

456/2

MATHEMATICS

Paper 2

JULY / AUGUST, 2023

2½ hours



JINJA JOINT EXAMINATIONS BOARD

Uganda Certificate of Education

MOCK EXAMINATIONS – JULY / AUGUST, 2023

MATHEMATICS

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer ALL questions in Section A and not more than FIVE from section B.

Any additional question(s) answered will not be marked.

All necessary calculations must be shown and should be done on the same page as the rest of the answer.

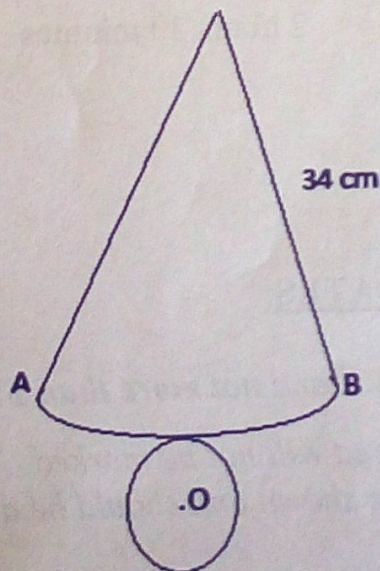
Mathematical tables and graph papers are provided.

Silent, non-programmable scientific calculators may be used.

SECTION A (40 MARKS)

Attempt all questions.

1. Form a quadratic equation in x whose roots are $\frac{2}{3}$ and -4 . [04 marks]
2. Jinja district organized a workshop for poultry farmers. 70 farmers attended the workshop, 34 farmers said they rear broiler birds, 38 said they rear layer birds and 2 said they rear none of the birds above. Draw a Venn diagram showing the information above and find the number of farmers who rear both broilers and layers. [04 marks]
3. Given that $\mathbf{x} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$, $\mathbf{y} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$ and $\mathbf{z} = \begin{pmatrix} 19 \\ 27 \end{pmatrix}$, find the values of the scalars m and n if $\mathbf{x}m + \mathbf{y}n = \mathbf{z}$. [04 marks]
4. A certain company manufactures two types of similar bottles called mini and supper. Supper bottle has volume of 1800cm^3 and mini bottle has a volume of 1200cm^3 and height of 25cm. Calculate the height of the supper bottle giving your answer to 3 significant figures. [04 marks]
5. Given that $f(x) = x + 7$ and $g(x) = 3x - 5$, find the value of x for which $gf(x) = f(x)$. [04 marks]
6. A net of a cone has a diameter of 32cm and slant length of 34 cm. Calculate the volume of the net, take $\pi = \frac{22}{7}$. [04 marks]



7. Find the equation of the line which is a Perpendicular bisector of the line $A(-2, -4)$ and $B(4, -8)$. [04 marks]

8. A rectangle measures $(\sqrt{2} + \sqrt{3})$ cm by $(\sqrt{2} - 2\sqrt{3})$ cm. Find the area of the rectangle. Leave your simplified answer in surd form. [04 marks]
9. A hardware shop in Iyunga trading Centre sells 20 Litre silk paints, recently they advertised on various radio stations in Jinja city as a way of giving back to their customers.

**EASY TERMS ON SILK PAINTS
MADE BY PLASCON**

CASH VALUE: 270,000/=

**HIRE PURCHASE TERMS: DEPOSIT 60% OF THE
CASH VALUE AND PAY 50,000/= FOR 4 MONTHS**

Calculate the total amount of money paid by the customer who bought the 20litre paint on hire purchase terms. [04 marks]

10. Three quantities A, B, C are such that A varies jointly with B and the square of C. Given that A = 80 when B = 5 and C = 2, find the value of A when B = 7 and C = 1. [04 marks]

SECTION B [60 MARKS]

11. (a) A spider made moves from point A to point B to point C then to point D and finally went back to point A. If $A(2, -3)$, $B(5, 2)$, $C(7, 5)$ and $D(-4, 1)$. Prove that a zero vector was obtained by the spider's movement. [06 marks]

(b) Given that \mathbf{P} and \mathbf{Q} are position vectors such that $P(9, 12)$ and $Q(15, 20)$. K divides \mathbf{OP} in the ratio 1:2 and L divides \mathbf{PQ} in the ratio 1:1. Find;

