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JUNIOR CERTIFICATE EXAMINATION, 1999

MATHEMATICS - ORDINARY LEVEL

THURSDAY, 10 JUNE - MORNING, 9.30 to 12.00.

PAPER 1 (300 marks)

Attempt **QUESTION 1**(100 marks) and **FOUR** other questions (50 marks each).

Marks may be lost if necessary work is not clearly shown.
Mathematics Tables may be obtained from the Superintendent.

1. **(i)** A person pays for 3 litres of milk with a IR£5 note. The milk costs 69p per litre. How much change should be given?

   (ii) A train left Dublin at 1715 hours. It arrived in Maynooth 47 minutes later. At what time did the train arrive in Maynooth?

   (iii) Write the following as a single fraction:

   $$\frac{4}{5} \div \frac{9}{10} - \frac{2}{3}.$$

   (iv) If $\pi r^2 h = 198$ cm³, find the value of h when $r = 3$ cm.
   Take $\pi = \frac{22}{7}$.

   (v) The mean of the six numbers 2, 8, 6, 3, x, 7 is 5.

   Calculate the value of x.

   (vi) If $x = 9$, find the value of
   $$x^2 - 4\sqrt{x} - 19.$$

   (vii) Express a in terms of b and c when
   $$\frac{a-c}{5} = b.$$

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(viii) Show on the number line the values of x for which

$$2x - 3 \leq x + 1, \quad x \in \mathbf{N}.$$

(ix) Factorise $9x^2 - 16$.

(x) Add 0.000125 to 0.006375 and express your answer in the form $a \times 10^n$, where $1 \leq a < 10$ and $n \in \mathbf{Z}$.

2. **(a)** IR£5000 was invested at 2% compound interest per annum.

    (i) Calculate the amount of the investment after one year.

    (ii) If IR£1000 was withdrawn at the beginning of the second year, what was the amount of the investment at the end of the second year?

(b) A closed cylindrical metal can has external radius 7 cm and height 10 cm.

    (i) Calculate the curved surface area of the can. Take $\pi = \dfrac{22}{7}$.

    (ii) Calculate the total surface area of the can. Take $\pi = \dfrac{22}{7}$.

    (iii) A rectangular sheet of metal measuring 50 cm by 25 cm was used to make the can. What area of the metal sheet was left over?

3. **(a)** Solve for x:

$$3(x - 4) = 24.$$

(b) Factorise

(i) $x^2 - 2x - 15$

(ii) $2ax - 2xz + 3ay - 3yz.$

(c) 1500 tickets were sold for a concert. Tickets were priced at either IR£20 or IR£30. Ticket sales amounted to IR£38 000.

Let x be the quantity of IR£20 tickets sold and let y be the quantity of IR£30 tickets sold.

Write down two equations, each in x and y, to represent the above information.

Solve the equations to find the quantity of each type of ticket sold.

4. In a survey, the number of people travelling in each car which crossed a certain bridge between 0800 hours and 0815 hours on a particular day was recorded. The results of the survey are contained in the following frequency table:

Number of people per car	1	2	3	4	5
Number of cars	25	15	5	10	5

(i) Write down the modal number of people per car.

(ii) Using graph paper, draw a bar chart to illustrate the data given in the frequency table. Put the number of people per car on the horizontal axis.

(iii) How many cars were involved in the survey?

(iv) Calculate the mean number of cars which crossed the bridge per minute while the survey was taking place.

(v) How many people travelled over the bridge by car while the survey was taking place?

(vi) Calculate the mean number of people per car.

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5. Using graph paper, draw the graph of the function

$$f: x \rightarrow x^2 + x - 2$$

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

(i) Use your graph to estimate the value of $f(0.5)$.

(ii) Construct on your graph the axis of symmetry of the graph of $f(x)$.

(iii) Show on your graph how to estimate the values of x for which

$$f(x) = f(0) + f(2).$$

6. **(a)** A person cycles at an average speed of 12 km/h.
How many hours and minutes will it take the person to cycle 27 km?

(b) U = {1, 2, 3, 4, 5, 6, 7},

P = {1, 2, 3}, Q = {3, 4, 5}, R = {1, 3, 5, 6}.

Write down the elements of

(i) P∩Q∩R

(ii) P\Q

(iii) (P∪Q)\R

(iv) (P∪Q∪R)'.

(c) Express as a single fraction

$$\frac{1}{x-3} - \frac{1}{x} \quad \text{where } x \neq 3 \text{ and } x \neq 0.$$

Hence, or otherwise, solve the equation

$$\frac{1}{x-3} - \frac{1}{x} = \frac{1}{6}.$$