BUGANDA EXAMINATION COUNCIL MOCKS

Uganda Certificate of Education

MATHEMATICS

PAPER 2

2HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

- Attempt **ALL** questions in section **A** and not more than **FIVE** questions from section **B**.
- **ALL** necessary calculations **MUST** be done on the same page as the rest of the answers.
- Mathematical tables and graph papers will be provided.
- Neat work is a **MUST**
- Silent, non programmable scientific calculators may be used.

SECTION A (40 MARKS)

Attempt all questions in this section.

1. The L.C.M of two numbers is 144 and their G.C.F is 12. If one of the numbers is 48, find the other number. (04marks)

2. Given that $\overrightarrow{PQ} = \begin{pmatrix} -3 \\ 5 \end{pmatrix}$ and P is the point P(2,9), find the position vector OQ and hence determine $|\overrightarrow{OQ}|$. Give your answer to 2 decimal places. (04marks)

3. Given that $g^{-1}(x) = 3x^2 - 2$, determine; (04marks)

   (a) g(x) (b) g(25)

4. Evaluate without using tables or calculator (04marks)

   $$\frac{\log 125 + \log 49 - \log 25 - \log 7}{\log 35}$$

5. A map is drawn to a scale of 1:250,000. Calculate the actual area in km^2 of a farm represented on this map by an area of $4.8cm^2$. (04marks)

6. In a class of 140 students, 54 study chemistry and 78 study physics. The number of students who do not study any of the two subjects is twice those who study both subjects. Find the number of students who study both subjects. (04marks)

7. Jocelyn bought a plot of land at Uganda shillings 6,900,000 after being given a discount of 8%. Determine the original cost of the plot of land. (04marks)

8. The volume of a cylindrical tin is $5544cm^3$. If its diameter is 21cm, calculate its height. (Use $\pi = {}^{22}/_7$)

9. Copy and complete the table below in which y varies inversely as x. (04 marks)

x	-	6	4
y	72	12	-

10. A parallelogram has vertices P (0,-1) Q (2, - 5), R (2, 3) and S (x, y). Use the vector method to find the coordinates of point S. (04marks)

Attempt any *five* questions in this section.

11. 48 dogs are being trained at a certain security company. 24 of the dogs are black, 12 have short tails and 30 have long hair. Two dogs have short tails, long hair and are black. Four of the dogs are black with short tails but have short hair. Other four dogs have short tails, long hair and are not black.

(a) Represent the above information on a Venn diagram.
(b) How many dogs are black with long hair and with long tails?
(c) If a dog is picked at random, find the probability that it is not black but has a short tail. (12marks)

12(a) Given that $g(y) = 3y + 3$ and $gh(y) = 6y + 11$.
(i) Find the expression for $h(y)$ (06marks)
(ii) Hence find the value of $h(o)$

(b) Two functions f and g are defined for;
$x \geq 1$ by $f(x) = 2 + \log x$ and $g(x) = 2(10^x) + 3$, find the value of;

(i) x when $f(x) = 4$ (06marks)
(ii) gf(100)

13. The cost shs. C of making n copies of books is partly constant and partly proportional to the number of books, **n**. It costs shs. 600,000 to make 50 copies and shs. 1,080,000 to make 100 copies. Each book is then sold at shs. 18,000 an a tax of 10% has to be paid on all the sales.

(a) Form an equation showing the relationship between the cost C and the number of books, **n** (07marks)

(b) Find the profit made when 200 copies are produced and sold. (05marks)

14.

Turn over
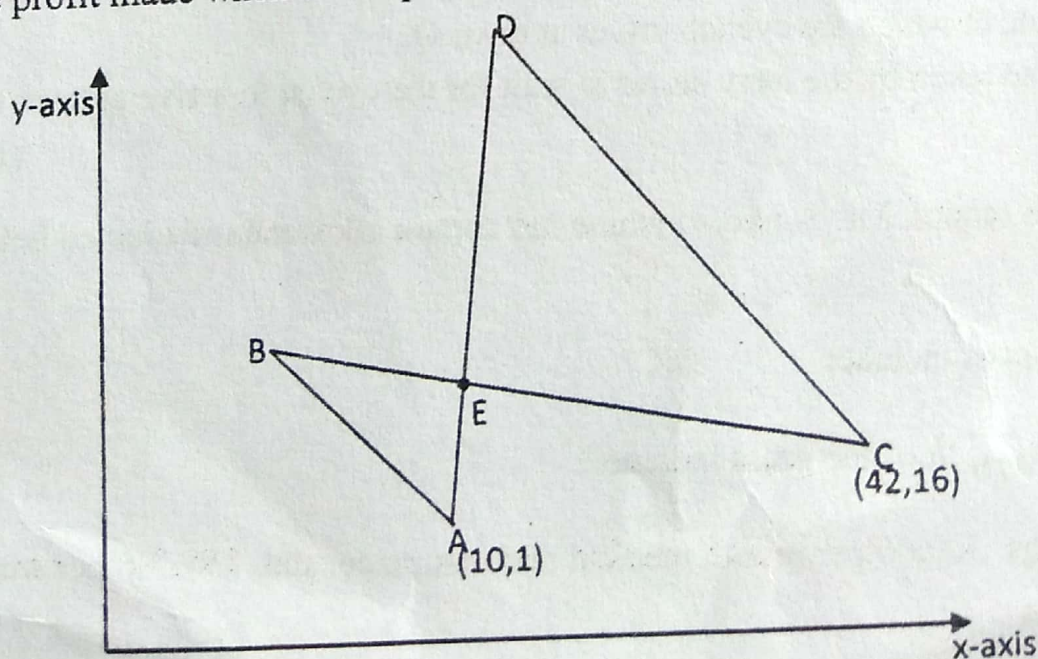
In the above diagram, point A has coordinates (10, 1) and $\overrightarrow{AB} = \begin{pmatrix} -5 \\ 15 \end{pmatrix}$

