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Cambridge IGCSE™

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6936447880

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/52**

Paper 5 Investigation (Core) **February/March 2025**

1 hour 15 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 40.
- 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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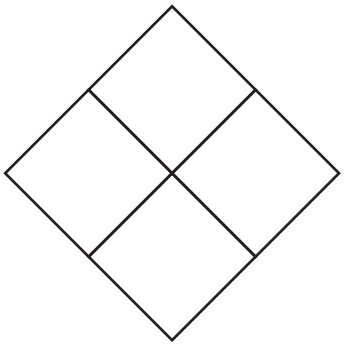
INVESTIGATION REGULAR POLYGONS

In this task you will investigate fitting regular polygons together at a point.

All the polygons have sides of the same length.
The polygons fit together exactly with one corner from each polygon meeting at a point with no gaps or overlaps.

1 The diagram shows 4 squares fitting together at a point.



Complete the sentences.

Each interior angle of a square is .....

The sum of the angles at the point where the squares meet is

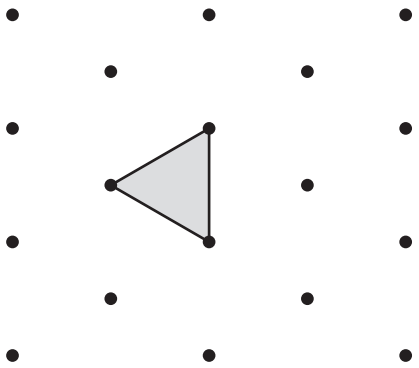
..... + ... + ... + ... = ...

The sum of the angles at a point is .....

[2]

2 **(a)** The diagram shows an equilateral triangle.

Complete the diagram to show that equilateral triangles fit together at a point.



