

O'LEVEL UNEB MTCS IN 2001

1. Find the H.C.F of 18, 42 and 48.
2. Without using tables or calculator evaluate $16^{1/2} + 64^{-1/3} + \left(\frac{8}{125}\right)^{2/3}$.
3. A television set costs British pound sterling (£)220. Given the exchange rates: One United states Dollar (1U\$)= £0.75, and 1U\$= Ush. 1,800, determine the cost of the set in Uganda shillings.
4. Using a number line, find the integral values of x which satisfy the sets:

$$\{3x > 2x + 5\} \cap \{3x < 32 - x\}$$

5. In the table below, y is known to be inversely proportional to x:

y	p	45	12
x	5	8	q

Find the value of p and q

6. Olga bought a motor cycle and sold it to Okello at a loss of 25%. If he sold it at sh. 1,200,000, find how much money Olga paid for it.
7. Solve the equation: $\frac{x+1}{2x+5} = \frac{x-1}{3}$
8. Express 0.321.... as a fraction.
9. A cylindrical tank of diameter 1.4m and height 2m has a capacity of 3.08m^3 . Find the radius and height of a similar tank of capacity 83.16m^3 .
10. The table below shows the age of pupils in a certain class.

Age (years)	11	12	8
No.of pupils	a	10	a

If the mean age of the pupils is 10, find the value of a.

SECTION B

11. (a) The length of a rectangular floor is 8 metres more than its width. If the area of the floor is 65m^2 , find the dimensions and perimeter of the floor.
(b) In the figure below, ABCD is a rectangle. $\overline{AB} = 10\text{cm}$, $\overline{AD} = \overline{AX} = 6\text{cm}$ and xy is an arc of a circle, centre D.

Calculate the area of the shaded region. (Take $\pi=3.14$)

12. Given the equation of a curve $Y=2x^2 + 5x -3$,

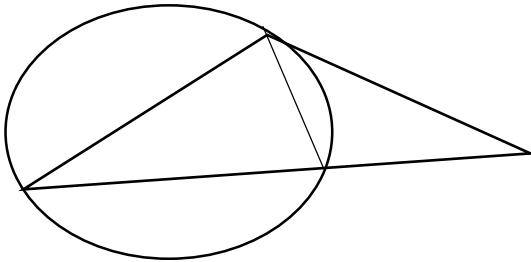
(i) Copy and complete the table below:

X	-4.0	-3.5	-2.5	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0
$2x^2$				8					0.5	
$5x$				-10					2.5	
-3	-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
Y				-5					0	

(ii) On the same axes and using the same scales plot the graphs of $Y=x+1$ and $y= 2x^2 + 5x -3$.

(iii) Using your graphs solve the equation $x^2 +2x-2=0$.

13. In the figure below $\overline{OL} = 4.5\text{cm}$, $\overline{PM}=3\text{cm}$, $\overline{NM}=4\text{cm}$ and $\overline{LN}=7.5\text{cm}$.

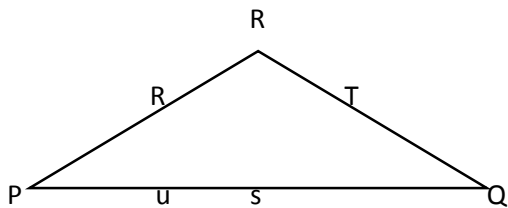


Find (i) lengths ON and OP,

(ii) The radius of the circle,

(iii) Area of OLMP.

14. In the figure below, vector, $\overrightarrow{PQ}=s$, $\overrightarrow{PR}= r$, $2\overrightarrow{QT} =3\overrightarrow{TR}$ and $\overrightarrow{PU}:\overrightarrow{UQ}= 2:3$



a) Find the terms of vectors r and s, vectors

(i) QR, (ii) QT, (iii) PT.

b) Show that UT is parallel to PR.

15. In a certain country, income tax is computed after deducting the following allowances:

TYPE OF ALLOWANCE	AMOUNT
Marriage	10,000
Single	4,000
Each child above 10 but below 20 years	3,000
Each child under 10years	2,000

Omoja is married with 3 children, two below 10years of age and the other child 12years old. Mbili is single but has two dependants aged 11 and 15years. Each month Omoja and Mbili earn gross incomes of sh. 130,000 and sh. 120,000 respectively. The income tax is calculated as follows:

Ush	% age tax
1 st : 01-10,000	20%
Next : 10,001-50,000	15%
Rest : 50,000 and above	10%

- (a) Calculate the (i) taxable income for Omoja and Mbili,
(ii) Income tax for Omoja and Mbili.
- (b) Express the total income tax for each man as percentage of their respective taxable incomes.
16. A helicopter flies from Moroto due South for 300km. it the flies on a bearing of 255° for 350km. From there it flies on a bearing of 020° for 400km.
- (i) Draw an accurate diagram showing the journey of the helicopter using a scale of 1 cm to represent 50km.
- (ii) From your diagram, find the distance and bearing of Moroto from the final position of the helicopter.
- (iii) Given that the helicopter flies at a steady speed of 200kmh^{-1} , find how long the whole journey took.
17. The diagram below shows a right pyramid with a rectangular base ABCD
 $\overline{AB}=16\text{cm}$, $\overline{BC}=12\text{cm}$ and each slant edge of length 26cm.

