AN ROINN OIDEACHAIS M.46(a)

INTERMEDIATE CERTIFICATE EXAMINATION, 1987

MATHEMATICS – LOWER COURSE – PAPER II (150 marks)

FRIDAY 12 JUNE, — 9.30 a.m. to 12.00 p.m.

SECTION A (45 marks) Examination Number

Attempt all questions. You should not spend more than 45 minutes on this section.
Answer each question by writing either (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. $\frac{2}{7} + \frac{3}{14} =$

☐ (a) $\frac{5}{7}$ (b) $\frac{5}{10}$ (c) $\frac{5}{14}$ (d) $\frac{5}{21}$

2. $12\frac{1}{2}\%$ of 72 =

☐ (a) 5·76 (b) 8 (c) 9 (d)81

3. $111_2+101_2 = x_2$, then x =

☐ (a) 11100 (b) 10100 (c) 1100 (d) 100

4. 340·06 ÷ 7 =

☐ (a) 46·58 (b) 47·18 (c) 48·58 (d) 49·18

5. 0·65 × 0·3 =

☐ (a) 195 (b) 19·5 (c) 0·195 (d) 0·0195

6. 356·75 =

☐ (a) $35{\cdot}675\times10^{-2}$ (b) $356{\cdot}75\times10^{-2}$ (c) $3567{\cdot}5\times10^{-2}$ (d) 35675×10^{-2}

7. $\frac{x^2-x^3}{x^2} =$

☐ (a) $1-x^3$ (b) x^2-x (c) $1-x$ (d) $-x^3$

OVER →

8. $1 : \frac{3}{2}$ is the the same as

☐ (a) $2 : \frac{5}{2}$ (b) $\frac{3}{2} : 2$ (c) $\frac{3}{2} : 1$ (d) $\frac{2}{3} : 1$

9. R is the relation "is greater than" on the set $\{2, 3, 4\}$. How many couples in R?

☐ (a) 0 (b) 1 (c) 2 (d) 3

10. f is a function defined on the domain $\{p, q\}$. f can be

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

11. The pattern 3, 5, 7 . . . is given by

☐ (a) $2n-1$ (b) $3n-1$ (c) $3n+1$ (d) $2n+1$

12. On a pie-chart 90% is represented by an angle of

☐ (a) 350° (b) 324° (c) 180° (d) 90°

13. A bathroom scales shows the mass of the father to be 75 kg, of the mother to be 55 kg and of the four children together to be 170 kg. The mean mass per family member is

☐ (a) 50 (b) 100 (c) 300 (d) 900

14. Two aunts each gave IR£x to be divided equally among the three nephews in one particular family. Each nephew got 50p. An equation showing this is

☐ (a) $\frac{x}{3} = \frac{1}{2}$ (b) $\frac{2x}{3} = \frac{1}{2}$ (c) $\frac{2x}{3} = 50$ (d) $\frac{x}{3} = 50$

15. Which one of the following diagrams represent the inequality $-1 < x$?

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FRIDAY 12 JUNE, 9.30 a.m. to 12 00 p.m.

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 invested IR£2700 at compound interest for two years. The interest rate for the first year was 7% and for the second year was 6%.
Calculate the total interest earned.

(*b*) A householder buying direct from a farmer bought a box of 144 apples for IR£20·00 and a bag of potatoes for IR£2·00.
In a shop the same kind of apples were 20p each and the potatoes were 25% more expensive.
How much did the householder save by buying the apples and potatoes from the farmer rather than the shop?
Express, to the nearest per cent, the money saved as a percentage of what she paid the farmer.

2. (*a*) Find the value of $\frac{x(2x-y)}{y^2(x^2+2y)}$

when $x = 2$ and $y = -1$.

(*b*) Find the value of x if

$$2(x-1) - 3(2x-3) = 3(2x-7)+8$$

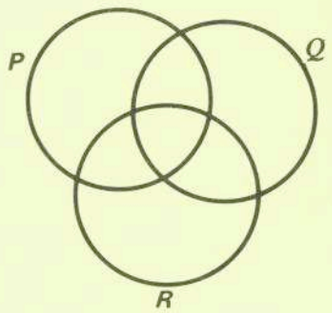
(*c*) Express $\frac{1}{x+4} - \frac{1}{x}$ as a single fraction.
Verify your answer by putting $x = -3$.

3. (*a*) Factorise
(i) $3xp-2yq+3xq-2py$.
(ii) $x^2+5x-24$

(*b*) Find the values of x for which
$x^2-10x+21 = 3x^2-27$.

OVER →

4. (*a*) P, Q and R are sets as shown.
Using a *separate* diagram for each, shade in the following regions



(i) $(P \cap Q) \cap R$

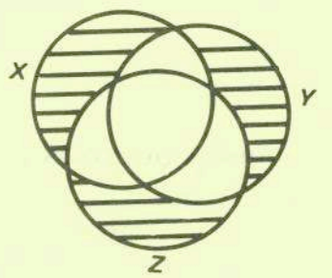
(ii) $P \cap (Q \cap R)$

(iii) $P \setminus (Q \setminus R)$

(iv) $(P \setminus Q) \setminus R$

(*b*) The number of elements in the sets X, Y and Z are respectively 2, 3 and 4. The hatched regions indicate empty sets.
Copy the diagram and show, using dots for elements, the location of all the elements when

$$\#(X \cap Y \cap Z) = 1.$$



5. Draw the graph of the function

$$f : x \to x^2 - x - 6$$

in the domain $-2 \leqslant x \leqslant 3$, $x \in \mathbf{R}$.
Using the graph, estimate

(i) the value of $f(1{\cdot}75)$.

(ii) the values of x for which $f(x) = -1$.

Draw the image of the above graph under the axial symmetry in the X-axis. (Use a dotted line for the image.) This image represents the function

$$g : x \to k\,(x^2 - x - 6).$$

What is the value of k?

6. Thirty pupils in a class were given a test containing ten questions. The number of pupils answering exactly 0, 1, 2, . . . questions correctly is shown:

Number of questions answered correctly	0	1	2	3	4	5	6	7	8	9	10
Number of Pupils	2	2	4	5	6	4	3	1	1	2	0

Write down the mode.
Calculate the mean number of questions answered correctly per pupil.
In a different test, also of ten questions, nine pupils of the same class answered all questions correctly.
Calculate (i) the highest possible (ii) the lowest possible mean number of questions answered correctly in this different test.

7. (*a*) Solve the simultaneous equations

$$x - y = 5$$
$$3x + 5y = 20.$$

(*b*) Write an algebraic equation or equations based on the following:
the perimeter of a rectangle is 34 m and one side is four metres longer than another.
Hence find the length of

(i) the sides

(ii) a diagonal as accurately as the Tables allow.