

FOR THE EXAMINER

EXAM. NUMBER:

Total
Marks:


Coimisiún na Scrúduithe Stáit State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2013

MATHEMATICS – ORDINARY LEVEL – PAPER 1 (300 marks)

FRIDAY, 7 JUNE – AFTERNOON, 2.00 to 4.00

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.

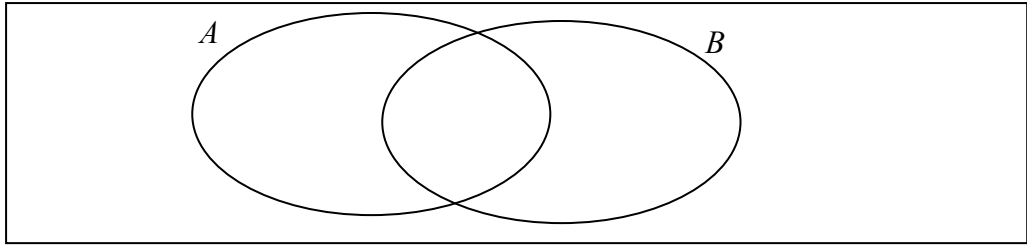
Make and model of calculator used:

For Superintendent/Examiner use only:

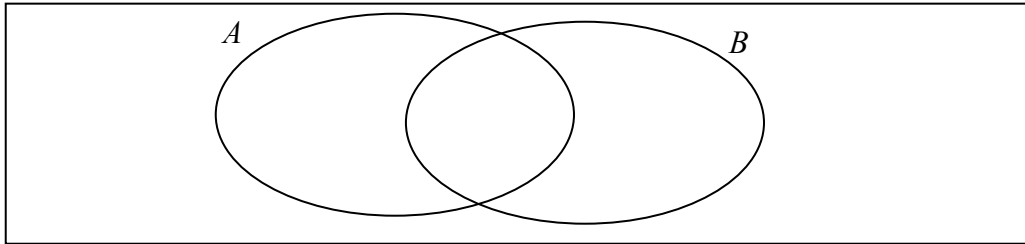
Centre Stamp

Question	Mark	Adv. Exam.
1		
2		
3		
4		
5		
6		
Total		
Grade		

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



- (ii) Using the Venn diagram below, shade in the region that represents $B \setminus A$.

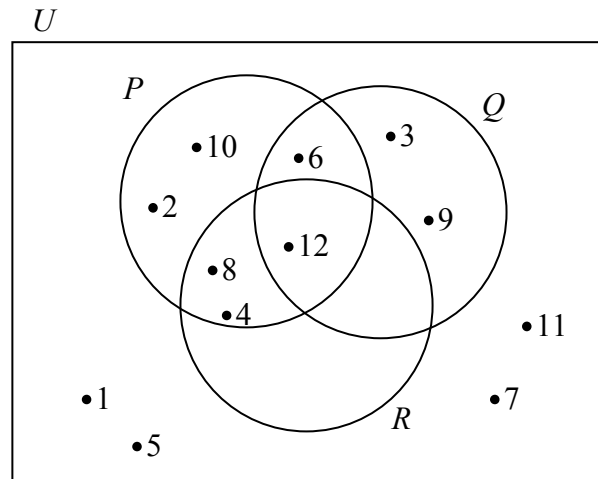


- (b) U is the universal set.

$P = \{2, 4, 6, 8, 10, 12\}$ is the set of multiples of 2 less than 13.

$Q = \{3, 6, 9, 12\}$ is the set of multiples of 3 less than 13.

$R = \{4, 8, 12\}$ is the set of multiples of 4 less than 13.



- (i) List the elements of $Q \cup R$.

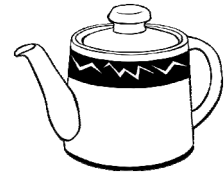
- (ii) List the elements of P' , the complement of the set P .

- (iii) Write down $\#R$.

