NAME:…………………………………INDEX NO:…..……….. CLASS:……….
CANDIDATE'S SIGNATURE………………… DATE……………………….

121/1
MATHEMATICS ALT A
PAPER 1
Sep/Oct,
TIME: 2½ hours

MOMALICHE 3 CYCLE 8

INSTRUCTIONS TO CANDIDATES:
(a) Write your name, admission and class 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 consists of TWO Sections; Section I and Section II.
(d) Answer ALL the questions in Section I and only five questions from Section II.
(e) Show all the steps in your calculation, giving your answer at each stage in the spaces provided
    below each question.
(f) Marks may be given for correct working even if the answer is wrong.
(g) Non-programmable silent electronic calculators and KNEC Mathematical tables may be
    used except where stated otherwise.
(h) This paper consist of 15 printed pages.
(i) Candidates should check the question paper to ascertain that all the pages are printed
    as indicated and that no questions are missing
(j) Candidates should answer the questions in English.

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   GRAND TOTAL

17	18	19	20	21	22	23	24	TOTAL

SECTION I (50 marks)

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

1. Use tables of reciprocal only to evaluate $\dfrac{1}{0.325}$, hence evaluate ;

   $$\dfrac{\sqrt[3]{0.000125}}{0.325}$$

   (4 marks)

2. Solve the equation $3x^2 + 4x = 2$ giving the roots correct to two decimal places. (3 marks)

3. The straight line through the points D (6, 3) and E (3, -2) meets the y-axis at the point F. Determine the coordinates of F.
   (3 marks)

4. Using the grid provided below, draw and shade the unwanted regions to show the region satisfied by R given the following inequalities; $y + x < 5$, $y - x \leq 1$ and $x + 5y > 5$
(3 marks)
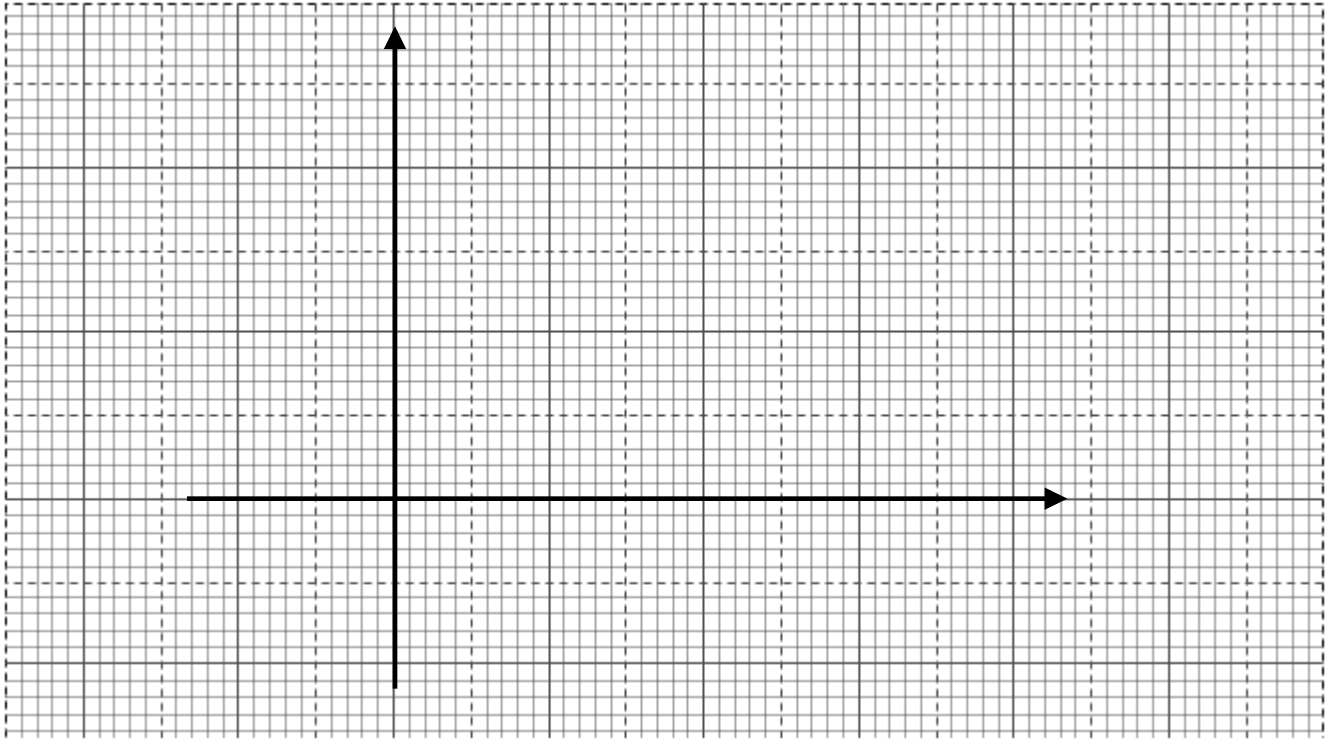
5. Given that $a = -2$, $b = -1$ and $c = 3$, evaluate $\dfrac{2(a + c)^2 - (a - b)(b - c) - 2c}{3(a + b) - 2(b - c)}$ (3 marks)

