MITYANA SESEMAT REGION
UCE MATHEMATICS SEMINAR 2022
QUESTIONS

SECTION A (40 MARKS)

Answer all questions in this section

1. Given that $x: y = 7: 4\ and\ y: z = 5: 6$, find the ratio $x: y: z$. (04 mark)

2. Given that $h^{-1}(x) = 7x - 3$, find $h(-24)$. (04 marks)

3. It would take 15 men 8 days to dig a trench 240m long. Find how many days it would take 18 men to dig a trench 360m long working at the same rate? (04 marks)

4. Solve for m if $\log_6 m + \log_6(m + 5) = 2$ (04 marks)

5. Show that the points $A(1,5), B(2,8)$ and $C(-1,-1)$ are collinear. (04 marks)

6. Given that the points $P(n, 2)\ and\ Q(-3, m)$ lie on the line $2y = 7x - 3$, find the values of n and m. (04 marks)

7. Evaluate $\left(\frac{81}{16}\right)^{\frac{1}{4}} + \left(\frac{8}{27}\right)^{\frac{-1}{3}}$ (04 marks)

8. Given that $n(\varepsilon) = 100, n(A) = 55, n(B) = 43\ and\ n(AnB^1) = 30$, with the help of a venn diagram, find
   i) $n(AuB)$
   ii) $n(A'nB')$ (04 marks)

9. A skirt costs sh. 12.000 in Uganda shillings. Given that the exchange rate is 1$ =U.sh.1250 and 1$=K.sh 35, find the cost of the skirt in Kenya shilling. (04 marks)

10. A map is drawn to a scale of 1:50,000. Find the area in cm^2 on a map of a field with actual area of $6000m^2$. (04 marks)

SECTION B (60 MARKS)

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

11. a) Given the set $M = \{-3,0,7\}$, represent set M on a papygram to show the relation "Is smaller than" (03 marks)

    b) For the mapping $x \rightarrow 3x + 2$, find the domain for the range $\{-4, 14\}$ (04 marks)

c) Given that $h(x) = 3x + 4$ *and* $hg(x) = x + 7, find\ g(x)$, hence evaluate $g(-9)$ (05 marks)

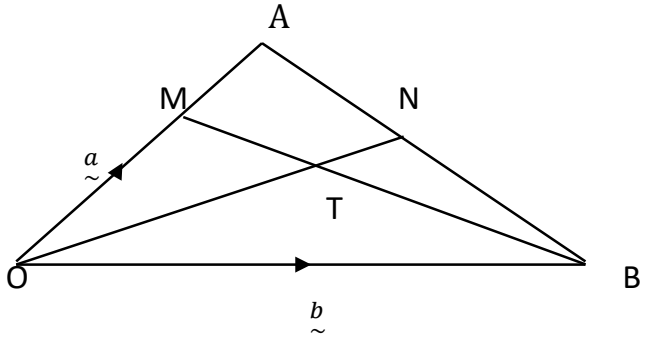
12.a) Use a mathematical table to evaluate $\sqrt[3]{\frac{0.0095 \times 0.008965}{0.03458}}$ (06 marks)

b) b) Two buckets are similar. The smaller bucket has a surface area of 1200cm^2 while the larger bucket has a surface area of 2700cm^2. If the smaller bucket has a volume of 1800cm^3, find the volume of the larger bucket. (06 marks)

13. Busega and Mubende are 120km apart. A cyclist starts from Busega to Mubende at 0800 hours at a steady speed of 25kmh^{-1}. At 0900hours a motorist sets off from the same town at a steady speed of 60kmh^{-1} to Mubende, but after 1 hour, the motorist stops for breakfast for 1 hour and thereafter continues his journey at the same speed.
    a) Using a scale of 2cm: 1hr on the horizontal axis and 2cm:10km on vertical axis, draw the journeys of the two on a distance-time graph. (06 marks)

    b) From your graph find
        i) When and where the motorist overtakes the cyclist. (02 marks)
        ii) When and where the cyclist overtakes the motorist. (02 marks)
        iii) Difference between their times of arrival. (02 marks)

14.



In the figure above, $OA = \underset{\sim}{a}, OB = \underset{\sim}{b}$. Points M and N are on OA and AB respectively such that $OM = \frac{3}{4}\ \underset{\sim}{OA}$ and $AN = \frac{2}{3}AB$. Lines ON and BM meet at T such that OT $= \frac{9}{10}\ \underset{\sim}{ON}$

a) Find in terms of $\underset{\sim}{a}$ *and* $\underset{\sim}{b}$ *the vectors*.
    i) AB ii) BM iii) ON (08 marks)

b) Given that BT=nBM, where n is a scalar, find the value of n, hence express TM in terms of $\underset{\sim}{a}$ *and* $\underset{\sim}{b}$. (04 marks)

15. In a class of S.3 students, 40 take Mathematics (M) 36 take Chemistry (c) and 37 take Physics (P). 17 take M and C, 18 take M and P and 12 take P only. Those taking C only are two more than those taking all the three subjects and 9 take none of the three subjects.
    a) Represent the above data on a venn diagram. (08 marks)

    b) Find the
        i) Number of students who do not study Mathematics. (01 mark)
        ii) Number of students who study Physics or Mathematics but not Chemistry. (01 mark)
        iii) Probability that a student picked at random takes Mathematics or Chemistry only. (02 marks)

16.a) The income tax rates of a certain industry in Uganda are shown in the table below.

Taxable income (shs)	Rate (%)
1-80,000	5.0
80,001-190,000	10.0
190,001-280,000	15.0
280,001-450,000	20.0
Above 450,000	25.0

Calculate the income tax an employee pays if his taxable income is

i) sh. 230,000= (02marks)

ii) shs. 560,000= (03marks)

b) John has a gross income of sh. 496,000 and a tax free allowance of sh. 126,000. Given that the income tax structure is such that the first sh. 80,000 of taxable income is charged at 40% the next 140,000 is charged at 25% while the rest of the income is charged at 10%, calculate John's net income. (04 marks)

c) In a certain industry which gives a family allowance for three children only is such that sh. 8000 is for a child below 9 years, shs 13,000 is for a child between 9 and 17 years inclusive while shs. 15,000 is given to a child between 18 and 22 years inclusive. Calculate the family allowance for an employee with children aged 2, 5, 7, 13, 16, 19 and 21. (02marks)

17. a) The cost (c) of hiring a bus is partly constant and partly varies as the square of the distance (d) it will travel. If the cost is sh 12.000 when distance is 10km and the cost c is sh.18,000, when distance d is 20km, find

i) The equating relating c and d. (4 marks)

ii) Cost of hiring a bus when d=8km. (2 marks)

b) A quantity P partly varies as the square of q and also partly varies inversely as the cube of q. Write down the equation for this information. (1mk)

c) Given that P varies inversely as the square of r and the difference between its values for r=2 and r=4 is $^{15}/_{16}$. Find the values of r for P=180. (5mks)

End