FOR THE EXAMINER

EXAM. NUMBER:

Total Marks:

Coimisiún na Scrúduithe Stáit
State Examinations Commission

JUNIOR CERTIFICATE EXAMINATION, 2010

MATHEMATICS - ORDINARY LEVEL - PAPER 1 (300 marks)

FRIDAY, JUNE 11 - 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.

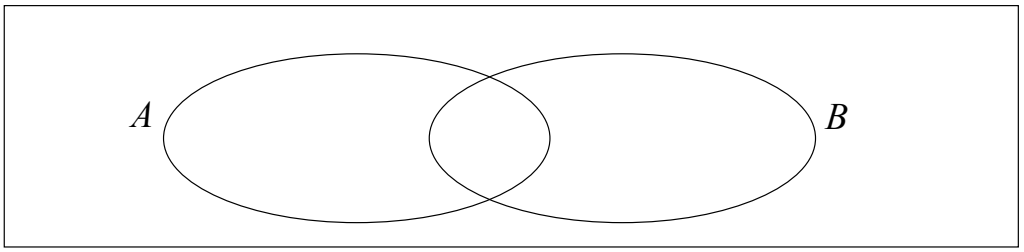
Make and model of calculator used:

For Superintendent/Examiner use only:

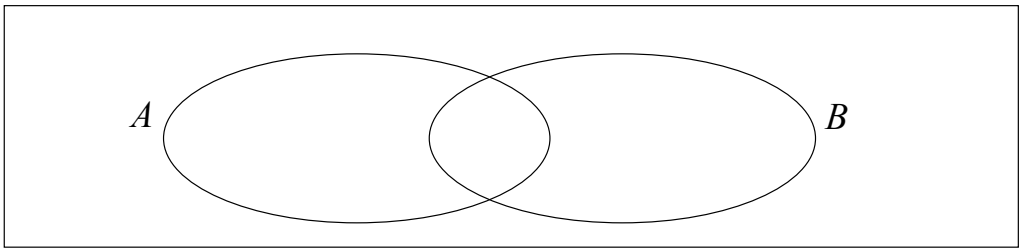
Centre Stamp

Question	Mark
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 $A \setminus B$.

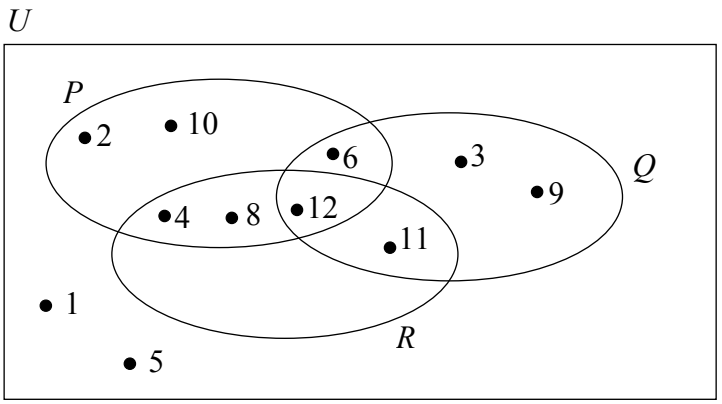


(b) U is the universal set.

$P = \{2, 4, 6, 8, 10, 12\}$

$Q = \{3, 6, 9, 11, 12\}$

$R = \{4, 8, 11, 12\}$



(i) List the elements of $P \cap Q \cap R$.

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

(iii) List the elements of $P \setminus (Q \cap R)$.

(iv) Write down # $(Q \cup R)$.

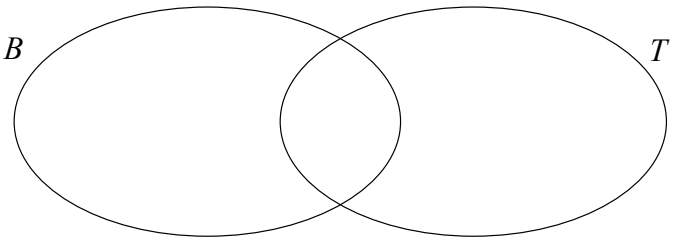
(c) In a survey, a group of 72 students were asked if they played basketball or tennis.

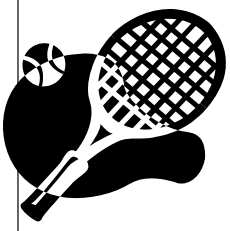
37 of these students said they played basketball (B).

30 of these students said they played tennis (T).

28 of these students said they played basketball but not tennis.

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





(ii) How many students played neither basketball nor tennis?

(iii) What percentage of the students surveyed played both basketball and tennis?

