456/2

MATHEMATICS

PAPER 2

JULY/AUG 2019

2½ HOURS

Uganda Certificate of Education Mock Exams.

MATHEMATICS PAPER 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES

- Answer all questions in section A and any five 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.
- Graph papers are provided.
- Silent non – programmable scientific calculators and mathematical tables with a list of formulae may be used.

Turn Over

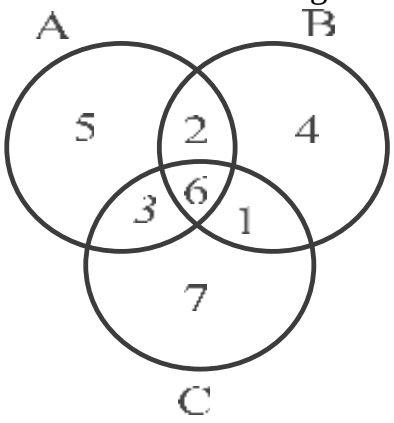
SECTION A (40 MARKS)

Answer all questions in this section.

1. The LCM of two numbers is 144 and their GCF is 12. If one of the numbers is 36, find the other number. (04 marks)

2. Given that $\frac{\left(a^{3}b^{-2}\right)}{a^{-2}b^{1}} = a^{p}b^{q}$, find the values of the constants p and q (04 marks)

3. The diagram below shows the members who belong to sets A, B and C.



(a). Find $n(A \cap (B \cup C))$ (02 marks)

(b). Shade the region $(A \cap B) \cup C$ (02 marks)

4. Vectors $\underline{\boldsymbol{a}}$, $\underline{\boldsymbol{b}}$ and $\underline{\boldsymbol{c}}$ are such that $\underline{\boldsymbol{a}} = \begin{pmatrix} y^{2} \\ 3^{1} \end{pmatrix}$, $\underline{\boldsymbol{b}} = \begin{pmatrix} -5 \\ 5 \end{pmatrix}$ Given that

$|\underline{\boldsymbol{a}}| = |\underline{\boldsymbol{b}} - \underline{\boldsymbol{c}}|$, find the possible values of y. (04 marks)

5. On a map whose scale is 1 cm: 1 km, some woodland is shown by a green patch of area 12 cm^2. What would be the corresponding area on a map whose scale is 2.5cm : 1 km? (04 marks)

6. Express $\frac{1}{\sqrt{8}}$ in the form $\sqrt{a} + \sqrt{b}$, where a and b are constants (04 marks)

√ √

7. Sheila can pay her hotel bill in Euros (€) or pounds (£). The bill was € 425 or £ 365 when the exchange rate was £ 1= € 1.14. In which currency was the bill cheaper and by how much? (04 marks)

8. A parallelogram has vertices at $A(0, -1)$, $B(2, -5)$, $C(2,3)$ and $D(x, y)$. Use vector method to find the coordinates of D. (04 marks)

9. Given that $f(x) = 2x \quad - 3x + k$, find the value of k if $f(-3) = 25$. (04 marks)

10. The points $\boldsymbol{P}(-2,3)$ and $\boldsymbol{Q}(1,3)$ are in the same plane. A line perpendicular to PQ passes through point Q.
    (a). State the equation of line PQ.
    (b). Find the coordinates of the point where the perpendicular line cuts the x-axis. (04 marks)

SECTION B (60 MARKS)

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

11. 24 dogs are in a kennel. 12 of the dogs are black, 6 have short tails and 15 have long hair. One dog has a short tail, long hair and is black. Two of the dogs are black with short tails but have short hair. Other two dogs have short tails, long hair and are not black.
    (a) Represent the above information on a Venn diagram. (07 marks)
    (b) How many dogs are black with long hair and with long tails? (02 marks)
    (c) If a dog is picked at random from the Kennel, find the probability that it is not black but has a short tail. (03 marks)

12. (a) Two functions f and g are defined for $x > 1$ by $f(x) = 2 + logx$ and $g(x) = 2(10\ ) + 3$. Find;
    (i). the value of x when $f(x) = 4$.
    (ii). $gf(100)$ (06 marks)

    (b) Given that $k(y) = 3y + 2$ and $kh(y) = 6y + 11$,

(i) Form an expression for $h(y)$.

(ii) Hence find $h(0)$. (06 marks)

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

(a). Using a scale 4cm:1hr and 1cm:5km, draw the graphs to represent the two journeys. (07 marks)

(b). Use your graph to find;

