

Parts of a circle: centre, radius, diameter, circumference

CURRICULUM ALIGNMENT

SHA.SHP.4a

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

ALG.PRR.4a

identify, explain and apply generalisations, including properties of operations, mathematical models and patterns.

WHAT THIS LESSON TEACHES

The centre is the exact middle point of a circle. Every point on the edge is the same distance from the centre; that distance is the radius, the diameter is twice the radius and goes right across, and the circumference is the distance all the way round the edge.

→ A spoke on a bicycle wheel is a radius from the centre hole to the rim.

→ A straight line across the middle of a dinner plate is a diameter.

MODEL THIS ON THE BOARD

RADIUS TO DIAMETER ON A WHEEL

- 1 A builder's cart wheel has radius 4 cm.
- 2 The diameter is always twice the radius.
- 3 Diameter = $2 \times 4 = 8$ cm.

LESSON ARC

Open with the bicycle wheel and dinner plate side by side and ask what one measurement describes a circle's size. On the circle-tool interactive, name centre, radius, diameter and circumference one at a time, tracing the circumference with the cursor. Drive radius 4, 7, then reverse to a diameter of 10, then the decimal 2.5. Pupils sketch and label a circle in their copies, then work five written $\times 2$ / $\div 2$ conversions.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers, not open call-outs. Steer toward the idea that a single distance — across or out to the edge — tells you a circle's size. Hold off naming radius or diameter; that comes on the board next.
2. **Watch and Notice.** On the first circle, trace the circumference right round the edge with the cursor so pupils see the part they'll label later. On the second circle, pause before the diameter shows and hold out for 'ten — five and five'. On the third, ask 'what's half of twelve?' before revealing the radius. Say 'diameter = twice the radius' every single time.
3. **Try It Together.** Pupils take turns at the board driving the circle-tool to radius 4, then 7, then setting the radius so the diameter reads 10 (the reverse move — they choose 5), then the decimal 2.5. Ask the class to predict the diameter before each reveal; on 2.5 hold out for five, not 4.10. Re-voice: 'so radius, I double it; diameter, I halve it.'
4. **Label the Parts in Your Copy.** Walk the room glancing that each radius reaches the edge and each diameter passes through the centre dot — this is practice, not marking. The thing to catch: a diameter drawn as a chord that misses the centre. Redraw it through the dot with the pupil.

5. **Class Challenge.** Brisk written conversion round — pupils work each line in their copy, class confirms aloud before moving on. Don't re-explain each one. Two watch-points: diameter 9 halves to 4.5 cm (hold out for the decimal, not '4 remainder 1'), and diameter 24 halves to 12 — check nobody doubles it to 48.
6. **What Did We Notice?.** Let the two pupil voices sit before settling it. If the class stalls, sketch the same circle in two corners of the board and ask whether the spoke got longer. Re-voice a strong answer: 'so the radius is set by the size of the circle, not by where we draw it.'

COMMON MISCONCEPTIONS

⚠ Asked to double 2.5 for the diameter, pupils say 'four point ten' or 'four and a half point five' — they double the whole and the decimal part separately.

Drag the circle-tool to radius 2.5 and lay a second radius end-to-end so the class sees two-and-a-half plus two-and-a-half. Count in halves aloud: 'two, four, five.' Land it as five before the reveal.

⚠ Pupils draw the diameter as any line across the circle, even one that misses the middle — they think 'across' is enough without 'through the centre'.

On a copybook glance, point at the centre dot and ask 'does your line go through this?'. Show on the circle-tool that only the line through the centre gives the full width; a chord that misses it is shorter.

⚠ Pupils think moving a circle to a different spot on the page changes its radius.

This is the maths-talk beat. Sketch the same circle in two corners of the board and ask whether the spoke got longer — separate 'where it sits' from 'how big it is'.

DIFFERENTIATION

EMERGING

- Stay with whole-number radii (4, then 7) on the circle-tool while the class moves to the 2.5 decimal case; these pupils double whole numbers only for now.
- In the copybook sketch, mark the centre dot for them first so they only draw and label the four parts, not invent the structure.

DEVELOPING

- After the conversion round, give a two-step line: radius 6 cm — find the diameter, then find the diameter of a circle whose radius is 3 cm longer.
- Ask them to write the halving rule as a sentence and test it on diameter 15 cm, another odd number.

PROFICIENT

- Pose: 'a diameter is 20 cm. I draw a second radius at a right angle to the first. How far apart are the two edge points?' Let them reach for it on the circle-tool without being told.
- Ask them to explain to an imagined younger pupil why every radius in one circle must be the same length — write the argument in the copy in their own words.

✂ **Cross-curricular:** Tie to the science strand — pupils examine a bicycle wheel and identify the hub as centre, a spoke as radius and the tyre line as circumference.

ANSWER KEY

Scaffold: visual check on the page

Q1: 6 cm

Q2: 16 cm

Q3: 5 cm

Q4: 14 cm

a) Always : By definition the diameter equals two radii placed end to end through the centre.

b) Never : The centre is the middle point inside; the circumference is the outer edge.

c) Always : All points on the edge are the same distance from the centre.

d) Never : The radius is always half the diameter so it is shorter.

EXTENSION SHEET · STRETCH ANSWERS

S1: radius, 5 cm

S4: 10 cm

S2: 3 cm

S5: 20 cm

S3: 4.6 cm