

Symmetry**Mathematics – Symmetry (Grade 5)**

Symmetry means a balanced arrangement. A figure is symmetric if a fold (or mirror) can place one part exactly on the other. You will explore **lines of symmetry**, **rotational symmetry**, and how to **complete or count symmetry** in complex shapes, letters, and grids.



mirror test



rotation order



grid reasoning

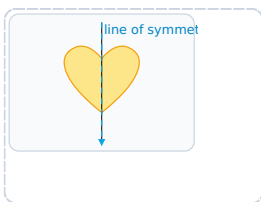
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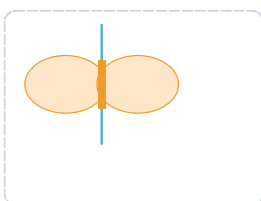
1) What is Symmetry?

Symmetry means a figure looks exactly the same after a flip or a turn. In Grade 5 we study:

- **Line (mirror) symmetry:** A line divides a figure into two matching halves.
- **Rotational symmetry:** A figure matches itself after a turn of some angle less than 360° .



A figure has **line symmetry** if it can be folded along a line so that both halves match exactly. It has **rotational symmetry** if it matches itself after turning less than a full turn (360°).



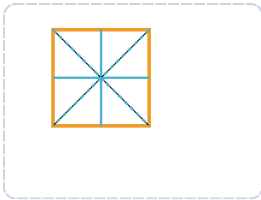
The blue line is a line of symmetry. Left wing reflects to right wing.

2) Lines of Symmetry

Types of lines

- **Vertical:** top to bottom fold.
- **Horizontal:** left to right fold.
- **Diagonal:** slanted fold (common in squares, rhombi, regular polygons).

Examples (small visuals)

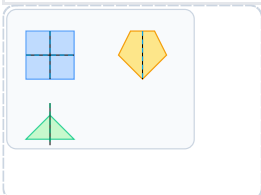


A square has 4 lines of symmetry.

Common figures and their lines of symmetry

Common figures and their *number of lines of symmetry (LoS)*:

Figure	LoS	Notes
Circle	Infinite	Every diameter is a line of symmetry.
Square	4	2 diagonals + vertical + horizontal.
Rectangle (not a square)	2	Vertical + horizontal only.
Equilateral triangle	3	Each through a vertex and midpoint of opposite side.
Isosceles triangle	1	Through the vertex at the top.
Rhombus (not a square)	2	Both diagonals.
Regular n-gon	n	All sides equal and angles equal.

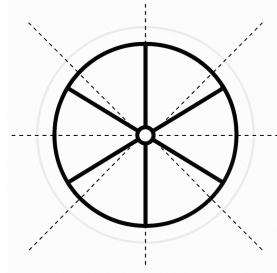


Key fact: If a figure has no fold that matches halves, it is *asymmetrical*.

3) Rotational Symmetry (Order & Angle)

Order = number of times a figure fits on itself during a 360° turn. **Angle of rotation** = $360^\circ \div \text{order}$.

Figure	Order	Angle	Why?
Equilateral triangle	3	120°	Matches at 120°, 240°, 360°.
Regular pentagon	5	72°	Five equal turns fit.
Rectangle (non-square)	2	180°	Half-turn symmetry only.
Scalene triangle	1	360°	No smaller turn fits.



4) Symmetry in Letters & Numbers

Common English letters (block style) and digits show different symmetry:

Typical vertical symmetry

A, H, I, M, O, T, U, V, W, X, Y (depends on font)

Typical horizontal symmetry

B, C, D, E, H, I, K (rare), O, X (font dependent)

Digits like 0 and 8 can have both vertical and horizontal symmetry; 3 and 5 usually have none.

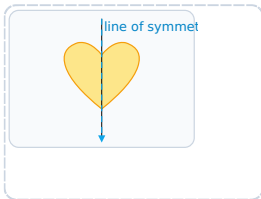
5) Regular Polygons

A **regular n-gon** has **n lines of symmetry** and rotational symmetry of **order n**. For non-regular shapes, count carefully; equal sides or equal angles alone do not guarantee symmetry.



6) Mirror & Paper-Fold Tests

- **Mirror test:** Place a mirror along a suspected line. If the visible half recreates the hidden half, it's a line of symmetry.
- **Fold test:** On grid figures, fold on the line. If outlines overlap exactly, the line works.
- For clocks and composite figures, compare symmetric parts around the line or center.



Use this idea when judging if irregular designs can be balanced by a fold.

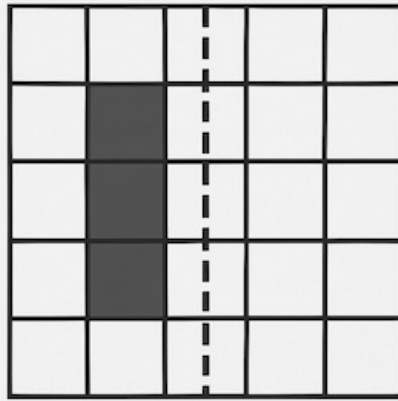
7) Make or Complete Symmetry

Add squares to balance

When a grid design is almost symmetric, reflect each filled cell across the line. Count how many are missing on the opposite side.

Shade strategy

1. Mark the line of symmetry.
2. For each shaded cell, jump equal distance to the other side.
3. Only count cells that are currently empty.

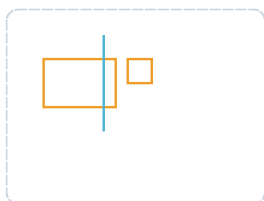


8) Tricky Cases & Tips

- A **rectangle** has 2 LoS; a **parallelogram** usually has none; a **rhombus** has 2 (diagonals).
- An **isosceles trapezium** has 1 vertical LoS; a general trapezium has none.
- **Composite figures:** Count LoS that leave *every* part unchanged. If any part moves or flips to a different place, it is not a LoS.
- **Numbers:** 0 and 8 (ideal shapes) have both vertical and horizontal LoS; 3 and 5 have none; 1 (block) has 1 vertical LoS.
- **Rotational vs line symmetry:** A shape may have rotational symmetry without any line symmetry (e.g., a pinwheel).

9) Fast Counting Tricks

- **Composite shapes:** Break into known symmetric parts and sum their lines. Beware overlaps; a new attachment can remove symmetry.
- **Arrows and fish shapes:** Often have a single line (usually horizontal) if fins/tails are balanced.
- **Letters & logos:** Treat serifs as extra bits—one unequal serif can destroy symmetry.
- **Clocks:** A circular dial has infinite lines; the *hand positions* decide symmetry (rarely symmetric unless opposite).



The right tab breaks vertical symmetry of the main rectangle.