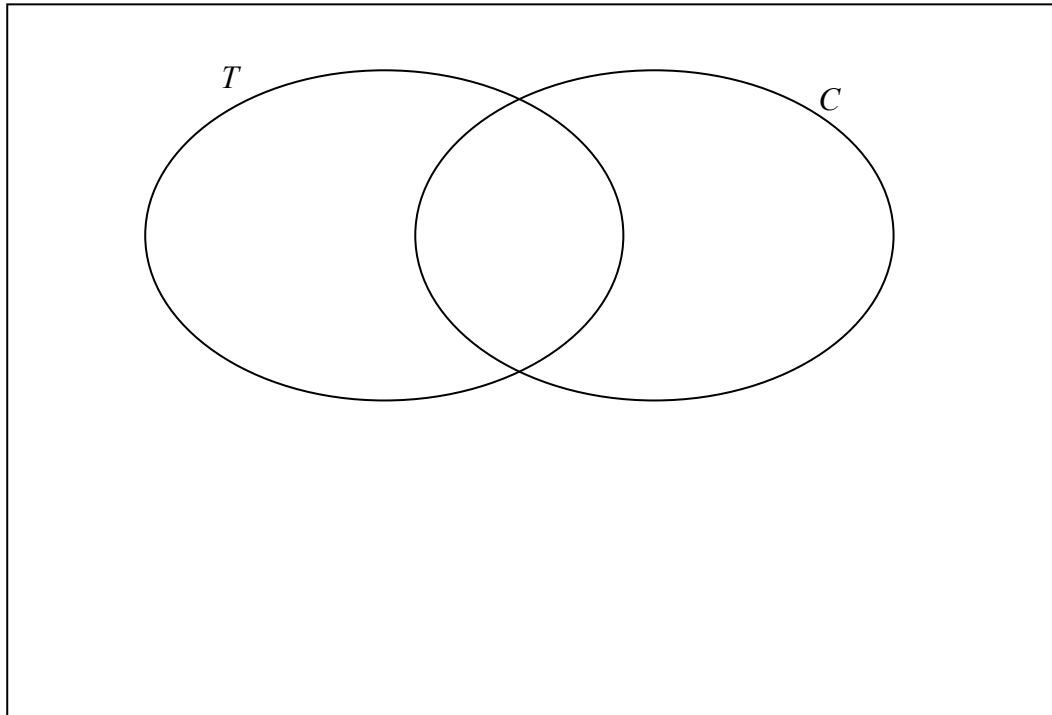
- (iv) What is the lowest common multiple of 2, 3 and 4?

- (c) In a class survey, a group of students were asked if they liked tea (T) or coffee (C).

21 said they liked tea.
17 said they liked coffee.
12 said they liked tea and coffee.
3 said they liked neither tea nor coffee.



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

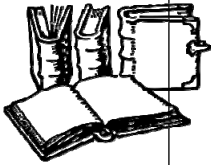


- (ii) How many students were in the group?

- (iii) How many liked either tea or coffee only?

2. (a) A book online cost £28.00, plus a delivery charge of £5.00.

What is the total cost of the book in euro, if the exchange rate is £1 = €1.25?






(b) (i) The population of a town in the year 2000 was 4850.
The population of the same town in 2010 was 5917.



What was the percentage increase in the population from 2000 to 2010?



(ii) By rounding each of these numbers to the nearest whole number, estimate the value of $\frac{15.765 + 5.47}{6.85}$.



$\frac{15.765 + 5.47}{6.85}$ is approximately equal to


$$\frac{\boxed{} + \boxed{}}{\boxed{}} = \frac{\boxed{}}{\boxed{}} = \boxed{}$$

(iii) Using a calculator, or otherwise, find the exact value of $\frac{15.765 + 5.47}{6.85}$.

- (c) (i) Using a calculator, or otherwise, find the exact value of $(8 \cdot 41)^{\frac{1}{2}}$.

$$(8 \cdot 41)^{\frac{1}{2}} =$$

- (ii) Simplify $\frac{a^6 \times a^3}{a^5}$. Give your answer in the form a^n , where $n \in \mathbb{N}$.


$$\frac{a^6 \times a^3}{a^5} =$$

- (iii) Two jars of the same brand of coffee are for sale in a shop.
The smaller jar contains 150 g and is priced at €5.28.
The larger jar contains 250 g and is priced at €8.50.
Which is the better value?
Show work to explain your answer.



3. (a) Place the following numbers in order, starting with the lowest:

$$\frac{3}{4}, \quad 0.7, \quad 72\%.$$

(b) (i) Lena's gross pay is €25 000. Her tax credit is €3200.
She pays income tax at the rate of 20%.

Calculate Lena's take home pay.



