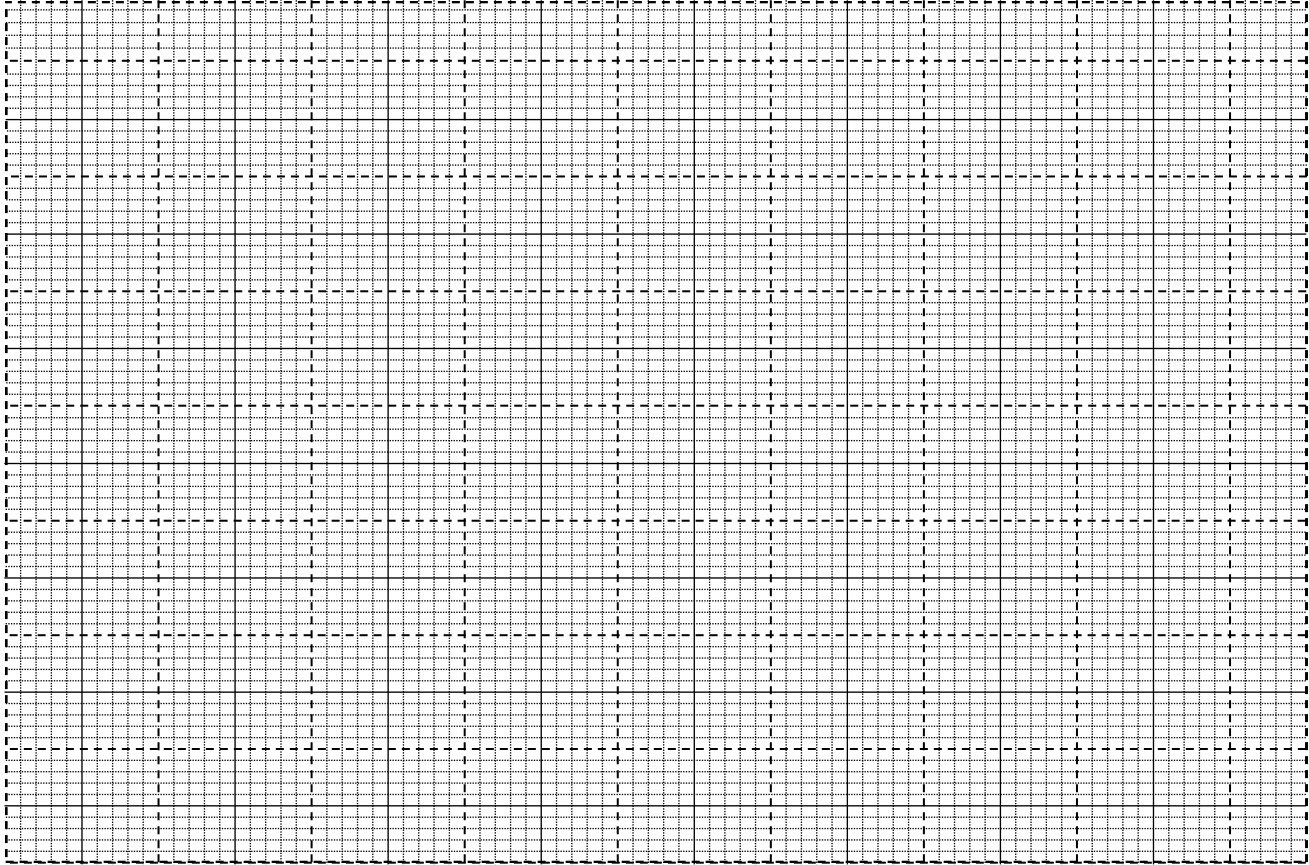
(ii) the sum of the first nine terms of the AP. (2marks)

(iii) The difference between the fourth and the seventh terms of an increasing AP. (2marks)

24. (a) Fill in the table below for the function $y = -6 + x + 4x^2 + x^3$ for $-4 \leq x \leq 2$ (2mks)

x	-4	-3	-2	-1	0	1	2
-6	-6	-6	-6	-6	-6	-6	-6
x	-4	-3	-2	-1	0	1	2
$4x^2$			16			4	
x^3							
y							

(c) Using the grid provided draw the graph for $y = -6 + x + 4x^2 + x^3$ for $-4 \leq x \leq 2$ (3mks)



(c) Use the graph to solve the equations:-

(i) $x^3 + 4x^2 + x - 4 = 0$ (2mks)

(ii) $-6 + x + 4x^2 + x^3 = 0$ (1mk)

(iii) $-2 + 4x^2 + x^3 = 0$ (2mks)

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