AN ROINN OIDEACHAIS

INTERMEDIATE CERTIFICATE EXAMINATION, 1972

MATHEMATICS—LOWER COURSE—PAPER II

(150 marks)

TUESDAY, 13th JUNE—MORNING, 9.30 to 12

Six questions to be answered.
All questions are of equal value.
Mathematical tables may be obtained from the Superintendent.

1. A man put £1,500 into a savings bank for three years at 8% per annum simple interest but a a tax deduction at the rate of 20p in the pound was made on all interest earned. How much in all did the man actually receive back from the bank?

2. (a) Divide £4,800 in the ratio 1:2:3.

    (b) Simplify $29 \sqrt{\dfrac{37 \cdot 02}{5 \cdot 31}}$ and give your answer correct to three significant figures.

    (c) If $\log_{10}x = 1 \cdot 5563$ and $\log_{10}y = 2$, find x and $x + y$.

3. (a) If $A = \{1, 2, 3\}$, $B = \{3, 4, 5\}$, $C = \{5, 6, 7, 8\}$, write out the elements of each of the following:

    (i) $A \cup B$ (ii) $B \cap C$ (iii) $A \cup (B \backslash C)$.

    (b) Of a set of 80 girls, 54 play the piano, 37 play the violin and 15 do not play either instrument.

    (i) How many play both instruments?

    (ii) How many play the piano only?

    (iii) How many play the violin only?

    Illustrate your answers by means of Venn diagrams.

4. (a) Factorise each of the following:

    (i) $ax + b - a - bx$, (ii) $x^2 - x - 12$, (iii) $a^2 - 9b^2$.

    (b) Graph on the number line the solution set of each of the following:

    (i) $A = \{x \mid x + 3 \leqslant 9\}$

    (ii) $B = \{x \mid x - 2 > -3\}$

    (iii) $A \cap B$.

5. A shopkeeper sold x newspapers at 4p each and y magazines at 10p each, his intake being £13. Had he sold half as many newspapers and twice as many magazines his intake would have been £14. Find the value of x and the value of y.

6. (a) Add the three binary numbers

    11010, 1011, 111

    and give your answer in binary form.

    (b) Write each of the numbers

    3451, 0·006157

    in the form $a.10^n$, where n is an integer and $1 \leqslant a < 10$.

    (c) A spaceship sets out on a journey of $7 \cdot 25 \times 10^6$ miles at an average speed of $2 \cdot 5 \times 10^4$ miles per hour. How long will the journey take?

7. A person wishes to decorate a room. The room is 5 metres long and 3 metres wide. The costs involved are as follows:

    (a) the ceiling has to be painted at a cost of 25p per square meter,

    (b) the floor is to be covered with square tiles 25cm long costing 60p per dozen,

    (c) it takes seven rolls of paper at 95p per roll to paper the walls,

    (d) paint for the doors and windows costs £1·60.

    Calculate the total cost of decorating the room.

8. (a) Solve each of the following equations:

    (i) $17 - 5x = x + 5$,

    (ii) $x - 4 = 3 - 4 (3 - x)$.

    (b) Graph $y = x^2 - x - 3$ for $-2 \leqslant x \leqslant 3$ and use your graph to find the solution set of each of the equations

    (i) $x^2 - x - 3 = 0$,

    (ii) $x^2 - x - 5 = 0$.

9. (a) The following graph shows the monthly rainfall in inches in a certain district for a period of twelve successive months, January to December.
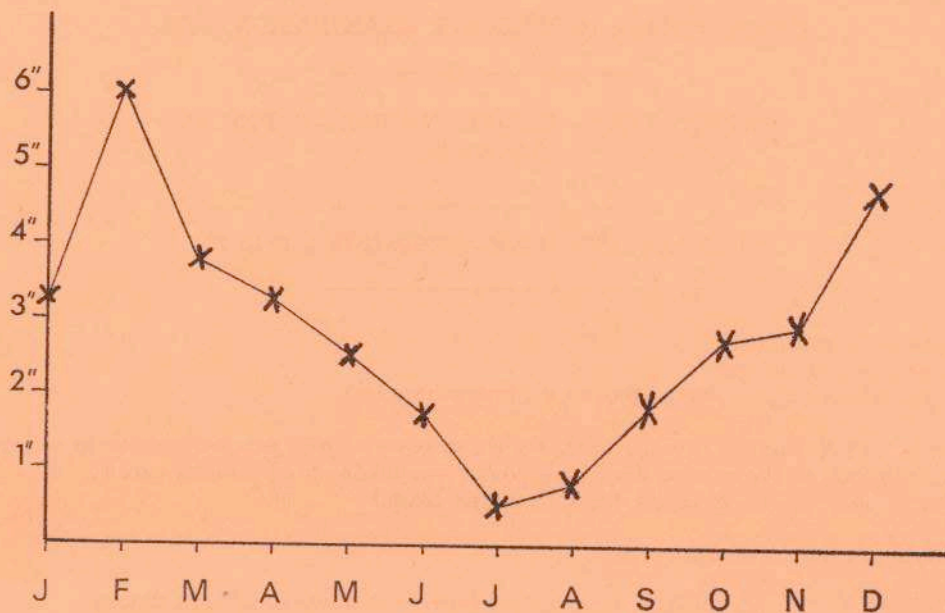
Use the graph to answer the following questions:—

(i) Which month had the greatest amount of rainfall?

(ii) Which month had the least amount of rainfall?

(iii) How many months had less than $4\frac{1}{2}$ inches but more than $1\frac{1}{2}$ inches of rainfall?

(b) Illustrate by means of a graph the following variations in temperature over a twenty-four hour period:

8 a.m. to noon — steady rise from 6°C to 10°C,
noon to 4 p.m. — constant at 10°C,
4 p.m. to midnight — steady fall from 10°C to 0°C,
midnight to 8 a.m. — constant at 0°C.

10. (a) Arrange in ascending order of magnitude:

$$\frac{1}{2}, \frac{5}{8}, \frac{3}{5}, \frac{7}{10}, \frac{13}{20}.$$

(b) The nth term of a sequence is $3n - 5$. Write down the first four terms of the sequence. Which term of the sequence is 55?

(c) Write down the next three terms in each of the following sequences, assuming that the obvious pattern holds:

(i) 2, 6, 18, ...

(ii) $\frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \cdots$

(iii) $\frac{1}{2}, \frac{2}{4}, \frac{3}{8}, \cdots$