

456/2
MATHEMATICS
Paper 2
Jul./Aug. 2023
2½ hours



WAKISO-KAMPALA TEACHERS' ASSOCIATION (WAKATA)

WAKATA MOCK EXAMINATIONS 2023

Uganda Certificate of Education

MATHEMATICS

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

*Answer **all** questions in section A and any **five** questions from section B.*

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

***All** necessary calculations must be done in the answer booklet provided; therefore, no paper should be given for rough work.*

Squared paper is provided.

Silent, non – programmable scientific calculators and mathematical tables with a list of formulae may be used.

Neat work is a must!!

SECTION A: (40MARKS)

Answer all questions in this section.

1. Without using mathematical tables or a calculator, simplify

$$2^{-1} \times 12^{\frac{1}{2}} \times 3^{\frac{3}{2}} \quad (04marks)$$

2. The distance between the points $(4, k)$ and $(1, 0)$ is 5. Find the possible values of k .
(04marks)

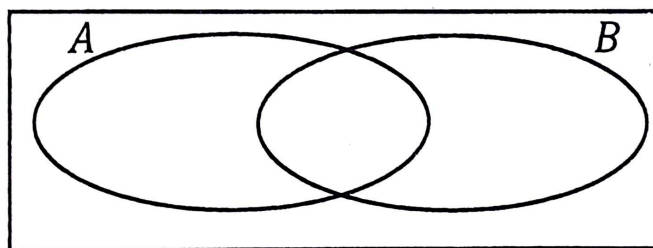
3. Hibah's expenditures and savings are in the ratio 5:3. If her income increases by 12% and expenditure by 15%, then by how much percent do her savings increase?
(04marks)

4. Given that $\overrightarrow{OS} = \begin{pmatrix} 2 \\ 4 \end{pmatrix}$ and $\overrightarrow{OV} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$ and that $\overrightarrow{OM} = \frac{1}{2}\overrightarrow{OS} + \overrightarrow{OV}$. Find $|\overrightarrow{OM}|$. (04marks)

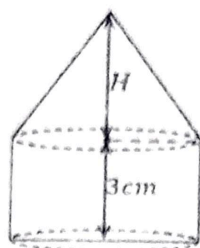
5. If $\log 2 = 0.3010$ and $\log 3 = 0.4771$, without using tables or calculator, evaluate $\log 720$ correct to 4 significant figures.
(04marks)

6. Given that $f^{-1}(x) = \frac{2x}{x+4}$. Find $f(4)$.
(04marks)

7. Two sets A and B in a universal set $\mathcal{E} = \{x: x \text{ is an integer, } 1 < x < 14\}$ are such that $A = \{x: x \text{ is a prime number}\}$ and $B = \{x: x \text{ is a factor of } 24\}$.
Copy and fill in the Venn diagram below the above given information. (04marks)



8. On a geographical map, the area of a lake is represented by 16cm^2 . If the actual area of the lake is 400km^2 on ground, find the representative fraction (RF) of the map.
(04marks)
9. A straight line P has gradient $\frac{1}{2}$ and passes through the point with coordinates $(2, 4)$. Find the equation of P in the form $ax + by + c = 0$, where a , b and c are integers. State the values of a , b and c .
(04marks)
10. The figure on page 3 shows a cylinder and a cone with equal bases placed together to form a solid of volume 500cm^3 .



If the height of the cylinder is 3cm and the area of its base is 100cm^2 , find the value of H .
(04marks)

SECTION B: (60 MARKS)

Answer any five questions from this section. All questions carry equal marks

11. (a) Solve for x in the equation $\left(\frac{a}{b}\right)^{x-1} = \left(\frac{b}{a}\right)^{x-3}$. (05marks)

- (b) A gift box contains bread rolls and cakes. The cakes weigh 750g and the rolls 150g. If the total number of cakes and rolls is 16 and their total weight is 6kg, how many rolls and how many cakes are in the box? (07marks)

12. If $f(x) = ax + b$ and that $f(2) = 5$ and $f(3) = 7$.

- (a) Find the values of a and b . (05marks)

(b) Also given that $g(x) = \frac{3x+2}{x+4}$, find

(i) $gf(x)$

(ii) $(gf)^{-1}(x)$

- (iii) the value of x for which $(gf)^{-1}(x)$ is meaningless. (07marks)

13. In a science class of 345 students, the students who took Physics (P), Math (M) and Chemistry (C) are equal in number. There are 30 students who took both Physics and Math only, 26 who took both Math and Chemistry only, 28 who took Chemistry and Physics only and 14 who took all the three subjects. There are 43 students who didn't take any of the subjects.

- (a) Represent the given information on a Venn diagram. (04 marks)
(b) What percentage of students did not take chemistry? (06 marks)
(c) If a student is picked at random, what is the probability that the student took at least one of the 3 subjects. (02 marks)

14. Pokopoko bus left Kisenyi bus terminal for Kasese. Having travelled 300km, it stopped for 30 minutes due to road blockage. It had travelled 60% of the total distance by this time. After it started again, the driver increased the speed by 20km/h and reached Kasese at the scheduled time. If V is the original speed of the bus;

(a) show that $V^2 + 20V - 8000 = 0$ (09 marks)

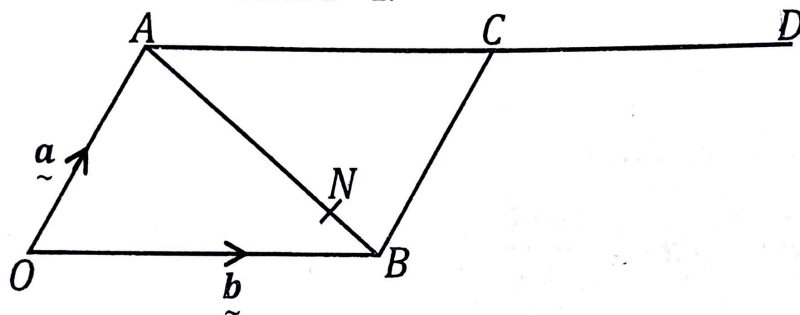
(b) find the value of V . (03 marks)

15. Samuel works with DFCU bank. He pays a monthly income tax of sh.196,000. Uganda Revenue Authority uses the tax from employees' income.

Taxable income	Rate (%)
1 st sh.40,000	2
Next sh.80,000	3
Next sh.180,000	5
Next sh.100,000	8
Next sh. 200,000	10
On remainder	12

- (a) Determine Samuel's monthly taxable income. (08 marks)
- (b) If Samuel receives a monthly allowance of sh. 120,0000, find his monthly gross salary (02 marks)
- (c) What is Samuel's monthly net pay? (02 marks)

16. In the diagram below $OACB$ is a parallelogram. D is a point such that $AC = CD$. Point N divides AB in the ratio 2 : 1.



Given that $\vec{OA} = \vec{a}$, $\vec{OB} = \vec{b}$.

- (a) Express in terms of \vec{a} and \vec{b} the vectors:

- (i) \vec{AB}
- (ii) \vec{ON}
- (iii) \vec{ND}

(04 marks)

- (b) Prove that OND is a straight line. Hence find the ratio $OD:ON$

(08 marks)

17. A military tent is made of a canvas in form of a cuboid and a triangular prism above it. The cuboid is of dimensions $20m \times 10m \times 12m$. The roof top makes an angle of 45° with the $10m$ side of the cuboid.

- (a) Draw the sketch of the tent.

(02marks)

- (b) Calculate the;

(06marks)

- (i) height of the tent.

- (ii) volume of the tent.

(04marks)

END