

# SAMPLE PAPER 4

## Leaving Certificate

# Mathematics

## Paper 1

## Ordinary Level

**Time:** 2 hours, 30 minutes

300 marks

Examination number
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Centre stamp
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Running total	
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For examiner	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

Grade
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## Instructions

There are **two** sections in this examination paper.

Section A	Concepts and Skills	150 marks	6 questions
Section B	Contexts and Applications	150 marks	3 questions

Answer all nine questions.

Write your answers in the spaces provided in this booklet. You may lose marks if you do not do so. There is space for extra work at the back of the booklet. You may also ask the superintendent for more paper. Label any extra work clearly with the question number and part.

The superintendent will give you a copy of the *Formulae and Tables* booklet. You must return it at the end of the examination. You are not allowed to bring your own copy into the examination.

Marks will be lost if all necessary work is not clearly shown.

Answers should include the appropriate units of measurement, where relevant.

Answers should be given in simplest form, where relevant.

Write the make and model of your calculator(s) here:





**Question 3**

**(25 marks)**

- (a) The first three terms of an arithmetic sequence are  $-11$ ,  $x$  and  $5$ . Find  $x$  and  $T_n$ , the general term of the sequence.

- (b) How many terms are there in the arithmetic sequence  $2, 4, 6, 8, 10, 12, \dots, 100$ ?

- (c) Find the sum of the first 100 even numbers.

