Mid Term One Examinations
S.3 Mathematics

Time: 2 ½ hours

Instructions

- *Answer **all** questions in section A and any **five** questions from section B*
- *Show all your workings clearly*
- *Neat and organized work is a must*

SECTION A (40 MARKS)

Answer all questions in this section

1. In a class of 120 students, 76 study chemistry, 25 study physics only while 60 study both chemistry and physics. Using a Venn diagram, find the number of students who study neither of the subjects. (04 marks)
2. Solve thy equations $\frac{4x+2}{3} = 3 - \frac{2x+1}{5}$ (04 marks)
3. A man 2 m tall observes the top of the flag pole at an angle of elevation of 23^0. If he is 15m away from the pole find the height of the flag pole. (04 marks)
4. The determinant of matrix T=$\begin{pmatrix} y & 7y \\ -1 & y \end{pmatrix}$ is -2, find the two possible values of y. (04 marks)
5. Convert 167_{eight} to base four. (04 marks)
6. Obote has sh 10,000. He spends half of it to buy a shirt and sh 1500 on a bottle of soda. What fraction of his money does he spend? (04 marks)
7. Without using tables or calculators evaluate $4\log_{10} 2 - \log_{10} 48 + \log_{10} 300$ (04 marks)
8. Express 2304 as a product of its prime factors hence find the square root of 2304. (04 marks)
9. The sum of two numbers is 190 and their difference is 12. Find the two numbers. (04 marks)
10. Simplify $\frac{4\sqrt{60}}{\sqrt{6}} - \frac{5\sqrt{30}}{\sqrt{3}} + \frac{2\sqrt{50}}{\sqrt{5}}$ (04 marks)

SECTION B (60 marks)

Answer any five questions from this section

11. (a). Given matrix T=$\begin{pmatrix} 6 & 3 \\ 6 & 4 \end{pmatrix}$ find matrix A such that TA = $\begin{pmatrix} 6 & 0 \\ 0 & 6 \end{pmatrix}$ (06 marks)

    (b). If $\begin{pmatrix} 4 & 1 \\ x & -1 \end{pmatrix}\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$ find the values of x and y (06 marks)
12. (a). Solve the equation $4^{2x}\ x\ 16^{x+1} = 8^x$ (04 marks)

    (b). Given that $\tan\alpha = \frac{15}{8}$ and $0^0 \leq \alpha \leq 360^0$ find the values of $3cos\alpha - sin\alpha$ (08 marks)

13. (a). John paid sh 7,000 for 4 exercise books and 2 pens if he had bought 3 exercise books an a pen he would spend sh 5,000. Find the cost of an exercise book and a pen. (06 marks)

(b). The equation ax+by=4 is satisfied by the values of x=3 and y=1 and also by the values x=-2 and y=-2 find the values of a and b hence find the value of y when x=8. (06 marks)

14. Three points A, B and C are on a level ground A vertical B is 13m away from M the base of the pole. The angles of elevation of K from A and B are 68^0 and 40^0 respectively. If angle ABC=25^0 and BC= 15cm. calculate the

(a). height of the flag pole MK (04 marks)

(b). length AB (03 marks)

(c). Angle of elevation of K from C. (05 marks)

15. The table below shows the marks scored by 90 students in a test marked out of 50 marks

Marks	Frequency
15-19	1
20-24	13
25-29	29
30-34	25
35-39	19
40-44	3

Use the given data above to calculate

(a). mean mark using an assumed mean of 32. (07 marks)

(b). Modal mark (02 marks)

(c). Median mark (02 marks)

16. Plot the graph of y=2x2+3x-3 and y=7x-3 for $-3 \leq x \leq 3$ using a scale of 2cm:5units for the vertical axis and 1cm: 0.5units for horizontal axis using your graph. (09 marks)

(a). Find the points of intersection of the line and the curve. (01 mark)

(b). to solve the equation $2x^2+3x-^3=0$ (02 marks)

17. (a). the surface areas of two cylinders are $16cm^2$ and $9cm^2$. If the volume of the large cylinder is $192cm^3$, determine the volume of the smaller cylinder.

(b). Use matrix methods to solve the simultaneous equations

x+y=3

3x-2y=-1 (04 marks)

(c). Find the inverse of matrix N=$\begin{pmatrix} 1 & -1 \\ 2 & 0 \end{pmatrix}$ (04 marks)

END