

Line symmetry: finding lines of symmetry

CURRICULUM ALIGNMENT

SHA.TRN.3

model and explain the effects of transformations on shapes and line segments.

SHA.SHP.3a

investigate and analyse the properties of 3-D and 2-D shapes and identify classes of shapes based on these properties.

INTERACTIVES [Symmetry Tool · display, find-lines](#)

WHAT THIS LESSON TEACHES

A line of symmetry folds a shape into two halves that land exactly on top of each other. It is also called a mirror line.

→ A square has four lines of symmetry that all match perfectly when folded.

→ A rectangle has two lines of symmetry down and across its middle.

MODEL THIS ON THE BOARD

LINES ON A BUILDING SQUARE

- 1 Draw a paper square like a floor tile for a model house.
- 2 Fold it straight down the middle from top to bottom; both halves land exactly on top so this is one line of symmetry.
- 3 Fold it across from left to right; the halves match again for a second line.
- 4 Fold corner to corner on both diagonals; each fold matches too.
- 5 Count every matching fold: the square has 4 lines of symmetry.

DISCUSSION STARTER

REFLECT How do you check that both halves really match across a fold line?

LESSON ARC

Open with the butterfly image and five seconds of quiet think-time on where a fold would match. Model true folds on paper squares and equilateral triangles, then a failed slanted fold on letter A, naming the matching-halves test. Pupils take turns placing mirror lines on the symmetry-tool interactive for T, heart, rectangle and L, with paper folds for diagonals the tool cannot show. Copybook: ruler-draw every line on a square and a rectangle. Class Challenge practises heart and rectangle, then a spoken circle count. Close on the cover-each-other test.

TEACHING MOVES

1. **Getting Started.** Hold up a real paper butterfly or heart if you have one and fold it slowly so both halves meet; otherwise point to the photo. Give five full seconds of silent think-time on 'where else could you fold so halves match?', then take two or three hands-up answers only.
2. **Watch and Notice.** Run the symmetry-tool folds on the board, then mirror each with paper: square side-to-side and corner-to-corner (four lines), equilateral triangle corner-to-midpoint (three lines). On letter A, show the true middle fold, then deliberately try a slanted fold and ask 'do the halves cover each other?' — they miss.

3. **Try It Together.** Call one pupil at a time to drag the mirror line. Before reveal, ask the class: 'will the halves match on that line?' Work T and heart on the tool; switch to paper for the rectangle (side-to-side matches, corner-to-corner does not) and the equilateral triangle's three lines. Keep revoicing: halves must cover each other.
4. **Draw the Lines in Your Copy.** Pupils draw a square and a rectangle freehand, then ruler-draw every line of symmetry and write the count underneath. Walk the room watching for four lines on the rectangle — corner-to-corner folds fail the match test, so it is two only.
5. **Class Challenge.** Brisk board turns: heart (1 line down the middle), rectangle (2 lines — remind slanted folds miss). Check each answer with the class before moving on. Finish by holding up or sketching a circle: any fold through the centre matches, so far too many to count.
6. **What Did We Notice?.** Ask: 'How do you test a fold? What must the two halves do?' Listen for 'land exactly on top of each other' in pupil words, then revoice. Head off 'any straight line counts' by recalling the rectangle's failed diagonal.

COMMON MISCONCEPTIONS

⚠ Pupils give a rectangle four lines of symmetry, drawing corner-to-corner folds as if it were a square. Fold a paper rectangle corner to corner in front of them — the halves stick out and miss. Side-to-side and top-to-bottom match; diagonals do not. Recount: two lines only.

⚠ Pupils treat any straight line drawn through a shape as a line of symmetry — 'it cuts it in half so it must be one'.
Return to the slanted fold on letter A or the rectangle diagonal. Ask: 'do the halves cover each other, or do they miss?' Only covering counts.

⚠ Pupils only look for up-and-down folds and miss diagonal lines on the square.
Hold the paper square and fold corner to corner slowly. 'Not every fold goes straight up and down — watch the corners meet.' Add those two lines to the count of four.

DIFFERENTIATION

EMERGING

- Give a pre-drawn square on copybook paper with the vertical fold already ruled; pupil adds only the horizontal, then counts two before trying diagonals.
- Stay with the heart and letter T on the interactive — one clear vertical line — while the class moves on to rectangle diagonals.

DEVELOPING

- After the copybook square and rectangle, sketch a capital H and ask how many lines pass the cover test before any fold is drawn.
- On the rectangle, predict first: 'will corner-to-corner match?' then fold to confirm the no.

PROFICIENT

- After Class Challenge, pose: 'draw a shape with exactly one line of symmetry that is not a heart or a letter — prove it with a fold test in your copy.'
- Ask why a circle has more lines than they can count, and whether every diameter is a mirror line — justify without listing them.

✂ **Cross-curricular:** Link to Visual Art: fold a paper shamrock or Celtic knot motif and test which crease is a true mirror line.

ANSWER KEY

Scaffold: visual check on the page

Q1: 4

Q2: 2

Q3: 1

Q4: 1

Q5: infinite

- a) **Always** : Both midlines and both diagonals fold so the halves match exactly.
- b) **Never** : A rectangle only has two lines of symmetry, the midlines, not the diagonals.
- c) **Always** : The rule states that a line of symmetry is also called a mirror line.

d) Sometimes : True for a square or a heart; false for the letter F.

EXTENSION SHEET · STRETCH ANSWERS

S1: 1 line

S2: 6 lines

S3: 1 line

S4: reflection

S5: reflection

Investigation: Flag symmetry — open-ended; scan pupils' working for valid solution paths rather than a single answer.