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JUNIOR CERTIFICATE EXAMINATION, 1994

MATHEMATICS - ORDINARY LEVEL - PAPER 1 (300 marks)

THURSDAY 9 JUNE - MORNING 9.30 a.m. to 12 noon.

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

1. (i) A shop offers discount of $12\frac{1}{2}\%$ on an article marked IR£36.
How much is the discount?

(ii) A ticket to a football game costs IR£25. How much does the ticket cost in dollars if IR£1 = \$1.6?
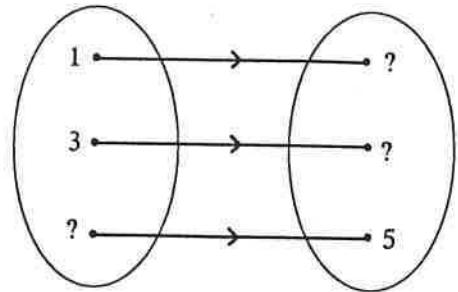
(iii) Express b in terms of a and c if
$$2(a - 2b) = 3c.$$

(iv) Use the Tables p20 - 27, or otherwise, to find the value of

$$\sqrt{(2.86)^2 - (2.64)^2}$$

(v) f is the function
$$x \rightarrow 1 - x, \qquad x \in \text{Z}$$

Copy the diagram and fill in the missing numbers.

(vi) For what values of x is
$$2x - 3 \leq 7, \qquad x \in \text{N}.$$

(vii) 120 people in a sports club were asked to name their favourite sport. 24 mentioned swimming, 48 said athletics and the remaining said soccer.
What angle does the number representing soccer have on a pie chart ?

(viii) Solve the equation
$$x^2 + 2x - 15 = 0.$$

(ix) It is estimated that the number of hours a child sleeps each day is given by the formula $(18 - 1.25x)$ hours, where x is the age of the child in years. How many hours does a four year old child sleep in a day ?

(x) Multiply 3700 by 0.2 and express your answer in the form
$a \times 10^n$, where $1 \leq a < 10$ and $n \in \text{Z}$.

2.   Find the volume of a sphere of radius 4.5 cm,

taking $\pi = 3$.

Four of these spheres exactly fit into
a cylinder of radius 4.5 cm and of height
h cm as shown.

Calculate

     (i)   the height, h, of the cylinder

     (ii)   the volume of the cylinder, taking $\pi = 3$

     (iii)   the fraction of the volume of the cylinder
              taken up by the four spheres.

h cm
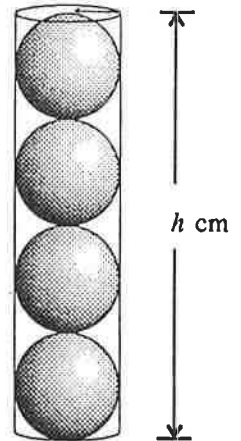
3.   **(a)**   Solve for x and for y:

$$3x + 2y = -9$$
$$2x - 4y = -22$$

     (b)   Factorise

         (i) $a - b - c(b - a)$

         (ii) $2x^2 + x - 10$

     (c)   1500 people attended a concert when the price was IR£10 per ticket per person.
For another concert $(1500 - x)$ people attended, but the price was IR£12 per ticket per
person and the receipts were IR£1200 more.
Form an equation in x and find the value of x.

4. A group of 40 students were given 5 projects each to complete. The results are shown in the table below. There were two students, for example, who did not complete any project.

Number of projects completed	0	1	2	3	4	5
Number of Students	2	7	12	10	6	3

(i) Draw a bar chart of the data.

(ii) Calculate the mean number of projects completed per student.

(iii) One of the projects involved swimming a certain distance. Find the least number of students who could have completed this project.
Find the largest number of students who could have completed this project.

5. Draw the graph of the function

$$x \rightarrow x^2 - 5x + 4$$

in the domain $0 \leq x \leq 5$.

Use your graph to estimate

(i) the value of $x^2 - 5x + 4$ when $x = 2\frac{1}{2}$

(ii) the values of x for which $x^2 - 5x + 4 = 2$.
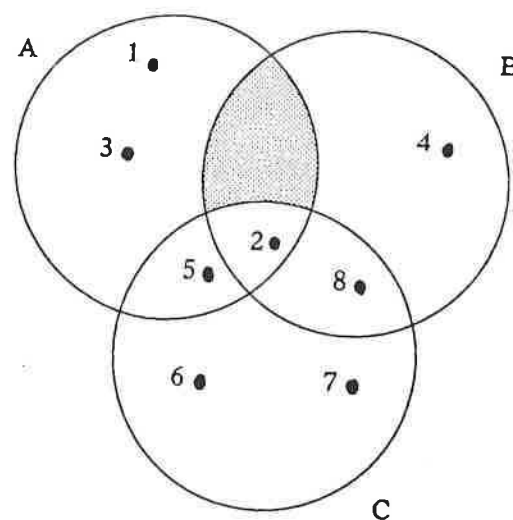
6. (a) List the elements of the set

  (i)   B

  (ii) $B \cup C$

  (iii) $A \setminus (B \cup C)$

  (iv) $A \cap C$

  (v)   Replace the question mark by the correct symbol in
         $(B \setminus C) \; ? \; A = \varnothing$,
         $\varnothing$ being the null set.

(b) Write as a single fraction

$$\frac{1}{x+1} - \frac{1}{x} .$$

Hence, or otherwise, solve the equation

$$\frac{1}{x+1} - \frac{1}{x} = -\frac{1}{2} .$$