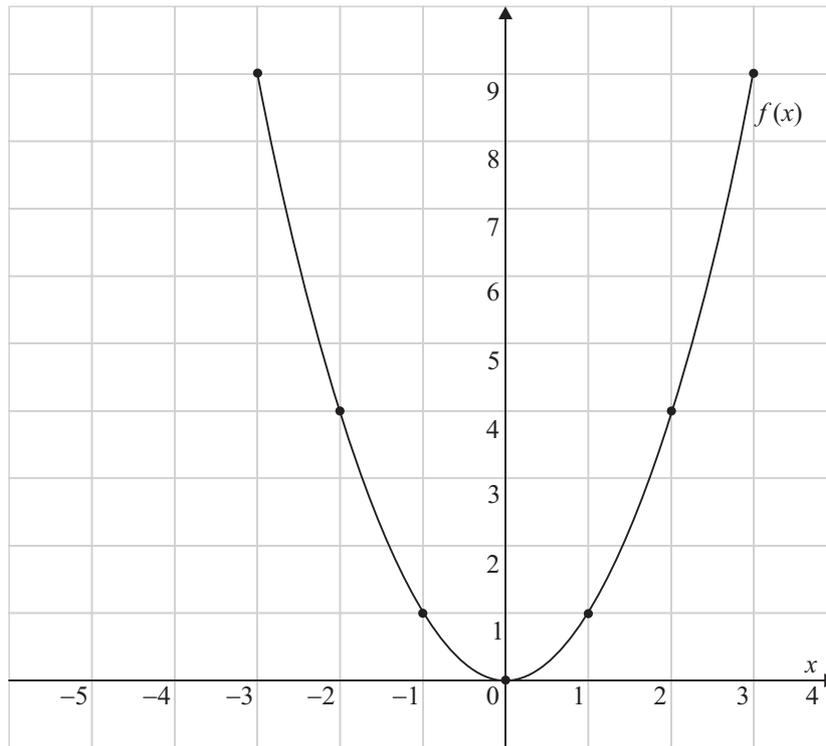




**Question 6**

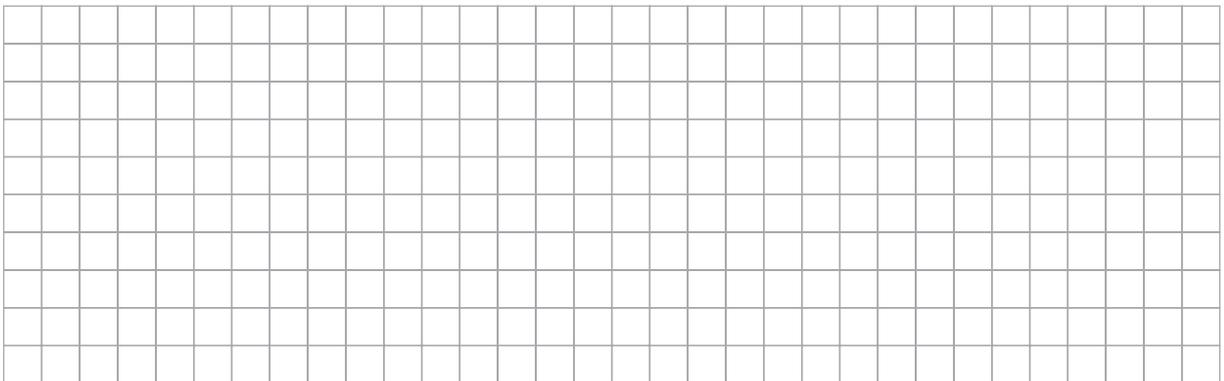
**(25 marks)**

The graph of  $f(x) = x^2$  in the domain  $-3 \leq x \leq 3$ ,  $x \in \mathbb{R}$  is shown.

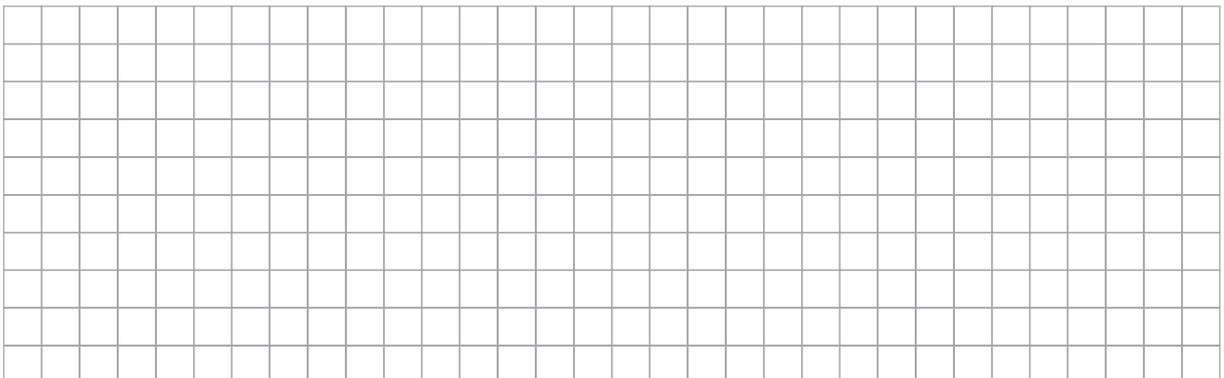


(a) On the same diagram, draw the graph of  $y = f(x + 2)$  in the domain  $-5 \leq x \leq 1$ ,  $x \in \mathbb{R}$ .

(b) Find the point of intersection of the two graphs by solving the equation  $f(x) = f(x + 2)$ .



(c) If  $m_1$  is the slope of the tangent to  $y = f(x + 2)$  at the point of intersection, and  $m_2$  is the slope of the tangent to  $f(x)$  at this point, show that  $m_1 + m_2 = 0$ .



