

FOR THE EXAMINER

EXAM. NUMBER:

Total  
Marks:


# Coimisiún na Scrúduithe Stáit State Examinations Commission

## JUNIOR CERTIFICATE EXAMINATION, 2005

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

#### THURSDAY, JUNE 9 - 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)  $P = \{x, y, w\}$

(i) Write down a subset of  $P$  that has one element.

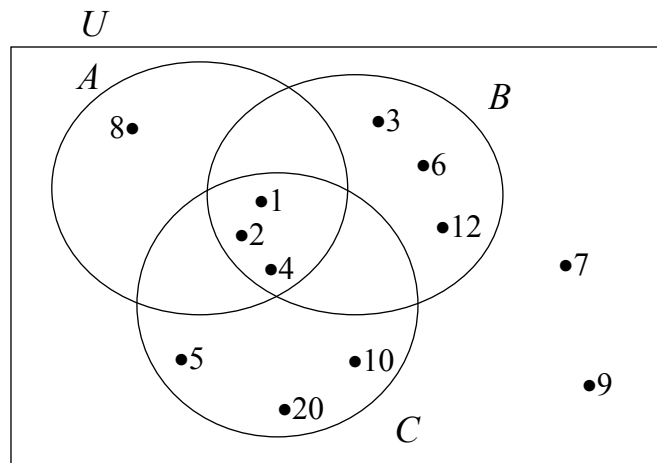
(ii) Write down a subset of  $P$  that has two elements.

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

$A = \{1, 2, 4, 8\}$ ,  
the set of divisors of 8.

$B = \{1, 2, 3, 4, 6, 12\}$ ,  
the set of divisors of 12.

$C = \{1, 2, 4, 5, 10, 20\}$ ,  
the set of divisors of 20.



(i) List the elements of  $A \cap C$ .

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

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

(iv) Using the Venn diagram above, or otherwise, find the highest common factor of 8, 12 and 20.

**1(c)**  $M$  is the set of natural numbers from 1 to 20, inclusive.


**(i)** List the elements of  $M$  that are multiples of 3.

**(ii)** List the elements of  $M$  that are multiples of 5.

**(iii)** Write down the lowest common multiple of 3 and 5.

**(iv)** Express 10 as the sum of three prime numbers.

2. (a) If 12 m<sup>2</sup> of carpet cost €504, find the cost of 15 m<sup>2</sup> of the same carpet.




- 2(b) (i) Simplify  $\frac{a^9 \times a^5}{a^6 \times a^2}$ , giving your answer in the form  $a^n$ , where  $n \in \mathbf{N}$ .



$$\frac{a^9 \times a^5}{a^6 \times a^2} =$$

- (ii) By rounding each of these numbers to the nearest whole number, estimate the value of  $\frac{56 \cdot 214}{2 \cdot 31 + 5 \cdot 79}$ .



$\frac{56 \cdot 214}{2 \cdot 31 + 5 \cdot 79}$  is approximately equal to:

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+

=

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=

- (iii) Using a calculator, or otherwise, find the exact value of  $\frac{56 \cdot 214}{2 \cdot 31 + 5 \cdot 79}$ .

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

(i)  $49^{\frac{1}{2}}$



(ii)  $\frac{1}{6 \cdot 4}$


(iii) Using a calculator, or otherwise, evaluate

$$\sqrt{65 \cdot 61} \times \frac{3 \cdot 14}{0 \cdot 47} - (2 \cdot 42)^2.$$

Give your answer correct to two decimal places.




- 3. (a)** Aoife bought 3 compact discs at €16.50 each and 2 magazines at €4.20 each. How much did she pay altogether?




A large empty rectangular box for writing the answer to question 3(a).

- 3(b) (i)** Patrick bought a car for €14 080 and sold it for €16 000. Calculate his profit as a percentage of the selling price.




Profit:



Percentage of selling price:

A large empty rectangular box for writing the answer to question 3(b)(i), with two lines of text and handwriting icons.

- (ii)** €6000 is invested at 5% per annum. What is the amount of the investment at the end of one year?



A large empty rectangular box for writing the answer to question 3(b)(ii), with a handwriting icon.

**3(c)**

Helen's weekly wage is €850.

She pays income tax at the rate of 20% on the first €600 of her wage and income tax at the rate of 42% on the remainder of her wage.

Helen has a weekly tax credit of €54.

**(i)** Calculate the tax payable at the rate of 20% on the first €600 of her wage.



**(ii)** Calculate the tax payable at the rate of 42% on the remainder of her wage.





**(iii)** Hence calculate Helen's gross tax.




**(iv)** Calculate the tax payable by Helen.



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

	(i) $5x + 3$
	(ii) $x^2 - x + 7$

- 4(b) (i) Multiply  $(3x - 2)$  by  $(4x + 5)$  and write your answer in its simplest form.


