FOR THE EXAMINER

EXAM. NUMBER:

Total Marks:

**Coimisiún na Scrúduithe Stáit
State Examinations Commission**

JUNIOR CERTIFICATE EXAMINATION, 2004

MATHEMATICS - ORDINARY LEVEL - PAPER 1 (300 marks)

THURSDAY, JUNE 10 - MORNING, 9:30 to 11:30

Time: 2 hours

Attempt **ALL** questions. Each question carries 50 marks.

Answers and supporting work should be written into the boxes provided.

Extra paper and graph paper can be obtained from the Superintendent, if needed.

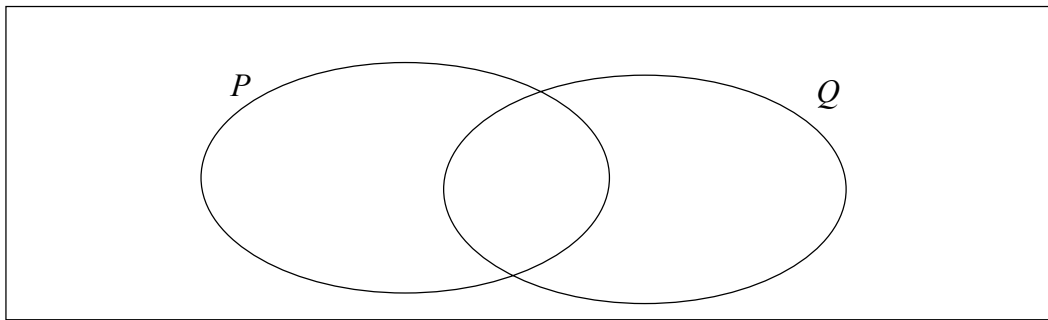**The symbol ✍ indicates that supporting work must be shown to obtain full marks.**

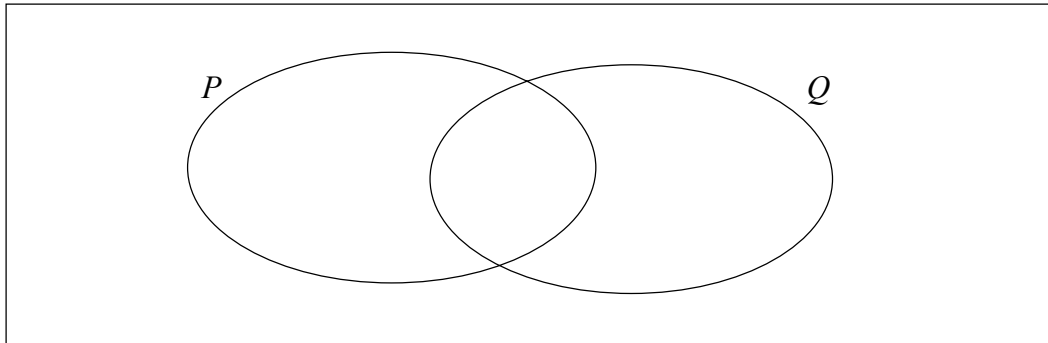**Make and model of calculator used:**

For Superintendent/Examiner use only:

Centre Stamp

Question	Mark
1	
2	
3	
4	
5	
6	
Total	
Grade	

1. **(a)** **(i)** Using the Venn diagram below, shade in the region that represents $P \cap Q$.

(ii) Using the Venn diagram below, shade in the region that represents $P \cup Q$.
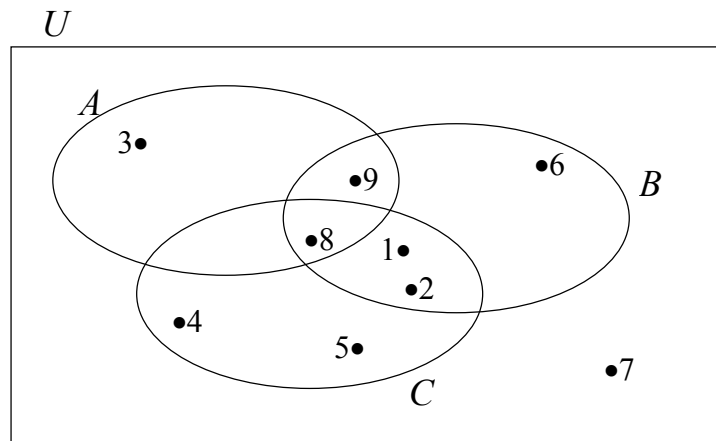

1(b) U is the universal set.

