Lesson 70 SHAPE & SPACE

Classifying triangles and quadrilaterals by properties

CURRICULUM ALIGNMENT

SHA.SHP.4a construct 3-D and 2-D models or structures given defined measurements and/or specific conditions.

SHA.SHP.4b investigate and construct angles in the context of shape; and solve angle-related problems.

ALG.PRR.4a identify, explain and apply generalisations, including properties of operations, mathematical models and patterns.

INTERACTIVES 2D Shape Inspector · display, explore | Drag Sort · challenge

WHAT THIS LESSON TEACHES

A feature we can use to sort a shape such as how many sides it has the size of its angles or whether any sides are parallel.

→ A rectangle has the property two pairs of parallel sides

→ An equilateral triangle also has three equal angles of 60 degrees each

MODEL THIS ON THE BOARD

CLASSIFY A SQUARE USING PROPERTIES

1. Look at the square and note it has four equal sides and four right angles.
2. Check for parallel sides: it has two pairs of parallel sides.
3. Tick the boxes for sides angles and parallel lines in the property table.

LESSON ARC

Open with a hands-up split: is a square a rectangle? Don't settle it. Reveal three triangles on the shape-inspector interactive, naming them by sides then by angles, before adding the rhombus, parallelogram and trapezium. The class checks each shape against a named property on the board, then builds a sides/angles/parallel-lines tick-table in their copy. The Class Challenge sorts triangles and quadrilaterals into overlapping groups, looping back to settle the opening question.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers, not open call-outs, and resist settling the argument — it is the whole lesson. Listen for the pupil who says 'a square is a rectangle but not the other way round' and bank that phrasing for the wrap.
2. **Watch and Notice.** Reveal one triangle at a time on the shape-inspector interactive and say 'equal sides give equal angles' as the matching angles light up. Make the point explicitly that an equilateral triangle is acute (all 60°) — the Class Challenge sort depends on pupils holding this. When the trapezium goes up, point to its single parallel pair and contrast it with the rhombus's two.
3. **Try It Together.** Call one property at a time and send a pupil to the board to tag each shape that fits — this round is talking it through, not marking. Start easy ('three sides') and build to 'exactly one pair of parallel sides' to catch the trapezium. Revoice: 'so a square fits because it has two pairs of parallel sides AND four equal sides.'
4. **Build a Property Table in Your Copy.** Walk the room glancing at column headings and ticks — sides, angles, parallel lines. Watch for the square row: pupils routinely leave its parallel-lines column blank

because the parallel sides aren't the 'obvious' feature. Prompt that pupil on the spot rather than at the end.

5. **Class Challenge.** Run the bank in order so the difficulty builds; pupils take turns at the board and the class confirms each answer before moving on. Keep it brisk — this is consolidation, not re-teaching. Before the first sort, remind the class that an equilateral triangle counts as acute.
6. **What Did We Notice?.** Display only — no writing. Push pupils to reason from properties, not appearance: 'a square ticks every rectangle box plus one more, so it fits inside the rectangle group; a rectangle is missing the equal-sides box so it does not fit inside the square group.' Head off the gut answer that 'they just look different.'

COMMON MISCONCEPTIONS

⚠ Pupils say 'no, a square isn't a rectangle — they look different', reasoning from the picture rather than the properties.

Run both shapes through the property table live: four right angles? two pairs of parallel sides? Both tick those. The square ticks one extra box (four equal sides), so it sits inside the rectangle group, not outside it.

⚠ When tagging 'has two pairs of parallel sides', pupils tag the trapezium — they assume every four-sided shape has two parallel pairs.

Stop at the trapezium on the shape-inspector and trace each side with a finger: only the top and bottom stay the same distance apart. Tag it under 'exactly one pair' and leave the 'two pairs' column empty for that row.

⚠ In the angle sort, pupils refuse to call an equilateral triangle 'acute' because it 'looks special' or already has a sides-name.

Point at all three 60° angles on the interactive: every angle is under 90°, so it is acute. A triangle gets a sides-name AND an angles-name — the two labels live in different columns.

DIFFERENTIATION

EMERGING

- Give these pupils the property table with the three column headings pre-drawn so they spend their effort on the ticks, not the structure.
- On the Try It Together board, start them on side-counting properties ('three sides', 'four sides') before any parallel-line property.

DEVELOPING

- After the copybook table, ask: which shape has the most ticks across the three columns, and why?
- Pose a missing-shape riddle — 'I have four equal sides but no right angles, what am I?' (rhombus) — and ask them to write the giveaway property.

PROFICIENT

- During the Class Challenge overlap, ask the strongest pupils to name every shape that lives in BOTH 'parallel sides' and 'equal sides', and justify each from its property ticks — narrate one for the class as the bridge back to the opening question.
- Challenge them to explain to a younger pupil, in one sentence each, why a square is a rectangle but a rectangle is not a square.

↗ **Cross-curricular:** Tie to Geography — pupils spot triangle and quadrilateral types in roof trusses and gable ends on buildings around the school, naming each by its properties.

ANSWER KEY

a) equal sides, right angles, parallel sides

b) equal sides

c) parallel sides

Q1: Yes

Q2: Yes

Q3: Yes

Q4: No

Q5: Yes

a) Always — Every square meets all rectangle properties.

b) Sometimes — Rectangles can have equal sides or not.

c) Never — It is right-angled not acute.

d) Always — That is the definition used for sorting.

EXTENSION SHEET · STRETCH ANSWERS

S1: a regular hexagon

S2: a regular hexagon

S3: an isosceles trapezium

S4: a rectangle

S5: an isosceles triangle