

Comparing area and perimeter: an investigation

CURRICULUM ALIGNMENT

MEA.MSR.3a compare, estimate and measure length, weight, capacity, area and volume using appropriate instruments and record and communicate appropriately.

SHA.SHP.3b represent shapes with drawings and models, and calculate dimensions of shapes.

INTERACTIVES Shape Measurer · challenge, display

WHAT THIS LESSON TEACHES

Area is how much flat space a shape covers, found by counting the equal squares inside it. Perimeter is the distance all the way around the outside. Shapes can share the same area yet have different perimeters.

- A shape made from 12 square tiles has an area of 12 squares, no matter what rectangle you arrange them into.
- A long thin 1 by 6 and a chunky 2 by 3 both cover 6 squares, but the long thin one has a longer way around.

MODEL THIS ON THE BOARD

SAME AREA, DIFFERENT PERIMETERS

- 1 Start with a long thin strip that is 1 square tall and 6 squares long.
- 2 Count the squares inside: area = 6 squares.
- 3 Add the sides all the way round: $1 + 6 + 1 + 6 = 14$ units for the perimeter.
- 4 Now make a chunky block 2 squares tall and 3 squares long.
- 5 Count inside: area is also 6 squares.
- 6 Add its sides: $2 + 3 + 2 + 3 = 10$ units, so the chunky shape has the shorter way around.

DISCUSSION STARTER

REFLECT Can two shapes share the same area but different perimeters? What did you notice?

LESSON ARC

Open with two rectangles on the IWB — one long-thin, one chunky, both covering 6 squares — and take prediction guesses on whether the walk around matches. Work three shapes live: count squares inside for area, walk the edge for perimeter, pausing to predict each perimeter. Pupils draw two 8-square rectangles in the copybook and ring the longer way around. The 12-tile investigation is the Class Challenge; What's Next looks ahead to volume.

TEACHING MOVES

1. **Getting Started.** Show the long-thin and chunky rectangles and take exactly three hands-up guesses on whether an ant walks the same distance around each — not open call-outs. Do NOT settle it; both cover 6 squares so the class will assume the perimeters match, and that unsettled tension is the whole lesson.
2. **Watch and Notice.** Work each shape live: count inside for area, then walk the edge adding sides, pausing before each perimeter reveal so the class predicts. When the 2-by-3 lands with perimeter 10 against the

1-by-6's 14, wait for a pupil to name 'same area, different distance around' before you say it. Flag that the 3-by-3 changes both numbers so nobody over-concludes area is fixed.

3. **Draw the Two Rectangles in Your Copy.** Pupils draw two different 8-square rectangles (steer toward 1-by-8 and 2-by-4), write each perimeter, and ring the longer way around. Circulate glancing for two genuinely different shapes and correct perimeter sums on the spot — this is practice, not marking.
4. **Try It Together.** Pupils take turns dragging the shape-measurer's corners from the 2-by-4 into a 1-by-8 then a 3-by-3, reading area first, then perimeter. Ask the class to predict each perimeter before it appears, and hold out for someone to spot that the 1-by-8 covers the same 8 squares yet has the longer way around.
5. **Class Challenge.** Brisk practice — pupils bring one 12-tile rectangle to the board, check the area and perimeter, class confirms, move on. Circulate prompting 'can you make a different rectangle from the same tiles?' Steer toward the full set: 1-by-12 longest perimeter (26), 3-by-4 shortest (14), all covering 12 squares — let a pupil say why before you revoice.
6. **What Did We Notice?** Put the claim up — 'same squares means same distance around' — and ask the class to settle it with the 12-tile evidence. Revoice the big idea: equal area does not mean equal perimeter; they are two separate ideas measured two separate ways.

COMMON MISCONCEPTIONS

⚠ Pupils insist the two 6-square rectangles must have the same perimeter — 'they cover the same amount, so the way around has to be the same too.'

Don't tell them — let the 2-by-3 (perimeter 10) land against the 1-by-6 (perimeter 14) on the shape-measurer. Walk the edge of each with a finger so the class sees the long thin one has far more edge on the outside for the same squares inside.

⚠ Pupils swap the two words — reading the perimeter number when asked for area, or counting squares when asked for the distance around.

Revoice cleanly every time you hear it: area is the squares inside, perimeter is the walk around the edge. On the shape-measurer, have the pupil physically point inside for area, then trace the edge for perimeter, so the two actions stay distinct.

DIFFERENTIATION

EMERGING

- In the copybook step, pre-draw one 8-square rectangle so the pupil only has to find a second different one and count its edges.
- On the Class Challenge, hand these pupils the 12 tiles physically and ask only for one rectangle with its area and perimeter — the 'find them all' part is optional.

DEVELOPING

- After the 12-tile round, ask whether 16 tiles would give more or fewer possible rectangles than 12, and why — predict before checking.
- Ask pupils to order all their 12-tile rectangles from shortest perimeter to longest and describe what the shortest one looks like.

PROFICIENT

- Pose at the board: 'I want a rectangle with area 12 and the shortest possible perimeter — how would you argue you've found it?' Let them reason toward the chunkiest shape and justify it aloud, then capture the reasoning in their copybook.

✓ **Cross-curricular:** Tie to Geography — pupils compare a long thin field and a square field of the same area and discuss which needs more fencing around its edge.

ANSWER KEY

a) 2×4 : $A=8$ $P=12$; 1×6 : $A=6$ $P=14$

b) 1×8 ($P=18$) ringed; 2×4 ($P=12$)

c) 2 by 6

Q1: 35

Q2: 1×8 ($P=18$) longer than 2×4 ($P=12$)

a) **Never** : A 1 by 6 and a 2 by 3 both have area 6 yet perimeters 14 and 10.

b) **Always** : Area only counts how many squares you used, not the shape.

c) Always : More edge is exposed when the same squares are stretched out.

d) Sometimes : A 3 by 3 has area 9 and perimeter 12, yet a 1 by 6 has smaller area 6 but larger perimeter 14.

EXTENSION SHEET · STRETCH ANSWERS

S1: 5 tiles long and 2 tiles wide

S2: The 3 by 4 covers more squares (12 and 11). The 1 by 11 has the longer way around (24 cm and 14 cm).

S3: No. Both cover 9 squares, but their perimeters are 20 cm and 12 cm.

S4: The area goes from 18 to 27 squares. The perimeter goes from 22 cm to 24 cm.

S5: 2 by 12 (28), 3 by 8 (22), 4 by 6 (20)

Investigation: Same perimeter, different area — open-ended; scan pupils' working for valid solution paths rather than a single answer.