$A = \{3, 8, 9\}$

$B = \{1, 2, 6, 8, 9\}$

$C = \{1, 2, 4, 5, 8\}$

List the elements of:

(i) $A \cup B$

(ii) $B \setminus C$

(iii) A'

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

1(c) **(i)** P is the set of prime numbers between 1 and 12.
List the elements of the set P.

(ii) Q = {1, 3, 5, 7, 9, 11}.

Write down # Q.

(iii) T = {2, 4, 6, 8, 10, 12}.
Write down the elements of T that are multiples of 3.

(iv) Express 12 as the product of three prime numbers.

2. **(a)** €400 is shared between Mary and Tom in the ratio 7:3.
How much does each receive?

Mary =   Tom =

2(b) **(i)** Simplify $\dfrac{a^7 \times a^4}{a^3 \times a^2}$, giving your answer in the form a^n, where $n \in \mathbf{N}$.
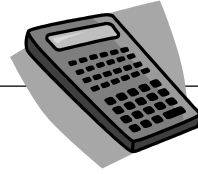
$$\frac{a^7 \times a^4}{a^3 \times a^2} =$$

(ii) By rounding each of these numbers to the nearest whole number, estimate the value of $\dfrac{66 \cdot 88 - 27 \cdot 36}{7 \cdot 6}$.

$\dfrac{66 \cdot 88 - 27 \cdot 36}{7 \cdot 6}$ is approximately equal to:

$$\frac{\boxed{} - \boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \boxed{}$$

(iii) Using a calculator, or otherwise, find the exact value of $\dfrac{66 \cdot 88 - 27 \cdot 36}{7 \cdot 6}$.

2(c) Using a calculator, or otherwise, find the exact value of:

(i) $9^{\frac{1}{2}}$

(ii) $(5 \cdot 32)^2$

(iii) Hence, evaluate $9^{\frac{1}{2}} + (5 \cdot 32)^2 \times \dfrac{1}{0 \cdot 625}$ and give your answer correct to two decimal places.

✍

3. **(a)** Anne bought 2 cans of cola. Each can cost 80c.
How much change did she get from a €10 note?

3(b) **(i)** John's gross pay is €21 000. His tax credit is €2369. He pays income tax at the rate of 22%.
What is his take-home pay?

Gross Pay	€21 000
Tax @ 22%	
Tax Credit	€2369
Tax Due	
Take-home Pay	

(ii) VAT at 15% is added to a bill of €84·60.
Calculate the total bill.

✍

3(c) **(i)** €3000 is invested at 4% per annum.
What is the amount of the investment at the end of one year?

✍

(ii) €500 is withdrawn from this amount at the beginning of the second year.
The interest rate for the second year is 3·6% per annum.
What is the amount of the investment at the end of that year?

✍

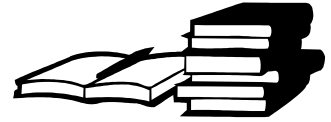**4.** **(a)** If $a = 2$ and $b = 7$, find the value of :

    (i) $2a + b$

    (ii) $3ab + 1$

4(b) **(i)** Solve the equation
$$5(2x + 1) = 45.$$

(ii) Write in its simplest form
$$(6x - y) - 3(x - 2y + 1).$$

4(c)   The cost of five books and one magazine is €32.

The cost of eight books and three magazines is €54.

Let €x be the cost of a book and let €y be the cost of a magazine.

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

First equation:

Second equation:

(ii)   Solve these equations to find the cost of a book and the cost of a magazine.

Cost of book =   Cost of magazine =

5. **(a)** Find the values of x for which
$$2x + 1 \leq 7, x \in \mathbf{N}.$$

✎

5(b) **(i)** Factorise $3x - 3y + ax - ay$.

✎ $3x - 3y + ax - ay$

(ii) Factorise $x^2 - 25$.

$x^2 - 25$

(iii) Express $\dfrac{2}{3} - \dfrac{1}{9}$ as a single fraction.

✎ $\dfrac{2}{3} - \dfrac{1}{9} =$

(iv) Express $\dfrac{x+7}{3} - \dfrac{x}{9}$ as a single fraction.

