Lesson 74 SHAPE & SPACE

Angles on a line, at a point and vertically opposite

CURRICULUM ALIGNMENT

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

INTERACTIVES Angle Tool · display, explore | Word Problem · challenge

WHAT THIS LESSON TEACHES

Angles on a straight line add to 180 degrees. Angles around a point add to 360 degrees. Vertically opposite angles are equal.

→ If one angle on a line is 125 degrees the other is 180 minus 125 equals 55 degrees.

→ Three angles round a point of 90 degrees 140 degrees and one unknown the unknown is 360 minus 90 minus 140 equals 130 degrees.

MODEL THIS ON THE BOARD

FIND THE MISSING ANGLE ON A LINE

1. Start with the straight line rule that all angles add to 180 degrees.
2. Subtract the known angle from 180 degrees.
3. **140** degrees is given so the missing angle is **180** minus **140**.

LESSON ARC

Open on the two crossing roads with one 70° angle — pupils guess which of the other three match before anyone confirms. Build three facts live on the interactive: line (180°), point (360°), crossing (equal opposites). Work the Try It Together predictions on the board, then pupils sketch each diagram in their copy and write the calculation, ringing the answer. Class Challenge finishes on a 2:1 ratio angle split.

TEACHING MOVES

1. **Getting Started.** Give five seconds of quiet think-time, then take three hands-up answers only — no open call-outs. Say nothing about who's right; you want the guess that the angle straight across looks equal and the neighbour looks bigger, because Watch and Notice pays that intuition off.
2. **Watch and Notice.** Work each interactive snapshot live rather than reading the captions. On the line, hold out for 'one hundred and eighty take away one hundred and twenty-five' before you reveal it. On the point, stress full turn — 360°, not 180° — it's the fact they forget first. On the crossing, trace one facing angle, its shared neighbour, then the other facing angle: both are 180° minus that neighbour, so both are equal.
3. **Try It Together.** Pupils take turns at the board and predict each missing angle before checking; the class agrees or corrects out loud. Hold the class on the point step — 360° not 180° is the slip. On the crossing, ask a pupil to name the 55° angle without a protractor and justify it as vertically opposite.
4. **Sketch and Solve in Your Copy.** Pupils sketch each board diagram and write the calculation underneath — e.g. 180° − 125° = 55° — not just the ringed answer. Walk the room glancing for anyone using 180° at a point where it should be 360°.
5. **Class Challenge.** Brisk practice round — pupils take turns at the board, the class confirms each answer, then move on. On the 2:1 ratio, draw the line split into three equal parts as pupils talk it: 3 parts share

180°, so one part is 60° and the angles are 60° and 120°. Reroute anyone treating the point problem as 180°.

6. **What Did We Notice?.** Push the two claims against each other: is every problem 'take the known ones from the whole'? Revoice the pupil who names the crossing as the case needing no sum — 'so 180° and 360° find missing angles, but two lines crossing hands you the answer for free.'

COMMON MISCONCEPTIONS

⚠ Pupils use 180° for angles around a point — given 90° and 150° they subtract from 180° and get a negative or nonsense, or they just assume the whole is a half-turn.

Stop and act it out: turn a pupil (or a ruler on the board) all the way round back to start — that's one full turn, 360°, two of the straight-line half-turns. Rebuild the point diagram and count the half-turns before subtracting.

⚠ On the crossing, pupils reach for a protractor or a subtraction to find the angle directly opposite the 55°, instead of just stating it equals 55°.

Cover the protractor. Point to one facing angle, its neighbour on the line, then the other facing angle sharing that same neighbour — both are 180° minus the neighbour, so they must be equal. The answer is free, no measuring.

DIFFERENTIATION

EMERGING

- Stay on line problems only (180°) while the class moves to points; give these pupils a pre-drawn diagram with the known angle already labelled so they just write the take-away.
- In the copybook step, let them trace the board diagram rather than sketch from scratch, so effort goes into the calculation not the drawing.

DEVELOPING

- After Try It Together, hand a point problem with two unknowns that are equal — 360° − 100°, then split the rest in half. Can they reason the two-step?
- Ask them to write the crossing fact as a rule in their own words in the copy: 'when two lines cross…'.

PROFICIENT

- Narrate a 3:2 ratio on a line at the board for fast finishers — 5 parts share 180°, so one part is 36°. Ask them to state both angles and check they sum to 180°.
- Pose: at a point, three angles are in the ratio 1:2:3. Find all three and explain how the parts share 360°.

↗ **Cross-curricular:** Tie to Geography map work — pupils measure the angles where two roads meet at a local crossroads or the compass turns on a route, naming vertically opposite pairs.

ANSWER KEY

Scaffold: visual check on the page

Q1: 40°

Q2: 70°

Q3: 120°

Q4: 0°

Q5: 70°, 110°, 70°

a) Always — This is the straight line rule.

b) Never — They are always equal when two lines cross.

c) Always — This is the point rule.

d) Never — It depends on the given angle.

EXTENSION SHEET · STRETCH ANSWERS

S1: 41°

S2: 124°

S3: 27°

S4: 27°

S5: 48°