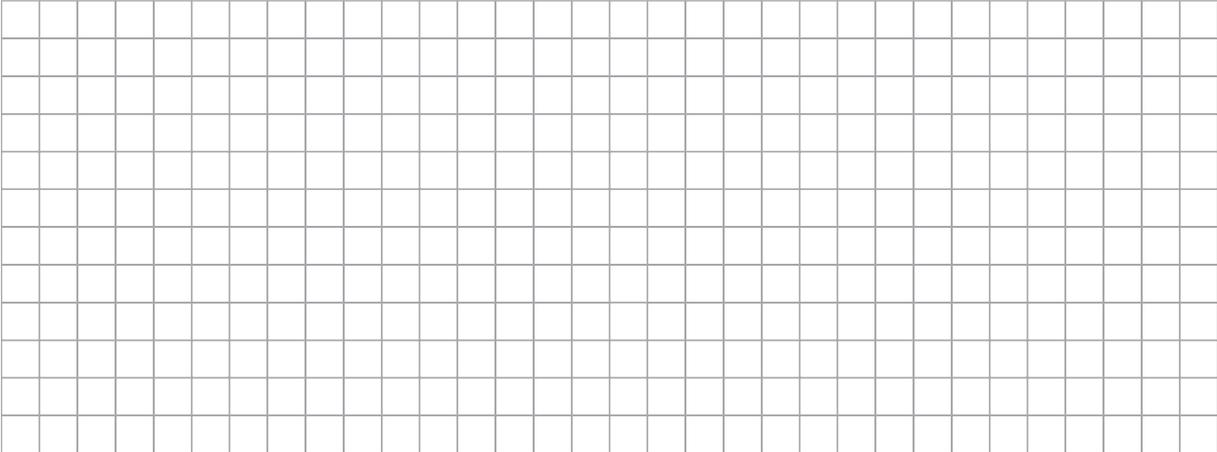




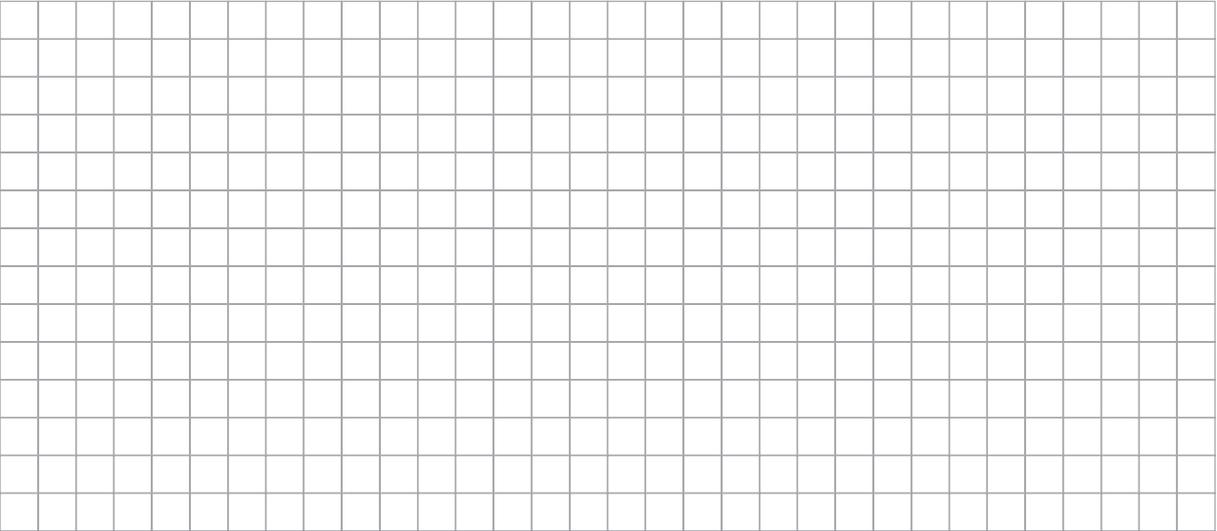




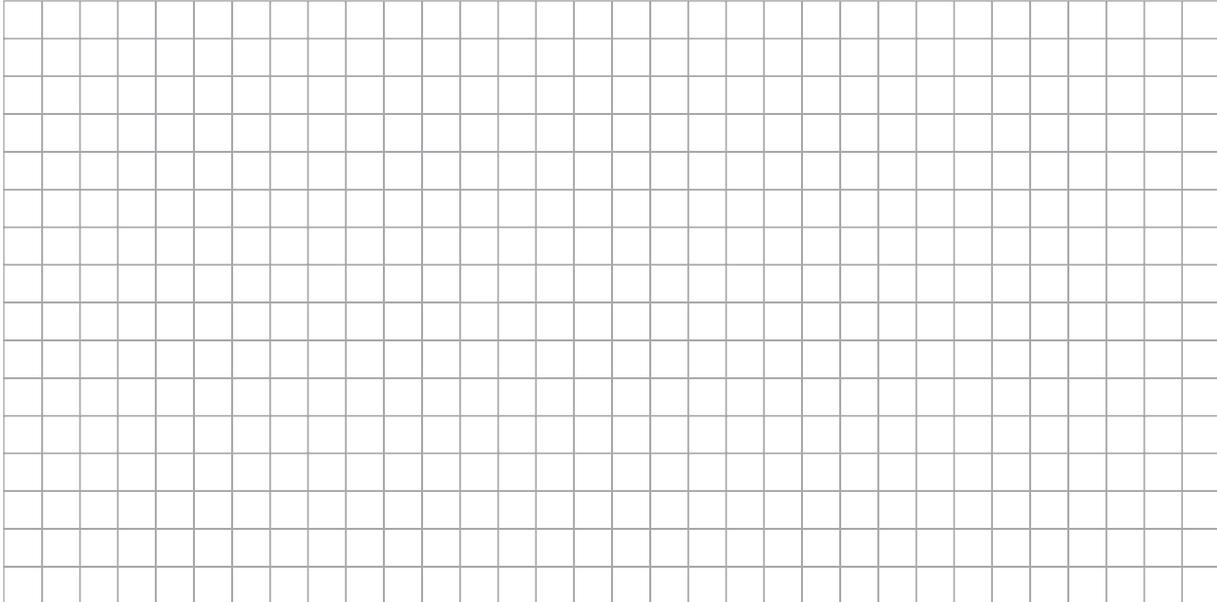
(iii) For  $t = 3$ , find  $N$  and draw the stack arrangement.



(e) Use the formula for the sum of an arithmetic sequence to find the total number of pipes in a stack with 10 pipes on the top and 20 on the bottom. Verify your answer by using the formula in part (d).



(f) Is it possible to arrange 513 pipes with twice the number in the bottom row as in the top row?



