

ST. MARYS' KITENDE
UGANDA CERTIFICATE OF EDUCATION
RESOURCEFUL MOCK EXAMINATIONS 2020
MATHEMATICS
Paper 2
2 hours 30 minutes

Instructions

- ***Answer all questions in Section A and any five questions from Section B.***
- ***Any additional question(s) will not be marked.***
- ***All necessary calculations must be shown clearly.***
- ***Non- programmable calculators may be used.***

SECTION A : (40MARKS)
Attempt all questions in this Section.

1. Simplify; $\frac{4}{7} + \frac{1}{3}$ of $\frac{9}{14} \div 3\frac{1}{7}$. (4marks)
2. Determine the range corresponding to the domain $\left\{-\frac{1}{2}, 0, \frac{1}{2}, 1\right\}$ for the mapping $x \rightarrow 4x + 1$. (3marks)
3. Find the equation of a line that passes through the point $(-2, 4)$ and is parallel to the line $y - 2x = 6$. State the y-intercept of the new line. (5marks)
4. P and Q are two points with position vectors $\overrightarrow{OP} = \begin{pmatrix} 5 \\ 3 \end{pmatrix}$ and $\overrightarrow{OQ} = \begin{pmatrix} -2 \\ 5 \end{pmatrix}$ respectively. Find;
i) $\overrightarrow{QP}$ ii) the angle $\overrightarrow{QP}$ makes with the x-axis. (4marks)
5. Given that $A = \{\text{Triangular numbers less than 25}\}$
 $B = \{\text{Prime numbers less than 20}\}$
Find $n(A \cap B)$. (4marks)

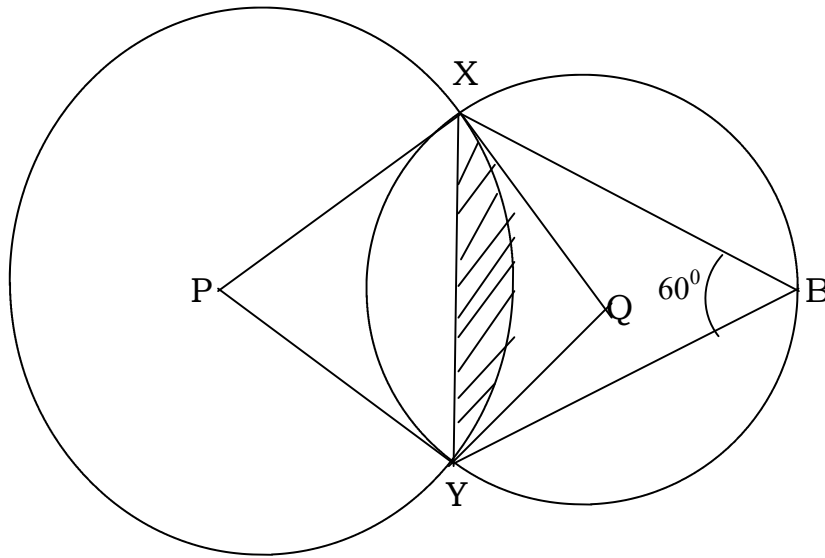
6. Muzee sold a bicycle at shs.150,000, making a loss of 25%. Find the cost price of the bicycle? (3marks)
7. On a map, a swamp of area 75km^2 is represented by 12cm^2 , find the representative fraction of the map. (4marks)
8. A certain amount of money was shared between Joseph(J), Peter(P) and Zaida(Z) in the ratio 2:3:6 respectively. If Zaida got shs 28,000 more than Joseph how much did Peter get? (5marks)
9. A car covered 60km at a speed of 30kmh^{-1} , and then the next 150km were covered in $1\frac{1}{2}$ hours. What was the average speed for the whole journey? (5marks)
10. The angle of elevation of the top of a building 42m tall from a point A, due East of the building is 30° . Find the distance of point A from the building. (3marks)

SECTION B: (60MARKS)

*Answer any **five** questions from this Section.*

11. a) Given that $P(x) = 3x - 5$, find $p^{-1}(10)$. (5marks)
- b) The functions $h(x) = x + 4$, $g(x) = x^2$ and $f(x) = -2x$. Find the value(s) of x for which $gh(x) = f(x)$. (7marks)
12. Maya SS has 1020 students. According to the school rules and regulations, students should bathe every day(B), wash their clothes every week(W) and iron their clothes(C). During a certain month it was found out that out of 102 senior four students, 41 obeyed B, 35 obeyed W and 52 obeyed C. 9 students obeyed B and W, 10 students obeyed C and W and 24 students obeyed B and C. If 17 students obeyed neither rules,
- a) Represent this information on a Venn diagram.
- b) From the venn diagram, find the number of students who;
- obeyed all the three rules
 - ironed clothes only
- c) If a student is picked at random from senior four, find the probability that he obeyed at least two of the rules. (12marks)

13. The diagram shows two circles intersecting at X and Y . The bigger circle has radius of $7\sqrt{3}\text{cm}$ and Centre P . The smaller circle has radius of 7cm and centre Q . Given that angle $XPY = 60^\circ$.