6. Simplify: (3marks)

$$\frac{x-2}{x+2} - \frac{2x-4}{x^2-4}$$

7. Two boys and a girl shared some money .The elder boy got $\frac{4}{9}$ of it, the younger boy got $\frac{2}{5}$ of the remeinder and the girl got the rest. Find the percentage share of the younger boy to the girl's share.
(3 marks)

8. Annette has some money in two denominations only. Fifty shilling notes and twenty shilling coins. She has three times as many fifty shilling notes as twenty shilling coins. If altogether she has sh. 3400, find the number of fifty shilling notes and 20 shilling coins.
(3 marks)

9. The figure below shows a circle centre **O** and **AOB** is a sector of the circle and angle **AOB** = 72^0 as shown. Given that the area of a sector **AOB** is $5\pi cm^2$, find the radius of the circle and hence calculate the area of the shaded part.

   (4mks)
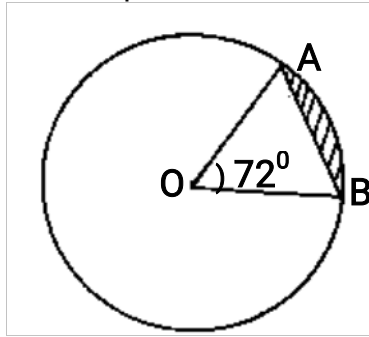
10. A particle accelerates uniformly from rest and attains a maximum velocity of 30m/s after 16 seconds. It travels at this constant velocity for the next 20 seconds before decelerating to rest after another 8 seconds. Calculate the total distance covered by the car.
    (3 marks)

11. Find the value of x in the equation $5^{\frac{x}{4}} = \dfrac{1}{25}$ (2 marks)

12. Given that $\tan x = 2.4$, evaluate without use of tables and calculators, $\sin x - \cos x$ in the form of $\dfrac{a}{b}$ where a and b are integers. (3 marks)

13. The difference between the interior and exterior angles at each vertex of a regular polygon is 162°. Find the number of sides of the polygon.
(3 marks)

14. The surface area of two similar bottles is 12cm^2 and 108cm^2 respectively. If the larger one has a volume of 810cm^3. Find the volume of the smaller one.

(3mks)

15. A cylindrical iron pipe is 2.lm long and 12cm in external diameter, the metal is 1cm thick and its density is 7.8g,/cm^3. Taking pie as 3 ½ find its mass. (4 Marks)

16. Draw the net of the solid below given that is a right pyramid and that **AB** = 4cm = **BC** = **CD** = **AD** and **BE**= 6cm

(3mks)
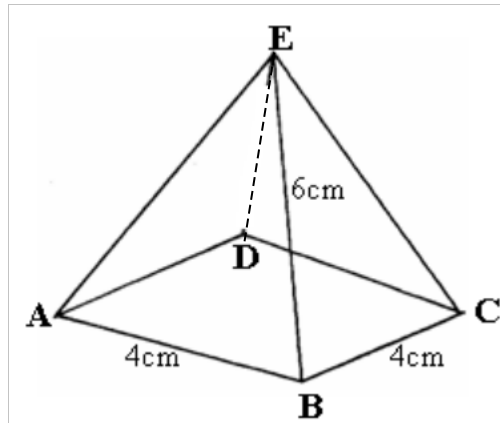
SECTION II (50marks)

Answer only five questions in this section in the spaces provided.

17. Ruhu, Toru, and Lwamawa contributed a total of Kshs. 8041950.00 for their joint campaigns ahead of 2022 general elections. The ratios of their contributions were Ruhu to Toru 5:4 and Lwamawa to Toru 2:3.

a) How much did each contribute? (4 Marks)

b) Ruhu further contributed Kshs. 875,000.00 towards the campaigns kitty. in response, Toru and Lwamawa increased their contributions in the ratios 10:9 and 11:6 respectively. How much did Toru and Lwamawa further contribute altogether?
(3 marks)

c) The three agreed that if they win elections they would share the 15 cabinet positions amongst them in the ratio of their contributions. How many cabinets positions did

Lwamawa get?
(3 Marks)