**Question 9**

**(50 marks)**

In economics, the ideas of supply and demand are important. **Supply** is the number of items manufacturers are willing to produce. **Demand** is the number of items consumers are willing to buy. Both are functions of the selling price  $p$  which is in euro (€).

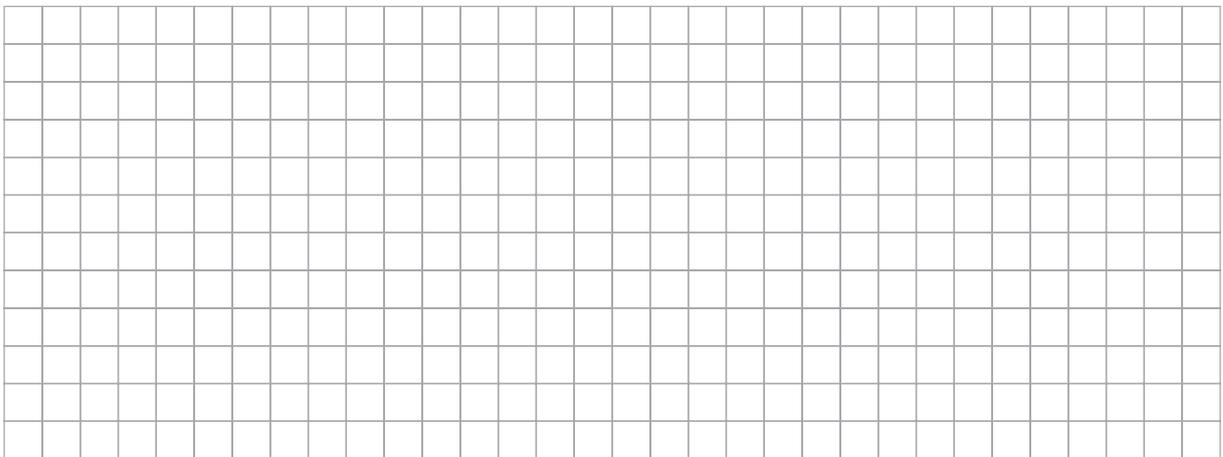


A well known games console manufacturer uses the following supply and demand equation:  $S = 2200 - 2p$ ,

$$D = 4p - 320,$$

where  $S$  represents supply and  $D$  represents demand.

