

$0 = \frac{72P}{52P}$

INTERMEDIATE CERTIFICATE EXAMINATION, 1991

27835

MATHEMATICS - SYLLABUS A - PAPER 1 (300 marks)

THURSDAY, 6 JUNE - MORNING, 9.30 TO 12.00

Attempt QUESTION 1 (100 marks) and FOUR other questions (50 marks each)
Marks may be lost if all your work is not clearly shown
Mathematics Tables may be obtained from the Superintendent

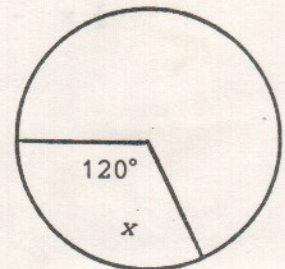
1. (i) A house has a value of IR£40 000.
Find the cost of insurance at 0.15% of its value.

(ii) Evaluate $2(1 - \sqrt{2}) - (1 - \sqrt{8})$.

(iii) Solve for x and y

$$\begin{aligned}x &= \frac{1}{2}y + 3 \\y &= \frac{1}{2}x - 3.\end{aligned}$$

(iv) A pie chart contrasting the values 40, 50 and x shows x with an angle of 120° at the centre. Find the value of x .



(v) $f : x \rightarrow \frac{1}{1+x}$, $g : x \rightarrow \frac{1-x}{x}$.

Find $(f \circ g)(x)$.

Over →

1. (contd.)

(vi) Express r in term of p and q

when

$$p = \frac{qr}{q - r}$$

(vii) 56 cards were posted when a group of friends sent each other a card.
How many in the group ?

(viii) When $\log_4 64 = m$ and $\log_m n = 2$,
find the value of n .

(ix) $A = \{ a, b, d \}$, $B = \{ a, c \}$.

Find the elements of a set X such that

$$A \Delta A \Delta B = A \Delta X.$$

(x) Show on the number line the set given by

$$\frac{1}{2}x - 1 < x - \frac{1}{2}, \quad x \in \mathbf{R}.$$

$L=3$
 $a=4$

2. (a) How many cylindrical tumblers can be filled from a full cylindrical jug, when they have the following measurements:

jug : radius length 5cm, height 30 cm.
 tumbler : radius length 2cm, height 5 cm.

- (b) (i) A cone and sphere have equal volumes. The length of radius (r) is the same in each. Find the height of the cone in terms of r . [See Tables P.7]

- (ii) A cone and sphere have equal areas of curved surface. The length of radius (r) of the base of the cone is the same as the length of radius of the sphere. Find the height of the cone in terms of r . [See Tables P.7]

If $r = 4\text{cm}$ in b (i) and
 $r = \sqrt{15}\text{cm}$ in b(ii),
 find the height of each cone.

3. (a) Solve for x

$$10(x + 1) + \frac{10}{x + 1} = 29 \text{ when } x \neq -1.$$

- (b) Factorise

(i) $6x^2 - x - 2.$

(ii) $a^2 + 2ab + b^2 - c^2.$

- (c) 300 people came to a school play, each adult paying IRE2.50 and each child paying IRE1.50.

One of the organisers remarked that if each adult had been charged IRE3.00 and each child IRE1 there would have been an extra IRE24 taken in.

How many adults came ?

4. Marks obtained by 20 pupils are

26	41	48	51	52
54	29	58	78	40
90	49	30	82	90
50	90	42	35	35

- (i) Verify that the average mark per pupil is 53.5.
 (ii) Complete the table:

Marks	25 - 39	40 - 54	55 - 69	70 - 84	85 - 100
Frequency	5		1		

Using mid-interval values calculate the average (mean) mark per pupil.

- (iii) Calculate the percentage error correct to one place of decimals.

5. Using the same axes and scales, draw the graph of each of the functions

- (i) $f : x \rightarrow 2 + 2x - x^2$
 (ii) $g : x \rightarrow 2x - 1$

in the domain $-2 \leq x \leq 3$, $x \in \mathbf{R}$.

Estimate from the graphs:

- (iii) the range of values of x such that

$$f(x) > g(x)$$

in the domain.

- (iv) the value of $\sqrt{3}$. Explain in your answerbook why you chose this value.

6. (a) If $p * q = \frac{p+q}{pq}$ and $A = \{1, 2, 3\}$,

verify that $p * p = 1$ for an element of A .
 Investigate if A is closed under $*$.

(b) $m = \log_{10} 12$ and $n = \log_{10} 20$.

Express, in terms of m and n

$$\log_{10} \frac{3}{5} \quad \text{and} \quad \log_{12} 20.$$

(c) Copy the diagram twice.
 Use separate diagrams to shade

- (i) $(P \cap Q)'$
 (ii) $P' \cup Q'$, where $'$ indicates the complement of the set.