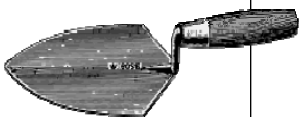
Gross Pay	€25 000
Tax @ 20%	
Tax Credit	€3200
Tax Due	
Take-home Pay	

(ii) Strong mortar can be used for exposed brickwork.
Sand and cement are mixed in a particular ratio to make strong mortar.

75 kg of strong mortar contains 60 kg of sand.

Find the ratio of sand to cement in the mixture.

Give your answer in its simplest form.




- (c) €10 000 is invested at 1.5% per annum, compound interest.
- (i) What is the amount of the investment at the end of one year?



A large empty rectangular box for writing the answer to question (i). A small icon of a hand writing is in the top-left corner.


- (ii) The money is left invested for a second year.
How much interest is earned over the two years?




A large empty rectangular box for writing the answer to question (ii). A small icon of a hand writing is in the top-left corner.



4. (a) If $x = 3$, find the value of:

 (i) $4x + 5$

 (ii) $20 - x^2$

(b) (i) Factorise $x^2 - 4$.

(ii) Factorise $3x - 3y + cx - cy$.



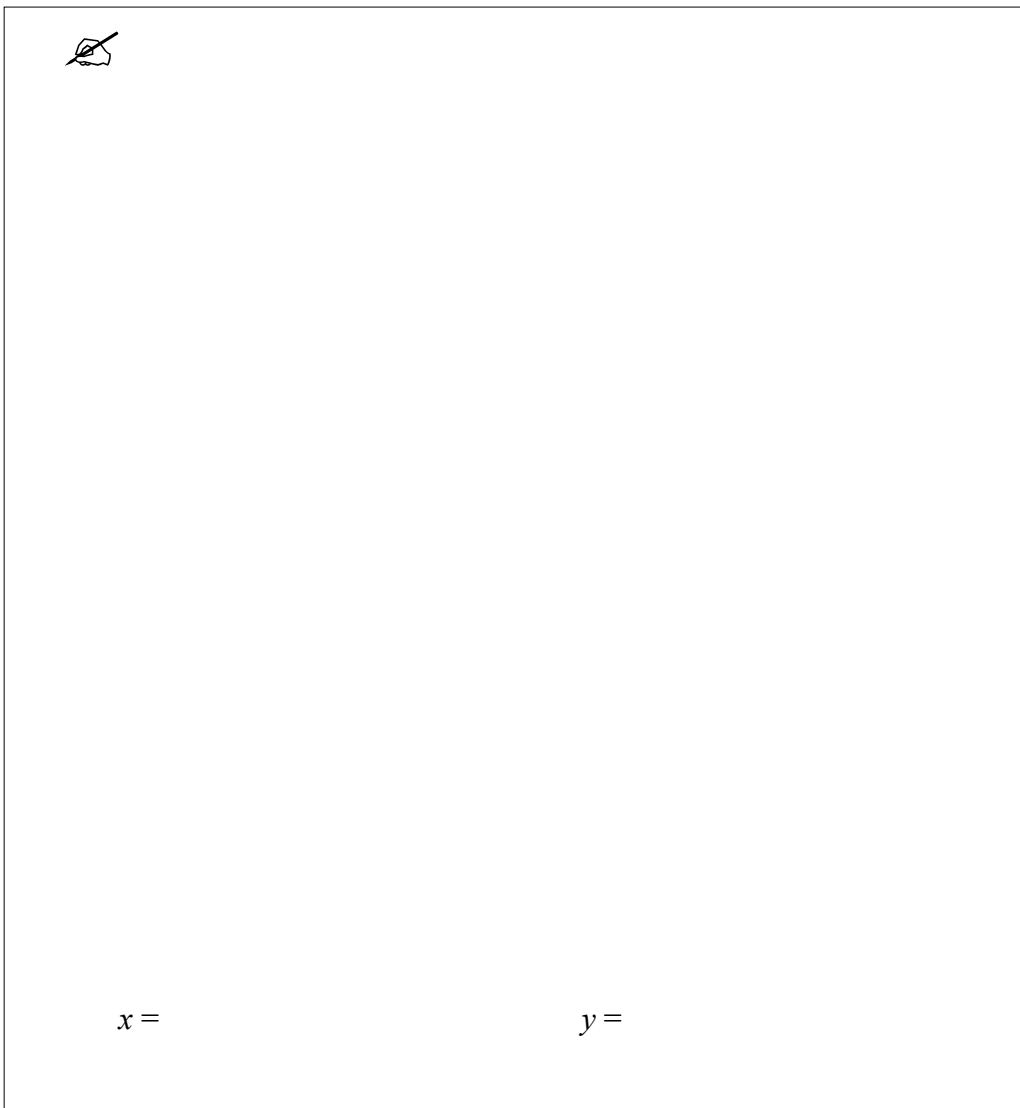
(iii) Multiply $(2x - 3)$ by $(4x - 1)$. Write your answer in its simplest form.