18. In the figure below, 0 is the centre of the circle. PQ and PR are tangents to the circle at P and R respectively Angle PQS = 40^0 and angle PRS 30° RTU is a straight line. (3mks)
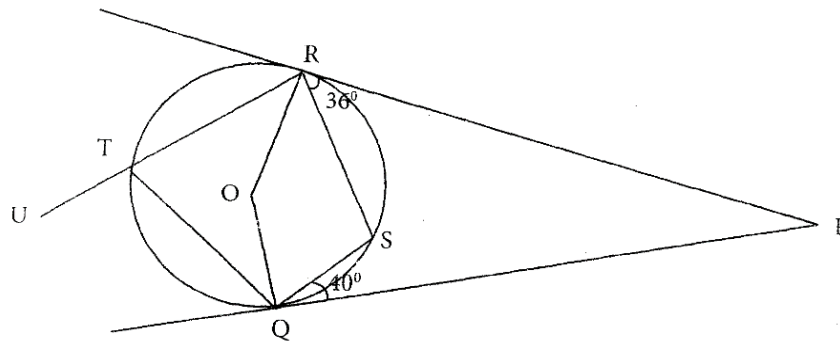
Find with reasons the angles

i) QRS (2marks)

ii) RTQ (2 marks)

iii) RPQ (2 marks
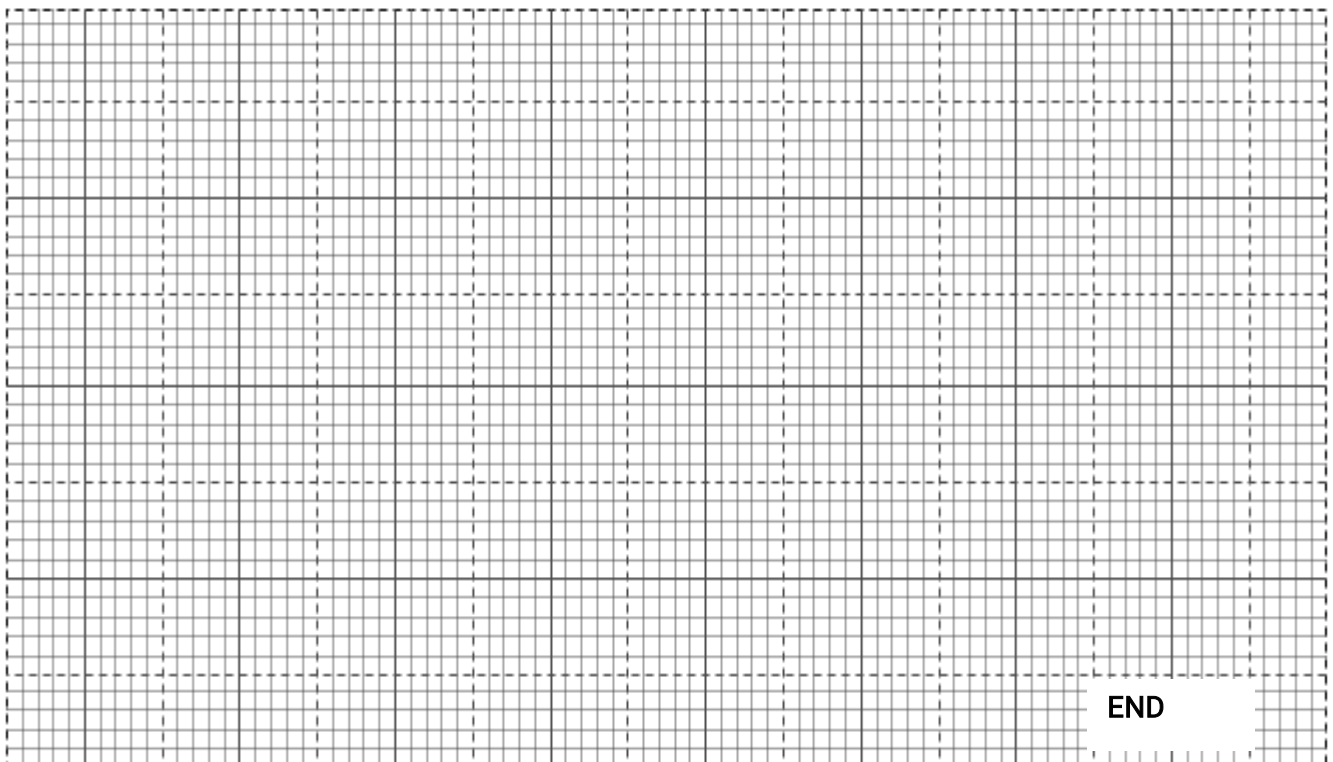
iv)　　Reflex angle QOR　　　　　　　　　　　　　　　(2 marks)

v)　　TRO given that TR =TQ　　　　　　　　　　　　(2 marks)

