456/2
MATHEMATICS
PAPER 2
July/August 2019
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 logarithm tables or calculator, simplify: $\sqrt{243} - \sqrt{108} + \sqrt{75}$ *(04 marks)*

2. The sets P and Q are such that $(P) = n(P^{l} \cap Q) = 7, n(Q^{l}) = 8$ and $n(\varepsilon) = 20$. Represent the given information on a venn-diagram hence find $n(P \cap Q^{l})$. *(04 marks)*

3. A cyclist moving at 50kmh^{-1} sets off from P at 11:58am and covers a distance of 60km to Q. Find the time when the cyclist arrived at Q. *(04 marks)*

4. Find the equation of a line whose $y-$ intercept is 6 and $x-$ intercept is $^{-}2$. *(04 marks)*

5. Given that $h(x) = {}^{8}/_{x} - 5$, determine the expression for $h^{-1}(x)$, hence evaluate $h^{-1}(^{-}3)$

6. Solve for x in: $3log_{10}\,5 + log_{10}\,x - log_{10}4 = 3$ *(04 marks)*

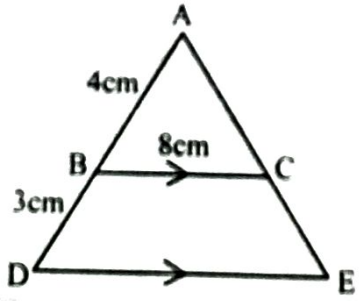
7. A point T on a line segment AB is such that $2TB = AT$. If $AT = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$.

   Find (i) column vector AB.
   (ii) the length of AB. *(04 marks)*

8. Express $3.4\overline{21}$ as a fraction in its simplest form. *(04 marks)*

9. The value of a machine depreciates at a rate of 5% per annum. If the value of the machine now is 3.61million, what was the value of the machine 2 years ago? *(04 marks)*

10. In the figure below $AB = 4cm$, $BD = 3cm$ and $BC = 8cm$.
    Find the length DE. *(04 marks)*



SECTION B (60 marks)

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

11. (a) Given that $f(x) = 3x - 4$ *and* $g(x) = x^{2}$ find;
    (i) $ff(x)$
    (ii) $(fg)^{-1}(x)$ and hence find $(fg)^{-1}(44)$ *(06 marks)*

SECTION A (40 marks)

Answer all questions in this section

1. Without using logarithm tables or calculator, simplify: $\sqrt{243} - \sqrt{108} + \sqrt{75}$ *(04 marks)*

2. The sets P and Q are such that $(P) = n(P^{l} \cap Q) = 7, n(Q^{l}) = 8$ and $n(\varepsilon) = 20$. Represent the given information on a venn-diagram hence find $n(P \cap Q^{l})$. *(04 marks)*

3. A cyclist moving at 50kmh^{-1} sets off from P at 11: 58am and covers a distance of 60km to Q. Find the time when the cyclist arrived at Q. *(04 marks)*

4. Find the equation of a line whose $y-$ intercept is 6 and $x-$ intercept is $^{-}2$. *(04 marks)*

5. Given that $h(x) = {}^{8}/_{x} - 5$, determine the expression for $h^{-1}(x)$, hence evaluate $h^{-1}(^{-}3)$

6. Solve for x in: $3log_{10} 5 + log_{10} x - log_{10} 4 = 3$ *(04 marks)*

7. A point T on a line segment AB is such that $2TB = AT$. If $AT = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$.

   Find (i) column vector AB.
   (ii) the length of AB. *(04 marks)*

8. Express $3.4\overline{21}$ as a fraction in its simplest form. *(04 marks)*

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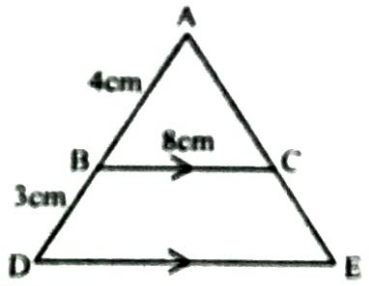
10. In the figure below $AB = 4cm$, $BD = 3cm$ and $BC = 8cm$. Find the length DE. *(04 marks)*



SECTION B (60 marks)

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

11. (a) Given that $f(x) = 3x - 4$ *and* $g(x) = x^{2}$ find;
    (i) $ff(x)$
    (ii) $(fg)^{-1}(x)$ and hence find $(fg)^{-1}(44)$ *(06 marks)*

(b) The functions h and g are defined by $h(x) = \text{cube root of } (x+1)$ and $g(x) = log_{10}(x^3 + 1)$, find;

(i) $gh(x)$ in its simplest form.

(ii) gh (98). *(06 marks)*

12. A group of 50 students was asked the food they liked of Matooke (M), Rice (R) or Posho (P). It was found out that 29 liked Matooke, 27 liked Posho and 25 liked Rice. 8 liked Posho and Matooke, 7 liked Matooke and Rice only, 9 liked Posho and Rice only. The number of students who liked Rice only was equal to those who disliked the three foodstuffs.