- Find the value of angle XQY .
- Show that $\overline{XY}^2 = 147\text{cm}^2$.
- Hence show that triangle XPY is an equilateral triangle.
- Find the area of sector XPY
- Calculate the area of the shaded part. (12marks)

14. Pakwach town is about 420km from Kampala. A Gaaga bus leaves Pakwach for Kampala at $10:30\text{am}$ travelling at a steady speed of 80kmh^{-1} . The bus stopped for 30 minutes at Karuma check point which is 220km from Kampala and continues with the steady speed of 60kmh^{-1} non-stop up to Kampala. On the same day, a Presidential Escort car left Pakwach 2 hours later after the Bus had left and moved non-stop at a steady speed of 160kmh^{-1} up to Kampala.

On the same axes, draw the distance-time graphs for the motion of the two vehicles (Use: $2\text{cm}: 40\text{km}$ on the vertical and $2\text{cm}: 1\text{hour}$ on the horizontal axes).

- From the graph, find the time and the distance from Kampala when the presidential car overtook the bus.
- Determine the period of time between the arrival of the two vehicles. (Give your answer in minutes) (12marks)

15. A community organization gives the following allowances to its employees.

Transport	40,000/= per month
Insurance	120,000/= per month
Housing	65,000/= per annum
medical	180,000/= per annum
Yaka electricity	20,000/= per month

The tax structure used by the organization is;

Taxable income(sh)	Rate(%)
150,001 – 300,000	10
300,001 – 500,000	15
500,001 – 750,000	20
750,001 and above	30

Given that Charles paid shs 164,900 of tax, find

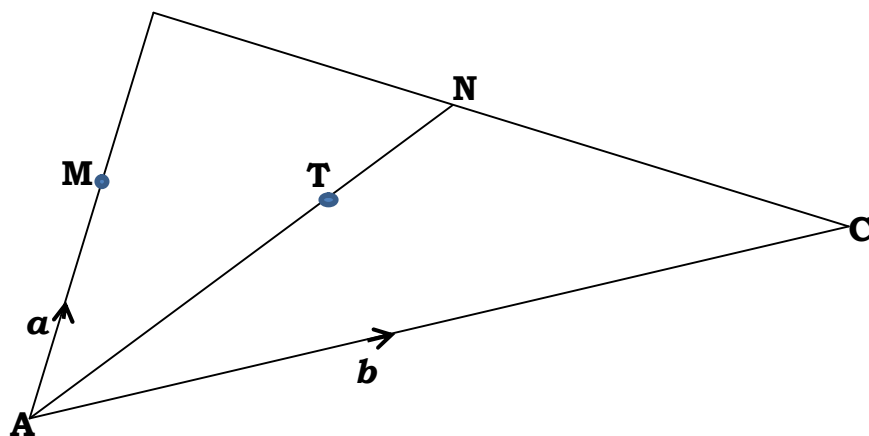
- Total monthly allowances
- Charles' gross salary
- The percentage of the gross paid as tax. (12marks)

16. a) Express $\frac{7}{2\sqrt{3}-\sqrt{5}}$ in the form $a\sqrt{b} + c$ where, a, b and c are intergers and state the value of b .

b) Find the value of $\log_3 27 - \frac{1}{2} \log_3 \frac{1}{9} + \log_3 81$.

c) Given that $125_n = 85_{ten}$, find the value of n . (12marks)

17. The triangle ABC has pints M and N on AB and BC respectively such that $AM:MB = 1:2$. $BN = 3NC$ and T lies on AN such that $3AT = 2AN$. Given that $\overrightarrow{AM} = \mathbf{a}$ and $\overrightarrow{AC} = \mathbf{b}$. **B**



a) Express the following vectors in terms of $\mathbf{a}$ and $\mathbf{b}$.

- $\overrightarrow{AB}$
- $\overrightarrow{BC}$
- $\overrightarrow{BN}$
- $\overrightarrow{AN}$

b) Show that points M, T and C are collinear. (12marks)

END