- (c) (i) Solve the equation $x^2 + 7x - 18 = 0$.



- (ii) Solve for x and y :
 $3x + y = 13$
 $2x - 5y = 20$



$x =$ $y =$

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



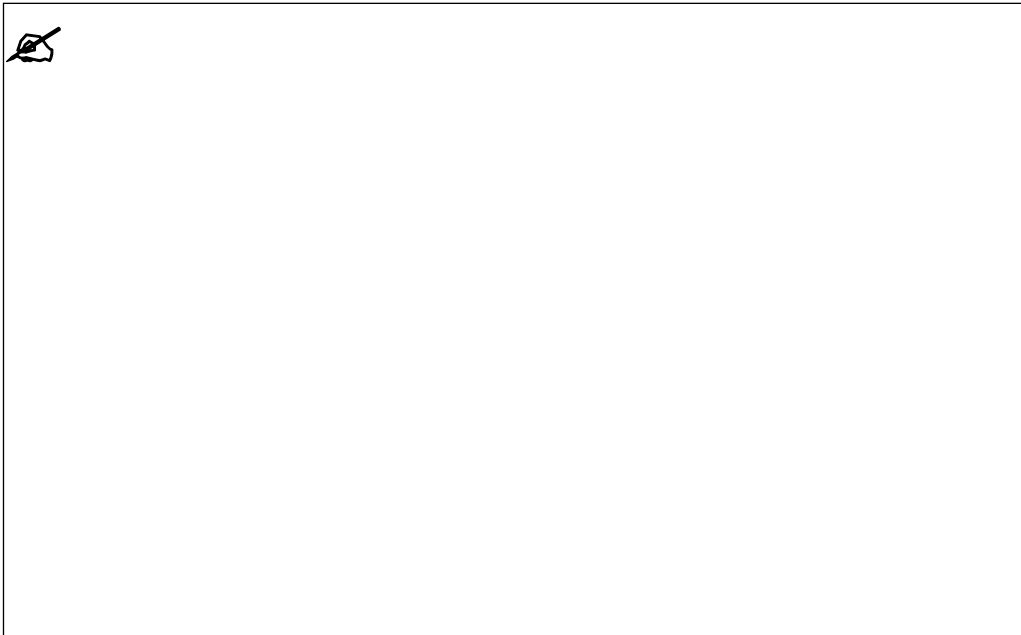
(b) (i) Find the values of x for which $4x - 1 < 11$, $x \in \mathbb{N}$.



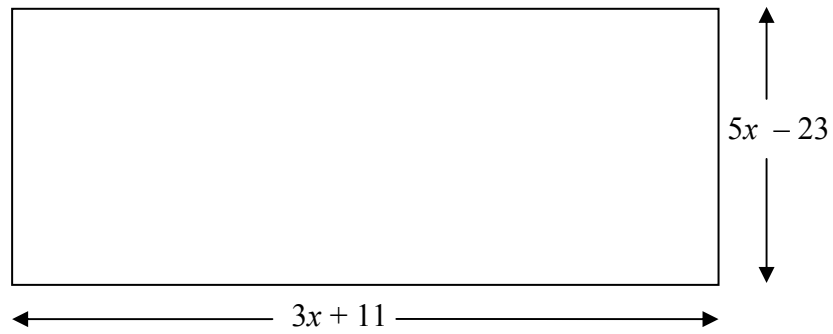
(ii) Write $\frac{4x}{7} - \frac{x}{2}$ as a single fraction.



(iii) Verify your answer to part **(ii)** by letting $x = 7$ in $\frac{4x}{7} - \frac{x}{2}$
and in your answer to **(ii)**.



- (c) The length of a rectangle is $(3x + 11)$ units and the width is $(5x - 23)$ units, as shown in the diagram.



- (i) Find, in terms of x , the perimeter of the rectangle.

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- (ii) If the perimeter is 88 units, find x .

A large empty rectangular box for the answer to part (ii). There is a small hand-drawn scribble in the top-left corner.