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- (ii) Write in its simplest form

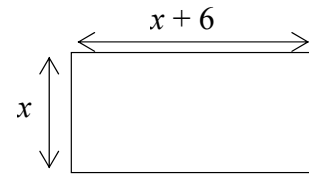
$$(4x^2 - 3x + 7) + (x^2 - 2x - 8).$$


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4(c)

A rectangle has a length  $(x + 6)$  cm and width  $x$  cm, as in the diagram.



(i) Find the perimeter of this rectangle in terms of  $x$ .

A large rectangular box for writing the answer to part (i). In the top-left corner, there is a small icon of a hand holding a pen.

(ii) If the perimeter of the rectangle is 40 cm, write down an equation in  $x$  to represent this information.

A large rectangular box for writing the answer to part (ii). In the top-left corner, there is a small icon of a hand holding a pen.


(iii) Solve the equation that you formed in part (ii) above, for  $x$ .

A large rectangular box for writing the answer to part (iii). In the top-left corner, there is a small icon of a hand holding a pen.

(iv) Find the area of the square with the same perimeter as the given rectangle. Give your answer in  $\text{cm}^2$ .

A large rectangular box for writing the answer to part (iv). In the top-left corner, there is a small icon of a hand holding a pen.

5. (a) Solve the equation  $5x - 6 = 3(x + 4)$



5(b) Factorise:

(i)  $4ab + 8b$




(ii)  $ab + 2ac + 5b + 10c$


(iii)  $x^2 + 2x - 15$

(iv)  $x^2 - y^2$

- 5(c) (i) Express  $\frac{x+5}{4} + \frac{x+2}{3}$  as a single fraction.  
Give your answer in its simplest form.