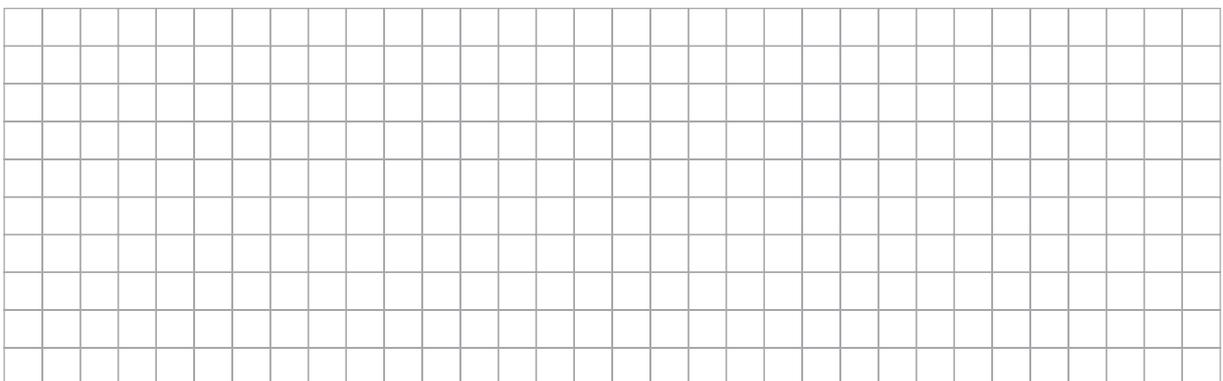
- (a) Write down an inequality satisfied by  $p$  which gives you the full range of prices at which the product can be sold.



- (b)  $S$  and  $D$  are straight line graphs. Plot  $S$  against  $p$  and  $D$  against  $p$  on the grid on the next page by choosing two points, as given in the table, on each straight line.

