

The circle: centre, radius and diameter

CURRICULUM ALIGNMENT

SHA.SHP.3a

investigate and analyse the properties of 3-D and 2-D shapes and identify classes of shapes based on these properties.

SHA.SHP.3b

represent shapes with drawings and models, and calculate dimensions of shapes.

WHAT THIS LESSON TEACHES

The centre is the middle point of a circle. Every point on the edge is the same distance from the centre; that distance is the radius, and a diameter is a straight line right across through the centre.

- The dot in the middle of a drawn-around lid is the centre.
- A line of 4 cm from the middle of a wheel to its rim is a radius.

MODEL THIS ON THE BOARD

CENTRE, RADIUS AND DIAMETER OF A LID

- 1 Draw round a circular lid and mark the middle point. This is the **centre**.
- 2 Draw a straight line from the centre out to the edge. This radius measures **3** cm.
- 3 Draw a straight line right across the lid through the centre. This diameter measures **6** cm, twice the radius.

DISCUSSION STARTER

REFLECT

Which part of a circle do you find easiest to spot — centre, radius or diameter?

LESSON ARC

Open with a cup-drawn circle and one centre dot — pupils decide by eye if every edge point is equidistant, but don't settle it yet. The interactive proves it: centre lights up, a radius sweeps round staying the same length, then a diameter crosses through the centre as two radii joined. Pupils take turns setting parts at the board, then trace a lid in their copy and label a radius and diameter. Class Challenge is real round objects at desks, passed round.

TEACHING MOVES

1. **Getting Started.** Five seconds of quiet think-time, then take two or three hands. Don't confirm whether every edge point is the same distance from the centre — the interactive settles it next, so keep them guessing.
2. **Watch and Notice.** Point to and name each part once as it appears. On the radius, hold out until the class spots it never changes length as it turns. On the diameter, show the two radii sitting end to end either side of the centre BEFORE saying it's twice as long — and say 'radii' aloud, glossing it as more than one radius. No circumference, no measuring today.
3. **Try It Together.** Pupils take turns at the board while the rest judge each move aloud. Watch for the classic slip — an edge-to-edge line that misses the centre is not a diameter. Ask every time: 'does your line go through the middle dot?' When the second radius goes up, get the class to judge by eye it matches the first.

4. **Draw and Label in Your Copy.** Model the fold-in-half-twice trick on a scrap circle so the class sees the folds cross at the centre — pupils don't fold, they trace a lid and place the centre dot by eye. Walk the room checking two things only: the dot is near the middle, and the diameter passes through it.
5. **Class Challenge.** Keep the pass-on rhythm brisk — draw round an object, mark the centre, label one radius and one diameter, then swap. The make-or-break is the centre dot: if it's off, the diameter won't cross it, so catch guessy dots on the spot and point back to where the folds crossed on the scrap circle.
6. **What Did We Notice?.** Listen for pupils saying the diameter is two radii joined so it must pass through where they meet. Revoice: 'a radius has one end at the centre and one at the edge; a diameter reaches all the way across, so it goes edge to edge through the middle.'

COMMON MISCONCEPTIONS

⚠ A pupil draws a line straight across the circle but slightly off to one side, misses the centre dot, and still calls it a diameter.

Ask: 'does your line go through the middle dot?' Put their line next to a true diameter on the board and show that a diameter splits the circle into two matching halves — an off-centre line doesn't.

⚠ Pupils think each radius can be a different length depending on which way it points, like the spokes were cut to size.

On the interactive, sweep the radius all the way round again and freeze it in two positions. Same length everywhere — that sameness is what makes it a circle. Have a pupil set a second radius pointing differently and let the class judge it matches.

DIFFERENTIATION

EMERGING

- Pre-mark the centre dot on their traced lid so they only place the radius and diameter, not hunt for the middle.
- Let them label just the radius first; add the diameter once they've seen it's two radii on the board.

DEVELOPING

- After the copy task, ask them to draw a second diameter at a different angle and check by eye that the two diameters cross at the centre.
- Give a length: 'if one radius is 3 cm, how long is the diameter?' — no measuring needed, just the doubling rule.

PROFICIENT

- Pose at the board during Class Challenge: 'how many different diameters can one circle have — and what do they all share?' Let them reason that all diameters cross at the centre.
- Pull them ahead into the Student Activity Book page while the class finishes the object swap.

✂ **Cross-curricular:** Tie to Geography — look at the centre and radius of a compass rose, or how map scale circles spread out equally from one point.

ANSWER KEY

Scaffold: visual check on the page

Q1: 6 cm

Q2: 3 cm

Q3: radius

Q4: 8 cm

Q5: 10 cm

Q6: No

Spot:

A line from the centre to the edge is the **radius**, not the diameter. The **diameter** goes right across the circle through the centre (two radii end to end).

EXTENSION SHEET · STRETCH ANSWERS

S1: radius, 5 cm

S2: 10

S3: diameter

Investigation: Circles in the room — open-ended; scan pupils' working for valid solution paths rather than a single answer.