AN ROINN OIDEACHAIS M.46(a)

INTERMEDIATE CERTIFICATE EXAMINATION, 1985

MATHEMATICS - LOWER COURSE - PAPER II (150 marks)

MONDAY, 17 JUNE - MORNING, 9.30 to 12.00

Examination Number

SECTION A (45 marks)

Attempt all questions. You should not spend more than 45 minutes on this section.
Answer each question by writing one of (a), (b), (c), (d) in the box under each question number.
If you wish to change an answer, cross out your first choice and write your new answer near the box.
Mathematical tables may be obtained from the Superintendent.

THIS PAPER MUST BE ENCLOSED IN YOUR ANSWER BOOK

1. $\frac{1}{4} - \frac{1}{12} =$

(a) $\frac{1}{8}$ (b) $-\frac{1}{8}$ (c) $\frac{1}{6}$ (d) $-\frac{1}{6}$

2. If $10001_2 = x_{10}$, then x is

(a) 3 (b) 5 (c) 9 (d) 17

3. $0{\cdot}035 \times 10^2 =$

(a) 0·0035 (b) 0·35 (c) 3·5 (d) 35

4. If 1 is the mode of 0, 1, 0, x, 1, 0, 1, then x is

(a) 0 (b) 1 (c) 3 (d) $\frac{4}{7}$

5. A bill of IR£110 includes VAT at 10%. The VAT alone, in IR£ is

(a) 10 (b) 11 (c) 99 (d) 100

6. The LCM (i.e. Lowest Common Multiple) of 3, 4, $4\frac{1}{2}$ is

(a) 9 (b) 12 (c) 36 (d) 72

7. When $X = \{3, 5, p, q\}$, $Y = \{p, q\}$, $Z = \{q\}$, then $(X \cap Y) \setminus Z$ is

(a) $\{3, 5, p\}$ (b) $\{3, 5\}$ (c) $\{q\}$ (d) $\{p\}$

OVER →

8. If $f : x \to 3x$, $x \in \mathbf{N}$, which one of the following belongs to the set f?

☐ (a) (1, 9) (b) (2, 6) (c) (3, 6) (d) (−1, −3)

9. $\dfrac{1}{p^2 + p^3}$ is

☐ (a) $\dfrac{1}{p^5}$ (b) $\dfrac{1}{p^6}$ (c) p (d) none of these

10. $\dfrac{(xz)(zy)}{z} =$

☐ (a) xy (b) xzy (c) xz^3y (d) z

11. $A = \{x \mid 2 \leqslant x \leqslant 5, \ x \in \mathbf{N}\}$ is the same set as

☐ (a) {2, 3, 4, 5} (b) {2, 3, 4} (c) {3, 4, 5} (d) {4, 5}

12. A relative give IR£1 to a baby at its birth and doubles the previous amount at successive birthdays. On its 3rd birthday the child is given IR£

☐ (a) 16 (b) 8 (c) 4 (d) 3

13. The value of $x(1 - x)$, when $x = -1$ is

☐ (a) −2 (b) 0 (c) 1 (d) 2

14. If $xy = 10$ and $z = 3$, where $x, y \in \mathbf{N}$, the greatest value of xz is

☐ (a) 30 (b) 75 (c) 6 (d) 3

15. If x is "3 or less", $x \in \mathbf{R}$ this is written as:

☐ (a) $x \geqslant 3$ (b) $x > 3$ (c) $x \leqslant 3$ (d) $x < 3$

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SECTION B (105 marks)

Attempt **QUESTION 1** (30 marks) and **THREE** other questions (25 marks each)

Marks may be lost if all your work is not clearly shown

1. (a) A person sold a house for IR£40 000. Solicitor's fees were 1% of the selling price.
Estate agent's fees were $2\frac{1}{2}\%$ of the selling price.
V.A.T. on each fee was at 23%.
How much did the person receive after fees and taxes were paid ?

