

# SAMPLE PAPER 5

## 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.

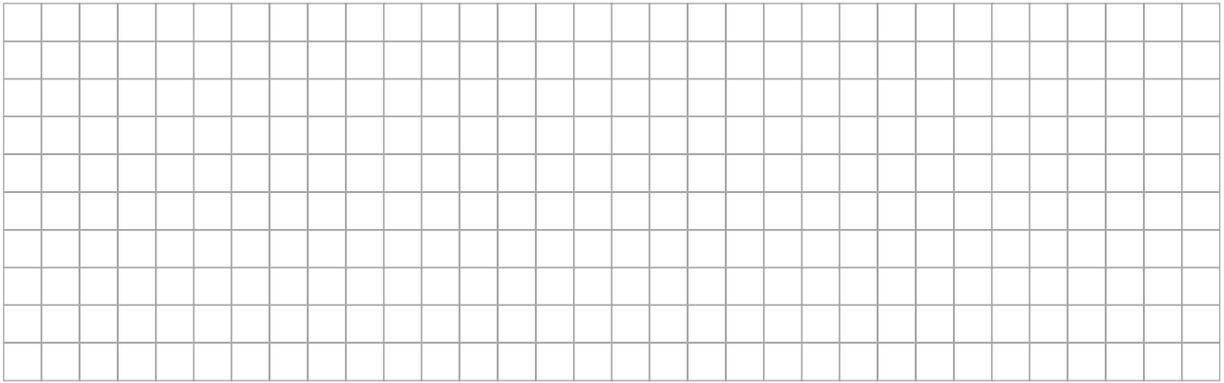
Marks will be lost if all necessary work is not clearly shown.

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

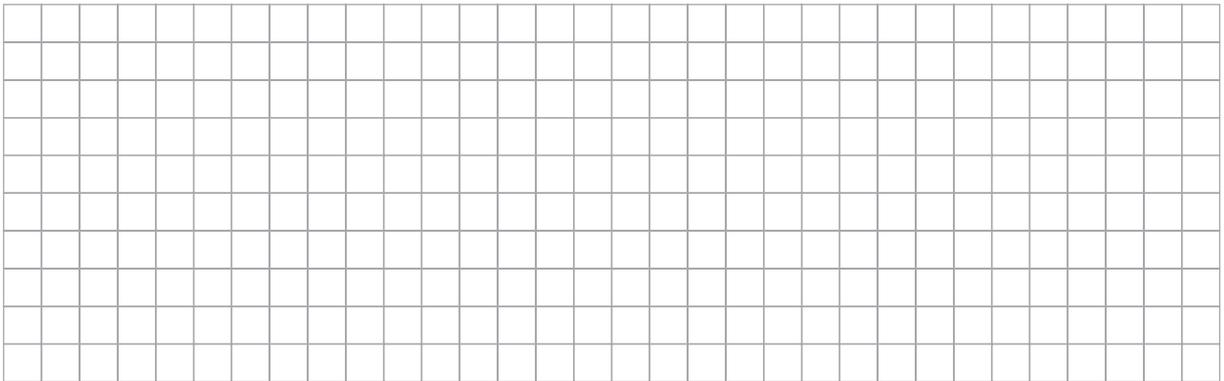
Answers should be given in simplest form, where relevant.

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





(ii) Find the area of trapezium  $ABCD$ .

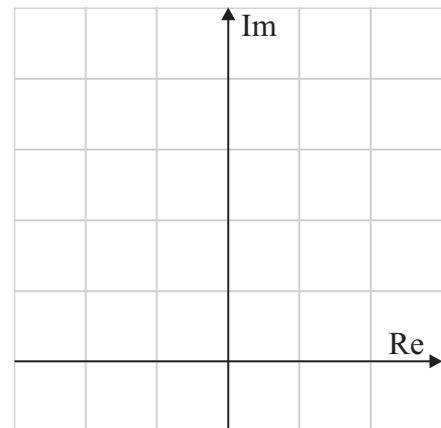
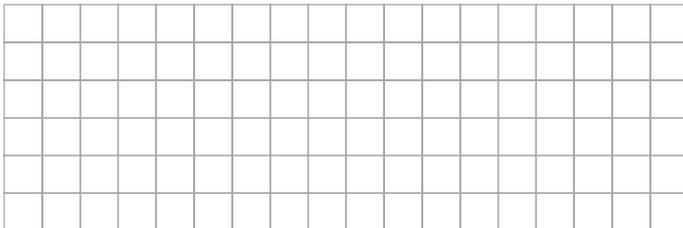