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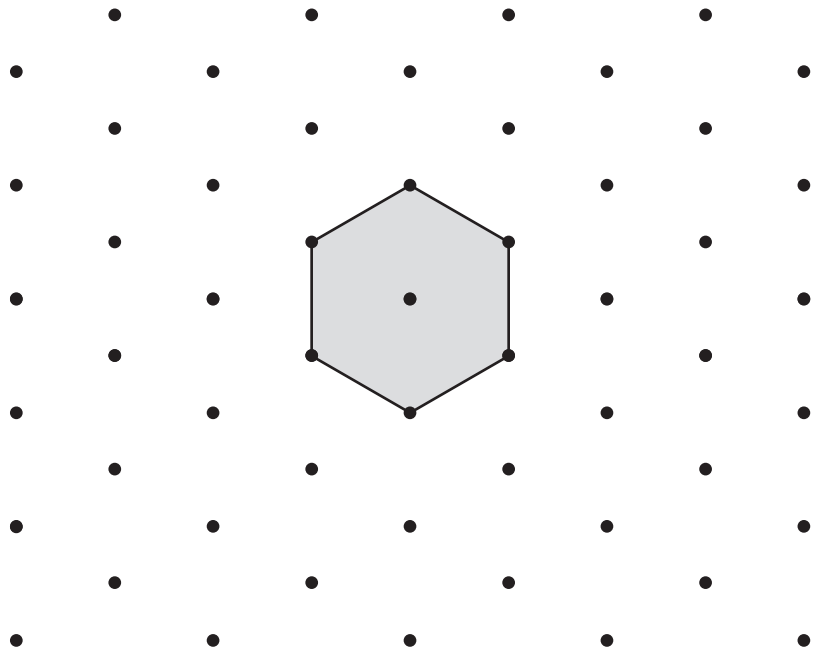
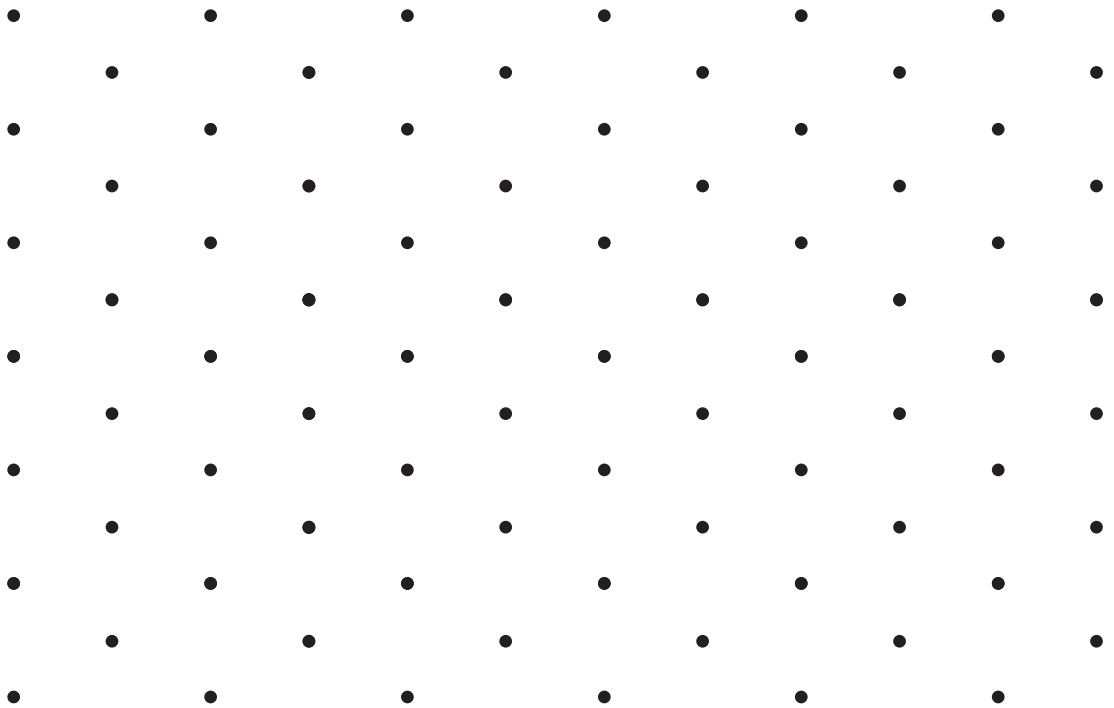
(b) The diagram shows a regular hexagon.

Complete the diagram to show that regular hexagons fit together at a point.



[1]

(c) Show how 2 equilateral triangles and 2 regular hexagons can fit together at a point.



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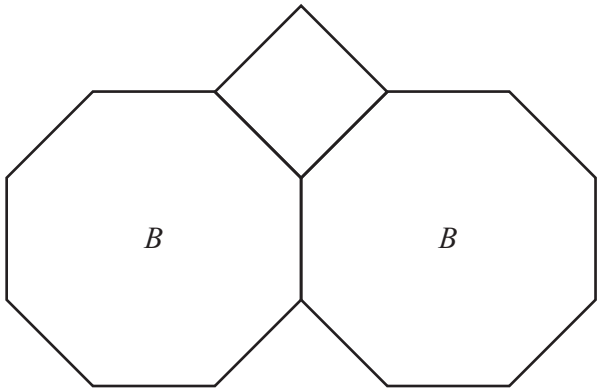
3 The rest of this investigation is about 3 regular polygons fitting together at a point.

The diagram shows a square and 2 congruent polygons fitting together at a point.



Write down the mathematical name for polygon *B*.

..... [1]

4 This is the formula for the size of each interior angle of a regular polygon.

Interior angle = 180° − (360° ÷ number of sides)

(a) Use the formula to show that the size of each interior angle of polygon *B* is 135°.

[1]

(b) Complete the sentences to explain why the 3 polygons fit together at a point.

Each interior angle of polygon *B* is 135°.

Each interior angle of a square is .....

The sum of angles at a point is .....

