

BRAINSE AN IARBHUNOIDEACHAIS

DAY VOCATIONAL CERTIFICATE EXAMINATIONS, 1974

MATHEMATICS - PAPER II

MONDAY, 17 JUNE - 9.30 - 11.30 a.m.

INSTRUCTIONS

- (a) Answer any **five** questions.
 (b) All working must be clearly set out in your answer book.
 (c) Mathematical Tables and squared paper are available from the Superintendent.
 (d) All questions carry equal marks.

1. The cost of setting up the type for a school magazine is £75. The cost of running the machines to print the magazine is £4.25 for each 100 copies. The cost of paper, ink, etc., is 6 pence per copy.

The magazine committee decides to print 700 copies and fixes the selling price at 25p each.

- (i) What is the least number of copies which must be sold so that the magazine committee loses no money?
 (ii) What profit is made if 656 copies are actually sold and the remaining 44 copies are given away free of charge?

2. Given that $U = \{x \mid 1 < x < 10, x \in \mathbb{N}\}$

$$A = \{x \mid x \text{ is an odd number in } U\}$$

$$B = \{x \mid x \text{ is a prime number in } U\}$$

List the elements of each of the following sets:

- (i) U , (ii) A , (iii) B , (iv) $A \cap B$, (v) $A \cup B$, (vi) $A \setminus B$, (vii) A' , (viii) B' ,
 (ix) $(A \cup B)'$, (x) $A' \cap B'$.

3. (i) Use logarithms or a slide rule to evaluate $\frac{235 \times 3.05}{59.3}$.

(ii) The 130 pupils in first year classes in a school were asked whether they listed music or reading among their hobbies. 33 pupils had listed music only, 48 pupils had listed reading only, 12 pupils had listed neither music nor reading.
 Enter the above information on a Venn diagram and then answer the following questions:

- (i) How many pupils listed both music and reading?
 (ii) How many did not list music as one of their hobbies?

4. Apples cost x pence each and pears cost y pence each. Write out an equation to express each of the following:

- (i) 5 apples and 3 pears together cost 49 pence; and
 (ii) an apple and 6 pears cost together 53 pence.

Make use of the two equations obtained to solve for x and y , and hence find (a) the cost of an apple; and (b) the cost of a pear.

5. Find the solution set of each of the following:

- (i) $2(x + 4) - 3(2x + 3) = 12 - 5(3x - 4)$
 (ii) $x^2 + 4x - 12 = 0$.

6. An observer in a helicopter 500 metres above sea-level sees a man in difficulties in the sea at a point x due north of him, at an angle of depression of $43^{\circ}06'$. He directs a rescue boat at y , which is due south of him at an angle of depression of $45^{\circ}12'$, to pick up the man.

Calculate the distance of the man in difficulties from the boat, that is $[xy]$. If the rescue boat has an average speed of 10 metres per second how long does it take to reach the man ?

7. Let $A = \{-1, 0, 1, 2\}$ and let $K = \{(x,y) | y = x + 1 \text{ and } x \in A\}$ and $H = \{(x,y) | y = 3x - 1 \text{ and } x \in A\}$.

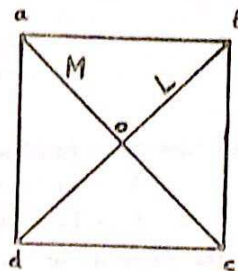
List the set of ordered pairs (couples) (i) of K , and (ii) of H . Use a sheet of the graph paper provided to graph the ordered pairs of both K and H . What is $K \cap H$?

8. $abcd$ represents a square with the diagonals intersecting at the point o . L is the line db and M is the line ac .

S_L denotes axial (line) symmetry in the line L ,

S_M denotes axial symmetry in the line M and

S_o denotes the central (point) symmetry of centre o .



- What is the image of the point b
 - by S_M ,
 - by S_L ,
 - by S_o and
 - by the translation \vec{ad} ?
- What is the image of the line segment $[ab]$
 - by S_M ,
 - by S_L ,
 - by S_o and
 - by the translation \vec{ad} ?
- What is the image of the line L
 - by S_M and
 - by a rotation about o of 90° ?