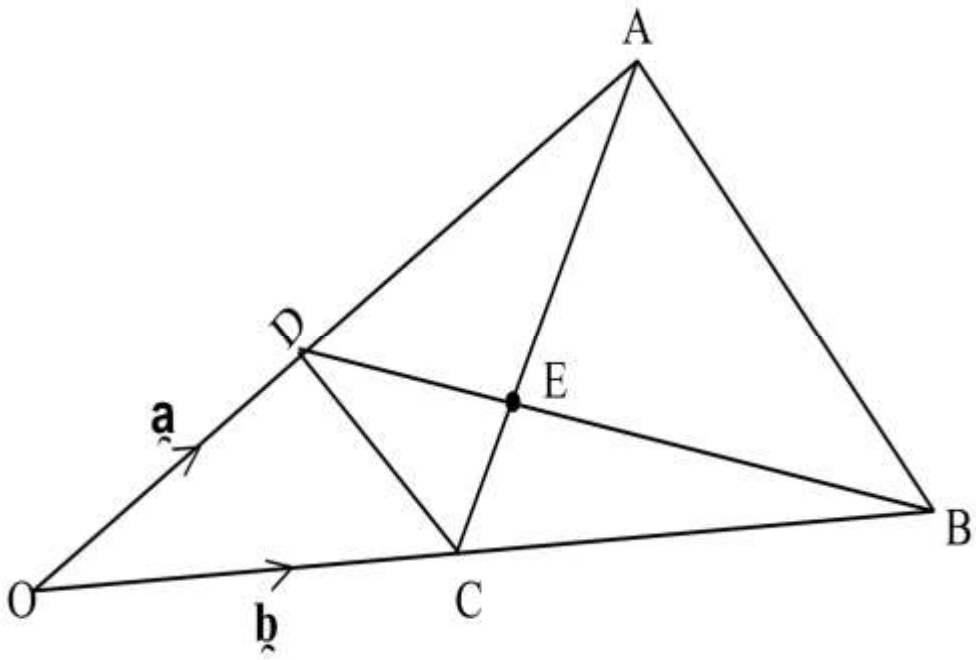
(i). When and where the motorist first catches up with the cyclist. (02 marks)

(ii). When and where the motorist over takes the cyclist. (02 marks) (iii). How far apart are the two men at 10:30 am. (01 mark)

Turn Over

14. The simple interest on a certain sum of money for 3 years is Shs. 2,250 and the compound interest on the same sum of money at the same rate for 2 years is Shs. 1,530. Calculate the principle invested.

15. The figure below shows a triangle OAB such that OA = 3OD, OB = 3OC and E is a point on BD such that 3BD = 4BE.



(a). If $\overrightarrow{OA} = \underset{\sim}{\boldsymbol{a}}$ and $\overrightarrow{OB} = \underset{\sim}{\boldsymbol{b}}$, express the following vectors in terms of $\underset{\sim}{\boldsymbol{a}}$ and $\underset{\sim}{\boldsymbol{b}}$.

(i). $\underset{\sim}{BD}$ (02 marks)

(ii). $\underset{\sim}{AE}$ (03 marks)

(iii). $\underset{\sim}{EC}$ (03 marks)

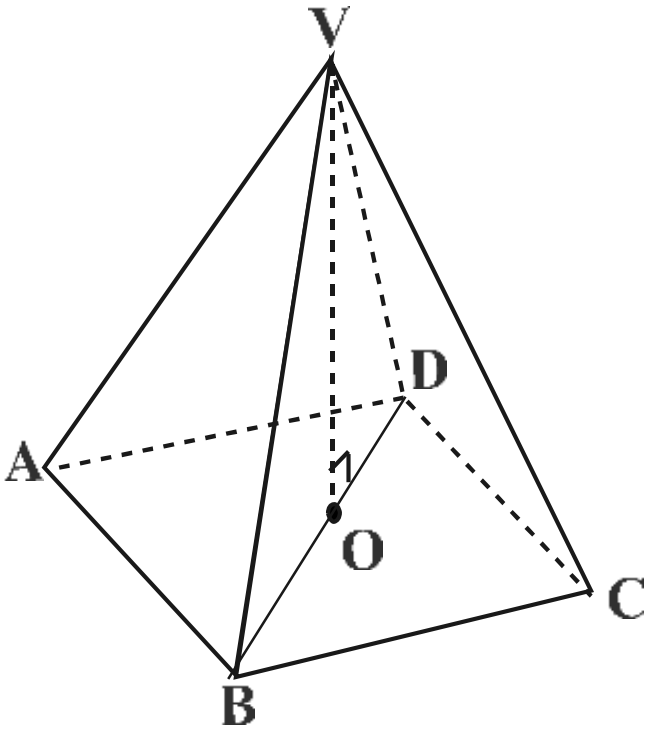
(b). Show that the points A, E and C are collinear. (04 marks)

16. The cost Shs. C of making N copies of books is partly fixed and partly proportional to N. It takes Shs. 600,000 to make 50 copies and Shs. 1,080,000 to make 100 copies. Each book can be sold at Shs. 16,000 and a tax of 10% has to be paid on all sales.

(a). Form an equation for the cost C and the number of book N. (07 marks)

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

17.



The diagram above shows a right Pyramid with a horizontal rectangular base ABCD and vertex V, vertically above point O, the centre of the base. The area of the base is 60 cm^2 and the volume of the pyramid is 280 cm^3.

(a) Calculate the height of the pyramid, OV. (03 marks)

(b) Given that the ratio of the sides AB: BC = 3: 5, find length AB and BC. (06 marks)

(c) Calculate the angle between the planes VCB and ABCD (03 marks)

END