(a)   Find (i) $|\overrightarrow{AB}|$

        (ii)   the coordinates of B.

(b)   If point C has coordinates (42, 16) and $\overrightarrow{CD} = 3\overrightarrow{AB}$, find;

(i)   the coordinates of D

(ii)   the vector $\overrightarrow{AD}$

(c)   The point E has coordinates (K, 16).

(i)   Find the vector $\overrightarrow{AE}$ in terms of K.

(ii)   Given that AED is a straight line, find the value of K.

15.   Towns **P** and **Q** are 140km apart. A cyclist leaves town **P** at 8.00 a.m and travels to **Q** at an average speed of 20km/hr. At 10.00 a.m a lorry leaves town **P** to travel to **Q** at an average speed of 50km/hr. After travelling for 1 hour, the lorry developed a mechanical problem which took the driver half an hour to fix. The lorry then continued its journey to town Q at an average speed of 30km/hr.

(a)   Using a scale of 2cm to represent 1 hour on the horizontal axis and 1cm to represent 10km on the vertical axis, draw a distance-time graph to represent the movement of the cyclist and the lorry on the same axes.

(b)   From the graph, determine the;
        (i)   time when the lorry overtakes the cyclist.
        (ii)   distance from town **P** to where the lorry overtakes the cyclist.
        (iii)   time at which the lorry arrives at town **Q**.
        (iv)   time at which the cyclist arrives at town **Q**.
        (iv)   time taken by the lorry driver to wait for the cyclist to arrive at town **Q**.
                                                                            (12marks)

16.   In a certain school, Mr. Sonko's income has certain allowances deducted before it is taxed.

        The allowances include;

        Marriage $^1/_{20}$ th of the gross income.

        Housing : shs. 30,000 per month medical and insurance: shs. 180,000 per annum.

Lunch and breakfast: shs. 1500 per day.
Family allowance is for three children only.
- Children aged below 10 years, shs. 20,000
- Children between 10 and 15 years; shs. 15,000
- Children aged 16 to 20 years, shs. 10,000 per child.

Mr. Sonko is married with three children one aged 8 years, the elder is 22 years and the other is 14 years. If his gross monthly income is shs. 720,000.

(a)   Calculate the taxable income and the income tax under the tax structure below:-

Income (shs)	Rate (%)
0 – 120,000	Tax free
120,001 – 250,000	13.0
250,0001 – 430,000	24.0
430,000 – 630,000	30.0
Above 630,000	40.5

Note: (One month = 30 days)

(b)   Determine the percentage of this gross monthly income paid as taxes.   (12marks)

17(a) The diagram below shows a giant water tank ABCDE which is made in the shape of a right circular cone mounted on a cylinder. The diameter of the cylinder is 12m. The slant length of the cone is 7.5m and the height of the cylinder is equal to 10m.
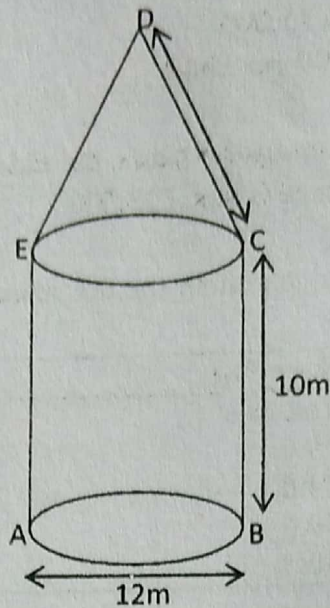
If the outer surface area of the water tank has to be painted, calculate the surface area to be painted. (Take $\pi = 3.142$)

(b) Calculate the volume of water needed to fill the water tank.

(Take $\pi = 3.142$)

END