Lesson 77 SHAPE & SPACE

Drawing angles with a protractor

CURRICULUM ALIGNMENT

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

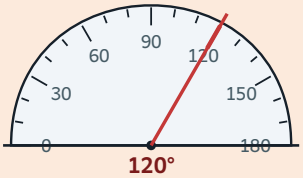
INTERACTIVES Angle Tool · challenge, display, explore

WHAT THIS LESSON TEACHES

To draw a given angle: draw the **base line** first, mark the **vertex**, place the protractor's centre on the vertex with the 0° line along the base, then **mark a dot** at the required degree and join from the vertex.

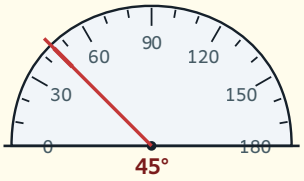
→ **Drawing 60°**: count 60° from the 0° line, mark a dot, join from the vertex through the dot.

→ **Drawing 135°** (obtuse): count past 90° to 135°; the line slopes back over the vertex.



MODEL THIS ON THE BOARD

DRAWING A 45° ANGLE



1. Draw a straight base line and mark a **vertex point** on it.
2. Place the protractor so its centre cross is on the vertex and the 0° line runs along the base line.
3. Find **45°** on the scale that starts at 0° and make a small mark.
4. Lift the protractor and join the vertex to the mark with a ruler — that's your **45° angle**.

LESSON ARC

Open in silence — draw a 60° angle on the IWB so pupils watch the order: cross, baseline ray, protractor seated, count and dot, then connect. Walk through four worked examples on the protractor interactive (60°, 95°, 135°, 175°), pivoting on mark-then-move and the right-scale rule. Volunteers rehearse 110° and 75° at the front with a real protractor while the class call out the next step. Pupils then draw five angles in their copybooks before the Class Challenge round on the angle-tool interactive.

TEACHING MOVES

1. **Getting Started.** Draw the 60° angle in silence — pupils are reading the order of your moves, not your words. Pause at the end and ask 'what was the very first thing I did, before the protractor even touched the page?' Take three hands; listen for 'cross' or 'vertex'.
2. **Watch and Notice.** Step through the four interactives one at a time, retracing the four moves in the air with your finger on the IWB. Slow right down on 95° — name aloud that the dot lands near the

protractor's centre top and the protractor will slip if pupils lift before marking. On 175°, count past 170° one degree at a time so pupils hear the overshoot risk.

3. **Try It Together.** Volunteer draws on paper under the document camera (or at the board with a large protractor). At each stage, lead the step yourself, then ask the class what comes next and take a couple of answers before the volunteer moves — their answers are your engagement check. After each finished angle, drag the orange ray on the angle-tool interactive to confirm and read the on-screen number aloud.
4. **Draw Each Angle in Your Copy.** Circulate the room glancing for the mark-then-move discipline — dot down before the protractor lifts. If you spot 75° read as 105° or 115° read as 65°, the pupil has jumped scales; have them anchor one finger on the baseline ray and trace up from zero on the ring that meets their finger.
5. **Class Challenge.** Four or five pupils take turns at the IWB through the five targets — about 90 seconds each. Give 90° to a pupil who needs a confidence win and hold 165° back for last. The watching pupils have a job: classify each angle aloud ('acute… obtuse…') and say whether the ray looks roughly right before the Check press.
6. **What Did We Notice?.** Display-only — listen for pupils naming the slip risk in their own words. Re-voice the strongest answer: 'the dot is your memory of where the protractor was'. If time, push for 'which angle was hardest, and which step caused the wobble?'

COMMON MISCONCEPTIONS

⚠ Pupils count up to the target on one scale, then jump to the other ring halfway — so 115° gets read as 65°, or 75° as 105°.

Have the pupil place one finger on the baseline ray where it meets the protractor's zero. Trace from that zero up the ring that meets their finger, naming the tens aloud (10, 20, 30…). The finger on the baseline anchors the correct ring.

⚠ Pupils lift the protractor first and then try to remember where the target degree was — by the time they ink the second ray, the angle has drifted by 3° or 4°.

Stop the pupil mid-action. Reseat the protractor on the cross, count back to the target, and make the dot while the protractor is still down. Say it aloud: 'dot down, then lift'. Have them redraw that angle from scratch.

⚠ Pupils place the protractor's edge on the baseline ray rather than centring the crosshair on the vertex — the angle ends up correct in size but starts in the wrong place.

Pause and point to the small hole or crosshair at the centre of the protractor's straight edge. That mark sits exactly on the pencil cross. The baseline ray then runs out through the zero. Rebuild that one angle with the protractor properly seated.

DIFFERENTIATION

EMERGING

- Pre-pencil the cross and the baseline ray in their copybook before they start, so they only have to count and connect. Stay with 30°, 90°, and 115° from the bank.
- Pair them with the paper protractor sheet for one practice angle first — the printed zero line is easier to see than the moulded line on the plastic version.

DEVELOPING

- After the five copybook angles, ask them to draw an angle 20° larger than one they just drew (e.g. 95° from 75°). Same protractor protocol, fresh count.
- Ask them to draw 75° twice — once with the baseline ray pointing right, once pointing left. Which scale did they use each time, and why?

PROFICIENT

- Pose: draw 165° without lifting the protractor between counting and marking — can you keep one hand pinning the protractor while the other dots? Useful when angles get close to 180°.
- Ask them to draw any two angles in their copybook that sum to exactly 180°. They choose the pair. Then explain to a neighbour how they know without measuring.

Cross-curricular: Tie to visual arts — pupils design a star or compass-rose motif where every point uses a target angle they have to draw with the protractor.

ANSWER KEY

W1: 48°

W2: 30° is acute

Q1: 158° is obtuse

Q2: 57°

Q3: 84°

Q4: 85° is acute

EXTENSION SHEET · STRETCH ANSWERS

S1: 98°

S2: 307° is reflex

S3: 84°

S4: 84° is acute

S5: 47° is acute