FOR THE EXAMINER

EXAM. NUMBER:

Total Marks:

Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2011

MATHEMATICS – ORDINARY LEVEL – PAPER 1 (300 marks)

FRIDAY, 10 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		

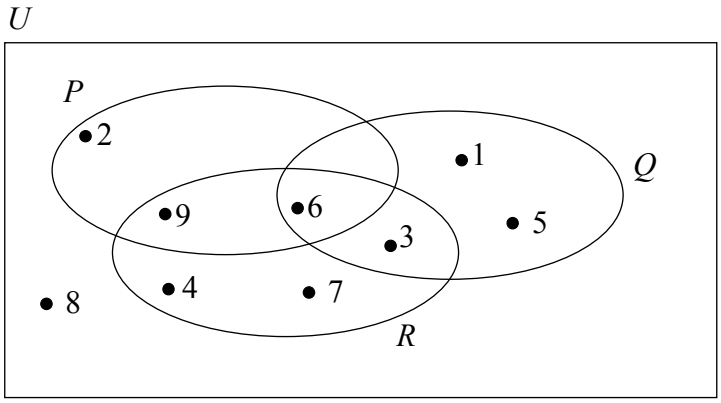
1. **(a)** $S = \{w, x, y, z\}$

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

(ii) Write down a subset of S that has three elements.

(b) U is the universal set.

$P = \{2, 6, 9\}$
$Q = \{1, 3, 5, 6\}$
$R = \{3, 4, 6, 7, 9\}$



List the elements of:

(i) $R \setminus Q$

(ii) P', the complement of set P

(iii) $Q \cup (P \cap R)$

(iv) $(Q \cap R) \setminus P$

(c) **(i)** List all the divisors of 18 and 24.

Divisors of 18:

Divisors of 24:

(ii) Write down the highest common factor of 18 and 24.

Highest common factor =

(iii) {5, 7, 9, 11, 13, 15} is the set of odd numbers between 4 and 16.

Which of these numbers are <u>not</u> prime numbers?
Give a reason for your answer.

Not prime numbers:

Reason:

2. **(a)** €52 is divided between Fiona and Orla in the ratio 9:4.

How much does each receive?

Fiona: Orla:

(b) **(i)** By rounding each of these numbers to the nearest whole number, estimate the value of $\frac{14 \cdot 18 - 4 \cdot 086}{1 \cdot 96}$.

$\frac{14 \cdot 18 - 4 \cdot 086}{1 \cdot 96}$ is approximately equal to:

$\frac{\square - \square}{\square} = \frac{\square}{\square} = \square$

(ii) Using a calculator, or otherwise, find the exact value of $\frac{14 \cdot 18 - 4 \cdot 086}{1 \cdot 96}$.

(iii) Find the difference between the exact value in **(ii)** and the estimated value in **(i)**.

(c) **(i)** Write $(a^3)^2$ in the form a^n, $n \in \mathbb{N}$.

(ii) Using your answer from **(i)** or otherwise evaluate $(5^3)^2$.

$(5^3)^2 =$

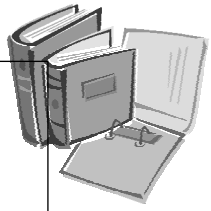
Before going on holidays to the USA Seán changed €500 into dollars.
The exchange rate was €1 = US$1·22.

(iii) How many dollars did Seán get?

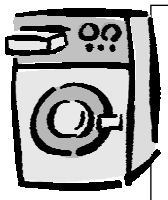
(iv) When Seán came home he changed US$50 back into euro (€).
The exchange rate was the same.

How much, in euro, did Seán receive?
Give your answer to the nearest cent.

3. **(a)** Three books were bought. They cost €8·75, €9·50 and €10·55 respectively.
If a €50 note was used to pay for the books, how much change was given?



(b) **(i)** A washing machine costs €320 plus VAT at 21·0%.
Calculate the total cost of the washing machine after the VAT is added.



(ii) A popular breakfast cereal comes in two sizes of packet,
Regular (360 g) and *Large* (900 g).
A standard portion of cereal is 30 g.
How many portions are there in each size of packet?

Regular: Number of portions =

Large: Number of portions =

(iii) A *Regular* box costs €0·96 and a *Large* box costs €2·25.
Using the number of portions per box, or otherwise,
find which size is better value?

(c) Geraldine's annual wage is €40 000.
She pays income tax at the rate of 20% on the first €33 000 of her wage and income tax at the rate of 41% on the remainder of her wage.
Geraldine has an annual tax credit of €3500.

(i) Calculate the tax on the first €33 000 of her wage, at the rate of 20%.

(ii) How much of Geraldine's wage is taxed at the rate of 41%?

(iii) Calculate the amount of tax payable at the rate of 41%.

