**456/2**

**MATHEMATICS**

**Paper 2**

**Uganda Certificate of Education**

MATHEMATICS

**Paper 2**

2 hours 30 minutes

**INSTRUCTIONS TO CANDIDATES:**

* *Answer* ***all*** *questions in Section* ***A*** *and* ***not*** *more than* ***five*** *from section* ***B****.*
* ***All*** *necessary calculations* ***must*** *be shown clearly with the rest of the answers.*
* *Graph papers will be provided.*
* *Silent, non-programmable scientific calculators, Mathematical tables with a list of formulae may be used.*
* *Any additional question(s) answered will* ***not*** *be marked.*

**Turn Over**

***SECTION A (40 MARKS)***

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

1. Express 2.6363 ……………….. as a fraction in its simplest form. (04 marks)

2. Find the equation of a straight line passing through a point (-1,2) and perpendicular to a line 2x + 3y – 6 = 0. (04 marks)

3. Given that n(P') = 8, n(Q') = 13, n(PnQ) = 5 and n($ϵ)=24.$

 (a) Represent the above information on a venn diagram. (02 marks)

 (b) Find $n$(P$∪$Q)' (02 marks)

4. If P(x) = ax + b, P(2) = 5 and P(1) = 2, find the value of a and b.

 (04 marks)

5. A plot of land appreciated at a rate of 20% per annum. If its value at the beginning of the year was shs.6,000,000, calculate the duration required for its value to accumulate to shs.8,640,000. (04 marks)

6. Given vectors $a=\left(\begin{matrix}2\\0\end{matrix}\right), b=\left(\begin{matrix}-1\\6\end{matrix}\right) and c\left(\begin{matrix}-3\\3\end{matrix}\right).$ Find the modulus of 3a – b + 2c.

 (04 marks)

7. A quantity A is partly constant and partly varies as the cube of B. When A = 5 and B = 1 and when A = 19, B = 2. Find the equation connecting A and B.

 (04 marks)

8. A radio is marked at shs.800,000. The hire purchase terms are pay 10% of the marked price and 10 monthly installments of shs.85,000 each. Calculate the savings one would make by pay cash rather than Hire purchase terms.

 (04 marks)

9. A container with a capacity of 500 litres is 80cm high. Another similar container has a capacity of 300litres. What is the height of the small container.

 (04 marks)

10. An area of 24.0cm2 is drawn on a map whose is 1:250,000. What is the area on ground in km2. (04 marks)

**SECTION B (60 MARKS)**

*Answer any* ***five*** *questions*

11. In a certain village 12 people speak Luganda (L), 15 speak English (E) and 15 speak Kiswahili (K). 3 people speak Luganda only, 4 speak English only and 2 speak Kiswahili only. 5 people speak all the three languages and 2 speak none of the languages.

1. Represent the above information on a venn diagram. (05 marks)
2. What is total number of people on the village? (04 marks)
3. Find the probability that a person selected at random from the village speaks only two languages. (03 marks)

12. Mbarara is about 225km away from Kampala. A coach bus leaves Kampala for Mbarara at 6:45am travelling at a steady speed of $45kmhr^{-1}$ . A taxi leaves Kampala an hour later at a speed of $70kmhr^{-1}$ but gets a mechanical problem after traveling for 1 ½ hours. The problem was fixed after 30 minutes and then the driver increased the speed by $10kmhr^{-1}$ for the remaining distance.

1. Draw on the same axes, the distance – time graphs showing the journey of the two vehicles. (use 2cm to represent 50km and 2cm to represent 1 hour), (08 marks)
2. Determine;
3. the time and distance from Mbarara when the taxi over takes the bus.

 (02 marks)

1. different in the time of arrival of the two vehicles. (02 marks)

13. Given that f(x) = 2x – 3 and g(x) = x2 – 3x

 (a) Find $f^{-1}(x)$ and $f^{-1}(2$). (04 marks)

1. Solve for x if gf(x) = 11 + fg(x). (08 marks)

14. In the figure below OACD is a parallelogram in which T is the midpoint of AC and OT produced meets BC also produced a x.

X

T

A

C

a

B

b

O

 Given that OA = a, OB = b, $\overbar{OX }$= r, $\overbar{OT}$ and CX = k, BC.

1. Find vector OT interms of a and b. (04 marks)
2. Determine the values of scalar k and r by expressing OX in two ways.

(06 marks)

1. Find the ratio of BC:BX. (02 marks)

15. ABCDV is a right pyramid on a rectangular base, AB = 8cm. BC = 6cm and the slanting height of the pyramid is 13cm.

 (a) Draw the pyramid. (02 marks)

 (b) Calculate;

 (i) height of the pyramid (03 marks)

 (ii) the angle between the plane BCV and the base ABCD. (03 marks)

 (c) X is a point on OV such that 30X = 20V. Calculate angle between NX and OV where N is a midpoint of BC. (04 marks)

 (d) Calculate the volume of the pyramid. (04 marks)

16. (a) Simplify $\frac{1}{\sqrt{3}+\sqrt{2}}+\frac{2}{\sqrt{3}-\sqrt{2}}$ (04 marks)

 (b) Given that $log\_{10}2=0.3010$ and $log\_{10}3=0.4771,$ without using table or calculator, evaluate $log\_{10}72$ (04 marks)

 (c) Use mathematical tables to evaluate $\sqrt[3]{82.36}$ (04 marks)

17. (a) A worker’s gross salary is shs.200,000 per month. If sh.130,000 is tax free and the rest is taxed at 10%, what is the worker’s net pay per month.

 (04 marks)

 (b) Mr. Odoi and Mrs. Kaiso are money lenders. Mr. Odoi lends money at a simple interest rate of 15% per annum. Mrs. Kaiso lends money at a compound interest rate of 15% per annum. A trader wants to borrow shs.500,000 for 2 years. Which of the two lenders would be cheaper and by how much? (08 marks)

***END***