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Cambridge Assessment International Education

# Cambridge IGCSE™

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**CAMBRIDGE INTERNATIONAL MATHEMATICS** **0607/62**

Paper 6 Investigation and Modelling (Extended) **October/November 2025**

**1 hour 30 minutes**

You must answer on the question paper.

No additional materials are needed.

**INSTRUCTIONS**

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly, including sketches, to gain full marks for correct methods.
- In this paper you will be awarded marks for providing full reasons, examples and steps in your working to communicate your mathematics clearly and precisely.

**INFORMATION**

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **12** pages. Any blank pages are indicated.

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## Section A

## INVESTIGATION SQUARE PATTERNS

You are advised to spend no more than 45 minutes on this section.

In this investigation you will look at the number of lines used to draw square patterns.

| is a vertical line and — is a horizontal line.

**1** This is Pattern 1.



There are 2 vertical lines.

There are 2 horizontal lines.

There are 4 lines in total.

This is Pattern 2.



There are 3 vertical lines.

There are 4 horizontal lines.

There are 7 lines in total.

This is Pattern 3.



**(a)** Complete the table.

| Pattern number ($n$) | Number of vertical lines | Number of horizontal lines | Total number of lines |
|---|---|---|---|
| 1 | 2 | 2 | 4 |
| 2 | 3 | 4 | 7 |
| 3 | | | |
| 4 | | | |
| 5 | | | |

[3]

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**(b)** Find an expression, in terms of $n$, for the total number of lines in Pattern $n$.

..... [3]

**(c)** The total number of lines in a pattern is 754.

Work out the number of **horizontal** lines in this pattern.

..... [3]

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**2** The square patterns in **Question 1** make towers of squares.

This is Tower 1.

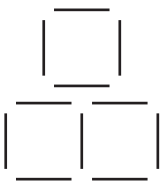


There are 2 vertical lines.

There are 2 horizontal lines.

There are 4 lines in total.

This is Tower 2.

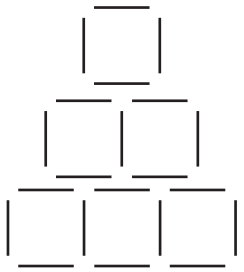


There are 5 vertical lines.

There are 6 horizontal lines.

There are 11 lines in total.

This is Tower 3.



**(a)** Complete the table.

| Tower number ($t$) | Number of vertical lines | Number of horizontal lines | Total number of lines |
|---|---|---|---|
| 1 | 2 | 2 | 4 |
| 2 | 5 | 6 | 11 |
| 3 | | | |
| 4 | | | |
| 5 | | | |

[4]

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**(b)** Find an expression, in terms of $t$, for the number of **horizontal** lines in Tower $t$.

..... [2]

**(c)** This is an expression for the total number of lines in Tower $t$.

$$0.5t(3t+5)$$

Use this expression and your answer from **part (b)** to find an expression for the number of vertical lines in Tower $t$.
Give your answer in its simplest form.

..... [3]

**(d)** A tower has 902 vertical lines.

Find the total number of lines in the bottom row of squares in this tower.

..... [4]

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**(e)** The total number of lines in Tower $(n+1)$ is 175 more than the total number of lines in Tower $n$.

Work out the value of $n$.

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**The modelling task starts on the next page.**

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## Section B

## MODELLING WASTE PLASTIC

You are advised to spend no more than 45 minutes on this section.

In this task you will look at how waste plastic is recycled or burned or discarded.

**3 (a)** Recycled waste plastic

The table shows some information about the percentage of waste plastic that was recycled.

| Number of years after 1988 ($x$) | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Percentage recycled ($y$) | | | 2.0 | 2.7 | | |

**(i)** Each year after 1988 the percentage of waste plastic that was recycled increased by 0.7 .

Complete the table. [2]

**(ii)** A straight line models the data in the table.

Find the equation of the model for $y$ in terms of $x$.

..... [2]

**(b)** Burned waste plastic

The percentage of waste plastic that was burned also increased by 0.7 each year after 1988.
In 1988 the percentage of waste plastic that was burned was 6.6 .
$y$ is now the percentage of waste plastic that was burned.
$x$ is still the number of years after 1988.

Find the equation of the model for the percentage of waste plastic that was burned.

..... [1]

**(c)** Describe fully the transformation that maps the graph of the model for recycled waste plastic onto the graph of the model for burned waste plastic.

..... [2]

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**(d)** Discarded waste plastic

Waste plastic that is not recycled and is not burned is discarded.
$y$ is now the percentage of waste plastic that was discarded.
$x$ is still the number of years after 1988.

**(i)** Show that the model for discarded waste plastic is $y = -1.4x + 92.8$ .

[2]

**(ii)** Explain why the model is not valid when $x = 70$.

..... [1]

**(e)** Find the number of years after 1988 when the percentage of discarded waste plastic is 49.4 .
Use the model in **part (d)(i)**.

..... [2]

**(f)** Find the year in which the percentage of recycled waste plastic becomes more than the percentage of discarded waste plastic.
Use the models in **part (a)(ii)** and **part (d)(i)**.

..... [5]

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**4** You will now look at the mass of *macroplastics* in the ocean.
Macroplastics are large pieces of waste plastic.

A model for the mass of macroplastics in the ocean is

$$m = 0.001595t^2 - 6.399t + 6419.$$

$m$ is the mass of macroplastics in megatonnes (1 megatonne = $10^9$ kg)
$t$ is the year

**(a)** In 2020, $t = 2020$.

Find the value of $m$ in 2020.
Write down all the figures in your answer.

..... [2]

**(b)** On the axes, sketch the graph of the model for $2020 \leqslant t \leqslant 2050$.




[3]

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**(c)** Use the model to find the number of years after 2020 that it takes for the mass of macroplastics to double.

..... [3]

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