(iv) Calculate the tax due.

Total Tax	
Tax Credit	
Tax Due	

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

(i) $3a + 5$

(ii) $3a^2 - 20$

(b) **(i)** Write as a single fraction $\frac{x}{3} + \frac{5x}{6}$.

$\frac{x}{3} + \frac{5x}{6} =$

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

(c) **(i)** The cost of a DVD is €x. The cost of a CD is €3 less.

What is the cost of a CD in terms of x?

(ii) The total cost of 3 DVDs and 2 CDs is €54.

Write an equation in x to represent this information.
Solve your equation to find the cost of a DVD.

Equation:

Cost of a DVD =

(iii) Solve for x and y: $5x + 3y = 12$
$3x + 2y = 11$

x = y =

5. **(a)** Write in its simplest form $2(x + 5) + 7(2x + 3)$.

(b) Factorise:

(i) $4xy - 8y$

(ii) $xy - xz + 3y - 3z$

(iii) $x^2 + 7x + 12$

(iv) $x^2 - 64$

(c) **(i)** Solve the equation $5(3x + 1) – 2(5x + 35) = 0$.

Verify your answer.

Solve:

Verify:

(ii) Solve $x^2 + 3x – 10 = 0$.

6. **(a)** $f(x) = 2x - 7$. Find:

(i) $f(4)$

(ii) $f(-3)$

(b) Draw the graph of the function

$$g : x \to 2x^2 - 4x + 1$$

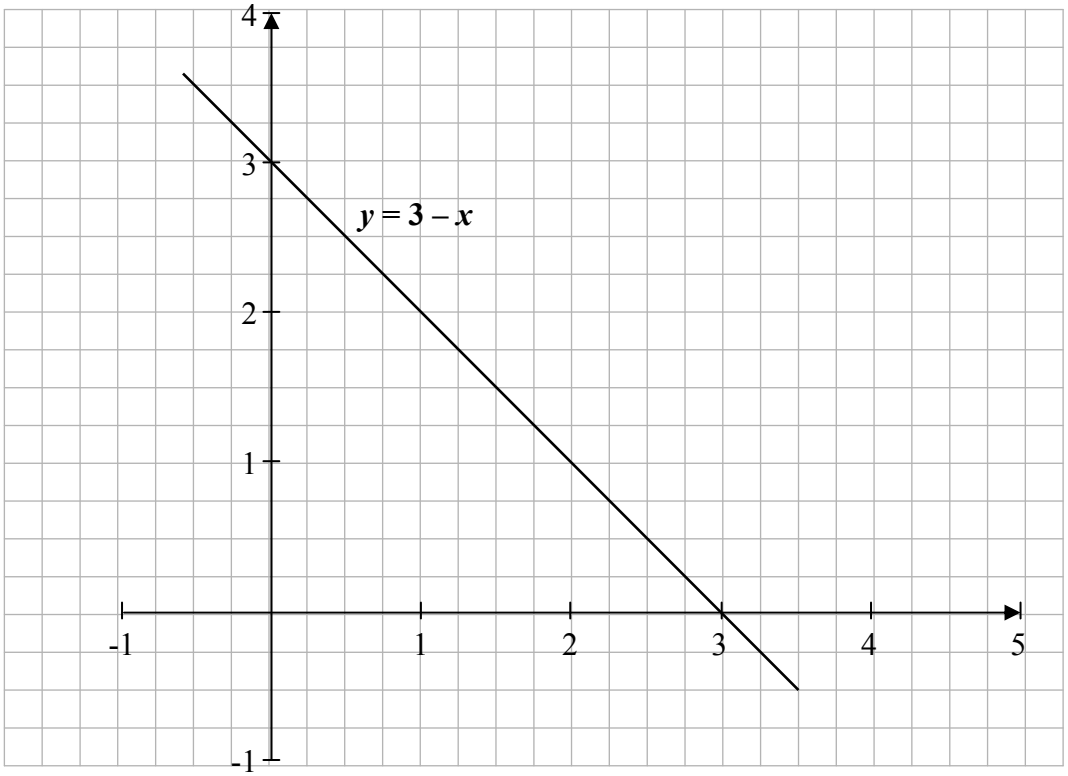
in the domain $-1 \leq x \leq 3$, where $x \in \mathbb{R}$.

Part (c) on next page

(c) **(i)** Given that $y = x - 1$, complete the table below.

x	1	2	3	4
y				

(ii) On the grid below the graph of the line $y = 3 - x$ is drawn.
Using your answers from **(i),** draw the graph of $y = x - 1$ on the same grid.



(iii) Use the graphs drawn in **6(c) (ii)** to write down the co-ordinates of the point of intersection of the two lines $y = 3 - x$ and $y = x - 1$.

Answer to be written here.

Space for extra work

Space for extra work