456/2
MATHEMATICS
PAPER 2
July/August
2½ hours

WAKISSHA JOINT MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 2

2hours 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 same answer booklet/sheets provided, with the rest of the answers. Therefore no paper should be given for rough work.*
- *Graph paper is provided.*
- *Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*

SECTION A (40 marks)

Answer **all** *questions in this section*

1. Without using tables or calculator evaluate; $(25)^{\frac{1}{6}} \times (200)^{\frac{1}{3}}$. (04 marks)

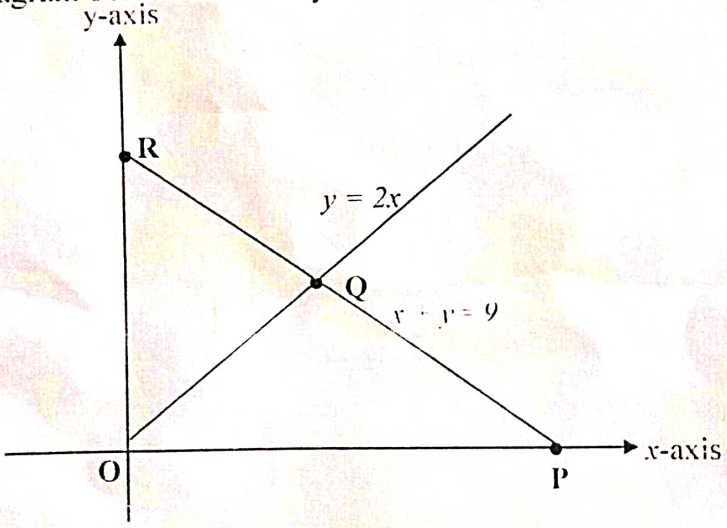
2. In a class of 30 students. 6 like neither mathematics (M) nor physics (P). 9 like P but not M and 7 like M but not P. How many students:
   (i) like physics or mathematics? (02 marks)
   (ii) dislike mathematics? (02 marks)

3. Given that, $g(x) = \frac{x}{y} + 5$, find the value of y for which $g^{-1}(8) = 6$. (04 marks)

4. A straight line with a gradient $-1/2$ passes through the points (6, k) and (k, -4), find the; (i) value of k.
   (ii) equation of the line.
   (04marks)

5. Given that vectors $\overrightarrow{PQ} = \begin{pmatrix} 6 \\ -1 \end{pmatrix}$, $\overrightarrow{OQ} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\overrightarrow{OR} = \begin{pmatrix} 1 \\ 7 \end{pmatrix}$, find the:
   (i) vector $\overrightarrow{PR}$. (02marks)
   (ii) length of $\overrightarrow{PR}$ to 3sf. (02marks)

6. In the diagram below, the lines $y = 2x$ and $x + y = 9$ intersect at point Q.



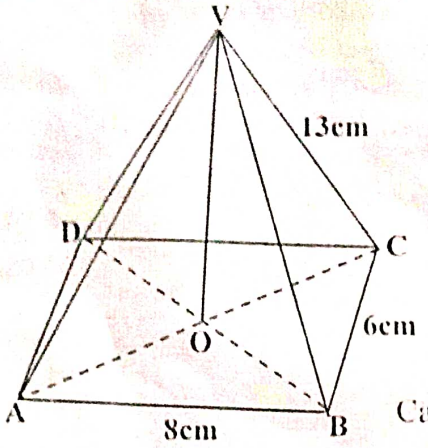
   Determine the coordinates of P, Q and R. (04marks)

7. A customer deposited a certain amount of money in a bank that pays simple interest of r %. After 3 years the total amount of money on his account was Ugx. 358,400. If the interest earned each year was Ugx. 12,800. Calculate the;
   (a) amount deposited.
   (b) annual interest, r %.
   (04marks)

8. Okello travelled a journey of 132km partly by bus and partly by motorcycle. After travelling 105km at an average speed of 42km/hr by bus, he jumped on a boda motorcycle that travelled at 54km/hr for the remaining journey. What was Okello's average speed for the whole journey?
   (04marks)

9. Find the lowest common multiple (LCM) of the set of numbers: 10, 12 and 15.
   (04marks)

10. The figure below is a right pyramid ABCDV with a rectangular base ABCD with AB = 8cm, BC = 6cm and AV = BV = CV = DV = 13cm.