**Question 2**

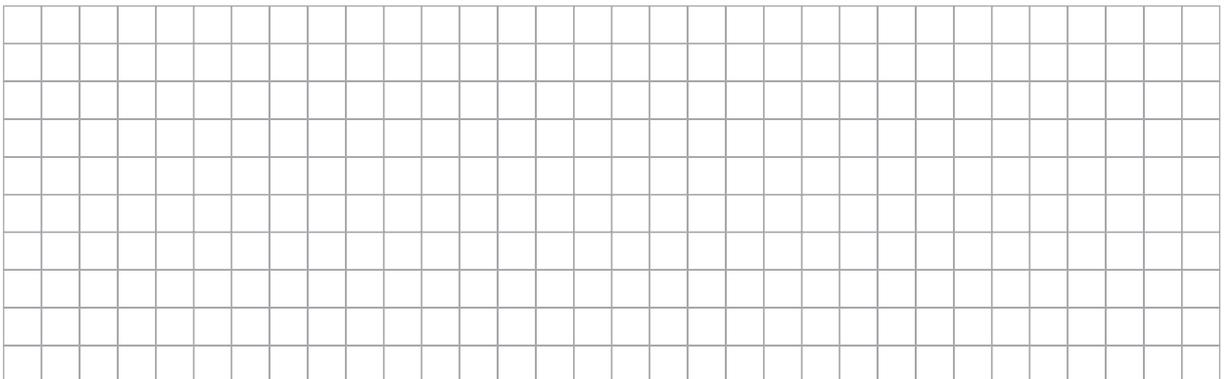
**(25 marks)**

(a) If  $z = 3 + 2i$  and  $w = 1 + 4i$ , where  $i = \sqrt{-1}$ , plot the following on the Argand diagram shown:

- (i)  $z$ ,
- (ii)  $w$ ,
- (iii)  $w - z$ .



(b) Express  $\frac{1}{5-12i}$  in the form  $a + ib$ .



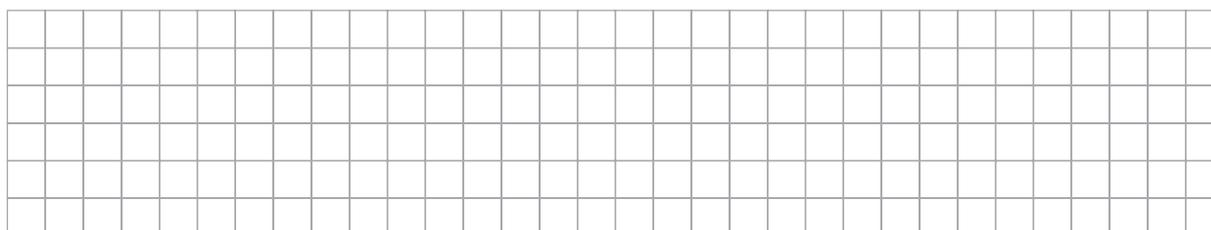
(c) For what values of  $k \in \mathbb{R}$  is  $|k + 6i| = 10$ ?



**Question 3**

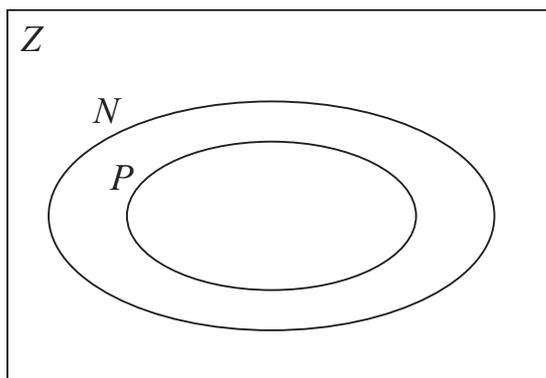
**(25 marks)**

(a) Write out all the prime numbers less than 30.



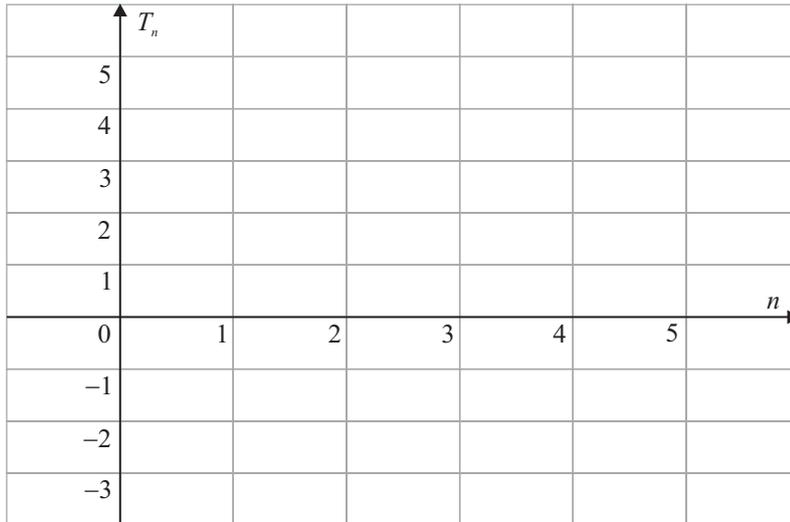
(b)  $Z$  is the set of integers.  
 $N$  is the set of natural numbers.  
 $P$  is the set of primes.