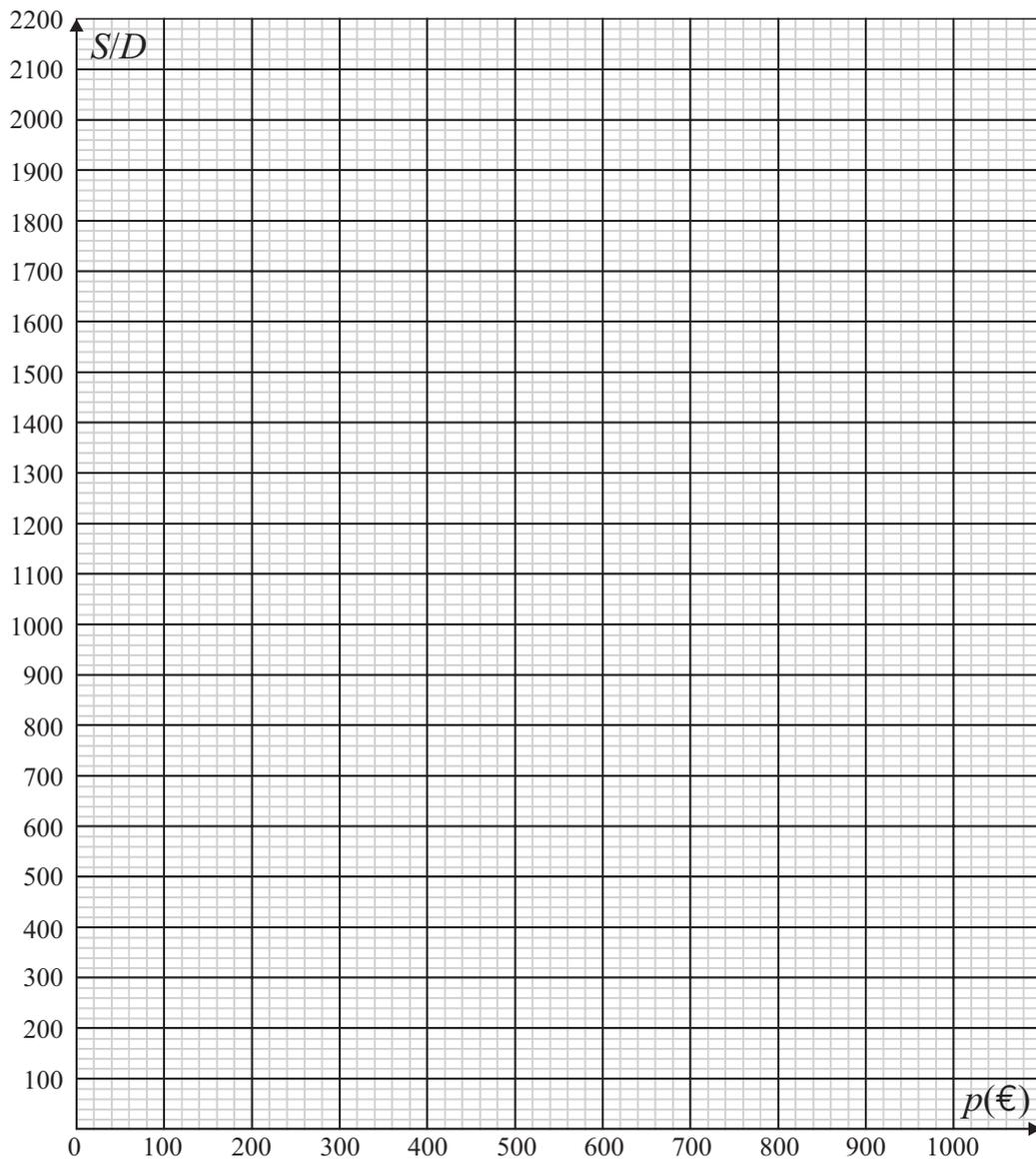
$p$ (€)	100	500
$S$		
$D$		

- (c) Use your equations to find the value of  $p$  at the equilibrium point, where the supply is equal to the demand. Use the graph to find  $p$  at the equilibrium point.

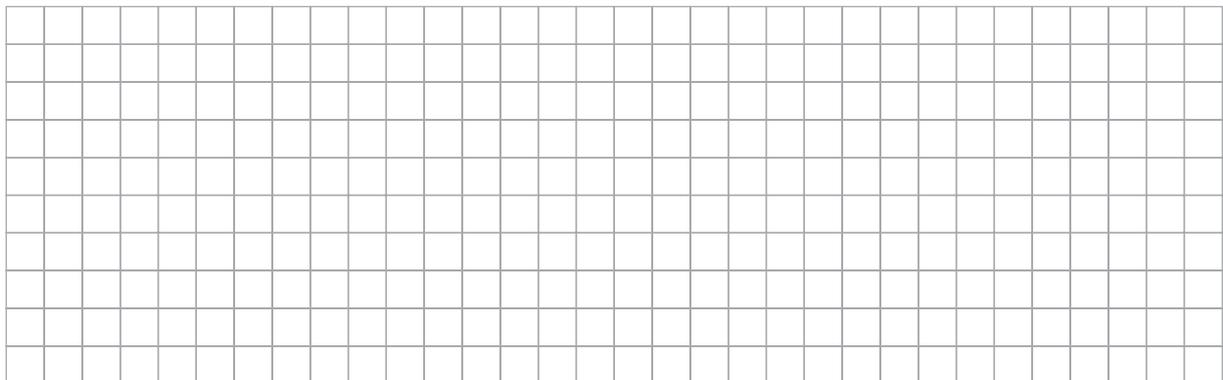


ALGEBRA:  $p =$  \_\_\_\_\_ €

GRAPH:  $p =$  \_\_\_\_\_ €



(d) Use your equations to find the supply and the demand at the equilibrium point. Use the graph to also find these values.



ALGEBRA:  $S =$  \_\_\_\_\_

GRAPH:  $S =$  \_\_\_\_\_

ALGEBRA:  $D =$  \_\_\_\_\_

GRAPH:  $D =$  \_\_\_\_\_

