

Helping Your Child with Symmetry, Reflections, Rotations and Translations

Space · Foundation to Year 6 · Australian Curriculum Mathematics

Shapes can be moved in three ways — **slid**, **flipped** and **turned**. Shapes can also have **symmetry** — where one half is a mirror image of the other. These ideas are everywhere: in tiles, fabric, nature, art and architecture. The formal vocabulary begins in Year 4, but the foundations are built from the very first year of school.

Year level	What your child learns	What this looks like
Foundation –Year 3	Prior knowledge — building spatial awareness Foundation: Sorts and names shapes (circle, square, triangle, rectangle). Looks for shapes in the environment. Year 1: Discovers that a shape is still the same shape even when turned or moved — early understanding of orientation. Year 2: Explores sliding, flipping and turning shapes informally. Learns that moving a shape does not change its size or type. Year 3: Studies 3D shapes and their flat faces. Begins noticing symmetry in shapes and in the natural environment.	<i>Cut shapes from paper. Slide, flip and turn them.</i> "Is it still the same shape?" <i>Find symmetry in leaves, tiles and fabric.</i> "Does this shape look the same on both sides?" <i>Look for shapes in the environment — windows, signs, floors.</i>
Year 4	Line symmetry and rotational symmetry Your child formally learns two types of symmetry. line of symmetry — a line that splits a shape into two matching mirror halves. Fold a rectangle top-to-bottom — both halves match → line of symmetry. A square has 4 lines of symmetry. A rectangle has 2. rotational symmetry — a shape looks the same after being turned part of the way around. A square matches itself at 90°, 180°, 270° and 360°. order of rotational symmetry — how many times a shape matches itself in one full 360° turn.	Fold shapes in half — does it match? That fold line is a line of symmetry! Trace a shape and rotate it. "How many times does it look the same in one full turn?" Find symmetry in letters: A H M O X Find it in logos and road signs.
Year 5	Translation, reflection and rotation — formal transformations Your child learns the formal names for the three moves and uses them precisely. translation — slide the shape to a new position (no flipping or turning) reflection — flip the shape over a mirror line rotation — turn the shape around a fixed point, clockwise or anticlockwise In all three transformations the shape's size and shape never change — only its position or orientation changes. transformation — any move that changes a shape's position or direction	Draw an arrow on grid paper. Slide it 3 right → translation ✓ Flip over a line → reflection ✓ Turn 90° clockwise → rotation ✓ "What changed each time? What stayed the same?"
Year 6	Combining transformations — tessellations and patterns Your child combines two or more transformations to create tessellations and geometric patterns. tessellation — a pattern of shapes that covers a surface with no gaps and no overlaps. They discover that order matters: reflect then rotate ≠ rotate then reflect. They design logos and tilings, and can explain which transformations they used and why.	Look at floor tiles or fabric. "What transformation connects each tile to the next?" Try: trace a triangle, reflect it, then translate the pair. "What pattern does it make?" Honeycomb = hexagon tessellation. Where else can you find them?

★ The three transformations — and two types of symmetry

Translation ("Slide")	Reflection ("Flip")	Rotation ("Turn")	Symmetry ("Mirror / Turn")
BEFORE: ➡ AFTER: ➡ Shape slides to a new position. Same way up. Same size.	BEFORE: ➡ AFTER: ⬅ Shape flips over a mirror line. Like a reflection in water.	BEFORE: ➡ AFTER: ↓ (quarter turn) Shape turns around a fixed point. Clockwise or anticlockwise.	Line symmetry: fold the shape — both halves match. Rotational symmetry: turn the shape — it looks the same before full turn.
<i>Changes: position</i> <i>Stays same: size, shape, orientation</i>	<i>Changes: orientation (faces other way)</i> <i>Stays same: size, shape</i>	<i>Changes: orientation (angle it faces)</i> <i>Stays same: size, shape</i>	<i>Line symmetry: 1 or more lines</i> <i>Rotational order: how many matches in one full turn</i>
<i>Sliding a book across a table.</i> <i>Moving a chess piece forward.</i>	<i>Your face in a mirror.</i> <i>Text on a stamp before printing.</i>	<i>Clock hands turning.</i> <i>A door opening.</i> <i>A wheel spinning.</i>	<i>Butterfly wings.</i> <i>A leaf.</i> <i>The letter A.</i> <i>Floor tiles.</i>

In ALL three transformations: the shape's size and shape never change. Only its position or direction changes.