  $\frac{x+5}{4} + \frac{x+2}{3} =$

- (ii) Hence, or otherwise, solve the equation

  $\frac{x+5}{4} + \frac{x+2}{3} = \frac{5}{2}$

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

$$3x - y = 8$$

$$x + 2y = 5$$



$x =$   $y =$

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



**(i)**  $f(3)$



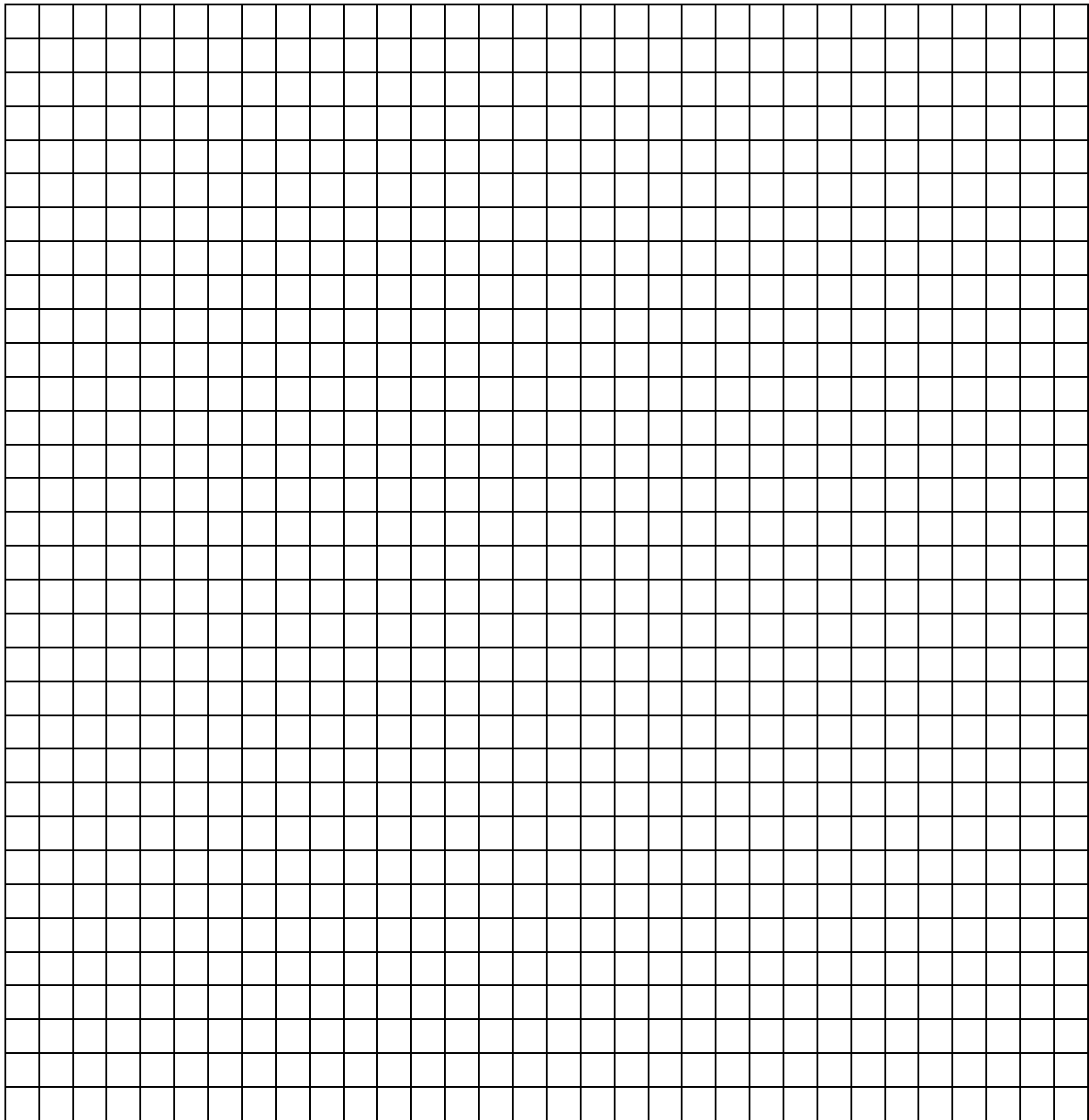
**(ii)**  $f(-2)$

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

$$f: x \rightarrow x^2 + x - 3$$

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





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

- (i)** the values of  $x$  for which  $f(x) = 0$



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

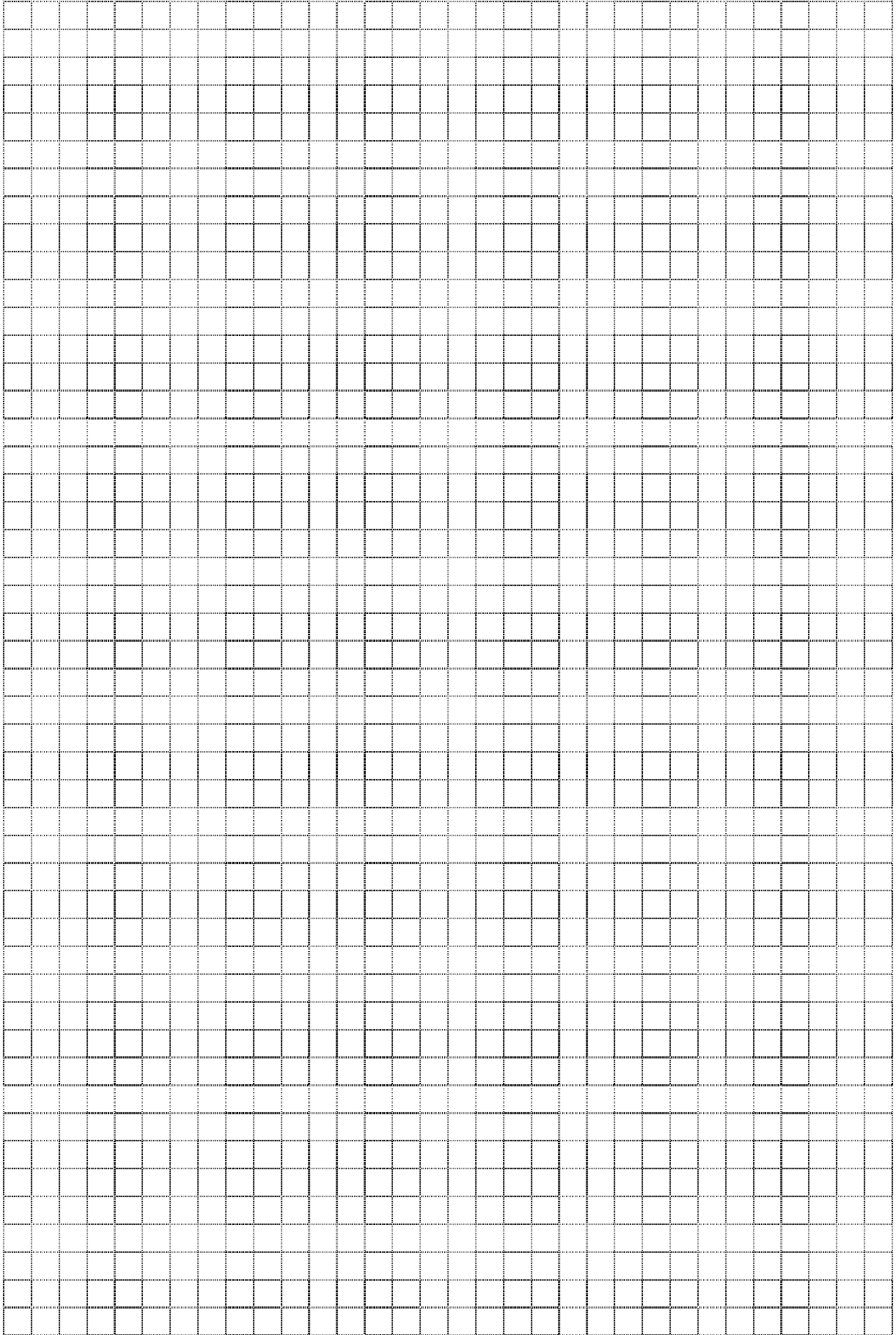
- (ii)** the value of  $f(x)$  when  $x = 0.5$ .



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**