

## Rotation of shapes about a point

### CURRICULUM ALIGNMENT

SHA.TRN.4a perform and devise a range of steps involving transformations.

INTERACTIVES Transformation Playground · challenge, display, explore

### WHAT THIS LESSON TEACHES

A rotation turns a shape around a fixed point. The shape keeps its size and shape but changes facing direction and position.

→ A flag at a point turned  $90^\circ$  clockwise about the pin.

→ A shape rotated  $180^\circ$  about a marked vertex on the grid.

### MODEL THIS ON THE BOARD

#### ROTATE THE L-SHAPE $90^\circ$ CLOCKWISE ABOUT C

- 1 Mark centre point C on the grid.
- 2 Count the squares from C to each vertex of the L-shape.
- 3 Turn each vertex  $90^\circ$  clockwise around C to its new position.
- 4 Join the new vertices to draw the rotated L-shape.

### LESSON ARC

Open by pinning a paper flag at a point and turning it a quarter-turn clockwise from the front — pupils call out what changed and what stayed. Move to the interactive rotations, pointing to the centre before each turn, and finish on a read-backwards snapshot that tracks one corner from start to finish. Pupils sketch  $90^\circ$  and  $180^\circ$  images in their copy on squared paper. The Student Activity Book page carries the individual rotation practice.

### TEACHING MOVES

1. **Getting Started.** Pin a paper flag at one point and turn it a quarter-turn clockwise around the pin, or do it on the IWB. Take two or three hands-up answers and hold out for 'same size and shape, just facing a different way' — revoice it, because that one sentence is the whole lesson.
2. **Watch and Notice.** Before each rotation runs, point to the marked centre and say 'the whole shape turns round this dot, it never slides away from it'. On the  $180^\circ$  turn, ask 'which way did it turn?' and let the class discover a half-turn looks the same either way. On the final read-backwards snapshot, track one corner aloud: 'it was here, now it's here — that's one quarter-turn this way.'
3. **Try It Together.** Set the centre of rotation first, every single time — most errors come from turning around the shape's middle instead of the fixed point. Pick one corner, ask the watching class to predict its new spot with hands up, then let the pupil at the board apply the turn and check. Revoice: 'same distance from the centre, just facing a new way.'
4. **Turn It in Your Copy.** Walk the room glancing at two things only: is the centre dot clearly marked, and does each image face the right way. Hand tracing paper to any pupil who's unsure — trace the shape, pin the pencil on the centre dot, and physically turn the paper.
5. **Class Challenge.** Keep the board work brisk — pupils take turns matching the shape onto the dashed target, check each answer, class confirms, move on. On the final one there's no move handed over: hold out for all three parts of the description — centre, angle, direction. 'It turned' is not enough.

6. **What Did We Notice?** Display only. Ask why a half-turn needs no direction while a quarter-turn does, and listen for 'a half-turn ends in the same place either way'. If a pupil links it to clock hands, name that as a strong example.

### COMMON MISCONCEPTIONS

⚠ Pupils turn the shape around its own middle rather than the marked centre, so the image ends up in roughly the right facing direction but the wrong place.

Stop and point to the marked dot: 'the shape turns round this, not round its own middle'. Hand the pupil tracing paper — trace the shape, pin the pencil firmly on the marked centre, and turn. The physical pin makes the fixed point obvious.

⚠ Pupils give the angle but leave out the direction — they say '90°' or 'it turned a quarter' without saying clockwise or anticlockwise.

Show a 90° clockwise and a 90° anticlockwise turn of the same shape side by side on the IWB so the two different landing spots are visible. 'Same angle, two different answers — that's why we always say which way.'

⚠ When reading a rotation backwards from a finished snapshot, pupils guess the turn by eyeballing the whole shape instead of tracking a point.

Model the corner-tracking method: pick one corner, mark where it started and where it landed, count the quarter-turns between them, then read off the direction. Do it aloud once, then have a pupil narrate the next one the same way.

### DIFFERENTIATION

#### EMERGING

- Stay with 90° clockwise only in the copy while the class moves on to 180° — one turn, mastered, beats two rushed.
- Give tracing paper from the start: trace, pin the pencil on the centre, turn the paper. The physical turn removes the need to imagine it.

#### DEVELOPING

- After the copy work, ask: what single turn would undo your 90° clockwise image and put it back? Predict, then test with tracing paper.
- Set a two-part target — which 90° turn followed by which other turn lands the shape on the dashed outline?

#### PROFICIENT

- Pose: is there a shape where a 90° turn and a 180° turn about the same centre look identical? Let them investigate on squared paper and justify what they find — no telling.
- Pull them ahead into the Student Activity Book rotation page while the class finishes the Class Challenge.

✂ **Cross-curricular:** Tie to the clock — a minute hand from 12 to 3 is 90° clockwise, from 12 to 6 is 180°. Pupils read turns off the classroom clock.

### ANSWER KEY

**Scaffold:** visual check on the page

**Q1:** (none)

**Q2:** (none)

**Q3:** (-1, 2)

**Q4:** (none)

**a)** Always — Both directions move the shape to the identical final position.

**b)** Never — They move the shape to two different positions.

**c)** Never — A rotation keeps the shape the same size and shape.

**d)** Sometimes — Any point including a vertex can be chosen as the fixed centre.

### EXTENSION SHEET · STRETCH ANSWERS

**S1:** 1 line

**S2:** reflection

**S3:** 6 lines

**S4:** 8 lines