Helping at Home — Symmetry, Reflections, Rotations and Translations

Worked examples and questions to ask · Foundation to Year 6

How it works — worked examples

Year 4 — Finding lines of symmetry

How many lines of symmetry does a rectangle have?

Line 1	Fold top to bottom — both halves match exactly. ✓
Line 2	Fold left to right — both halves match exactly. ✓
Diagonal?	Fold corner to corner — the halves do NOT match. ✗

A rectangle has **2 lines of symmetry**. A square has **4**. A circle has infinitely many!

Year 5 — Translation, reflection, rotation on a grid

Starting shape: an arrow pointing RIGHT →

Move	Result	What changed?
Translation (slide)	→ → Slide 3 spaces right	Position — now further right. Size and direction: unchanged.
Reflection (flip)	→ ← Flip over vertical line	Direction — now points left. Size and shape: unchanged.
Rotation (turn)	→ ↓ Turn 90° clockwise	Direction — now points down. Size and shape: unchanged.

The shape is always the same size and shape after any transformation — only its position or direction changes.

Year 6 — Creating a tessellation

Can a regular hexagon tessellate? Try it step by step.

Step 1	Place one hexagon on paper and trace it.
Step 2	Translate (slide) the hexagon to sit beside it — no gap, no overlap. Trace it.
Step 3	Continue translating to fill the row. Then start a new row.
Result	YES — hexagons tessellate! Honeycomb is a natural hexagon tessellation.

Shapes that tessellate: squares, triangles, hexagons. Shapes that do NOT: circles, regular pentagons.

Questions to ask your child

You do not need to know the answer. Ask and let your child do the explaining!

F Foundation

- Find me something shaped like a rectangle in this room.
- How many corners does this shape have?
- Can you find a shape with curved sides?

1 Year 1

- Turn this triangle upside down. Is it still a triangle?
- Find me a shape that looks the same on both sides.
- Look at this leaf — does it have matching halves?

2 Year 2

- Slide this shape to the other side of the table. Did it change?
- Flip this shape over. Is it still the same size?
- Turn this shape a quarter turn. What do you notice?

3 Year 3

- How many flat faces does this box have?
- What 2D shape is each face?
- Does any face of this shape have a line of symmetry?

4 Year 4

- Fold this shape in half — do both sides match exactly?
- How many lines of symmetry does a square have?
- Turn this shape — how many times does it look the same before a full turn?

5 Year 5

- Slide this shape 4 squares to the right. What is that called?
- Reflect this shape over the dotted line. Which way does it face now?
- Rotate this shape 90° clockwise. What changed? What stayed the same?

6 Year 6

- Can this shape tessellate? How do you know?
- What transformations did you use to make this pattern?
- Does the order of reflection and rotation matter? Try it and see!

Things to try at home

Any age: Look for symmetry at home — in tiles, fabric, leaves and flowers. Fold things in half to test for symmetry.	Year 1–2: Cut out shapes from paper. Slide, flip and turn them. Does the shape change? What stays the same?
Year 2–3: Hold a shape up to a mirror. What do you see? That mirror image is a reflection!	Year 4: Draw a shape and fold it to find its lines of symmetry. Try letters: A, B, H, X — how many lines of symmetry does each have?
Year 5: Draw a simple shape on grid paper. Translate it 5 squares right. Reflect it over a line. Rotate it 90°. Describe each move.	Year 6: Make a tessellation using cut-out triangles or squares. What transformation connects each tile to the next?

Key words to learn together

symmetry: when one half of a shape is a mirror image of the other half	line of symmetry: a line that divides a shape into two matching halves
rotational symmetry: a shape looks the same after being turned part of the way around	transformation: any move that changes a shape's position or direction
translation: sliding a shape to a new position without flipping or turning it	reflection: flipping a shape over a mirror line — like a reflection in water
rotation: turning a shape around a fixed point — clockwise or anticlockwise	orientation: the direction a shape is facing
clockwise: turning in the same direction as clock hands move	anticlockwise: turning in the opposite direction to clock hands
tessellation: a pattern of shapes that fits together with no gaps and no overlaps	vertex: a corner point of a shape (plural: vertices)