BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of Education

MATHEMATICS

PAPER 2

2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

o Attempt **ALL** questions in section **A** and not more than **FIVE** questions from section **B**.

o All necessary calculations **MUST** be shown on the same page as the rest of the answers.

o Mathematical tables and graph papers will be provided.

o Neat work is a **MUST**

o Silent, non-programmable scientific calculators may be used.

SECTION A (40 MARKS)

Attempt **All** questions in this section.

1.   Solve for y if; $27^{y+1} = 27^{y+1} = 3 \times 9^{2y} 9^{2y}$
(4marks)

2.   In a group of 40 students, 14 do not eat meat (M) while 22 do not eat beans (B), 10 eat both meat and beans.

(a)   Represent the information on a Venn diagram.
(b)   How many eat meat but not beans   (4marks)

3.   Without using logarithm tables or a calculator, evaluate   (4marks)
$$\left(2^{10}/_{27}\right)^{-2/3}$$

4.   Given that x = $3 + \sqrt{5}\,3 + \sqrt{5}$ and y = $3 - \sqrt{5}\,3 - \sqrt{5}$, write the expression $\frac{x\,x}{y\,y}$ in the form

a + b$\sqrt{c}\,\sqrt{c}$ and state the values of a, b and c.
(4marks)

5.   Given that A (-6, -18) and B (15, 10) are two points in a plane, determine the;

(a)   vector $\overrightarrow{AB}\,\overrightarrow{AB}$

(b)   modulus of $\overrightarrow{AB}\,\overrightarrow{AB}$ (4marks)

6.   Find the equation of a straight line passing through the point Q (-2, 1) and the parallel to the line joining the point A (8, 14) to the point B (3, -6)   (4marks)

7.   Mr. Kaleebu has a farm with an area of 60km² which is represented on a map by an area of 15cm². Determine the representative fraction of the map.   (4marks)

8.   Given that $g^{-1}(x) = \sqrt{x+9}\,g^{-1}(x) = \sqrt{x+9}$, determine;

(a)   the expression for g (x)
(b)   the values of x for which g(x) = 0   (4marks)

9. Simplify: $1 + 2^{log_{10}5} - log_{10}20 + 3log_{10}2 \ log_{10}5 - log_{10}20 + 3log_{10}2$.

(4marks)

10. A quantity P is directly proportional to Q and inversely proportional to T.
If P = 50, Q = 30 and T = 144, find the value of P when Q = 35 and T = 3 (4marks)

SECTION B (60 MARKS)

Attempt any *five* questions in this section.

11. The sports department of Buddo S. S has 80 students who play Football (F), Basketball (B) or Netball (N). It was found that 32 play F, 28 play B, 14 students play F and N, 12 play both B and N, 10 play both F and B. It was also found that 28 students play atleast two of the above games, while 14 students do not play any of the above games as they play volleyball only. X students play football, basketball and netball.

(a) Show the above information on a Venn diagram.
(b) Determine the number of students that play all the three games excluding volleyball.
(c) If a student is picked at random, what is the probability that he/she plays netball?

(12marks)

12(a) Use logarithm tables to evaluate: $\left(\dfrac{23.5 \ x \ 0.146}{8.3}\right)^{1/2} \left(\dfrac{23.5 \ x \ 0.146}{8.3}\right)^{1/2}$

(b) Given that $log_{10}x = 1.3917 \ log_{10}x = 1.3917$ and $log_{10}y = 0.4791,$

$log_{10}y = 0.4791,$ find the value of

$log_{10}x^3y^{1/2} \ log_{10}x^3y^{1/2}$

(12marks)

13(a) The price of Viola's house was valued at 45 million shillings. It increased by 25% after the first year but in the second year, the value of the house depreciated by 10%. Find the value of her house at the end of the second (2nd) year.

(b) The tax structure of WAKANDA is as follows:-

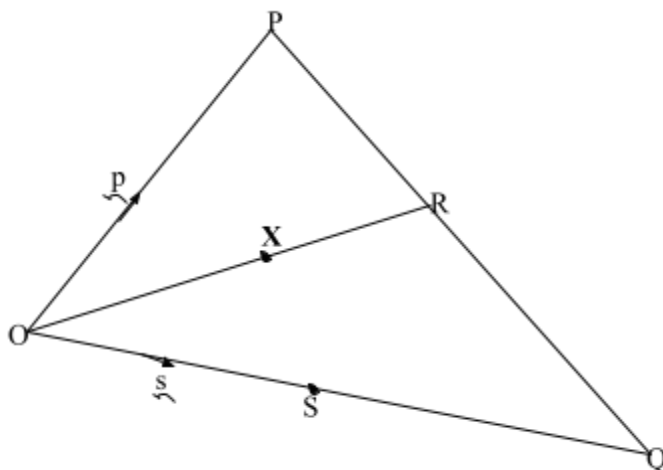| Taxable income (shs)	Tax rate (%)
1 – 150,000	Free
150,0001 – 400,000	5
400,001 – 700,000	8