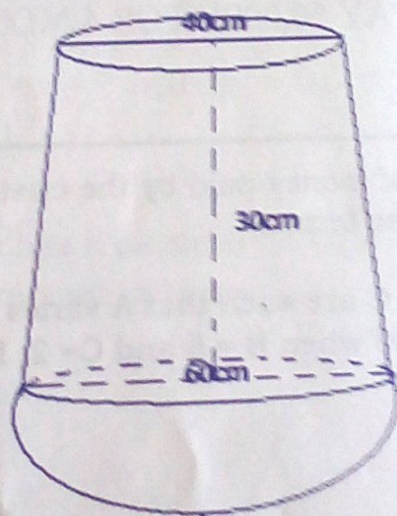
(i) \mathbf{PQ}

(ii) \mathbf{OL}

(iii) Length of \mathbf{KL}

[06 marks]

12. A bucket with top diameter of 40cm and bottom diameter of 60cm is 30cm high sitting on a hemisphere as shown below;



Calculate the volume of the whole solid above.

[12 marks]

13. (a) Simplify $(8x^6)^{-\frac{1}{3}} \times (16x^4)^{-\frac{1}{4}}$

[04 marks]

(b) On a map scale 1:2500, the area of a school is 20cm^2 on the map. Find the actual area of the school in km^2 .

[04 marks]

(c) The height of the elephant is directly proportional to the diameter of its footprint. If the elephant has height of 150cm and the diameter of its footprints is 20cm. Calculate the diameter of the footprints of an elephant whose height is 3.6cm.

[04 marks]

14. In a certain school there are 52 students in form six. These candidates organized a picnic in one of the resorts in mukono and they ordered three types of foods to be served namely Matooke(M), Rice (R) and Irish potatoes (I). 28 liked Rice, 31 liked Irish potatoes, 11 liked Matooke and Irish potatoes, 15 liked rice and Irish potatoes, 13 liked Matooke and Rice. Each of these students ate at least one of these foods.

(a) Represent the information above on a suitable Venn diagram.

(b) Find the number of students who;

- (i) Ate all the three types of foods
- (ii) Ate at least two types of foods

(c) If a student was selected at random from the class, what is the probability that student ate at most one type of food? [12 marks].

15. (a) Given that $f(x) = \frac{2}{x-2}$ and $g(x) = \frac{10}{x^2+x-6}$

Find;

(i) The value of x if $g(x)$ is not defined [03 marks]

(ii) $f(x) - g(x)$ in a simplified form [03 marks]

(b) Find;

(i) $g(0)$

(ii) $f^{-1}(2)$ [06 marks]

16. Two towns M and N are 450km apart. A taxi left town M at 7:30am and used 30 minutes to travel a distance of 50 km. Then the taxi got a puncture and it took them 30min to repair the tyre and then resume the journey at a steady nonstop speed of 80km/hour up to town N. At 8:00am, A Subaru left town N at a steady speed of 100km/hour, after one hour the driver stopped to buy some fruits along the road and it took him 30minutes to finish shopping thereby resuming the journey at the same speed up to town M.

(a) Using the scale of 1cm to represent 25km vertically and 1cm to represent 30 minutes horizontally, draw the distance time graph for the two vehicles.

(b) Use your graph to determine the;

(i) Time when the two vehicles met

(ii) The distance from N when the two vehicles met. [12 marks]

17. In a certain company, a worker gets the following tax free allowances each month as follows

TYPE OF ALLOWANCE	AMOUNT
Lunch.....	28,000/=p.m
Medical	
.....	35,000/=p.m
Transport	
.....	720,000/p.a
Housing	5% of the gross
Married	25,000/=p.m
Un Married	12,000/=p.m
Children;	
Below 13 years per child	5,000/=
13 years and above but below 18 years	3,000/=

Mr Kalyebala earns a gross monthly income of 720,000/= from the company. He is married and has 4 children aged 6years, 10years, 14years and 18years. The workers are taxed using the structure below;

Slabs	Rate (%)
1 - 120,000	5
120,001 - 240,000.....	10
240,001 - 400,000	12
400,001 - 600,000	15
Above 600,000	20

Calculate the;

- Monthly Taxable income of Mr Kalyebala
- Tax he pays monthly
- Net income as a percentage of his gross monthly income.