

FOR THE EXAMINER

**EXAM. NUMBER:**

Total  
Marks:



# Coimisiún na Scrúduithe Stáit

## State Examinations Commission

**JUNIOR CERTIFICATE EXAMINATION, 2009**

**MATHEMATICS - ORDINARY LEVEL - PAPER 1 (300 marks)**

**THURSDAY, 4 JUNE - 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:**

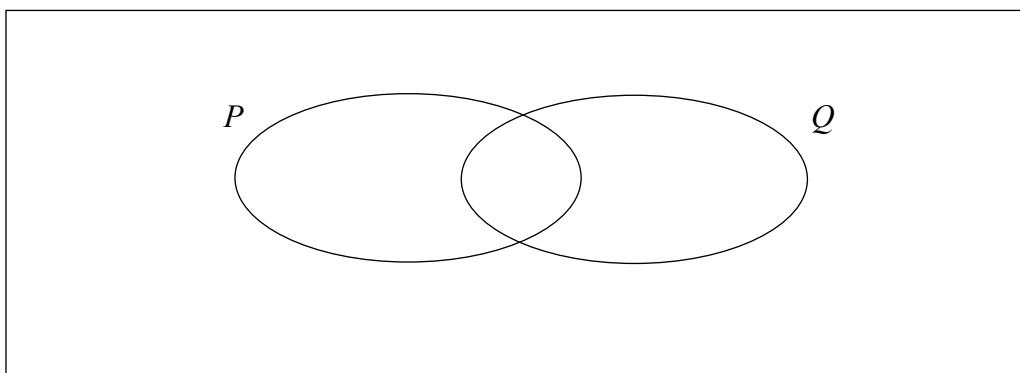
Question	Mark
1	
2	
3	
4	
5	
6	
Total	
Grade	

For Superintendent/Examiner use only:

Centre Stamp

1. (a)  $P = \{w, x, y, z\}$        $Q = \{v, w, x\}$

Fill the elements of  $P$  and  $Q$  into the following diagram.

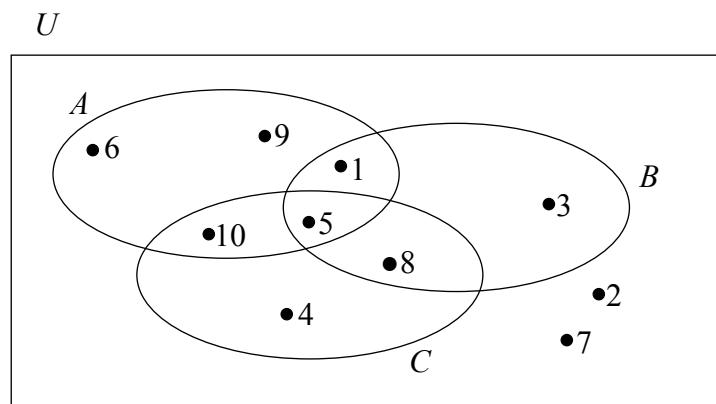


1(b)  $U$  is the universal set.

$$A = \{1, 5, 6, 9, 10\}$$

$$B = \{1, 3, 5, 8\}$$

$$C = \{4, 5, 8, 10\}$$



(i) List the elements of  $B \cup C$ .

(ii) List the elements of  $A'$ , the complement of the set  $A$ .

(iii) List the elements of  $(B \cap C) \setminus A$ .

(iv) Write down  $\#B$ .

**1(c)** In a survey, a group of students were asked if they were studying French or German at school.

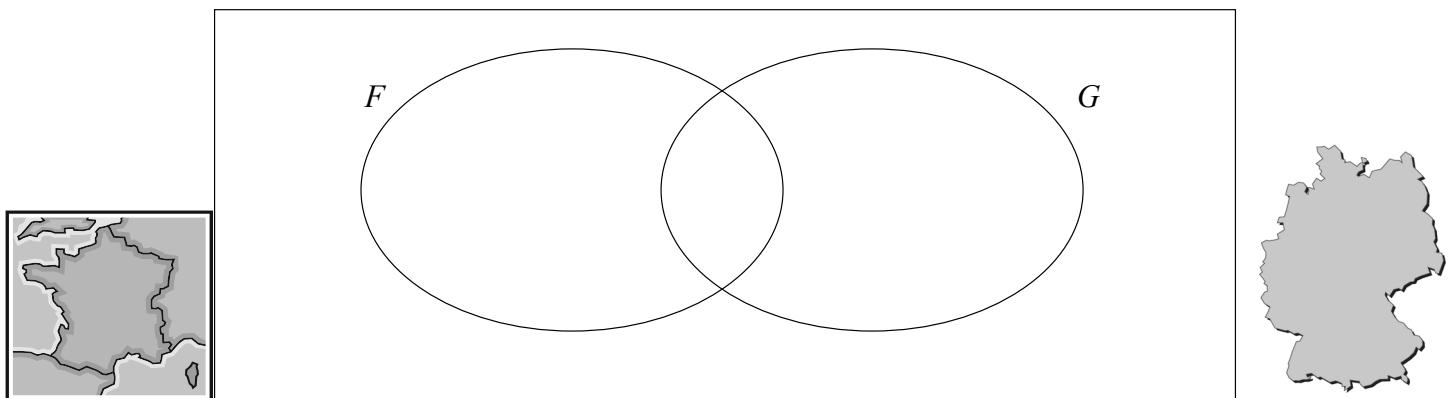
80 of these students said they were studying French ( $F$ ).