Place the following numbers in the Venn diagram: 0, 2, 1, -3, 7, 11, -11, 18, 103.

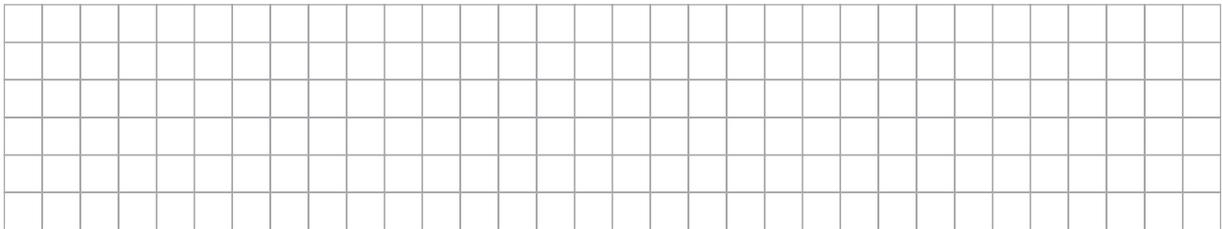




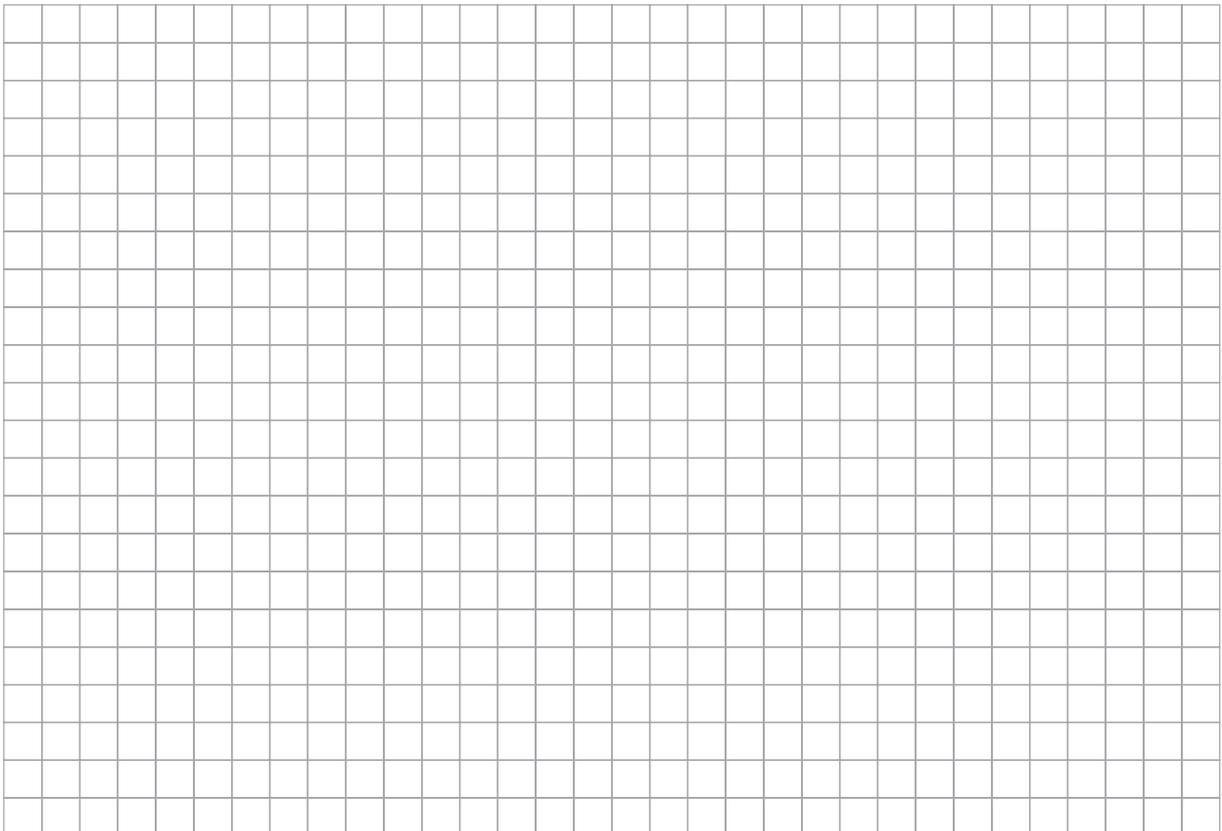
(iii) Represent these 5 terms on the diagram below.