Calculate the perpendicular height of the pyramid. (04marks)

SECTION B (60 marks)

Attempt any **five** *questions from this section. All questions carry equal marks.*

11. (a) A map has a scale of 1: n. The area of a forest cover on the map is 13cm^2. If the actual area of the forest is 81.25km^2 determine the value of n. (05 marks)

(b) A quantity y is partly constant and partly varies as the square of x.
When y = 51, x = 3 and when y = 2.25, x = 0.5.
(i) form an equation relating y and x. (04 marks)
(ii) find y when x = 2. Round your answer to two decimal places. (03 marks)

12. Given that the function: $g(x) = \frac{a}{x} + b$. If $g(-1) = 1\frac{1}{2}$ and g(2)= 9. determine the value(s) of: (a) (i) a and b. (06 marks)
(ii) x for which $g(x) = 0$. (02 marks)

(b) Evaluate $g^{-1}(6)$. (04 marks)

13. In an organization, the following allowances are not taxed; medical Ugx 720,000 per annum. Electricity Ugx 40,000 per month. Transport Ugx 2,500 per day and housing 90% of the monthly medical allowance. The tax structure below applies to all employees on their taxable income.

Taxable income (Ugx)	Rate (%)
00,000 - 80,000	2.0
80,001 - 190,000	5.0
190,001 - 280,000	7.5
280,001 - 380,000	12.0
380,001 - 490,000	15.0
Above 490,000	20.0

If an employee paid a monthly income tax of Ugx 125,350 in the month of June 2018, calculate his/her; (08 marks)
(a) taxable income. (02 marks)
(b) monthly gross income. (02 marks)
(c) net monthly income.

14. From a certain school a random sample of 50 students was selected. It was found out that in this sample, 38students like Fanta (F), 32students like Mirinda (M) and 24students like

Turn Over

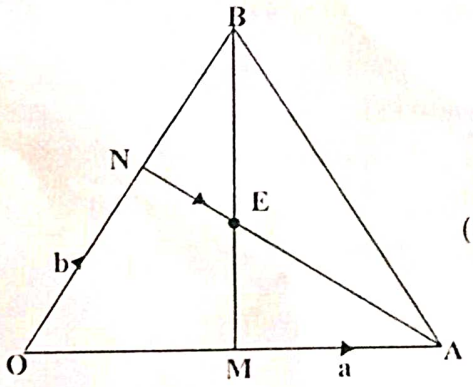
Pepsi cola (P). Eight students like neither of the drinks. All those students who like Pepsi cola also like Mirinda and 21 students like all the three drinks.

(a) Represent the above information on a neat venn diagram. (04 marks)

(b) How many students like; (i) Fanta and Mirinda?
(ii) One type of drink only? (06 marks)

(c) Find the probability that a student chosen at random from the group likes at most one of the drinks. (02 marks)

15. In the diagram below, $\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = \mathbf{b}$. M is the mid-point of $\overrightarrow{OA}$. Point N is on $\overrightarrow{OB}$ such that $3\overrightarrow{ON} = 2\overrightarrow{NB}$. MB and NA meet at E such that $\overrightarrow{ME} = h\overrightarrow{MB}$ and $\overrightarrow{NE} = k\overrightarrow{NA}$.

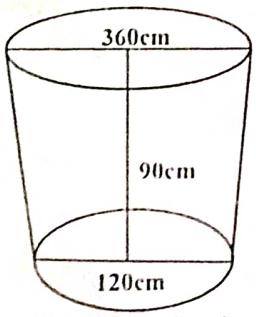


(a) Express in terms of **a** and **b** the vectors:
(i) $\overrightarrow{AN}$
(ii) $\overrightarrow{BM}$ (04 marks)

(b) Express the vector $\overrightarrow{ME}$ in terms of; (i) **a, b** and h.
(ii) **a, b** and k.
Hence find the values of the scalars h and k. (08 marks)

16. (a) The volumes of two similar cylinders are $4752cm^3$ and $1408cm^3$. If the area of the curved surface of the smaller cylinder is $352cm^2$, calculate the area of the curved surface of the larger cylinder. (05 marks)

(b) The figure below shows a bucket filled with water to the brim which was cut from a cone. The height of the bucket is 90cm, its base diameter is 120cm and its top diameter is 360cm.



Using $\pi = 3.14$, Find the capacity of the bucket in litres. (07 marks)

17. Towns P and Q are 160kms apart. A lorry left town P at 6:15am and travelled towards town Q at a steady speed of 20km/hr. A bus left town Q at 6:45am and travelled towards town P at a steady speed of 40km/hr. Using a scale of 2cm: 20kms and 2cm : 1 hour.

(a) Draw distance time graphs showing journeys of the two vehicles. (06 marks)

(b) Using your graphs estimate the;
(i) distance from town Q where the lorry by passes the bus.
(ii) time at which the two vehicles bypass one another.
(03 marks)

(c) Calculate the difference in their time of arrival to respective destinations.
(03 marks)

END