24 of these students said they were studying German ( $G$ ).

15 of these students said they were studying both French and German.

11 of these students said they were studying neither of the two languages.

**(i)** Represent this information in the Venn diagram below.



**(ii)** How many students were in the group?

**(iii)** How many students did not study German?

2. (a) 9 metres of cloth cost €13·95. Find the cost of 20 metres of the same cloth.



- 2(b) (i) Simplify  $\frac{a^9 \times a^3}{a^6 \times a^2}$ , giving your answer in the form  $a^n$ , where  $n \in \mathbb{N}$ .



$$\frac{a^9 \times a^3}{a^6 \times a^2} =$$

- (ii) By rounding each of these numbers to the nearest whole number,  
estimate the value of  $\frac{18\cdot207}{3\cdot7 + 2\cdot08}$ .



$\frac{18\cdot207}{3\cdot7 + 2\cdot08}$  is approximately equal to:

$$\frac{\boxed{\phantom{00}}}{\boxed{\phantom{0}} + \boxed{\phantom{0}}} = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{0}}} = \boxed{\phantom{00}}$$

- (iii) Using a calculator, or otherwise, find the exact value of  $\frac{18\cdot207}{3\cdot7 + 2\cdot08}$ .



**2(c) (i)** Using a calculator, or otherwise, write  $\frac{1}{8}$  and  $\frac{13}{80}$  as decimals.

Hence or otherwise, put the following numbers in order, starting with the smallest and finishing with the largest:

$$\frac{1}{8}, \frac{13}{80}, 0.1525.$$

$$\frac{1}{8} =$$

$$\frac{13}{80} =$$

\_\_\_\_\_ , \_\_\_\_\_ , \_\_\_\_\_ .

**(ii)** Using a calculator, or otherwise, find the exact value of  $(3.61)^{\frac{1}{2}}$ .

$$(3.61)^{\frac{1}{2}} =$$

**(iii)** Using a calculator, or otherwise, evaluate

$$\sqrt{94.09} \times (2.75)^2 - \frac{1}{0.3125}.$$

Give your answer correct to two decimal places.



- 3. (a)** Aideen owns 6000 shares in a certain company.  
She sells two-thirds of her shares.  
How many shares does she now own in the company?

- 3(b) (i)** Brian's gross annual pay is €26 000. His annual tax credit is €2800. He pays income tax at the rate of 20%. What is his annual take-home pay?



<b>Gross Pay</b>	€26 000
<b>Tax @ 20%</b>	
<b>Tax Credit</b>	€2800
<b>Tax Due</b>	
<b>Take-home Pay</b>	

- (ii) A dealer buys a car for €17 500. He sells the car for €23 800.  
Calculate his profit as a percentage of the cost price.



- 3(c) (i) €20 000 is invested at  $5 \cdot 2\%$  per annum.  
What is the amount of the investment at the end of one year?



- (ii) €5000 is withdrawn from this amount at the beginning of the second year.  
The interest rate for the second year is  $6 \cdot 25\%$  per annum.  
What is the amount of the investment at the end of that year?



4. (a) If  $a = 5$ , find the value of :



(i)  $4a + 1$



(ii)  $a^2 - 3a + 6$

4(b) (i) Solve the equation  $5x - 10 = 3(x + 2)$ .



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



4(c)

- (i) The cost of a cinema ticket is € $t$  for an adult and €5 for a child.  
The cost of tickets for 2 adults and 3 children is €33.

Write down an equation in  $t$  to represent this information.



- (ii) Solve the equation you formed in part (i) above, for  $t$ .



- (iii) Solve for  $x$  and for  $y$ :

$$5x - 4y = 16$$

$$2x + 3y = 11$$



$x =$                      $y =$

5. (a) Write in its simplest form  $3(x + 2) + 4(3x + 1)$ .