6. (a) $f(x) = 3x - 5$. Find:

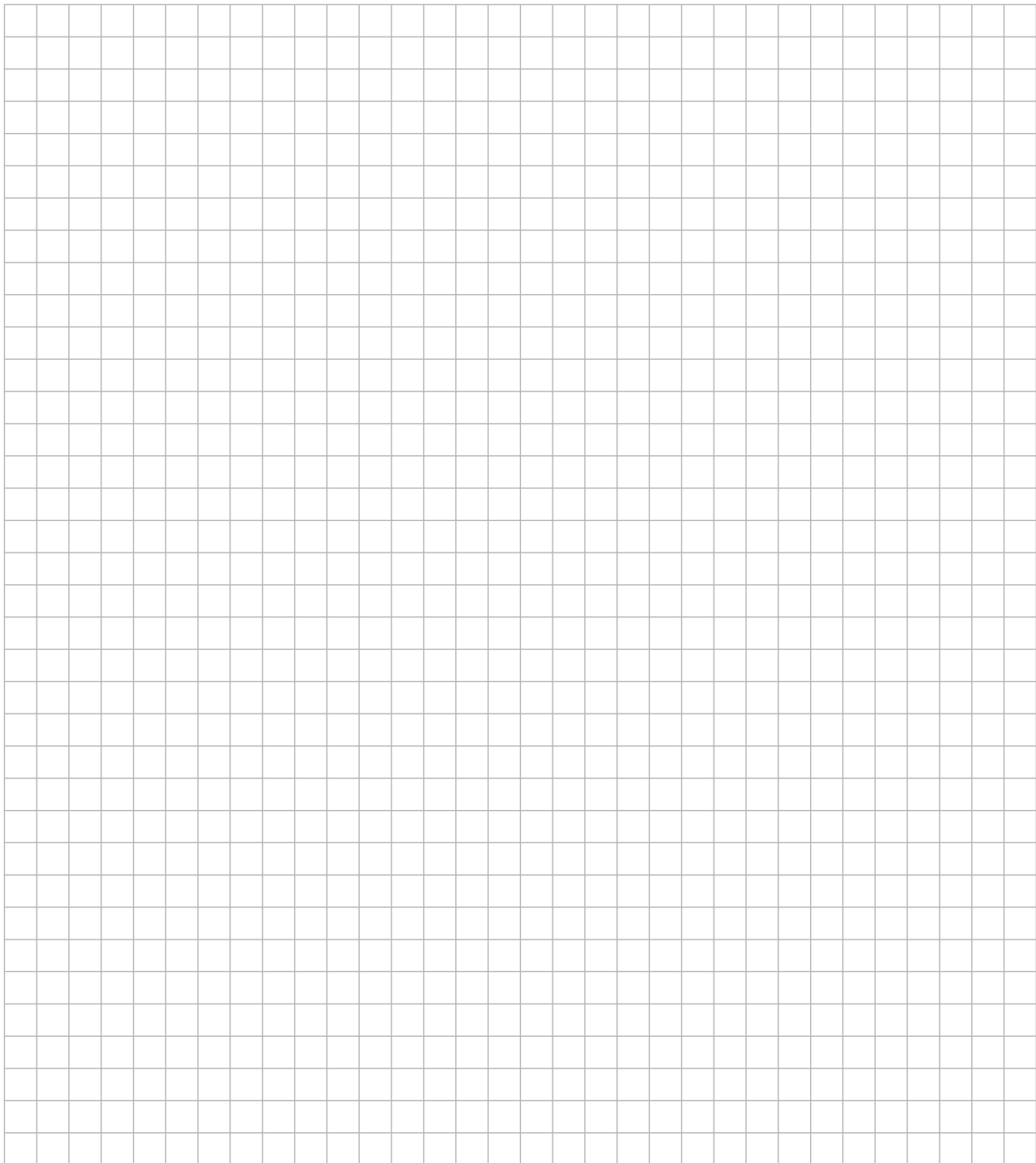
	(i)	$f(7)$
	(ii)	$f(-1)$

(b) Draw the graph of the function


$$g : x \rightarrow 2x^2 - 2x - 5$$

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






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

(i)  The value of $2x^2 - 2x - 5$ when $x = 0.5$. (Show work on graph)

Answer: _____

(ii)  The values of x for which $g(x) = 0$. (Show work on graph)

Answers: _____

Space for extra work



Space for extra work

Space for extra work