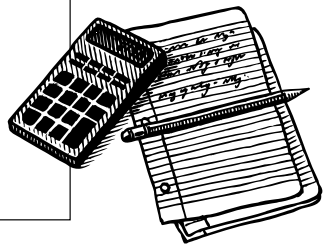
2. **(a)** There is €1200 in a prize fund. The first prize is $\frac{7}{10}$ of the fund.
Find the value of the first prize.

(b) **(i)** By rounding each of these numbers to the nearest whole number, estimate the value of $\frac{9{\cdot}15 \times 2{\cdot}196}{5{\cdot}5815}$.

$\frac{9{\cdot}15 \times 2{\cdot}196}{5{\cdot}5815}$ is approximately equal to:

$$\frac{\square \times \square}{\square} = \frac{\square}{\square} = \square$$

(ii) Using a calculator, or otherwise, find the exact value of $\frac{9{\cdot}15 \times 2{\cdot}196}{5{\cdot}5815}$.



(iii) Using a calculator, or otherwise, write $\frac{3}{8}$ and $\frac{9}{25}$ as decimals.

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

$$\frac{3}{8},\ \frac{9}{25},\ 0{\cdot}37$$

$\frac{3}{8} =$ $\frac{9}{25} =$

_____ , _____ , _____ ,

(c) **(i)** Using a calculator, or otherwise, divide 1120 by 0·035.
Express your answer in the form $a \times 10^n$, where $1 \leq a < 10$ and $n \in \mathbf{N}$.

(ii) Simplify $\frac{a^5 \times a^2}{a \times a^3}$. Give your answer in the form a^n, where $n \in \mathbf{N}$.

$\frac{a^5 \times a^2}{a \times a^3} =$

(iii) Using your answer to part **(ii)**, or otherwise, find the value of $\frac{6^5 \times 6^2}{6 \times 6^3}$.

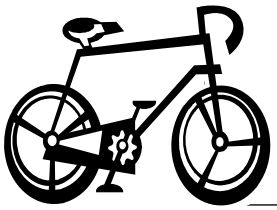
$\frac{6^5 \times 6^2}{6 \times 6^3} =$

3. **(a)** Carol buys a magazine which costs €2·83.
In her purse she only has the following:

Three 50 cent coins
Four 20 cent coins
Seven 10 cent coins

How much money will she have left after paying for the magazine?

(b) **(i)** A bicycle costs €305. There is a 15% discount on the cost during a sale.
What is the sale price of the bicycle?



(ii) David wishes to get some bars for a party.
A packet of 12 bars costs €4·08 in **Shop A**.
A packet of 7 bars costs €2·17 in **Shop B**.

Find the unit cost (cost of one bar) in each shop.

Shop A: Unit cost =

Shop B: Unit cost =

(iii) If David buys 84 bars, how much will he save by buying the bars in the shop offering the better value?

(c) **(i)** €12 000 is invested at 2% per annum.

What is the amount of the investment at the end of the first year?

(ii) Using central heating oil for 6 hours a day, a tank full of oil will last for 90 days.

If the oil were used for only 5 hours a day, how much longer would it last?

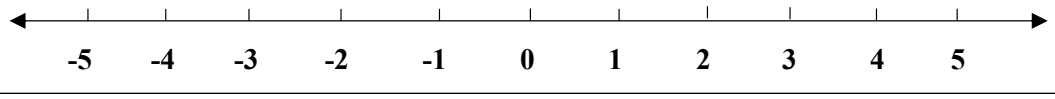
4. **(a)** If $a = 3$ and $b = 5$, find the value of :

(i) $a + 2b$

(ii) $ab - 6$

(b) **(i)** Write in its simplest form $(3x + 2y) - 2(x + 3y - 4)$.

(ii) Solve $3x - 2 \leq 7, x \in \mathbf{N}$.
Graph your answer on the number line.



(c) **(i)** Eoin is t years of age.
Katie is 4 years older than Eoin.
Laura is twice as old as Eoin.

Write Katie's age and Laura's age in terms of t.

Katie's age = Laura's age =

(ii) From part **(i)**, the sum of Eoin's age, Katie's age and Laura's age is 52.

Write down an equation in t to represent this information.

Solve your equation to find Eoin's age in years.

Equation:

Eoin's age =

(iii) Solve for x and y: $7x + 2y = 11$
$4x + y = 7$

x = y =

5. **(a)** Solve the equation $3(x - 2) = 2x + 5$.

(b) **(i)** Factorise $x^2 - 25$.

(ii) Factorise $ab - 2ax + mb - 2mx$.

(iii) Factorise $x^2 + 4x - 12$.

Hence solve the equation $x^2 + 4x - 12 = 0$.

(c) **(i)** Express $\frac{5x-1}{2} + \frac{4x-9}{3}$ as a single fraction.
Give your answer in its simplest form.