- 5(b) Factorise

(i)  $5cd + 7d$



(ii)  $ax + 3ay + 4x + 12y$

(iii)  $x^2 - 49$

5(c)

(i) Express  $\frac{5x+1}{3} - \frac{x+6}{5}$  as a single fraction.

Give your answer in its simplest form.



(ii) Verify your answer to part (i) by substituting  $x = 4$  into  $\frac{5x+1}{3} - \frac{x+6}{5}$   
**and** into your answer to part (i).



(iii) Solve the equation  $x^2 - 4x - 21 = 0$ .



**6.** (a)  $f(x) = 4x - 5$ . Find:



(i)  $f(3)$



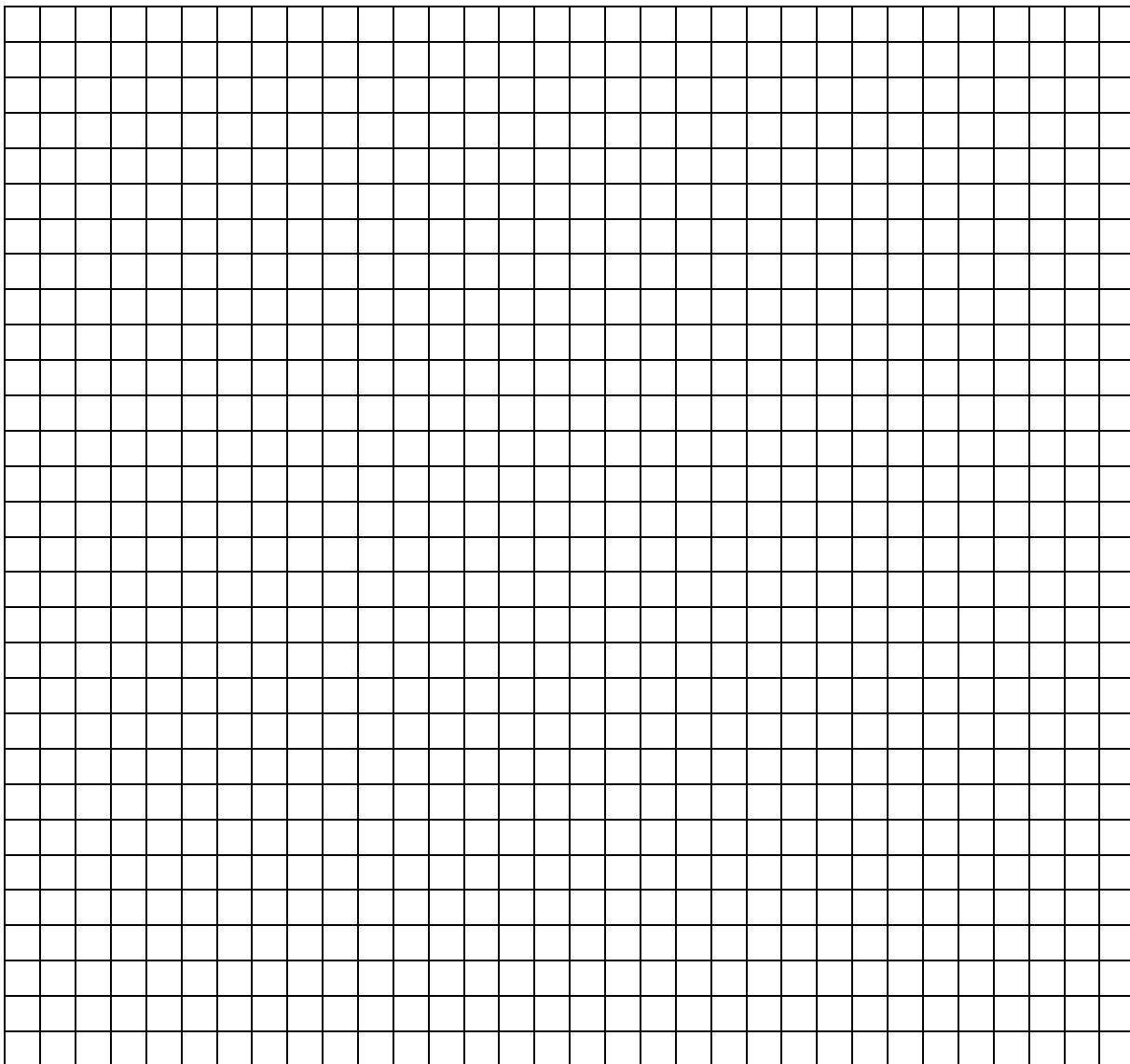
(ii)  $f(-2)$

**6(b)** Draw the graph of the function

$$f: x \rightarrow x^2 - 2x - 1$$

in the domain  $-1 \leq x \leq 3$ , where  $x \in \mathbf{R}$ .