(iv) Draw the line joining these points and use any 2 of them to find its slope. Make a conclusion.



(b) For another arithmetic sequence  $T_n = 4 + \frac{3}{2}n$ , what is the first term and the common difference?









Answer **all three** questions from this section.

**Question 7**

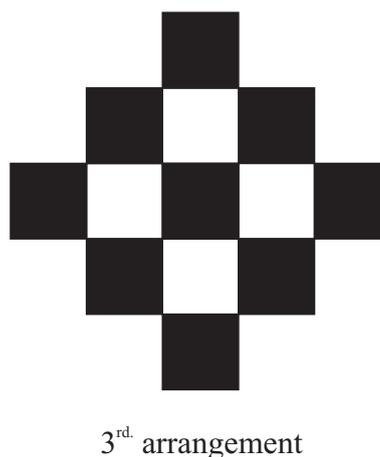
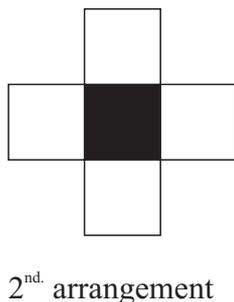
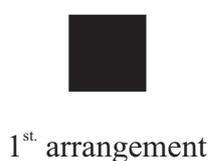
**(50 marks)**

A tiler has to tile a room, working out from the centre of the room, with black and white tiles.

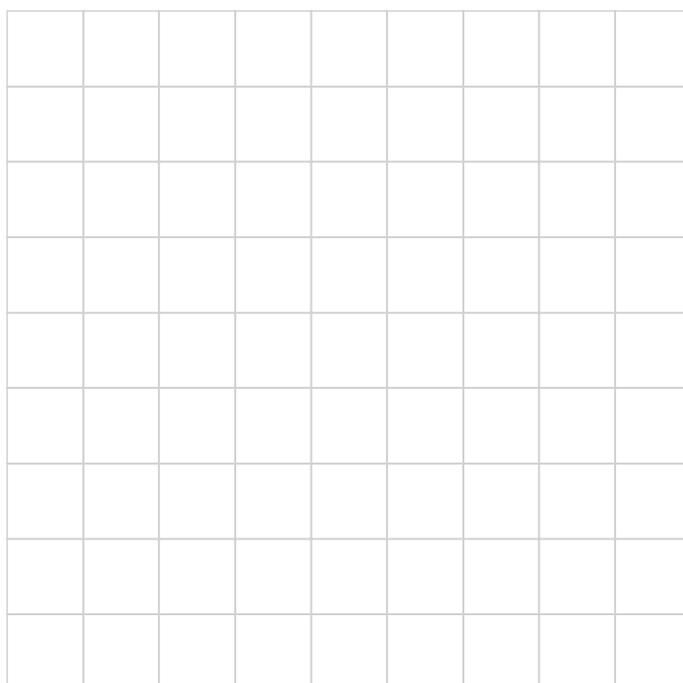
His first arrangement is to start with a black tile in the centre.

His second arrangement involves placing a white tile against each edge of the black tile.

His third arrangement involves placing black tiles against the edge of each of the white tiles and so on until he is finished tiling the room.