$\frac{5x-1}{2}+\frac{4x-9}{3} =$

(ii) Verify your answer to part **(i)** by substituting $x = 3$ into $\frac{5x-1}{2} + \frac{4x-9}{3}$ **and** into your answer in part **(i)**.

(iii) Multiply $(x - 2)$ by $(x^2 - 3x + 11)$.
Give your answer in its simplest form.

6. **(a)** $P = \{ (1, 5),\ (2, 8),\ (2, 9),\ (3, 10) \}$.

Write out the domain and range of P.

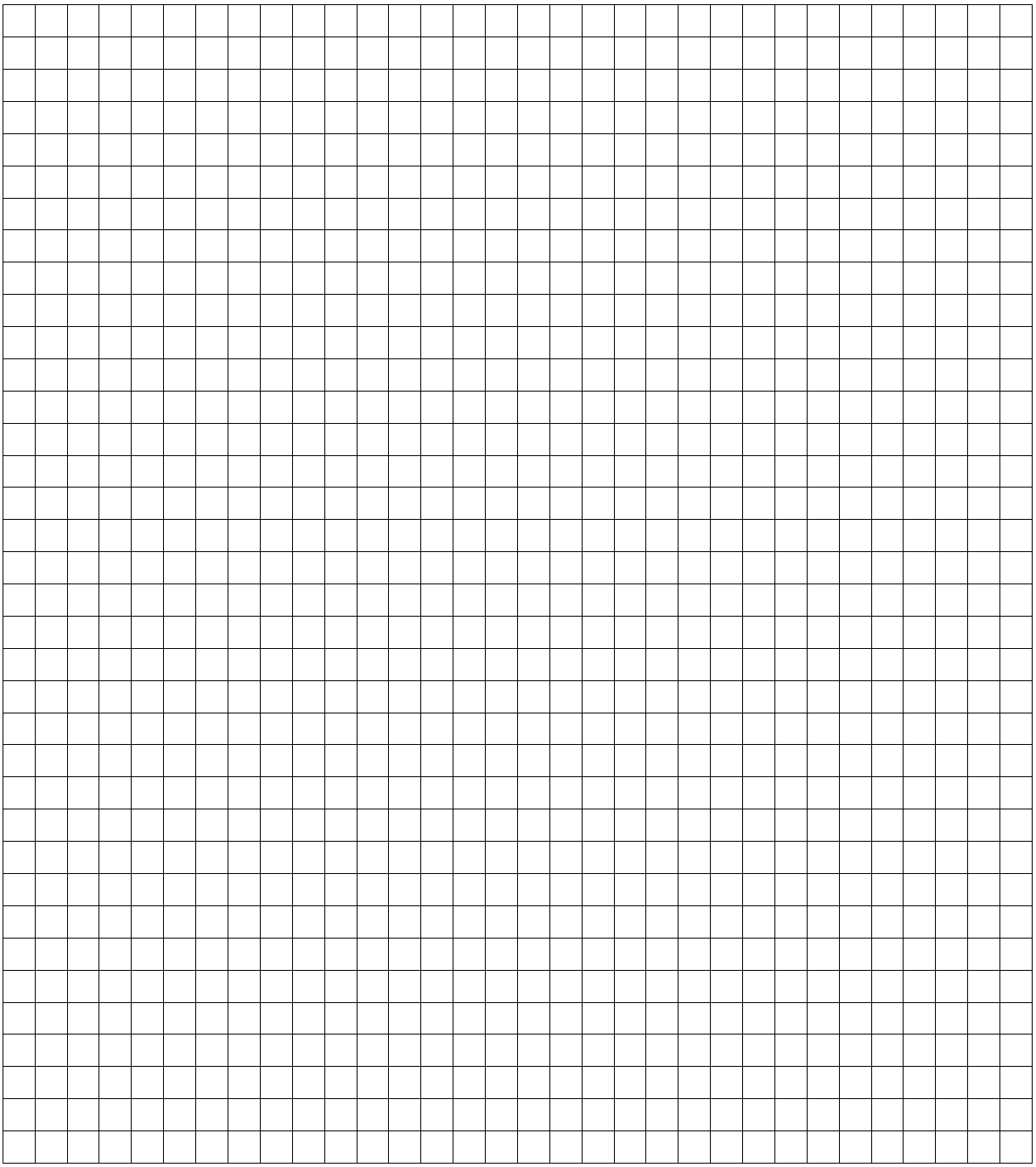
Domain =

Range =

(b) Draw the graph of the function

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

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



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

Work to be shown on the graph.

(ii) Use the graph you have drawn in part **(b)** to estimate the value of $3 + 2x - x^2$ when $x = 2{\cdot}5$.

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