456/2
Mathematics
Paper 2
July/August 2022
2hours 30 minutes

BUGANDA EXAMINATIONS COUNCIL MOCKS

Uganda Certificate of Education

MATHEMATICS

PAPER 2

2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

- Attempt **ALL** questions in section **A** and not more than **FIVE** questions from section **B**.
- All necessary calculations **MUST** be shown on the same page as the rest of the answers.
- Mathematical tables and graph papers will be provided.
- Neat work is a MUST.
- Silent, non-programmable scientific calculators may be used.

SECTION A (40 MARKS)

1. Solve for y if $16^{y+1} = 2 \times 8^{2y}$ (04 marks)
2. F and G are two sets such that n(Ɛ) =38 , n(F' ∩ G') =9 , n(F) =9 and n(G) =17. Find:
   (i) n(F ∩ G) (ii) n (G') (04marks)
3. Without using tables or a calculator, evaluate:
   $\log_2 8 + \log_3 27 - \log_5 25$ (04 marks)
4. A car is valued at shs. 26,000,000. It is estimated that the vehicle loses value at a rate of 8% per annum. Find the value of the car after three years. (04 marks)
5. Given that P (-16, -36) and Q (5, -8) are two points on a plane, determine the modulus of the vector $\overrightarrow{PQ}$ (04marks)
6. Given that $\frac{3+\sqrt{2}}{1-\sqrt{2}} = p - q\sqrt{2}$, find the values of p and q. (04marks)
7. Mr. Kaleebu has a farm with an area of 729 km^2 and it is represented on a map by an area of 9 cm^2. Find the scale of the map. (04 marks)
8. If g(x) = $\frac{3x}{2x+1}$, find $g^{-1}(x)$ and hence evaluate $g^{-1}(2)$ (04 marks)
9. A line whose equation is 2x + 3y = 6 passes through the point (0, k). Find the: (i) Gradient of the line.
   (ii) Value of k (04 marks)
10. Given that p varies inversely as the square of q and that p = 9 when q = 4, find the values of p when q = 8. (04marks)

SECTION B (60 MARKS)

11 There are 96 students in S4. Of these, 55 play Football (F), 36 play Rugby(R) and 43 play volleyball (V). 20 students play football only, 8 students play rugby only and 19 students play volleyball only. 12 play Football and volleyball but not rugby while 9 students do not play any of the games.

(a) Represent the above information on a Venn diagram.

(b) Find the number of students who play all the three games.

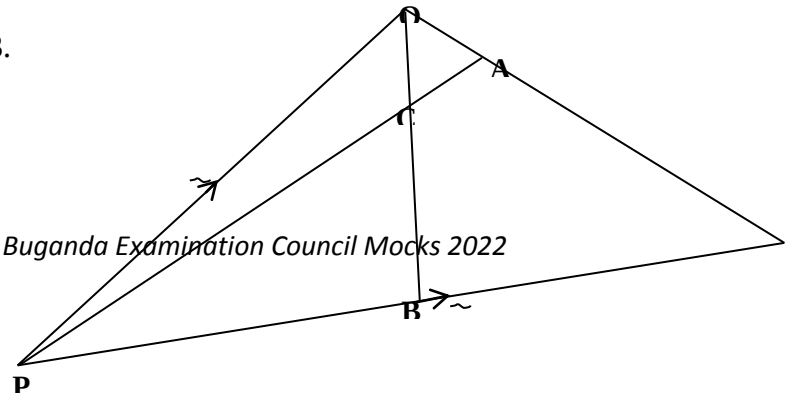
(c) If a student is selected at random from the class, find the probability that the student plays at most one game. (12 marks)

12. (a) Use logarithm tables to evaluate ; $\frac{28.4 \times 0.438}{0.0042}$.

(b) Simplify without using a calculator ; $\frac{2}{3}\log_2 64 + \log_2 32 - \log_2 128$

(c) Prime factorise 600 and hence find the value of $\log_{10} 600$ given that $\log_{10} 5 = 0.6990$, $\log_{10} 3 = 0.4771$ and $\log_{10} 2 = 0.3010$. (12marks)

13.