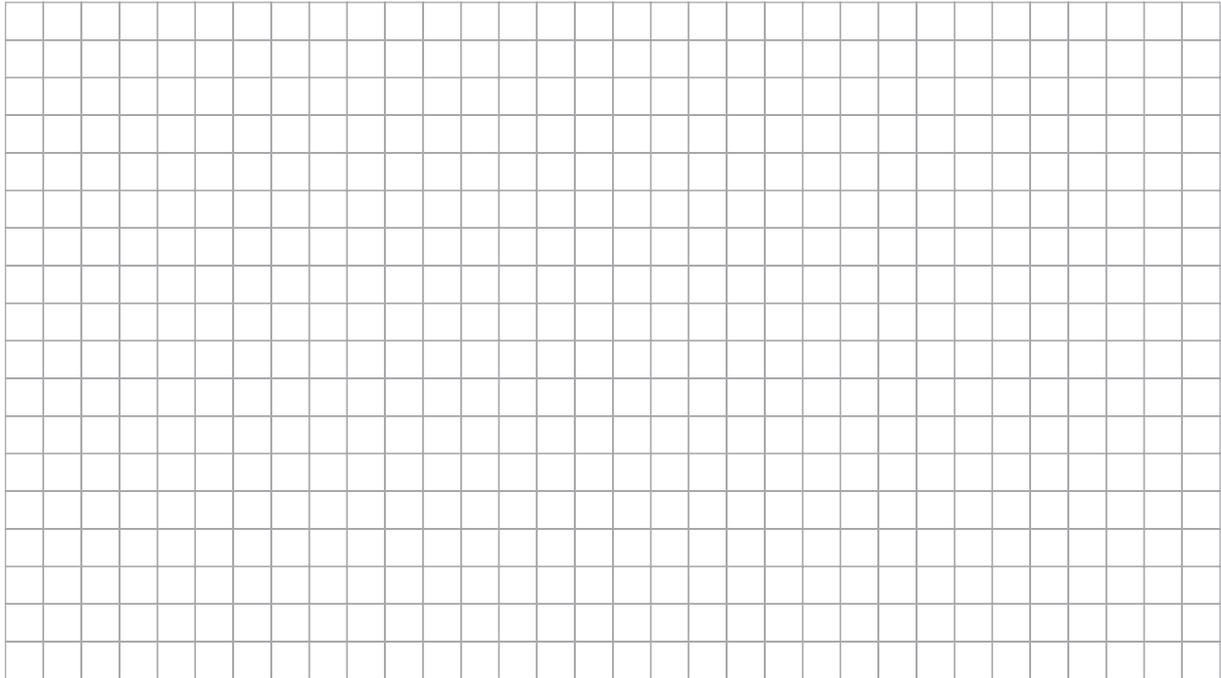


- (a) Using the grid, below draw a picture of the tiler's fourth arrangement.

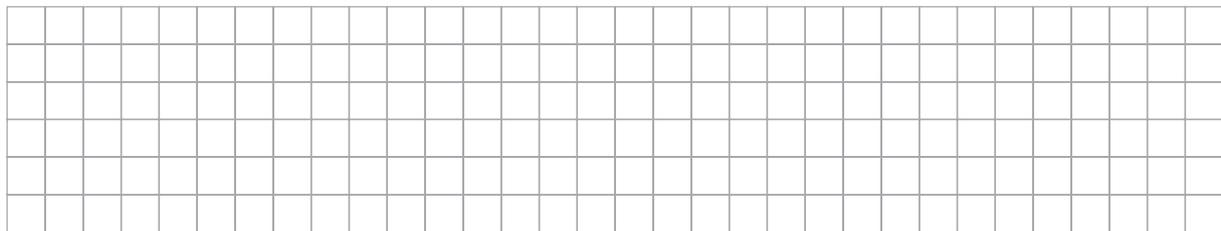




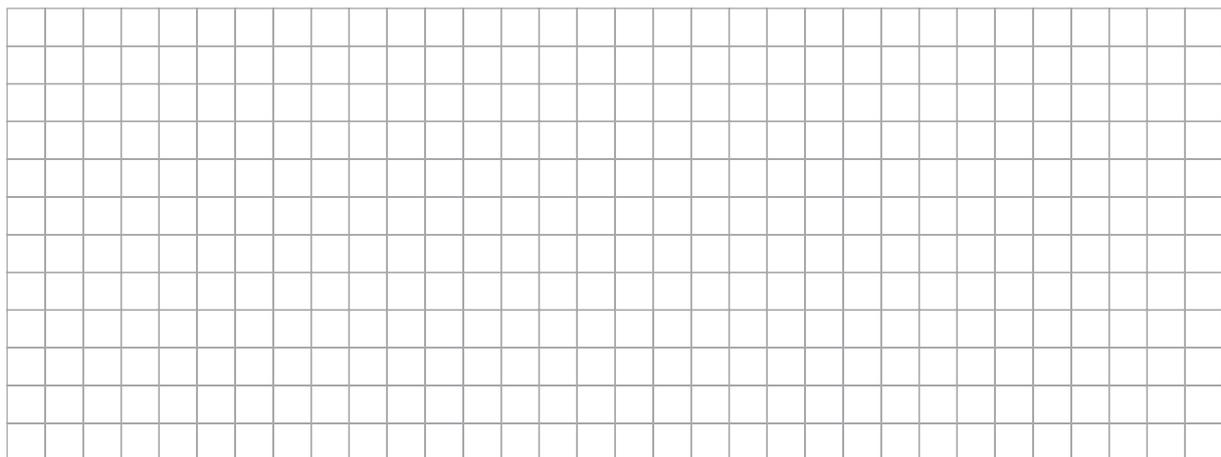
- (d) The total number of tiles  $T$  needed to make the  $n^{\text{th}}$  arrangement is given by the formula  $T = 2n^2 + an + b$ . Find  $a$  and  $b$ .



