AN ROINN OIDEACHAIS

M.46(a)

INTERMEDIATE CERTIFICATE EXAMINATION 1977

MATHEMATICS - LOWER COURSE - PAPER II (150 marks)

TUESDAY, 14 JUNE - MORNING, 9.30 to 12

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.
Mathematics tables may be obtained from the Superintendent.

THIS PAPER MUST BE ENCLOSED IN YOUR ANSWER BOOK

1. The least common multiple of 2, 10, 50 is

(a) 2 (b) 50 (c) 100 (d) 1000

2. $\frac{1}{2} - \frac{1}{3} - \frac{1}{4}$ is equal to

(a) $-\frac{1}{5}$ (b) $\frac{1}{12}$ (c) $-\frac{1}{12}$ (d) $-\frac{7}{10}$.

3. Of the following which is the best approximation to $\frac{7}{11}$?

(a) 0·117 (b) 0·64 (c) 1·6 (d) 6·4

4. A person walks at a speed of 6 km per hour. How long will it take this person to walk $1\frac{1}{2}$ km ?

(a) 9 minutes (b) 15 minutes (c) 45 minutes (d) 4 hours

5. There are 180 animals in a field. On a pie chart the number of sheep in the field is represented by an angle of 180°. Then the number of sheep in the field is

(a) 1 (b) 45 (c) 90 (d) 180

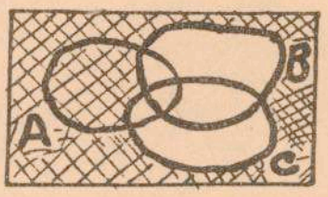
6. The nth term of a sequence is $\left(\frac{n}{2}+\frac{2}{n}\right)$. The 4th term is

(a) $4\frac{1}{2}$ (b) $4\frac{1}{4}$ (c) $2\frac{1}{2}$ (d) 4

7. The cross shaded region of the Venn diagram shown is represented by

(a) $(A \cap B \cap C)'$ (b) $A \setminus (B \cup C)$

(c) $(B \cup C)'$ (d) $(A \cup B \cup C)'$.



OVER→

8. The factors of $x^2 - 9y^2$ are

(a) $(x - 9y)(x + y)$ (b) $(x - 3y)(x - 3y)$

(c) $(x + 3y)(x + 3y)$ (d) $(x - 3y)(x + 3y)$

9. The value of $(6x^4)(4x^6)$ is

(a) $10x^{10}$ (b) $24x^{24}$ (c) $24x^{10}$ (d) $10x^{24}$.

10. The function f is defined as $x \to 5x - 1$.
If $f(x)$ is 9, then x is

(a) 1 (b) 2 (c) 9 (d) -2

11. Which one of the following couples satisfies the simultaneous equations

$$3x + y = 5$$
$$2x + y = 2 \quad ?$$

(a) (1,2) (b) (2, − 2) (c) (− 3,4) (d) (3, − 4)

12. When $x \neq 4$, $\dfrac{2x^2 - 7x - 4}{x - 4}$ is

(a) $2x + 4$ (b) $2x - 1$ (c) $2x + 1$ (d) $x - 4$.

13. $(4x - y)^2$ is the same as

(a) $16x^2 - 4xy + y^2$ (b) $16x^2 - 8xy + y^2$

(c) $16x^2 - y^2$ (d) $16x^2 + y^2$

14. The solution set $\{-1,1\}$ satisfies

(a) $x^2 - 2x + 1 = 0$ (b) $x(x + 1) = 0$

(c) $x^2 - 1 = 0$ (d) $x^2 - x = 0$.

15. If $n > t$, for $n, t \in \mathbf{N}$, which one of the following is always true ?

(a) $n - 1 < t$ (b) $\frac{t}{n} > 0$ (c) $-n > -t$ (d) $-n < -t$.

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SECTION B (105 marks)

Attempt **QUESTION 1** and **THREE** other questions

1. (a) Find the compound interest on £3600 for 2 years at 8% per annum.

(b) The weekly cost of operating a factory is as follows:

Wages	£1000
Materials	£4000
Electricity	£400

If (i) workers are allowed a 6% rise in salary (ii) material costs are increased by 25% (iii) electricity charges go up by $22\frac{1}{2}\%$, calculate the new cost per week to operate the factory.

(25 marks)

2. (a) Write down the factors of $x^2 - 3x - 28$ and hence solve the equation

$$x^2 - 3x - 28 = 0.$$

Find the values of x for which

$$x^2 - 3x - 28 = 12.$$

(b) Write down a quadratic equation which has $\{-5,5\}$ as its solution set.

(20 marks)

3. (a) Factorise

$$3x^2 - y - xy + 3x$$

(b) (i) When $x \in \mathbf{N}$, write down the elements of the solution set of the inequality:

$$-6 < 1 - x.$$

(ii) When $x \in \mathbf{R}$, show on the number line the solution set of the inequality:

$$0 < 5x \leqslant 15.$$

(20 marks)

OVER→

4. A gardener chose a number of potatoe plants and counted the number of potatoes per plant. The information was arranged in the table given below:

Number of potatoes per plant	2	3	4	5	6	7
Number of plants	3	4	11	14	11	7

(i) Draw a bar chart to illustrate the information.
(Have the 'Number of plants' along the vertical axis).

(ii) What is the mode in this selection ?

(iii) What is the mean number of potatoes per plant ?

(25 marks)

5. Using the same axes and the same domain $-3 \leqslant x \leqslant 3$, for $x \in \mathbf{R}$, graph each of the functions

$$f: \quad x \quad \rightarrow \quad 1 \quad - \quad 3x$$

$$g: \quad x \quad \rightarrow \quad x^2 \quad - \quad 2x.$$

Using the graph, or otherwise, find the values of x for which $f(x) = g(x)$

(25 marks)

6. (a) Express as a single fraction

$$\frac{1}{2(1 + 2n)} + \frac{1}{2(1 - 2n)}$$

and test your answer by putting $n = 0$.

(b) Each of two children spent 50p as follows:

One child bought four apples and four bars of chocolate.
The second child bought one apple and six bars of chocolate.

If each apple cost x pence and each bar of chocolate cost y pence, express what each child spent as an equation in x and y.
Hence find the value of x and the value of y.

(25 marks)

7. Illustrate the following by a Venn diagram:

U is the set of all 25 students in a class; B is the set of these students who play basketball; C is the set who play chess, and T is the set who play tennis.

$\#(B) = 8$, $\#(C) = 7$, $\#(T) = 6$, $\#(B \cap T) = 4$,
$\#(C \cap T) = 3$, $\#(B \cap T \cap C) = 1$, $\#(C \setminus (B \cup T)) = \phi$.

How many students in the class

(i) play basketball and chess
(ii) play no one of the three games
(iii) play only one of the three games ?

(30 marks)