The 3 polygons fit together at a point because 135° + 135° + ... = ...

[2]

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5 Use the formula in **Question 4** to complete the table.

Number of sides	5	6	8	9	10	12	18	20
Interior angle in degrees	108		135		144	150		162

[4]

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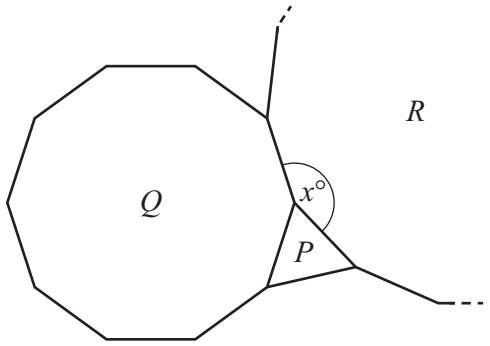
6 The diagram shows regular polygons P and Q and part of regular polygon R.



NOT TO SCALE

P is an equilateral triangle.
Q is a regular decagon.
R is a different regular polygon.

(a) Write down the number of sides in a regular decagon.

..... [1]

(b) Write down the size of each angle in an equilateral triangle.

..... [1]

(c) Work out the size of angle x.
Use the table in **Question 5** to help you.

..... [2]

(d) This is the formula for the number of sides, n, of a regular polygon with interior angle $A°$.

$$n = \frac{360}{180 - A°}$$

Work out the number of sides in polygon R.

..... [2]

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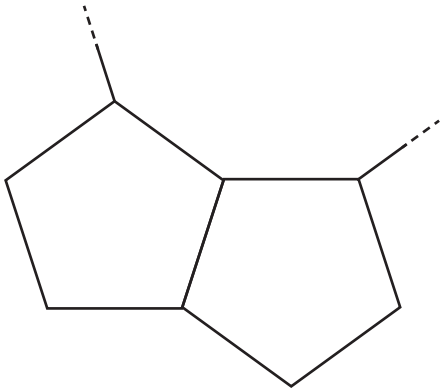
7 The diagram shows 2 regular polygons with 5 sides and part of another regular polygon.



NOT TO SCALE

Calculate the number of sides of the other regular polygon.

..... [3]

8 Tom uses a regular 5-sided polygon and a regular 8-sided polygon.

Show that Tom cannot fit these 2 polygons and a third regular polygon together at a point.

[3]

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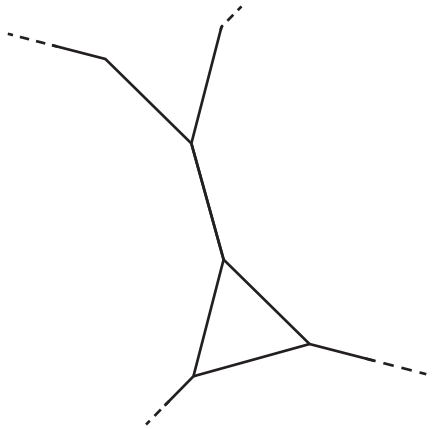
9 The diagram shows an equilateral triangle and parts of 2 congruent regular polygons.



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Show that each of the 2 congruent regular polygons has 12 sides.

[3]

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10 Samira wants to find all the ways to fit 3 regular polygons together at a point.

In this question one of the polygons is always an equilateral triangle.

(a) Samira uses an equilateral triangle and a regular hexagon.

Give reasons why these 2 polygons and a third regular polygon cannot fit together at a point.

.....

..... [2]

(b) Complete the table.
Use your answers from **Question 5** and **Question 6(d)** to help you.

Number of sides of first polygon	Number of sides of second polygon	Number of sides of third polygon
3	7	42
3	8	
3	9	
3	10	
3	12	12

[5]

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11 Find all the possible ways where one of the 3 polygons is a square.
Use the table from **Question 5** to help you.

..... [5]

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