

Tessellate a quilt block

CURRICULUM ALIGNMENT

SHA.SHP.4b

investigate and construct angles in the context of shape; and solve angle-related problems.

SHA.TRN.4a

perform and devise a range of steps involving transformations.

INTERACTIVES [Pattern Blocks](#) · challenge, display, explore

WHAT THIS LESSON TEACHES

Tessellation means fitting identical shapes together so they cover an area with no gaps and no overlaps. At every point where corners meet, the angles must add up to exactly 360° .

- Four square corners of 90° add to 360° , so squares tessellate a floor with no gaps.
- Three regular pentagon corners of 108° add to only 324° , so a gap is left and they do not tessellate.

MODEL THIS ON THE BOARD

BUILD A 4 BY 4 QUILT BLOCK

- 1 Mark a 4 by 4 outline on the squared grid.
- 2 Place unit squares inside so every cell is filled and edges touch with no gaps.
- 3 Check one interior meeting point: four 90° corners meet, and $90 + 90 + 90 + 90 = 360^\circ$.
- 4 The block is complete and tessellates; it also looks the same after a quarter turn (rotational symmetry of order 4).

LESSON ARC

Open on the bathroom-tile and honeycomb images and hold for the word gap. On the pattern-blocks interactive, count corners at a point: squares $90^\circ \times 4$, triangles $60^\circ \times 6$, hexagons $120^\circ \times 3$, then the pentagon shortfall. Model a 4×4 quilt block on the squared grid—plus by translation, corner triangles by quarter-turn rotation—then name order 4. Class Challenge fills plus, L and full-square blocks, turning each to check order. Table stations verify mixed corners with real pattern blocks before the Student Activity Book.

TEACHING MOVES

1. **Getting Started.** Show the tiled floor and honeycomb side by side. Take three hands-up answers only—hold out for gap or no overlaps. Ask which shapes might leave a hole, then park the question for the interactive.
2. **Watch and Notice.** Before giving totals, have pupils count how many corners meet at each point. Narrate squares ($90^\circ \times 4$), triangles ($60^\circ \times 6$), hexagons ($120^\circ \times 3$), then point along the mixed $90^\circ + 60^\circ + 60^\circ + 60^\circ + 90^\circ$ panel. Finish on the pentagon: $108^\circ \times 3 = 324^\circ$, finger the 36° wedge gap.
3. **Try It Together.** Pupils take turns dragging squares onto the grid. Before each lands, freeze and ask: does this corner still make a full turn? Revoice: the angles at that point have to add to 360° . Keep the board work brisk—mixed corners stay for paper later.
4. **Turning a Design: Symmetry and Transformations.** Point to each of the four pictures and have the class chorus same or different. Land order 4 as matching four times in one full turn, order 1 as matching only after the full turn. Name one slide, one flip and one turn from the board so the three transformation words stay concrete.

5. **Sketch Your Quilt Block in Your Copy.** Model end-to-end on the board squared grid first: 4×4 outline, centre square translated into a plus, diagonal triangles in one corner, then rotate that corner pattern a quarter turn into the other three. Turn the finished block; class says same four times. List on the board—shapes, transformations, order 4—then send pupils to copybook. Watch for single-shape-only designs and order labels with no actual turn-check.
6. **Class Challenge.** Practice round only—pupils place squares to complete plus, L, then full square. After each build, turn a quarter at a time and have the class say match or not. Push the contrast: plus and full square stay order 4; L drops to order 1. No re-teach mid-build.
7. **Verify With Real Shapes.** Groups test one shape at a time round a single point—squares, triangles, hexagons—then the mixed two-squares-plus-three-triangles corner. Circulate and pick one group to show the mixed close-up to the class. Point back at the board pentagon as the gap-leaver. Stop at testing round a point; no free whole-block build.
8. **What Did We Notice?.** Open with: what lets a shape tessellate? Listen for corner angles adding to a full turn of 360°. Revoice: same shape or a mix—both close when the angles at the point make 360°. Head off ‘only regular shapes tessellate’.

COMMON MISCONCEPTIONS

⚠ Pupils say regular pentagons tessellate because ‘tiles are five-sided’ or ‘three almost fit’—they ignore the leftover wedge.

Point to the three pentagon corners in the labelled picture, beside three hexagon corners. Point to the 36° gap: $108^\circ \times 3 = 324^\circ$, not 360°. Same test every time—do the corners make a full turn?

⚠ Pupils label the L-block order 4 because it has four arms or four corners, without turning it. Turn the L a quarter on the board. Class choruses different. ‘Order is how many times it matches itself in one full turn—not how many parts it has.’ Contrast with the plus that stays same.

⚠ Pupils claim only matching shapes can tessellate—‘squares and triangles can’t share a point’. Have a table rebuild the mixed corner with two square and three triangle pattern blocks. Count aloud: $90+90+60+60+60=360$. Revoice: a mix closes whenever the angles still make a full turn.

DIFFERENTIATION

EMERGING

- Stay on squares only at the board and in copybook—four 90° corners, no mixed shapes yet. Pre-write the $90 \times 4 = 360$ number sentence beside the grid so they only place blocks.
- At the pattern-block station, give only squares first; the pupil checks close-up at one point before touching triangles.

DEVELOPING

- After the plus build, ask: swap one arm square for two triangles—does the corner still make 360°? Prove it on the board before copybook.
- On the L-block, have them predict order before turning, then justify why it falls to 1 while the plus stays at 4.

PROFICIENT

- During Class Challenge, after the three board shapes, ask: design a block with rotational order 2 on copybook squared paper—name the transformation that forces order 2 rather than 4.
- At Verify, challenge: find a different mixed set (not 2 squares + 3 triangles) whose corners still total 360°, and show the class.

✂ **Cross-curricular:** Link to SESE Science—honeybee comb cells are regular hexagons because three 120° corners meet cleanly at every point.

ANSWER KEY

Scaffold: visual check on the page

Q1: 6

Q2: 1

a) **Always** : 90 four times is exactly 360, so squares always tessellate at a point.

b) **Never** : Three 108° corners make only 324°, leaving a permanent gap.

c) **Always** : That is the definition of tessellation used in the lesson.

d) Sometimes : True for a square's 90° (four fit) or a regular hexagon's 120° (three fit); false for a regular pentagon's 108° , which leaves a gap.