456/2
MATHEMATICS
Paper 2

2½ hrs

STANDARD HIGH SCHOOL ZZANA

Uganda Certificate of Education

MATHEMATICS

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **all** *questions in section* **A** *and any* **five** *questions from section* **B**.

Any additional *question(s) answered will* **not** *be marked.*

All *necessary calculations* **must** *be shown clearly with the rest of the answer. Therefore,* **no** *paper should be given for rough work.*

Graph paper is provided.

Silent non – programmable scientific calculators and Mathematical tables with a list of formulae may be used.

Turn Over

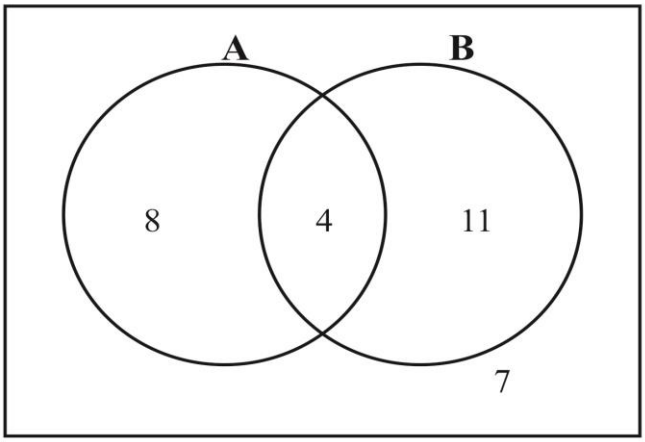
SECTION A: (40 marks)

Answer **all** *questions in this section.*

1. Express $0.8\dot{3}$ as a simplified fraction. (04 marks)

2. A function $f(x)$ varies inversely as the square of 2^x, $f(2) = 20$. Find $f\left(-\frac{1}{2}\right)$. (04 marks)

3. The Venn diagram below represents students who visited Angola (**A**) or Burundi (**B**).



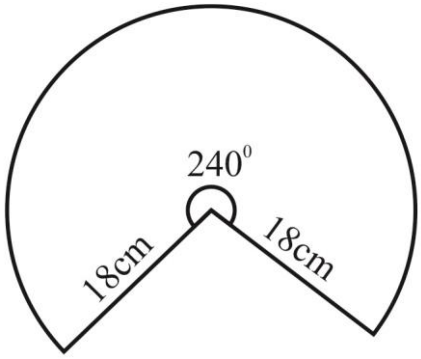
Find;

(a) $n(A'UB')$

(b) $n(AUB')$. (04 marks)

4. A line with gradient of $\frac{-5}{7}$, passing through a point $(21, -5)$, cuts the y – axis at A. Determine the coordinates of A. (04 marks)

5. A sector with radius $18cm$ subtending 240^o at the centre was folded to form a cone.



Find the radius and height of the cone formed. (04 marks)

6. A television can be bought by paying cash of shs. 400,000 or by depositing 70% of the cash value and pay five monthly installments of shs. 50,000 each. Determine the amount;

(a) Used to buy the television under installment method.

(b) Saved by paying cash than installment method.

(04 marks)

7. Given that the points $(-2, a)$ and $(b, -1)$ lies on the line $y = 3 - 2x$; find the values of a and b. (04 marks)

8. The capacity of a hemisphere is 54 litres. Find the capacity in litres of a hemisphere whose radius is a third that of the given hemisphere. (04 marks)

9. Express $\frac{\sqrt{3}}{2-\sqrt{3}}$ in a form $p + q\sqrt{r}$ and hence evaluate $\frac{\sqrt{3}}{2-\sqrt{3}}$ correct to three significant figures if $\sqrt{3} = 1.732$. (04 marks)

10. Three vectors $\boldsymbol{a} = \begin{pmatrix} 2 \\ 1 \end{pmatrix}$, $\boldsymbol{b} = \begin{pmatrix} -7 \\ 4 \end{pmatrix}$ and $\boldsymbol{c} = \begin{pmatrix} -1 \\ -1 \end{pmatrix}$. Find

(i) $\boldsymbol{a} - 2\boldsymbol{b} + \boldsymbol{c}$

(ii) length of $\boldsymbol{a} - 2\boldsymbol{b} + \boldsymbol{c}$

(04 marks)

SECTION B: (60 marks)

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

11. (a) Express $Log_3 35^2 + Log_3 5^{-1} - 2log_3 7 - 2$, as a single logarithm $log_3 B$ and hence evaluate $log_3 16.2B$. (06 marks)

(b) Use mathematical tables of logarithm to evaluate $\frac{0.0651}{\sqrt[3]{0.213} \times 68.2}$. (06 marks)

Turn Over

12. Two cars P and Q started off from rest at the same time moving in the same direction on a straight road. The speeds of the two cars in ms^{-1} are shown in the table below after time in seconds.

