

456/2

Mathematics

2 hours and 30 Minutes

GOD'S SHEPHERD SECONDARY SCHOOL

UGANDA CERTIFICATE OF EDUCATION

S.4 MATHEMATICS

June 2023

Paper 2

Duration: 2 Hours 30 Minutes

Instructions to Candidates;

- Attempt **All** questions in section **A** and any ***five*** from section **B**.
- Any addition questions answered will not be marked.
- Only silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.
- Graph paper is provided.

.....Suffer today, enjoy tomorrow.....

SECTION A (40 marks)

Attempt all questions in this section

1. Three students, Sarah, Jane and Ismail shared money in the ratio 4: 6:9 respectively. Ismail received shs. 24300. How much money did they share?
2. Two sets A and B in a universal are ε are such that $n(\varepsilon) = 21$, $n(A) = 14$ and $n(B) = 14$ and $n(A \cup B) = 16$ Find:
 - i) $n(A \cap B)$
 - ii) $n(A \setminus B)$ (04 marks)
3. Without using tables or calculator, evaluate $\frac{27^{\frac{1}{3}} \times 16^{\frac{3}{4}}}{9^{\frac{1}{2}}}$ (04 marks)
4. Convert the recurring decimal 1.0272727... to a fraction in its simplest form.
5. A forest on a map of scale 1: 250,000 is of area 3.2cm². Determine the actual area of the forest in km² (04 marks)
6. a) Draw the graphs of the lines $y = 1$ and $x + y = 6$ on the same axes.
b) Use your graph to state the co-ordinates of the point of intersection of the two lines (04 marks)
7. Given that $\mathbf{a} = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 4 \\ 9 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 14 \\ 36 \end{pmatrix}$ Find the value of k if $k\mathbf{a} + 2\mathbf{b} = \mathbf{c}$
8. The function $(x) = ax^2 + 4x$. If $(-1) = 3$ Find
 - (i) The value of a .
 - (ii) The values of x for which $g(x) = 0$ (04 marks)
9. Two similar beakers hold 125cm³ and 1 litre respectively. If the smaller beaker is 12.5cm high, find the height of the larger one. (04 marks)
10. Find the volume of a cone whose height makes an angle of 30° with the slant edge and having a radius of 8cm (04 marks)

SECTION B (60 Marks)

Attempt any **five** questions from this section

11. Solve for x and y in the equations $8^x = 4^{2y+1}$ and $27^{2x} = 9^{y-3}$ (12 marks)

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12. In a class of 40 students, 18 offer Luganda (L) 15 offer Art (A) and 22 offer CRE (C), 7 offer Luganda and Art, 9 offer Art and CRE, 8 offer Luganda and CRE, 4 offer all the three subjects.

- a) Represent the given information on a Venn diagram.
- b) Find the number of students who do not offer any of the three subjects.
- c) Find the probability that a student chosen at random only offers:

i) Only one subject

ii) At least two subjects (12 marks)

13. a) Given that $f(x) = 27(x - b^2)$ and $f(4) = 0$ find :

i) The possible value(s) of b .

ii) (-8)

b) If $f^{-1}(x) = px^2 + q$, $g^{-1}(3) = 11$ and $g^{-1}(2) = 16$, determine:

i) The values of p and q
(12 marks)

ii) $g(x)$.

14. The daily cost per child in Kampala family is partly constant and partly inversely proportional to the number of children in the family. Given that for a family of 10 children, the cost is shs. 350 and for the cost is shs. 300.

a) Find the cost per child for a family of

(i) 50 children

(ii) 30 children

b) Find the number of children when the cost per child is shs.250 (12 marks)

15. A dealer sells motor cycles on cash terms and hire purchase terms. A motor cycle can be bought on hire purchase terms by making a deposit of shs. 1,000,000 and then paying 10 equal instalments of shs. 300,000 each . The hire purchase price is 25% higher than the cash price.

a) Calculate the cash price. (04 marks)

b) The dealer bought motor cycles. The cost price of a motor cycle was shs. 3,000,000. The dealer then sold 18 motor cycles on cash terms and 30 motor

cycles on hire purchase terms. Calculate the percentage profit made by the dealer on the sales of the motor cycles. (08 marks)

16. a) Given the vector $\mathbf{a} = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 8 \\ 11 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 4 \\ -5 \end{pmatrix}$, Find:

i) $\mathbf{a} + 2\mathbf{b} + \mathbf{c}$

ii) The length of $\mathbf{a} + 2\mathbf{b} + \mathbf{c}$ (06 marks)

b) The position vectors of \mathbf{p} and \mathbf{Q} are $\begin{pmatrix} 6 \\ 4 \end{pmatrix}$ and $\begin{pmatrix} 12 \\ -11 \end{pmatrix}$ respectively. \mathbf{M} is the point on \mathbf{PQ} such that $\mathbf{PM} : \mathbf{MQ} = 2 : 3$. Find the position vector of \mathbf{M} (06 marks)

17. A cyclist starts at **8:00am** and moves at a steady speed of **25km/h** to cover a distance of **105 km**. At **9:00am**, a motorist at takes off from the same place travelling at **50km/h** to reach the same destination. After **1** hour, the motorist stops for a rest for half an hour and then continues with his journey at the same speed.

a) Using a scale of $4\text{cm} : 1\text{hr}$ and $1\text{cm} : 5\text{km}$, draw the graphs to represent the two journeys.

b) Use your graph to find:

i) When and where the motorist first catches up with the cyclist.

ii) When and where the motorist over takes the cyclist

iii) How far apart the two men at **10:30am**. (12 marks)

~END~

Good-Luck

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