

UNEB U.C.E MATHEMATICS (PAPER 2) 2010

SECTION A

- Express 0.341666... in the form $\frac{p}{q}$, where $q \neq 0$.
- Solve for x in $32\frac{3}{5} \div x\frac{1}{2} = 2$.
- Given two points $P(4, 5)$ and $Q(-2, 9)$, find the equation of the line through P and Q .
- Simplify $\sqrt{20} - \sqrt{45} + \sqrt{125}$. Give your answer in the form $a\sqrt{b}$ where a and b are constants.
- A rectangle 6cm long and 5cm wide is enlarged so that its area becomes 270cm^2 . Find the linear scale factor of the enlargement.
- In the figure below, O is the centre of the circle, angle $JKQ = 40^\circ$ and KOQ is a straight line.

CIRCLE

Find the angles marked n and p .

- Given that $\mathbf{a} = \begin{pmatrix} -2 \\ -9 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 7 \\ 2 \end{pmatrix}$ and $\mathbf{m} = \mathbf{a} + 2\mathbf{b}$, find the magnitude of $\mathbf{m}$.

- If $\mathbf{n} = \mathbf{x} \sqrt{\left(\frac{2}{4m^2 - 1}\right)}$, express m in terms of n and x .

- A function $f(x) = \frac{3}{1-x^2}$. Find the values of x for which $f(x) = 4$.

- Three girls, Auma, Assimwe and Nakato shared shs10, 500. Nakato got twice as much as Assimwe and Assimwe got twice as much as Auma. Find how much money Assimwe got.

SECTION B

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

- A speed boat sets off from an island M on a bearing of 080° to an island X at an average speed of 150kmh^{-1} , island X is 450 km from island M . at X it alters its course to a bearing of 200° and maintains the average speed of 150kmh^{-1} for 3 hours until it reaches island Y . it then moves to island P is 400 km from island M .

- Using a scale of 1 cm to represent 50 km, construct a scale drawing to show the route of the speed boat.
- Use the scale drawing in (a) to find the distance PY .
- Calculate the
 - Total time taken for the speed boat to move from M to P .
 - Speed boat's average speed for the whole journey.

- The Venn diagram below shows the members of a district council who sit on three different committees of works (W), production (P) and Finance (F).

VENN DIAGRAM

- Determine the value of x , y and z .
- Find the total number of members who

(i) Make up the district council.

(ii) Belong to more than one committee.

c) Given that a member is selected at random from the district council, find the probability that the member belongs to only two committees.

13. a) express $\frac{2}{(x+4)} + \frac{4}{(x-3)} - \frac{4(x+4)}{(x^2+x-12)}$ in the form $\frac{a}{(x+b)}$

b) A mini bus travels from Migyera to Kampala, a distance of 156km, at a certain average speed of V km/hr. on the return journey, it increases the average speed by 4 km/hr and takes 15 minutes less. Find the average speed V from Migyera to Kampala.

14. The table below shows time (t) in seconds and velocity (V) in m/s of an object.

$t(s)$	0	1	2	3	4	5	6
$V(m/s)$	0.0	1.0	1.7	2.0	1.7	1.0	0.0

a) Using a scale of 2cm to represent one second on the horizontal axis and 4cm to represent 0.5 m/s on the vertical axis, plot the values of t and V and join the points with a smooth curve.

b) Use your graph in (a), to find the

(i) Times at which the speed of the object is 0.8 m/s.

(ii) Acceleration of the object when the time is 2 seconds.

c) If the total distance covered by the object was 7.5m, what was its average speed?

15. a) without using mathematical tables or a calculator, find the value of

$$2 \log_{10} 50 + \log_{10} 80 - \log_{10} 2.$$

b) (i) find the prime factors of 150.

(ii) Using your result in (i), find $\log_{10} 150$, given that

$$\log_{10} 5 = 0.6990, \log_{10} 3 = 0.4771 \text{ and } \log_{10} 2 = 0.3010.$$

16. a) solve the following simultaneous equations using the matrix method

$$5x + 2y = 5,$$

$$3x - 0.2y = 10.$$

b) Given that $P = \begin{pmatrix} 2 & -1 \\ 3 & -2 \end{pmatrix}$, $Q = \begin{pmatrix} 1 & 5 \\ 2 & -3 \end{pmatrix}$ and $R = \begin{pmatrix} 4 & 3 \\ 1 & -2 \end{pmatrix}$;

Find:

(i) $QR - P$,

(ii) The determinant of $QR - P$.

17. Mr. Oketcho's monthly gross salary is shs900,000 which includes the following allowances:

Shs

Water and electricity 20,000

Relief and insurance 30,000

Housing allowances 50,000

Medical allowance 25,000

Transport allowance 28,000

Marriage allowance 20,000

Family allowance

(for only 4 children):

- From 0 to 9 years 20,000 per child

- Between 9 and 16 years 15,000 per child

- Over 16 years 10,000 per child

Mr. Oketcho has five children; two of whom are aged between 0 and 9 years, one aged 14 years and the other two are over 16 years.

The income tax structure is shown in the table below:

Taxable income per month in shillings.	Tax rate %
01 - 50,000	10.0
50,001 - 110,000	20.0
110,001 - 200,000	24.5
200,001 - 350,000	35.0
350,001 - 600,000	40.0
Above 600,000	49.0

a) Calculate Mr. Oketcho's

(i) taxable income

(ii) Income tax

b) Express the income tax as a percentage of his monthly gross salary.