Time (s)	0	4	8	12	16	20	24
Speed of $P(ms^{-1})$	0	4.00	8.25	12.50	16.50	20.75	24.75
Speed of $Q(ms^{-1})$	0	2.50	6.50	11.00	17.75	22.75	26.50

(a) Using a scale of $2cm$ representing 4 seconds, and 4cm representing $5ms^{-1}$, draw on the same axes the velocity time graphs for the two cars P and Q.
(06 marks)

(b) Find from your graph the

(i) time when the two cars have equal speed and the magnitude of this speed. (02 marks)

(ii) difference in their speeds after 18 seconds. (04 marks)

(c) Estimate the total distance covered by car P after 24 seconds. (02 marks)

13. A group of students in senior five was interviewed to find out those taking Economics (E), Sub mathematics (S) or Geography (G).
It was found out that 32 students took Economics, 13 took Sub mathematics while 28 took Geography. 12 students took only Economics. 12 students took Economics and Geography. All students taking Sub mathematics also took Economics. The number of students not taking any of the three subjects was seven less than twice those taking all the three subjects.

(a) Represent the above information on a Venn diagram. (04 marks)

(b) Determine the number of students;

(i) taking all the three subjects,

(ii) who did not take any of the three subjects,

(iii) who were interviewed.

(06 marks)

(c) If a student is picked at random from this group, find the probability that he / she takes Economics but not Sub mathematics. (02 marks)

14. (a) Given that $Q = \{2, 3, 5, 15, 20\}$, illustrate on papygrams the relations;

(i) "more than by a prime number",

(ii) "multiple of"

(06 marks)

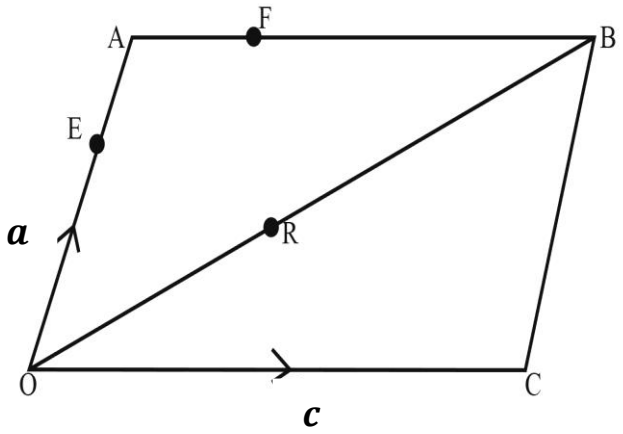
(b) If $g^{-1}(x) = 3 - \frac{2}{x}$;

Find;

(i) $g(-2)$,

(ii) the value of x when $g(x)$ is undefined. (06 marks)

15. The diagram below represents a parallelogram $OABC$ with $\boldsymbol{OA} = \boldsymbol{a}$, $\boldsymbol{OC} = \boldsymbol{c}$, E is mid point of OA.



If $OR: RB = 1:2$ and $5AF = FB$

(a) Express in terms of $\boldsymbol{a}$ and $\boldsymbol{c}$ the vectors;

(i) $\boldsymbol{FC}$,

(ii) $\boldsymbol{FR}$. (04 marks)

(b) Show that the points E, R and C lie on a straight line and hence find the ratio $ER: RC$. (08 marks)

Turn Over

16. An employee earns a gross monthly salary of shs 3 millions which includes the following tax free allowances;

Medical shs 50,000

Transport shs 720,000 per annum

Family and insurance shs 180,000

The rest of the employee's income is taxed as follows:

6.5% on the first shs 1,900,000

11.2% on the next shs 600,000

16% on the next shs 400,000

19.5% on the remainder

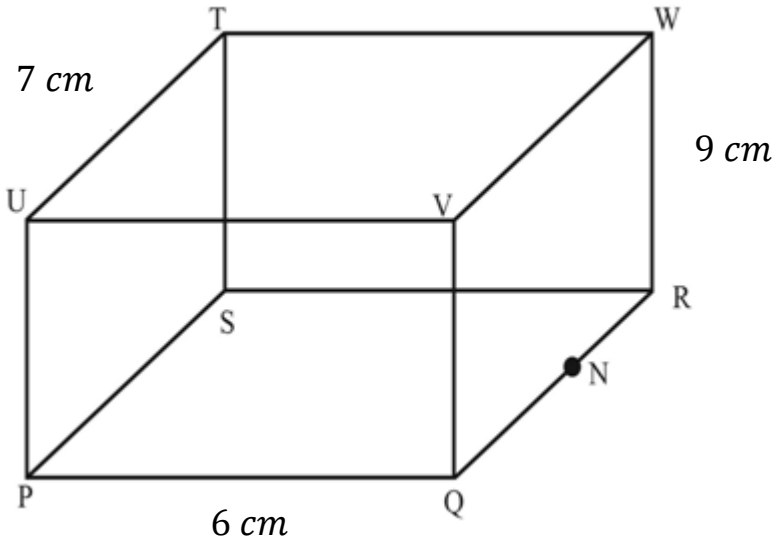
Find the employee's monthly;

(a) taxable income. (04 marks)

(b) income tax (06 marks)

(c) net income. (02 marks)

17. The figure below shows a cuboid $PQRSTUVW$ in which $PQ = 6\ cm$, $UT = 7cm$ and $RW = 9\ cm$. N is the mid point of QR.



Find the;

(a) length SV (04 marks)

(b) angle between;

(i) line SV and the base

(ii) planes UTN and $UTWV$. (08 marks)

END