- (e) Hence, find the number of tiles in the tenth arrangement.



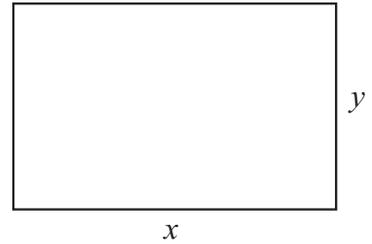
- (f) How many arrangements can the tiler carry out if he has 265 tiles?



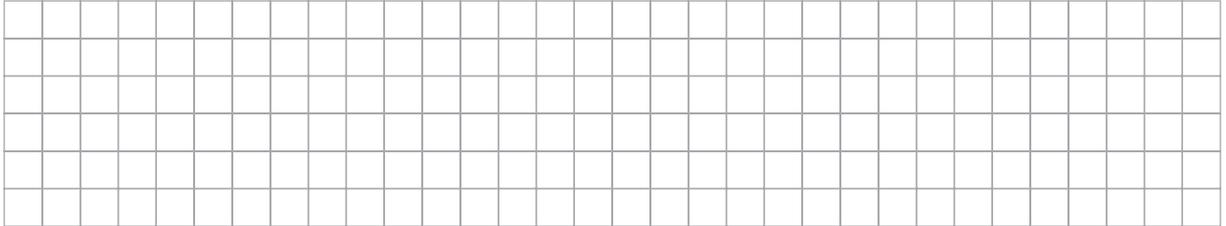
**Question 8**

**(50 marks)**

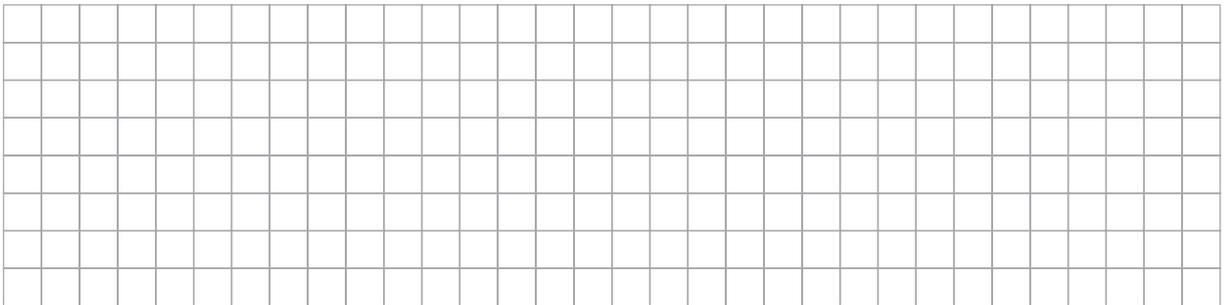
A farmer wishes to fence off a rectangular section of a field to plant potatoes, as shown on the right. He has 160 m of fencing. Let  $x$  denote the length in metres (m) and let  $y$  denote the width in metres (m).



(a) Express  $y$  in terms of  $x$ .

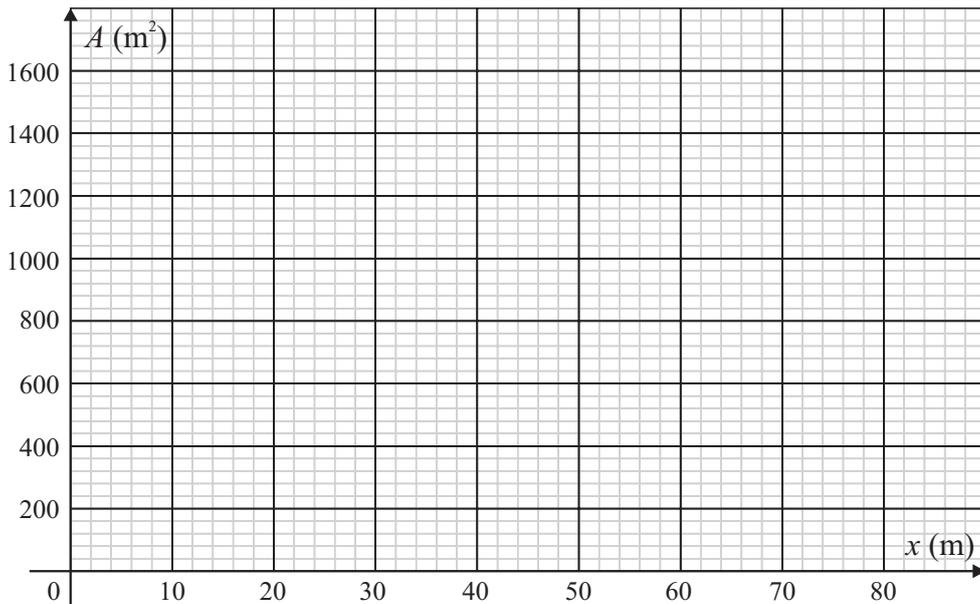


(b) Show that the area of the field  $A$  is given by  $A = 80x - x^2$ .

