456/2
MATHEMATICS
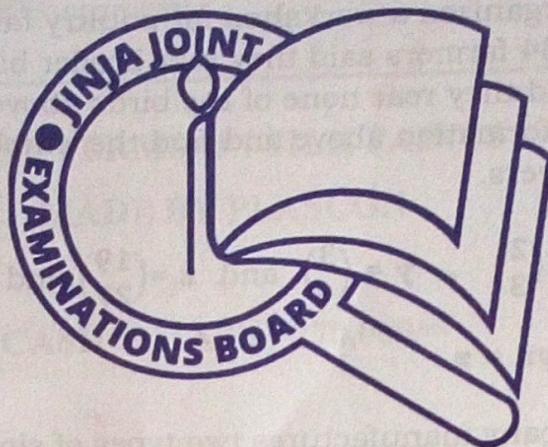**Paper 2**
JULY / AUGUST, 2023
$2\frac{1}{2}$ hours

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 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 **P** and **Q** are position vectors such that P (9,12) and Q (15,20). K divides **OP** in the ratio 1:2 and L divides **PQ** in the ratio 1:1. Find;
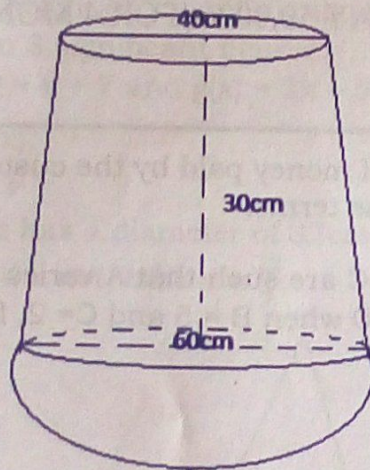(i) **PQ**
(ii) **OL**
(iii) Length of **KL**   [06 marks]

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 20cm² on the map. Find the actual area of the school in km².   [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 atmost 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;
(a) Monthly Taxable income of Mr Kalyebala
(b) Tax he pays monthly
(c) Net income as a percentage of his gross monthly income.