Give your answer in its simplest form.

$$\dfrac{x+7}{3} - \dfrac{x}{9} =$$

5(c) **(i)** Solve the equation $x^2 - 3x - 10 = 0$.

(ii) Multiply $(x - 4)$ by $(x^2 + 3x - 1)$.
Give your answer in its simplest form.

6. **(a)** P = { (1, 5), (2, 5), (3, 6), (4, 6)}.
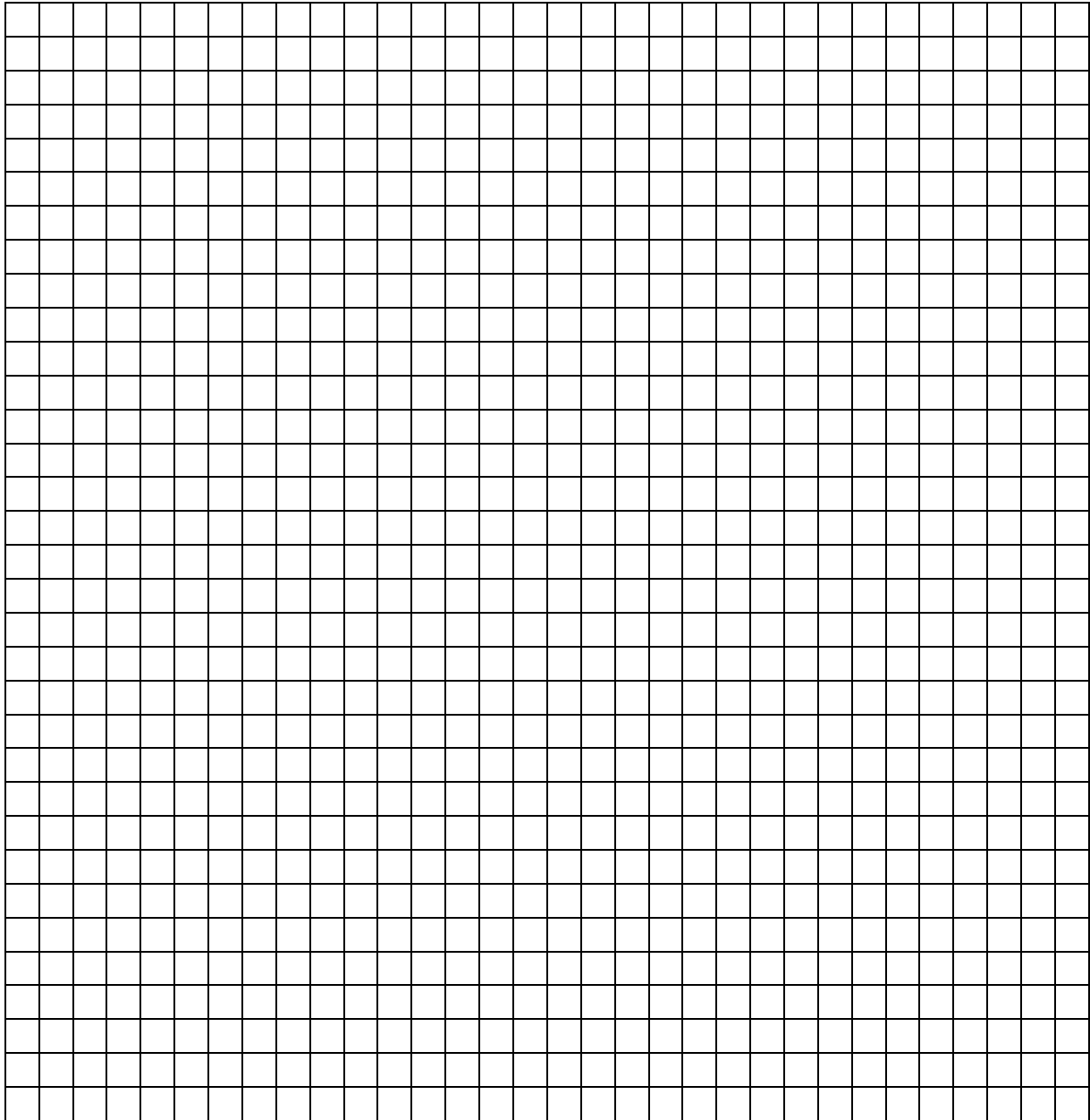Write out the domain and range of P.