- Calculate the: (i) height of OV above the base,
(ii) Angle between line VB and the base,
(iii) Angle between the planes BCV and ABCD.

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- Simplify: $\frac{\left[\frac{3}{8} + \frac{1}{5}\right] \div \left[2\frac{2}{5} - 1\frac{5}{6}\right]}{1\frac{1}{68}}$
- If $A * B = 2(AB^2)^2$, find the value of
 - $-1 * 2$
 - $-3 * (-1 * 2)$
- Evaluate $\sqrt{0.0276}$ without using a calculator to two significant figures.
- The bearing of A from B is 038° and that of C from A is 100° . Find the bearing of B from A.
- Given that $t = \sqrt{\frac{a-b}{1+ab}}$
Make b the subject of the formula.
- The areas of two similar figures are 72cm^2 and 128cm^2 respectively. The height of the larger figure is 32cm. find the corresponding height of the smaller figure.
- If $Y = \begin{bmatrix} 5 & 0 \\ 1 & 6 \\ 2 & 7 \end{bmatrix}$ and $X = \begin{bmatrix} 1 & 8 & 2 \\ 3 & 4 & 2 \end{bmatrix}$
Find (i) det (XY)
(ii) Inverse of (XY)
- Express 0.2363636.....as a fraction in its simplest form.
- A man leaves Kampala at 1928 hours for Gulu which is 300km, travelling non-stop and arrives at 0728 hours. What was his average speed?
- A line S passes through the intersection of the lines $y=6$ and $X=9$, and is parallel to the line $4y=19-18x$. Find the equation of the line S.
- a) Solve each of the following for X
 - $\text{Log}_2 32 = x$
 - $\text{Log}_3 x = -4$

b) Solve, correct to one decimal place the equation $5-3x-x^2=0$

Hence find,

Correct to one decimal place the values of y for which,

$$(2y + 1)^2 + 3(2y + 1) - 5 = 0$$

12. Using a ruler, pencil and a pair of compasses only,
- Construct a triangle ABC such that $AB = 6\text{cm}$, $BC = 4\text{cm}$ and $\angle ABC = 120^\circ$.
 - Circumscribe a circle on the triangle ABC.
 - Using the Centre of the circumscribed circle as Centre for enlargement draw $A'B'C'$, the image of ABC with scale factor -2 .
 - Calculate the areas of the triangles ABC and $A'B'C'$ respectively.
13. Forty five candidates registered for an examination in physics (P), Chemistry (C) and Biology (B). 13 registered for B, 20 for C and 17 for P. if $n(B \cap P) = 9$, $n(P \cap B \cap C) = 3$, $n(C \cap P) = 8$ and $n(P \cap C \cap B) = 2$.
- Draw a Venn diagram to represent the following.
 - Find $n(P \cap C \cap B)$
 - How many students registered for only one subject?
 - Determine the probability that a student chosen at random registered for at least two subjects.
14. (a) A point $P(-2, -4)$ is rotated through 30° about the origin, then it is rotated through 75° about the origin, find the final image of P.
- (b) Find the image of the line $2y + 3x + 6 = 0$ when it is reflected in the line $x + y = 0$

15. Points A, B and C are on level ground with point D vertically above point B. $\angle ABC = 150^\circ$, $AB = 30\text{ms}$, $BC = 20\text{ms}$ and the angle of elevation of D from A is 60° . Find the;

- Height BD
- Angle of depression of C from D
- Length of AC
- A man walks from A towards C. He stops at point E where BE is perpendicular to AC, find the angle of elevation of D from E.

16. A farmer supplied a restaurant with 50kgs of vegetables in the first week of February as follows; 8kgs tomatoes, 30kgs Irish potatoes and 12kgs of carrots. He charged, shs 300/= per kg tomatoes shs. 250/= per kg of Irish potatoes and shs. 200/= per kg of carrots.

(a) Write down the prices of vegetables as a column matrix and the quantities as a row matrix, hence calculate the amount paid to the farmer in the first week.

(b) In the second, third and fourth weeks of the same month the farmer supplied the same restaurant with the following amounts of vegetables at the same prices (weights in kg in order, tomatoes Irish potatoes, carrots $a; (30, 60, 20); (10, 50, 24)$). How much did the restaurant have to pay the farmer for the three weeks?

(c) Using matrix method, calculate the total quantity of each kind of vegetables in February. Hence find the total cost of these vegetables.

17. L is the line $3x + 2y - 4 = 0$ and K is the line $2x - 3y - 7 = 0$

- (i) Find the coordinate of the point where L crosses the Y-axis.
- (ii) Find the slope of L
- (iii) Show that L is perpendicular to K.
- (iv) Find the coordinates of Q, the point of intersection of L and K.
- (v) Write down the equation of the line through Q, which is parallel to the X-axis.
- (vi) Calculate the area of the triangular region enclosed by L, K and Y-axis.