In the figure above, PQR is a triangle. Given that $\overrightarrow{PQ} = \underline{m}$, $\overrightarrow{PR} = \underline{n}$, 5 $\overrightarrow{QA} = \overrightarrow{QR}$ and B is the mid-point of $\overrightarrow{PR}$

If $\overrightarrow{PC}$ = h $\overrightarrow{PA}$ and $\overrightarrow{QC}$ = k$\overrightarrow{QB}$

(a) Express:

(a) $\overrightarrow{PC}$ in terms of $\underline{m}$ and h

(b) $\overrightarrow{PC}$ in terms of $\underline{n}$ and k (12 marks)

(b) Determine the values of h and k. (12 marks)

14. The table below shows the tax structure on the taxable income of Mr. Kaleebu an employee of SMASK.

Income shs. Per month	Tax rate (%)
0 – 50000	4
50,001 – 150,000	10
150,001 – 350,000	18
350,001 – 650,000	35
Above 650,000	55

Mr. Kaleebu earns a gross salary of shs. 995,000 per month and his allowances include the following:

Housing allowance shs. 960,000 per annum

Water and electricity shs. 300,000 per annum
Insurance shs. 15,000 per month
Medical shs. 30,000 per month
Transport shs. 60,000 per month
Marriage shs. 10,000 per month
Children allowance for up to only 3 children

Age bracket(years)	Amount(shs)
0 - 9	25,000 per month
10 - 17	15,000 per month
18 and above	5,000 per month

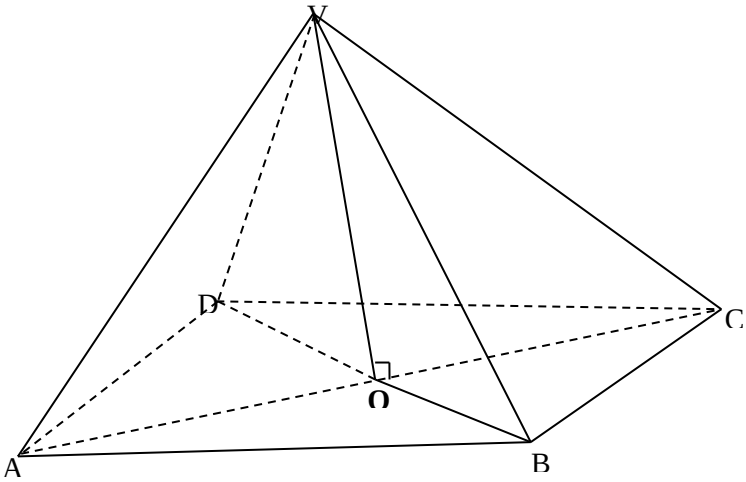
Given that Mr. Kaleebu is a married man with 4 children who are aged 3, 7, 14 and 19 years, calculate:

(a) Mr. Kaleebu's taxable income.

(b) The income tax Mr. Kaleebu pays

(c) The percentage of Mr. Kaleebu's gross salary which is paid as tax, correct your answer to one decimal place. (12 marks)

15. VABCD is a right pyramid with a rectangular base where AB = 64 cm, BC = 48 cm and the slant length VA = VB = VC = VD = 50 cm as shown below.



Calculate;

(a) The height OV of the pyramid
(b) The volume of the pyramid.
(c) The angle between the line VA and the base ABCD.
(d) The angle between the plane VBC and the base ABCD. (12 marks)

16.(a) The fare (F) for a person in a bus going to Kampala from Jinja is partly constant and partly varies as the square root of the number of passengers (n) in the taxi. If the fare of shs, 12,300 is paid when there are 100 passengers and shs 14,700 when there are 144 passengers, find how much is paid when the bus takes 81 passengers?

(b) Given that f(x) = 3x + 5 and g (x) = $\frac{2}{x-5}$

Find; (i) gf (x)
(ii) gf(½) (12 marks)

17. Town **A** and **B** are 300 km apart. At 9:30 am, Kagoro was 60 km away from **A** moving towards **B** on a motor bike when Elijah set off from **A** on a boxer motor bike moving at a non-stop speed of 50km/hr towards **B**. At 2:42 pm Elijah overtook Kagoro and they both continued with their journeys. Calculate;

(a) The distance from **A** when Elijah overtook Kagoro.
(b) Kagoro's average speed given to three significant figures.
(c) The time Kagoro and Elijah reached their destination.
(d) The difference in the time of arrival of the two people. (12 marks)

END