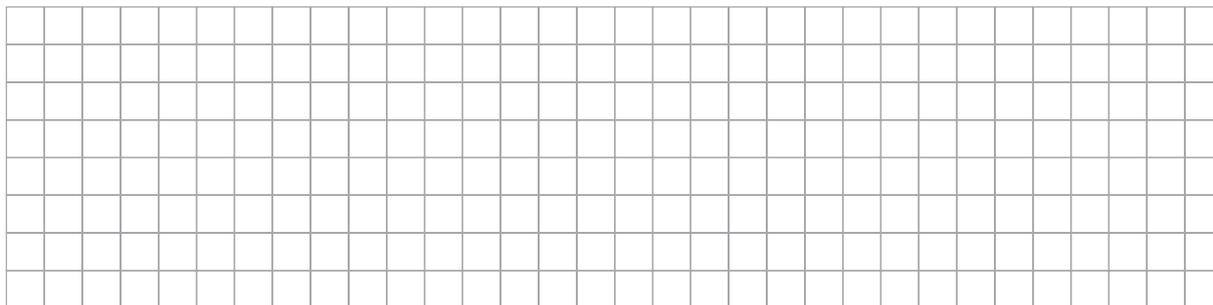


(c) Complete the table and plot the graph of  $A$  (on  $y$ -axis) against  $x$ .

$x$ (m)	0	10	20	30	40	50	60	70	80
$A$ (m <sup>2</sup> )									



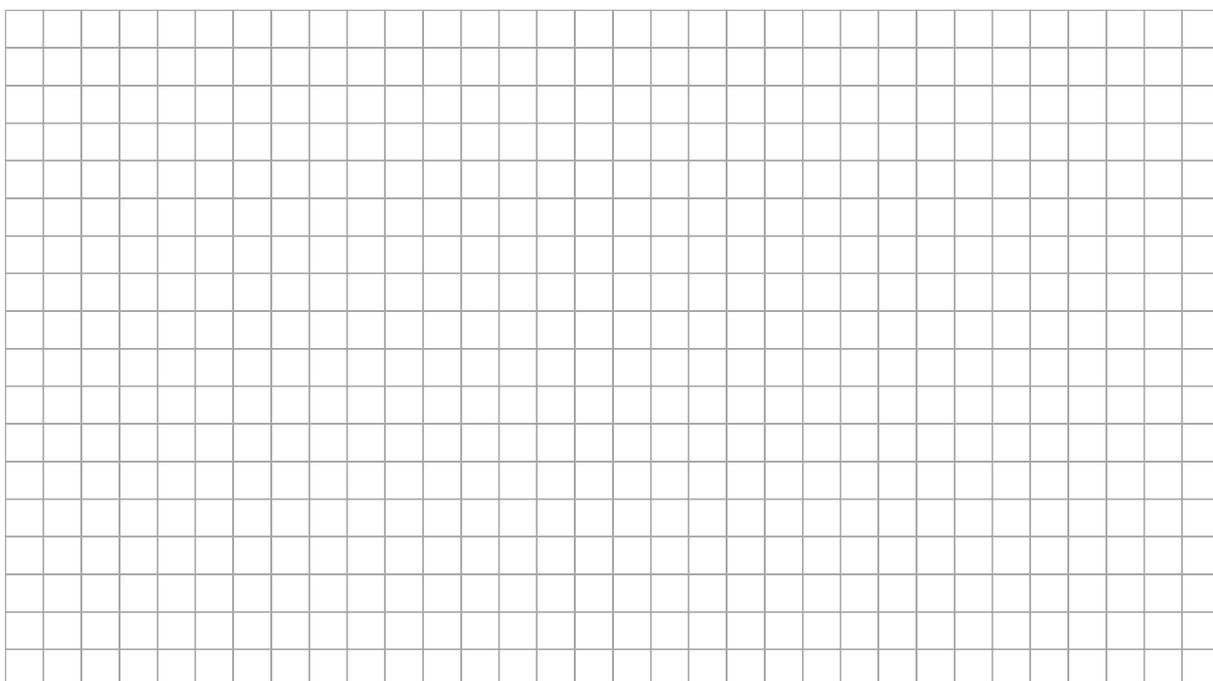
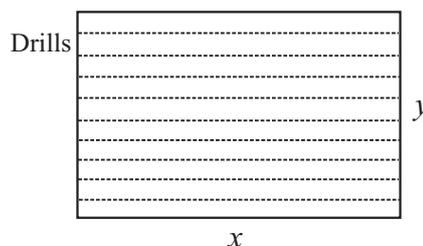
(d) (i) Use the graph to find the dimensions of the field of maximum area.