**6(c)** Use the graph drawn in **6(b)** to estimate:

- (i) the values of  $x$  for which  $x^2 - 2x - 1 = 0$



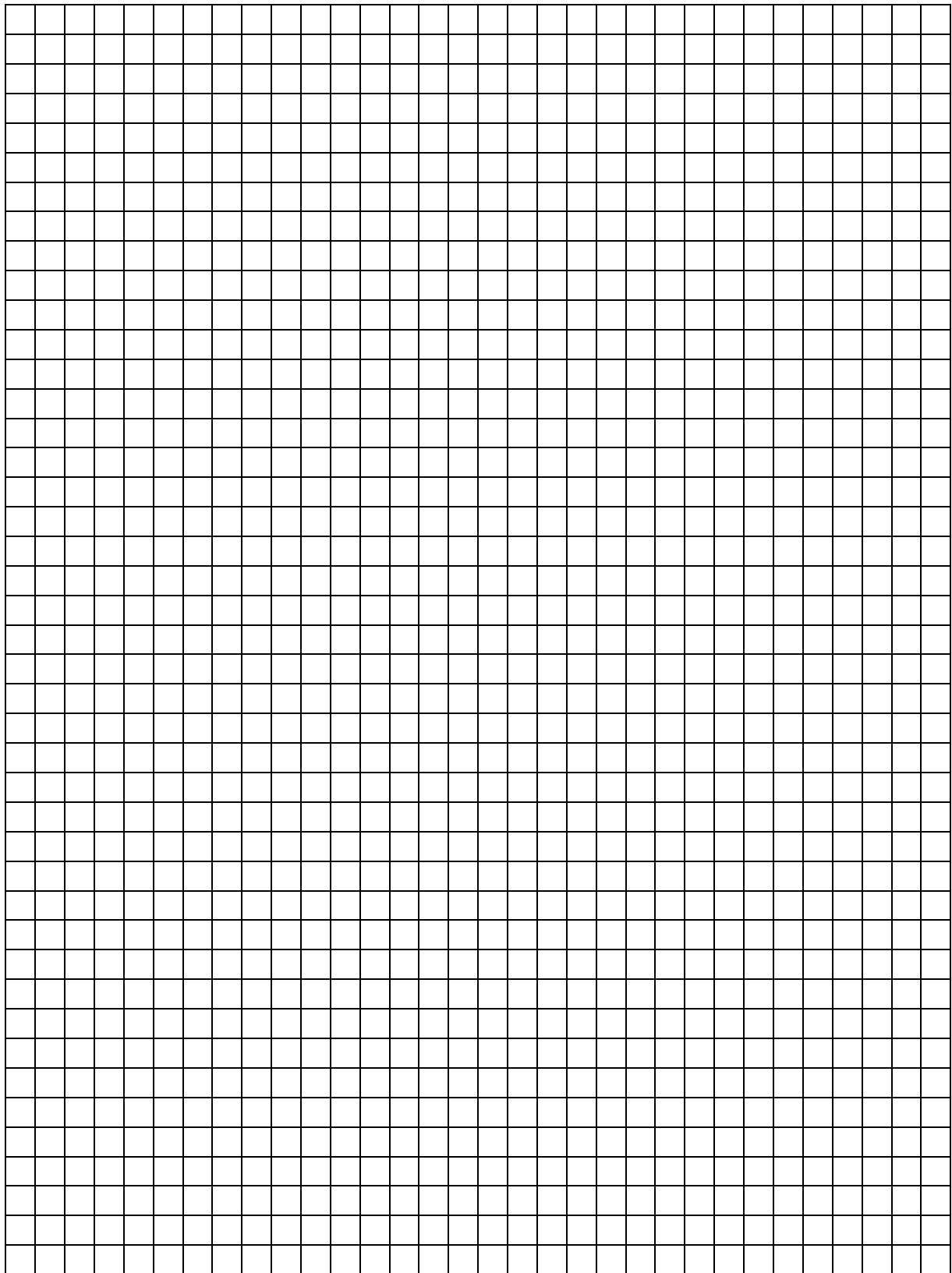
Work to be shown on the graph and answer to be written here.

- (ii) the value of  $f(x)$  when  $x = 1.5$ .



Work to be shown on the graph and answer to be written here.

**Space for extra work**



**Space for extra work**

**Space for extra work**