Domain =

Range =

6(b) Draw the graph of the function

$$f : x \rightarrow x^2 - 4x + 2$$

in the domain $0 \leq x \leq 4$, where $x \in \mathbf{R}$.

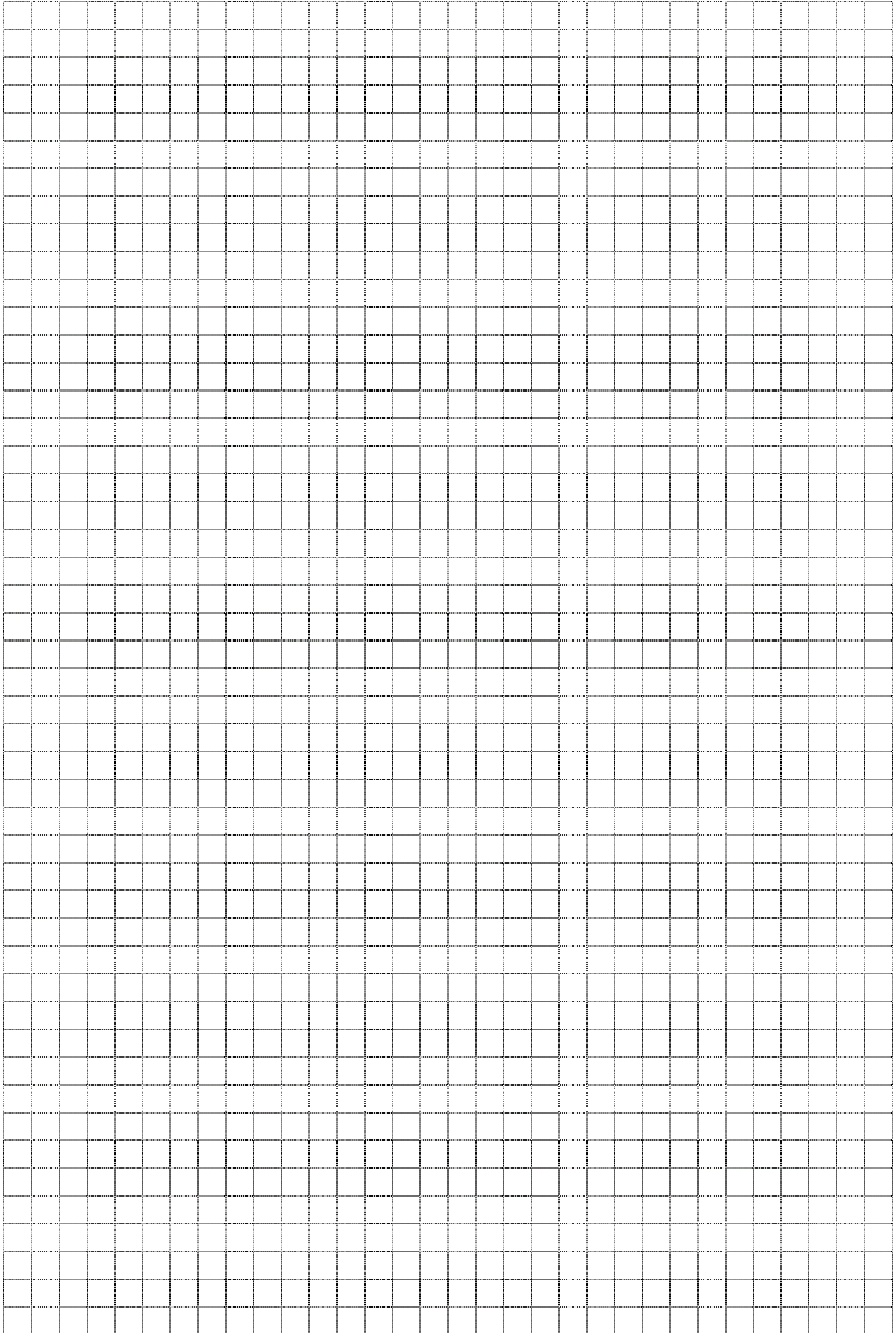**6(c) (i)** Draw the axis of symmetry of the graph drawn in **6 (b)** above.

✎ Work to be shown on the graph.

(ii) Use the graph to estimate the values of *x* for which *f* (*x*) = 0.

✎ Work to be shown on the graph and answers to be written here.

Space for extra work

Space for extra work

Space for extra work