| Above 700,000 | 12 |

If Kagoro has an allowance of shs. 50,000 which is exempted from tax, but pays a tax of shs. 58,100; calculate Kagoro's

(a)   gross income

(b)   net income   (12marks)

14

In the figure above, **R** and **S** are the mid-points of $\overrightarrow{PQ}$ and $\overrightarrow{OQ}$ respectively. $\overrightarrow{OX} : \overrightarrow{OR} = 2 : 3$ and $\overrightarrow{OP} = \underline{p}$ while $\overrightarrow{OS} = \underline{s}$

(a)   Find in terms of $\underline{p}$ and $\underline{s}$ the vectors;

     (i) $\overrightarrow{PQ}$

     (ii) $\overrightarrow{OR}$

     (iii) $\overrightarrow{XQ}$

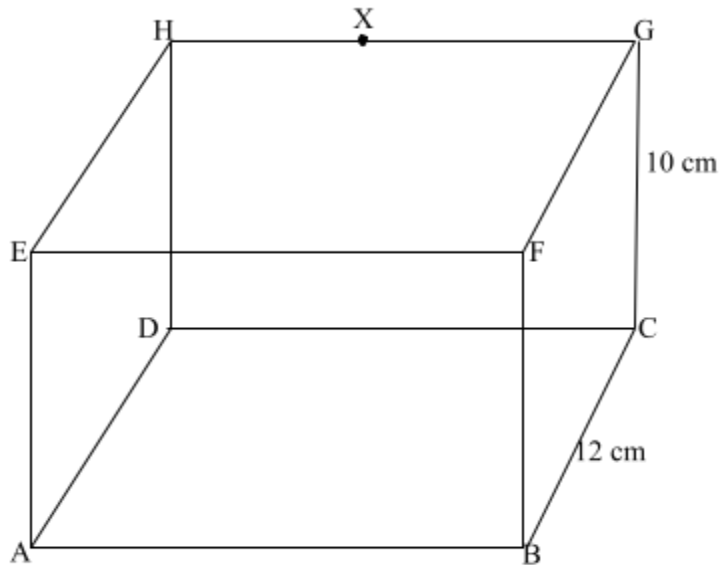   (iv) $\overrightarrow{PS}$

(b)   Show that P, X and S are collinear.   (12marks)

15.   Given the function $f(x) = 2x - 3$ and $g(x) = x^2 - 3x$; find;

Find; (a)   the inverse function, $f^{-1}(x)$ and hence $f^{-1}(-2)$

(b)   the expressions for; (i) $fg(x)$

(ii) $gf(x)$

(c)   the values of x for which $gf(x) - 11 = fg(x)$.   (12marks)

16.   The figure below shows a cuboid ABCDEFGH in which $\overline{BC}\,\overline{BC}$ = 12cm, $\overline{GC}\,\overline{GC}$ = 10cm. X is a midpoint of $\overline{HG}\,\overline{HG}$ and the volume of the cuboid is 1920cm³.

(a)   Determine the length of the lines;

(i) $\overline{AB}\,\overline{AB}$

(ii) $\overline{AG}\,\overline{AG}$

(b)   Find the angle between;
          (i)   line AG and the base ABCD
          (ii)   plane AXB and the base ABCD   (12marks)

17.   Kampala (K) and Arua (A) are about 450km apart. At 7:30 a.m, a bus starts from Arua and moves towards Kampala (K) at a steady speed of 100km/hr while a lorry starts from Kampala (K) an hour later moving at an average speed of 60km/hr to Arua (A).
At 10.00 a.m, the bus is stopped at town C by police and ordered to reduce speed. After 30 minutes at C, it resumes its journey at a reduced average speed of 50km/hr until it reaches Kampala (K).

(a)   Draw on the same axes, the distance – time graphs showing the journeys of the bus and the lorry.

(b)   State the time when the two vehicles arrive at their destinations.

(c)   Determine when and at what distance from Arua the two vehicles meet.

(d)   Find the average speed of the bus.   (12marks)

END