19. Complete the table below for the function $y = x^3 + 6x^2 + 8x$ for $-5 \le x \le 1$　　　　(2 marks)

x	-5	-4	-3	-2	-1	0	1
x^3	-125	-64			-1	0	1
$6x^2$			54		6	0	
$8x$	-40		-24	-16		0	8
y		0	3			0	15

(a) Draw the graph of the function $y = x^3 + 6x^2 + 8x$ for $-5 \le x \le 1$　　　(3 marks)

(Use a scale of 1cm to represent 1 unit on the x axis. 1 cm to represent 5 units on the y-axis)

END

(b) Hence use your graph to estimate the roots of the equation

i) $X^3 + 6X^2 + 8X = 0$ (1 mark)

ii) $x^3 + 5x^2 + 4x = -x^2 - 3x - 1$ (4 marks)

20. Three islands P, Q, R and S are on at ocean such that island Q is 400kmon a bearing of 030^0 from island P. Island R is 520km and on a bearing of 120^0 from island Q. A port S is sighted 750km due south of island Q.
    (a) Taking a scale of 1cm to represent 100km, give a scale drawing showing the relative positions of P, Q, R and S.
    (4 marks)

Use the scale drawing to
(b) Find the bearing of:
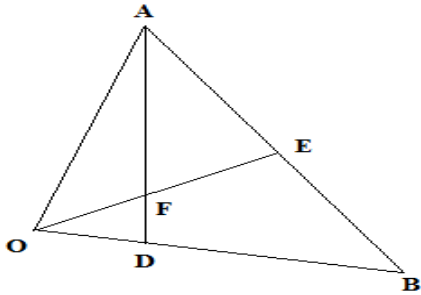   (i)   Island R from island P   (1 mark)

    (ii) Port S from island R   (1 mark)

(c) Find the distance between island P and R   (2 marks)

(d) Find distance between S and R   (2marks)

21. In the figure below, E is the midpoint of AB, OD : DB = 2 : 3 and F is the point of intersection of OE and AD

Given that OA = a and OB = b,

(a) Express in terms of a and b

   (i) AD   (1 mark)

   (ii) OE   (2 marks)

(b) Given further that AF = sAD and OF = tOE, find the values of s and t (5 marks)

(c) Show that E, F and O are collinear   (2 marks)

22. A plastic water tank has a shape as shown below, with a frustrum of a cone on top, a cylindrical body and a hemispherical bottom.
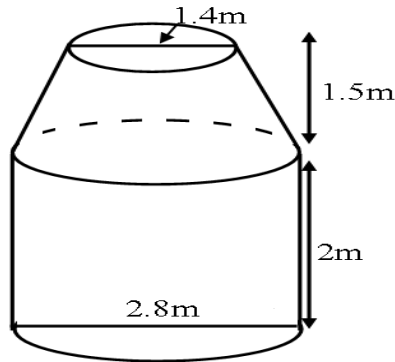
(a)   Calculate

   (i)   The volume of the tank in m³.

(5mks)

(b)   A filler pipe takes 3 hours to fill a third of the tank. If the tank is already ¼ full, at what time will the filler pipe fill the tank if the pipe is opened at 9.00a.m.
(3mks)

(c)   A particle falls in the tank. If its chances of being in any part of the tank are equally likely, find the probability of it being in the hemispherical part

(2mks)

23. Construct a parallelogram ABCD in which AB = 8.5cm, AD = 6cm and angle BAD = 75^0. (Use a ruler and pair of compasses only in this question)

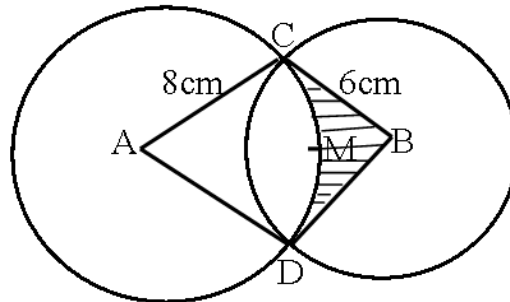a) Measure the length of AC.   (4mks)

b) On the same diagram, construct a perpendicular from D to line AB at M. Measure BM. Hence calculate the area of the parallelogram ABCD.   (4mks)

c) Ex-scribe a circle to triangle BDA tangent to BD   (2marks)

24. The figure below shows two circles intersecting at C and D. The centres are A and B with radii 8cm and 6cm respectively. AB = 10cm.

Determine to 2 decimal places

     (i)   Size of angle DAC   (2mks)

     (ii)   Size of angle DBC   (2mks)

     (iii)   Area of sector ACMD

(2mks)

(iv)   Area of the shaded region   (4mks)