

INTERMEDIATE CERTIFICATE EXAMINATION, 1974

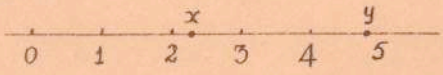
MATHEMATICS - LOWER COURSE - PAPER II
(150 marks)

TUESDAY, 18 JUNE - MORNING, 9.30 to 12

SIX questions to be answered.

All questions are of equal value.

Mathematics tables may be obtained from the Superintendent.

1. Find the simple interest on £800 for 3 years at 9% per annum.
If £800 together with simple interest for 3 years amounted to £944, find the rate per cent simple interest being paid.
2. (a) Simplify $9.63 \times 3.28 \div \sqrt{0.527}$ and give your answer correct to 3 significant figures.
(b) A sum of £540 is divided between 3 people *A*, *B* and *C* in the ratio of 2 : 3 : 4.
How much does each receive ?
(c) Find the value of $(3 \times 10^5) \times (1.5 \times 10)^3 \div (9 \times 10^6)$.
3. (a) Complete each of the following:
(i) $\{1, 2\} \cup \{1, 5, 6\} =$
(ii) $\{3, 5\} \cap \{6, 8\} =$
(iii) $\{1, a, 7\} \setminus \{k, 7, 9\} =$
(iv) $\{3, 4, 7, 5\} \cap (\{4, 7\} \setminus \{5, 3\}) =$
(b) Of 250 pupils, 166 collect coins, 135 collect stamps and 55 collect both coins and stamps.
How many collect (i) coins only; (ii) stamps only; (iii) neither coins nor stamps.
Use a Venn diagram to illustrate your answer.
4. (a) Find the factors of each of the following:
(i) $ac - ad + bc - bd$,
(ii) $x^2 - x - 42$,
(iii) $9x^2 - 25y^2$.
(b) Find the solution set of each of the following:
(i) $\{x \mid 5x - 7 < 23, x \in N\}$
(ii) $\{x \mid 5 - 2x \geq -1, x \in N\}$
5. A woman buys a number of apples @ 6p each and a number of oranges @ 8p each at a total cost of £3.04. If she had bought twice as many apples and only half the number of oranges, she would have paid 64p more.
How many (i) apples, (ii) oranges did she buy ?
6. (a) (i) Express the denary number 73 in binary notation.
(ii) Express the binary number 11001 in denary notation.
(b) *x* is a number between 2 and 3 and *y* is a number between 4 and 5, as in diagram. Say whether each of the following statements is true or false:
- 
- (i) $2 - x > 0$ (ii) $y - 1 < 2x$ (iii) $\frac{1}{x} < 0$ (iv) $\frac{1}{y} < \frac{1}{x}$ (v) $x - y > 0$
(vi) $\frac{x + y}{2} > y$.

7. A builder constructs eight houses at a cost of £5,000 each. He makes a profit of 20% on the sale of each of five houses. Calculate the selling price of each of these houses.

At what price should he sell each of the remaining three houses so as to make a profit of 25% on the whole transaction. Give your answer to the nearest pound.

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

(i) $14 - 3x = 5x - 10$

(ii) $\frac{1}{14 - 3x} = \frac{1}{5x - 10}$.

(b) Draw the graph of $x^2 - x - 3$ in the domain $-2 \leq x \leq 3$. Find from your graph the roots of the equations:

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

(ii) $x^2 - x - 4 = 0$.

9. (a) The n th term of a sequence is $(1 - \frac{1}{n})$. Verify that $0, \frac{1}{2}, \frac{2}{3}$ are its first three terms.

Hence find the n th term of a sequence which has $0, 1, \frac{4}{3}$ as its first three terms. Write down the next four terms of this sequence.

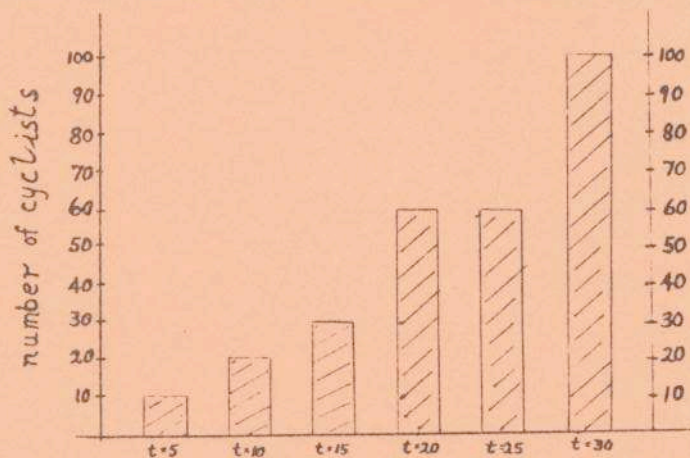
(b) If $1^2 = 1$

$2^2 = 1 + 2 + 1$

$3^2 = 1 + 2 + 3 + 2 + 1$,

continue the pattern for $4^2, 5^2$ and 6^2 .

10. 120 cyclists competed in a race. The winner finished at 2:00 p.m. The bar-chart below shows the number of cyclists who finished within intervals of t minutes after the winner.



[$t = 5$ means within 5 minutes after the winner, $t = 10$ means within 10 minutes after the winner, etc.]

- How many cyclists finished the race by 2:15 p.m. ?
- How many cyclists finished the race in the third 5-minute interval ?
- In which 5-minute interval did no cyclist finish the race ?
- In which 5-minute interval did the greatest number of cyclists finish the race ?
- How many cyclists did not finish the race before 2:30 p.m. ?