(ii) Use the graph to find the dimensions of a field with an area of  $1000 \text{ m}^2$ , to the nearest metre.



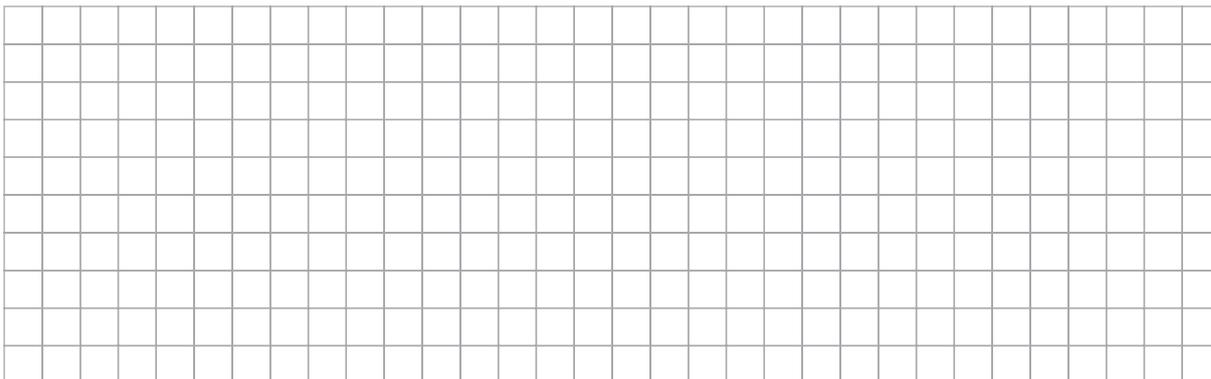
(e) The farmer plants potatoes in the maximum area of his field in drills separated by 32 cm, with each plant separated by 16 cm. What is the number of drills? What is his maximum number of potato plants?



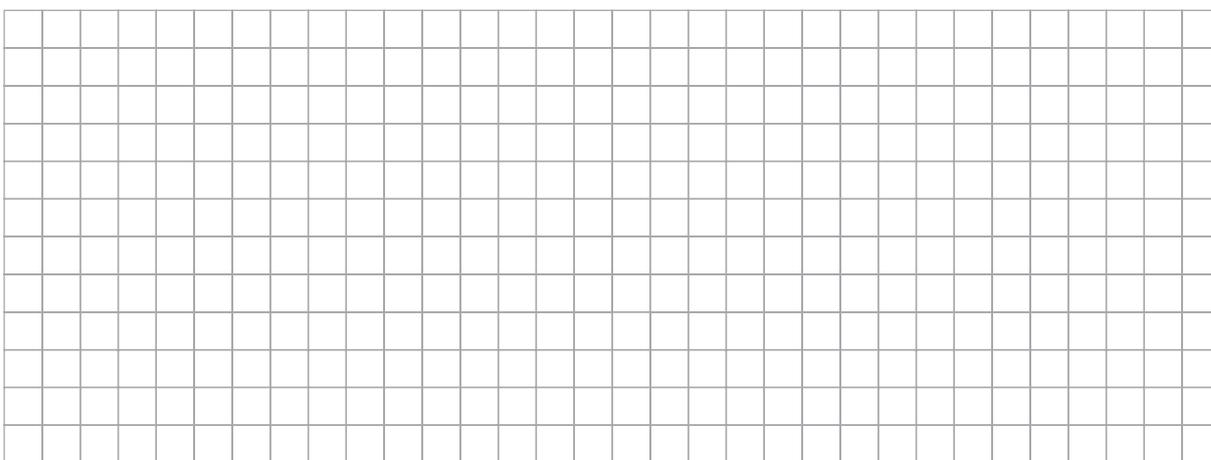




(ii) If the lorry moves to the side of the centre line, so that the side of the lorry is on the centre line, show that it doesn't clear the arch.



(iii) Find out how far the nearest side of the lorry can be from  $O$ , so that it just clears the arch. Give your answer to two decimal places.



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You may use this space for extra work.

