

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 an angle, first mark a small dot for the vertex. Sit the protractor centre exactly on that dot, rule a baseline from zero, mark the target degrees, then rule the second ray through the mark.

→ Mark a vertex dot then draw a 60° angle from a right-hand baseline.

→ Draw a 90° angle by counting to 90 on the scale and ruling the second ray.

MODEL THIS ON THE BOARD

DRAW A 60° CLASSROOM ANGLE

- 1 Mark one small dot on the page for the vertex where the two rays will meet.
- 2 Place the protractor centre hole exactly on the dot and rule a baseline to the right from the zero mark.
- 3 Count along the scale to **60** and make a clear pencil mark at that point.
- 4 Rule the second ray from the vertex dot straight through the 60 mark and label the angle 60° underneath.

LESSON ARC

Flip the familiar job: pupils know how to measure a drawn angle, now they draw to a target. Demo 60° at the IWB in three named moves — dot, baseline, count-and-mark — then work 95° , 135° and a knife-edge 175° where a one-degree slip shows. Try 110° , 75° and 90° together with volunteers predicting aloud. Copybook practice of five angles follows, then the Class Challenge bank checks each on the board.

TEACHING MOVES

1. **Getting Started.** Pose the one question — dot first or slanted line first? — and take two or three hands, but don't settle it. Leave the class hanging so the Watch and Notice demo pays it off.
2. **Watch and Notice.** Say the three moves aloud as you point: mark the dot, rule the baseline, count round and mark, rule the second ray. On the 175° angle, freeze and ask what would happen if the dot shifted after the baseline was drawn — that near-straight line is where the habit earns its keep.
3. **Try It Together.** Before each volunteer drags the ray, get the whole class to say the target aloud and predict where it lands. Park the 90° as the checkpoint — both halves of the scale read the same at the square corner. Three angles, three volunteers, keep it moving.
4. **Draw the Angles in Your Copy.** Walk the room watching for dot-first order and clean baselines. The two to catch are 115° and 165° — that's where the wrong-scale count shows up. Glance, don't mark; this is practice.
5. **Class Challenge.** Brisk turns at the board — set the ray, hit Check, class confirms, next one. Keep 90° quick as the fluency beat. Watch the 125° and 160° for counting from the wrong zero, but flag it, don't re-teach the whole procedure.

6. **What Did We Notice?** Listen for the dot being named as the vertex where both rays meet. Revoice a strong answer: 'so if the dot moves, the whole angle shifts and the reading is wrong.' Head off the idea that either scale works.

COMMON MISCONCEPTIONS

⚠ For 115° a pupil counts up from the wrong zero and draws 65° instead — they've read the scale that starts at the opposite end from their baseline.

Stop at the board and trace a finger from the baseline's zero, saying each ten aloud — 10, 20, 30 — until you reach 115° . Then trace the other scale to show it lands on 65° . 'Count from the zero your baseline sits on.'

⚠ A pupil rules the baseline first, then plants the centre dot wherever the protractor happens to sit — so the vertex and the protractor centre don't line up.

On the 175° demo, deliberately nudge the dot after the baseline and let the class watch the whole angle swing off. Rebuild it dot-first so they see the centre hole must sit exactly on the vertex.

DIFFERENTIATION

EMERGING

- Pre-rule the baseline and mark the centre dot on the copybook for the first two angles, so pupils only count round and mark the target.
- Stick to acute targets (30° , 75°) in the copybook while the class moves to obtuse; support the 90° at the teacher table.

DEVELOPING

- After the copybook set, ask pupils to draw 165° a second time without a protractor by estimating, then measure to see how close they got.
- Give a target that lands between scale marks, like 137° , and ask them to judge the ray position carefully.

PROFICIENT

- During the Class Challenge, narrate a harder variant: 'draw two angles that share a baseline, 40° and 125° — which ray is steeper and by how many degrees?'
- Pull them ahead into the Student Activity Book while the class finishes the board round.

✂ **Cross-curricular:** Tie to Geography — pupils draw compass bearings as angles from north (e.g. a 135° bearing south-east) on a simple map sketch.

ANSWER KEY

Scaffold: visual check on the page

Q1: 30° angle drawn and labelled

Q2: 75° angle drawn and labelled

Q3: 115° angle drawn and labelled

a) **Always** : The centre hole must sit exactly on the pre-marked vertex.

b) **Never** : The baseline is drawn first so the scale can be read from zero.

c) **Always** : Any target size including 90° is drawn by marking the vertex, baseline and scale point.

d) **Sometimes** : It depends on which zero the baseline uses and the direction of the angle.

EXTENSION SHEET · STRETCH ANSWERS

S1: 84°

S2: 57°

S3: 136°

S4: 69°

S5: 47° is acute