(b) In an election 10 000 votes were cast. A candidate received 10% of the vote.
If this was an increase of 25% on the same candidate's vote in the previous election, how many votes did the candidate receive in the previous election ?

2. (a) Solve for x:
$$8(x - 4) - 2(x + 5) = 6.$$

(b) Find the value of x and the value of y when
$$3x + 4y = 1$$
$$x - 3y = 4$$

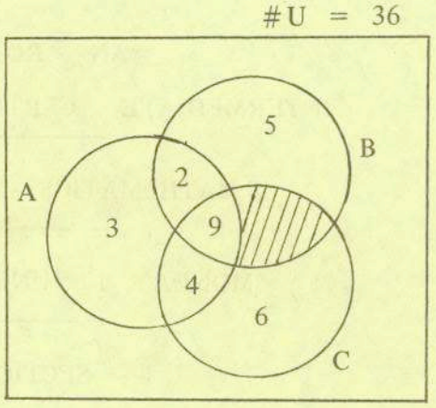
(c) A boat travels 1 kilometre at a speed of $(x - 4)$ kilometres per hour and then 3 kilometres at a speed of $(x - 1)$ kilometres per hour.
If time $= \frac{\text{distance}}{\text{speed}}$, write an algebraic expression for the total travelling time.

3. (a) Factorise
(i) $11x^2 + 19x - 6$
(ii) $10{\cdot}01^2 - 9{\cdot}99^2$ and calculate the answer.

(b) A person viewed the contents of a house the day before an auction, being interested in a table, a kettle and a toaster.
On returning home, the person remenbered only that the table was twice the price of the kettle; the toaster was IR£2 less than the kettle; the cost of the three items was IR£15. Find the cost of each of the three items.

OVER→

4. The Venn diagram shows the number of elements in the various parts of the sets and the Universal set.
Make a rough copy of the diagram in your answer book.



(a) Find (i) $\#((A \cap B) \cup C) - \#(A \cap (B \cup C))$
(ii) $\#U - \#(A \cup B \cup C)$.

(b) Express as a combination of A, B, C
(i) the number 3
(ii) the number 0 i.e. the null set.

(c) If $P = \{x \mid x \in A \text{ or } x \in B\}$
and $Q = \{x \mid x \in A \text{ and } x \in C\}$
find $\#P - \#Q$.

5. A test was given to 30 pupils. The results were as follows:

1	4	5	4	3	4	6	2	3	2
2	3	7	4	2	3	4	5	4	1
3	4	5	3	6	4	3	2	5	4

(i) Copy the following table into your answer-book and fill in the frequencies.

mark	1	2	3	4	5	6	7
frequencies	2	5					

(ii) Calculate the mean mark.
(iii) How many pupils received less than the mean mark ?
(iv) Five other pupils, not in the class, did the same test. The mean mark then for the 35 pupils was the same as that for the 30 pupils. Calculate the sum of the marks for the five others.
(v) In another test involving 35 pupils, the mean mark was 5. Calculate the sum of the marks of the 35 pupils.

6. Draw the graph of $f : x \to x^2 - 3x - 4$, $x \in \mathbf{R}$, for $-2 \leqslant x \leqslant 5$.
The table below may help.

x	−2	−1	0	1	2	3	4	5
$f(x)$	6			−6	−6			

From the graph, estimate
(i) $f(4{\cdot}5)$
(ii) the minimum value of $f(x)$
(iii) the area of the triangle formed by joining the lowest point of the graph and the points where the graph intersects the x-axis
(iv) the two values of x for which $f(x) = -f(4{\cdot}5)$.

7. (a) If $y_1 = 0$, $y_2 = 2$ and $y_3 = 3$ find the value of
$-2(y_2 - y_3) + 0(y_3 - y_1) - 1(y_1 - y_2)$.

(b) A shopkeeper bought some bars of chocolate at 20p each and other bars at 25p each. Altogether, 400 bars were bought in for IR£85·50. Write an algebraic equation for the toal cost and calculate how many of each bar was bought by the shopkeeper.