(a) Represent the above information on a venn-diagram. *(07 marks)*

(b) Determine the number of students who liked;

(i) all the three foods

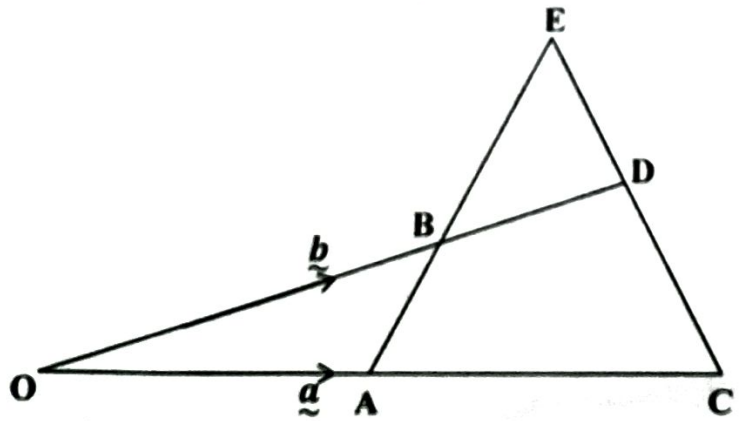
(ii) M and P but not R. *(03 marks)*

(c) If a student is chosen at random from the group, what is the probability that he liked at least two types of food? *(02 marks)*

13. (a) Two towns A and B are 3km apart. A man walks the first part of this journey at $6kmh^{-1}$, and rests for 10 minutes. He then runs the remaining distance at a speed of $10kmh^{-1}$. If this man uses 36 minutes for the whole journey, calculate the distance that he walked. *(08 marks)*

(b) Using scales of 4cm to represent 1km and 2cm representing 10 minutes; draw a distance-time graph to represent the man's journey. *(04 marks)*

14. In the figure below $\overline{OA} = \mathbf{a}$ and $\overline{OB} = \mathbf{b}$. Given that point A lies on $\overline{OC}$ such that $\overline{OA}$: $\overline{AC}$ = 1: 2 and B is the mid–point of $\overline{OD}$.



(a) Express in terms of **a** and **b** the vectors

(i) $\overline{AB}$

(ii) $\overline{CD}$ *(03 marks)*

(b) If $\overline{BE} = h(\overline{AB})$ and $\overline{CE} = k(\overline{CD})$, Express $\overline{CE}$ in terms of

(i) a, b and h.

(ii) a, b and k. Hence find the values of h and k. *(07 marks)*

(c) State the ratios of AB: BE *(02 marks)*

Turn Over

15. In a certain organisation, the following allowances are not taxed for any employee;
Transport Shs. 35,000 per month, Housing Shs. 80,000 per month, Water and Electricity Shs. 25,000 per month and Medical care Shs. Shs. 240,000 per annum. His remaining income is subjected to the tax structure below;

Taxable income	Rate %
1−150,000	10
150,001 −350,000	15
350,001 −600,000	20
Above 600,000	25

Given that an employee paid Shs. 113,750 as tax, calculate his

(i) total monthly allowances *(02 marks)*
(ii) taxable income *(06 marks)*
(iii) gross income. *(02 marks)*
(iv) Net income *(02 marks)*

16. (a) Given that $log_{10} x = \bar{3}.216$ and $log_{10} y = 1.732$, without using logarithm tables or calculator, determine

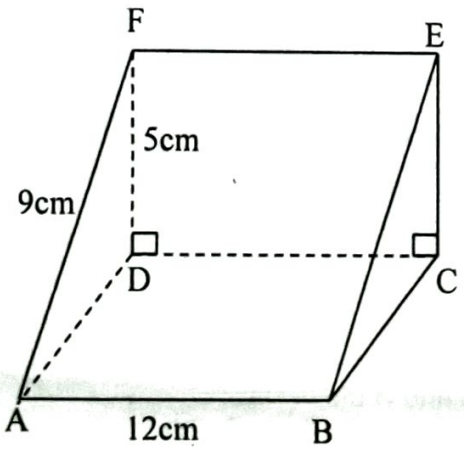
(i) $log_{10}(xy)$

(ii) $log_{10}\left(\frac{\sqrt{x}}{y}\right)$ *(06 marks)*

(b) Use logarithm tables to evaluate;

$$\frac{\sqrt{0.456} \times 365}{0.256}$$ *(06 marks)*

17. ABCDEF is a wooden wedge with a rectangular base ABCD and across-section of a right angled triangular ends. AB = 12cm, BE = 9cm and CE = 5cm.



(a) Calculate the

(i) length AE *(03 marks)*
(ii) angle between line AE and the base ABCD. *(03 marks)*

(b) Determine the surface area of the wedge. *(06 marks)*

END