

Transformations: translation, reflection, rotation and enlargement

CURRICULUM ALIGNMENT

SHA.TRN.4a

perform and devise a range of steps involving transformations.

SHA.TRN.4b

analyse and show how shapes are enlarged on scaled diagrams.

INTERACTIVES

Transformation Playground · challenge, display, explore

WHAT THIS LESSON TEACHES

Transformations move or resize a shape on a grid. A translation slides every point the same way, a reflection flips it over a mirror line, a rotation turns it about a point, and an enlargement changes its size by a scale factor.

→ A triangle slid 3 squares right and 2 squares down.

→ A triangle enlarged by scale factor 2: each side twice as long, four times the area.

MODEL THIS ON THE BOARD

SLIDE THEN CHECK THE RESULT

- 1 Begin with a triangle on the grid.
- 2 Move every point 4 squares right.
- 3 Move every point 1 square down.
- 4 Size, angles and orientation stay the same after the slide.

LESSON ARC

Open with a real paper triangle: slide it, flip it, turn it, then make it bigger — pupils name the four moves and hunt the odd one out (enlargement changes size). On the grid, run slide/flip/turn briskly, then hold the enlargement reveal for a prediction on sides and area, and count the four unit squares inside the 2×2 . Pupils sketch all four results in their copy and label them, then match a triangle to dashed targets at the board.

TEACHING MOVES

1. **Getting Started.** Do all four moves live with a paper triangle if you have one. Take three hands-up answers for the naming, then hold out on the odd-one-out — don't confirm that enlargement is the different one. You want the class chasing that all lesson.
2. **Watch and Notice.** Run slide, flip and turn briskly as review, pointing along the grid corner-by-corner for the slide. Then stop and get a prediction for the enlargement's sides AND its area before the copy appears — many will say the area doubles. Let the 1×1 -beside- 2×2 picture show four squares; count them aloud with the class, this is the beat the wrap depends on.
3. **Try It Together.** Pupils take turns at the board; the watching class predicts what stays the same and what changes before each reveal. Reset to the starting triangle before every move — these don't chain. Slow right down on the enlargement: get the class to say 'sides $\times 2$, area $\times 4$ ' before you confirm it.
4. **Sketch the Four Moves in Your Copy.** Walk the room glancing for the four labels and the two enlargement notes. Watch for pupils drawing the enlarged triangle too small — the sides should visibly double against the starter shape.

5. **Class Challenge.** Brisk practice — pupils take turns at the board and the class confirms each match before moving on. On the final two-move round, ask which move to do first and why before anyone touches the board.
6. **What Did We Notice?.** Listen for 'area is length times width, so if both double you multiply by two twice'. Revoice a strong answer: 'so the space inside is two lots of doubling — 2 times 2 is 4.' If nobody reaches it, point back to the four-square picture and let the class count them again.

COMMON MISCONCEPTIONS

⚠ When the shape is enlarged by scale factor 2, pupils say the area also doubles — 'the sides doubled, so the area doubled too.'

Freeze before confirming and go to the 1×1 -beside- 2×2 picture. Count the small unit squares inside the big square together — one became four, not two. 'Both directions doubled, so it's 2 times 2.'

⚠ During Try It Together, pupils apply the next move to the already-transformed shape instead of resetting — so the enlargement lands on a shape that was already flipped and turned.

Say the reset aloud before every move: 'back to the starting triangle first.' Keep the original visibly on the grid so pupils can see each move begins from the same place.

⚠ Pupils treat 'flip' and 'turn' as the same thing, calling a rotation a reflection.

Put the flipped and turned copies side by side and ask which way each faces. A flip is a mirror image (like water); a turn keeps the same handedness, just pointing a new way.

DIFFERENTIATION

EMERGING

- Give a paper cut-out triangle so pupils physically slide, flip and turn it on their squared paper before sketching — the movement makes 'stays the same' concrete.
- For the copy sketch, pre-draw the starter triangle so pupils only produce the four results, not invent the layout.

DEVELOPING

- After the copy work, ask what an enlargement of scale factor 3 would do to the sides and the area — push them to reach $3 \times 3 = 9$ before confirming.
- On the final Class Challenge round, ask whether doing the turn first then the slide lands in the same place as slide-then-turn.

PROFICIENT

- Pose: 'If a shape's area became 9 times bigger, what scale factor was used, and how do you know?' Have them justify it in their copy against the $2 \times 2 = 4$ pattern.
- Narrate a harder board variant: enlarge by scale factor 2 from a centre point that is NOT a corner of the shape — where does each corner land, and does the area rule still hold?

✂ **Cross-curricular:** Tie to Visual Arts — pupils spot translation, reflection and rotation in a Celtic knotwork or tiling pattern and name each move they find.

ANSWER KEY

Scaffold: visual check on the page

Q1: reflection

Q2: rotation

Q3: translation (3 right, 2 down)

a) Always : Every point moves the same distance in the same direction so nothing else changes.

b) Always : That is the definition of a reflection.

c) Never : Sides double so the area becomes four times as big.

d) Always : An enlargement makes the shape bigger or smaller, but it still faces the same way.

EXTENSION SHEET · STRETCH ANSWERS

S1: reflection

S2: reflection

S3: reflection

S4: rotation

S5: reflection