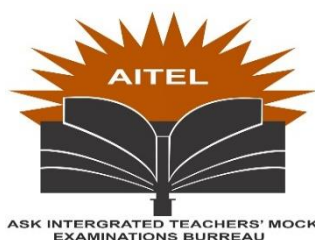


456/2
MATHEMATICS
Paper 2
2023
 $2\frac{1}{2}$ hours



AITEL JOINT MOCK EXAMINATION

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**.

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

All necessary calculations **must** be shown and should be done on the same page as the rest of the answer.

Mathematical tables and graph papers are provided.

Silent, non-programmable scientific calculators may be **used**.

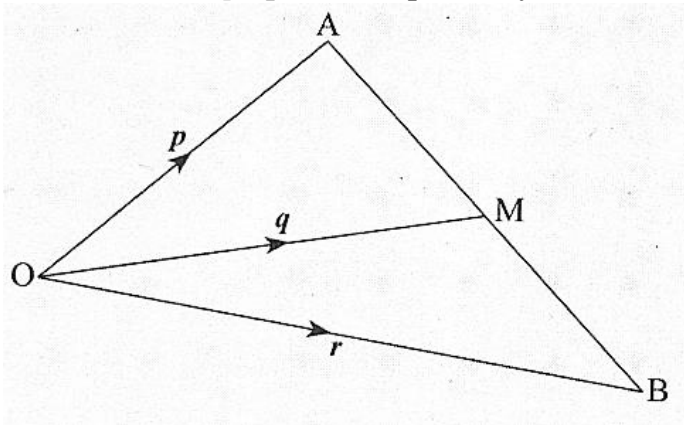
SECTION A (40 MARKS)**Attempt all questions.**

1. Find the highest common factor (HCF) of 150 and 216 (04 marks)
2. In a class of 52 pupils, 44 passed a history test and 36 passed a chemistry test. All pupils passed at least one test. How many pupils passed both tests? (04 marks)
3. Without using tables or calculators, evaluate $\frac{1}{3-\sqrt{5}} + \frac{1}{3+\sqrt{5}}$ (04 marks)
4. Express 5.3636... as a mixed fraction in its simplest form. (04 marks)
5. A straight line passes through the points (4, -2) and (7, 1), determine the equation of the line (04 marks)
6. The capacities of two similar bottles are 300ml and 8100ml. If the height of the larger bottle is 12cm. Find the height of the smaller one. (04 marks)
7. Given the functions $f(x)=3x$ and $g(x)=x^2 - 3$ find:
 - i) An expression for $fg(x)$
 - ii) $fg(2)$ (4 marks)
8. Solve the equation $\log_{10}(x^2 - 6) = 1 + \log_{10}(x - 3)$ (04 marks)
9. Given that $AB = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ and A is the point (-9, 1), find $|OB|$ (04 marks)
10. Amongin bought a photocopier at Shs.3,500,000. If the depreciation rate of the machine is 10.5% per annum. Calculate the value of the copier after 2 years. (04 marks)

SECTION B (60 MARKS)***Attempt any FIVE questions from this section.***

11. (a) Mr. Onyait bought three cars Audi, Benz and Corsa for a total of Shs. 150,000,000. The amounts he paid for these cars were in the ratio 3:5:7. Calculate the amount he paid for each car. (06 marks)
- (b) The scale of the map is 1:250000. Find the actual perimeter in km of a rectangular plot which measures 15cm by 9cm on the map. (06 marks)

12. In the figure below O is the origin and M is the midpoint of AB. The position vectors of A, M and B are p , q and r respectively.



- (a) Express \overrightarrow{AB} in terms of p and r . (02 marks)
- (b) Show that $q = \frac{1}{2}(p + r)$. (03 marks)
- (c) You are given that $A(5, 10)$ and $B(9, -4)$.
- (i) Write q as a column vector. (05 marks)
- (ii) Find the coordinates of M. (02 marks)
13. Two towns Mbarara and Masaka are 110km apart. A motorist leaves Masaka at 9:00am and travels towards Mbarara at an average speed of 50km/hr. At the same time another motorist leaves Mbarara and travels towards Masaka at an average speed of 30m/hr.
- (a) On the same axes draw, a distance time graph for each motorist, use scale 1cm to represent 10km on vertical axis and 2cm to represent 1 hour on horizontal axis
- (b) From your graph, determine
- i) the time when the two motorists met.
- ii) the distance from Masaka when the two Motorists met.
- iii) the difference in time of arrival for the two motorists.
- (12 marks)

14. A group of 60 students were asked whether they belonged to the Music club(M), the Debating club (D) or the Writers club (W). 10 students belong to M only, 11 belonged to

W only and 14 belonged to D only. 8 students belonged to W and D only, 11 belonged to both D and M. Those who belonged to all the three clubs were one more than those who belonged M and W only. 2 students belonged to none of the clubs.

(a) Represent this information on a Venn diagram.

(b) Find the number of students who belong to;

(i) All the three clubs.

(ii) The music club.

(c) If a student is selected at random from this group, what is the probability that the student belongs to;

(i) Only two clubs.

(ii) Not more than one club?

(12 marks)

15. Kiiza and Namwanje have shares in a company. Kiiza contributed Ug. Sh. 8,000,000 as her share capital. Namwanje contributed Ug.Shs. 12,000,000 as her share capital. In one year the company made a gross profit of Ug.Shs.22,000,000. The company expenses that year for electricity, transport, water and wages were shs 2,400,000,shs3,000,000,shs 2,000,000 and shs2,600,000 respectively. The net profit was shared in proportion to their share capitals.

(a) Find the:

(i) Total expenditure for the company.

(ii) Percentage of the company's expenses to the net profit

(b) Calculate how much money each shareholder got that year.

(12 marks)

16. A quantity S is partly constant and partly varies as the cube of t . when $t=1, S=5$ and when $t=2, S=19$,

find (a) the equation connecting S and t

(b)i) the value of S when $t = 10$

ii) the value of t when $S=253$

(12 marks)

17. The base of a right pyramid ABCDV is a square ABCD of side 24 cm. The slant edges are each 20cm long.

Calculate the

(a) Height of the pyramid

(05 marks)

(b) Volume of the pyramid

(02 marks)

(c) Angle between two opposite slanting faces.

(05 marks)