



Instructions: No answer bank: show your working for the shape maths. Number the steps in order, answer the case study questions, explain the key terms, then write full-sentence answers and plan the extended answer.

1. Shape maths (show your working)

Question	Working and answer
Angle sum of a heptagon	
Each angle of a regular decagon	
Diagonals in an octagon	
Kite angles 110° , 110° , 50° and x . Find x .	
A regular polygon has angles of 140° . How many sides?	

Did you know?

- Each exterior angle of a regular polygon is $360^\circ \div n$.
- Only three regular polygons tile a floor alone: triangles, squares and hexagons.
- A 20-sided polygon is called an icosagon.
- The diagonals of a kite cross at right angles.

Background

A polygon is a flat, closed shape made of straight sides. Polygons are named by their number of sides: triangle (3), quadrilateral (4), pentagon (5), hexagon (6), heptagon (7), octagon (8), nonagon (9), decagon (10). A regular polygon has all sides equal and all angles equal. A shape with a curved side, such as a circle, is not a polygon.

2. Steps in order

Number the steps 1 to 5 (1 = first).

1	Split: Draw diagonals from one corner to make triangles
2	Share: For a regular polygon divide by the number of angles
3	Count triangles: There are always $n - 2$ triangles
4	Count sides: Count the straight sides to name the polygon
5	Multiply: Multiply the number of triangles by 180°

4. Key terms

Key term	What does it mean? Give an example.
Polygon	
Quadrilateral	
Diagonal	
Regular polygon	
Trapezium	

3. Case study

Tayo wants to tile a patio with one kind of regular polygon and no gaps. He tries regular pentagons first, then regular hexagons.

Case study: Tayo's patio tiles

1. What is each angle of a regular pentagon?

2. Why do pentagons leave gaps?

3. Why do hexagons work?

5. Think it through

1. Explain the formula $n \times (n - 3) \div 2$ for diagonals.

2. Explain how diagonals can tell a rhombus from a rectangle.

6. Longer answers (full sentences)

1. Sort the quadrilateral family by their properties.

2. Explain why $(n - 2) \times 180^\circ$ gives the angle sum.

3. Find each exterior angle of a regular hexagon and check it with the interior angle.

4. Explain in your own words: Why do the angles of a quadrilateral add up to 360° ?

7. Extended answer

Extended answer: 'A square is just a special kind of rhombus.' How far do you agree?

Plan: introduction · point for (example) · point against (example) · conclusion with your judgement.
