Lesson 51 MEASURES

Estimating and measuring the area of irregular shapes

CURRICULUM ALIGNMENT

MEA.MSR.4b find, interpret and deduce measures experimentally with increasing precision.

NUM.FRC.4a explore (model, compare and convert) the relationships between fractions, decimals and percentages.

WHAT THIS LESSON TEACHES

To estimate the area of an irregular shape count whole squares inside then add part-squares using the more-than-half rule.

→ A leaf covers 20 whole squares and 7 part-squares.

→ A paw print covers 15 whole squares and 5 part-squares.

MODEL THIS ON THE BOARD

ESTIMATE A LEAF AREA ON GRID

1. Count all whole squares inside the outline: there are 24.
2. Count part-squares along the edge and keep only those more than half full: there are 8.
3. Add the totals to get the estimated area: 24 plus 8.

LESSON ARC

Open on the annotated leaf-on-grid diagram at the IWB — the on-screen shape tool draws straight edges only, so this beat runs on the diagram, not the interactive. Count fully-covered squares aloud first, then land the more-than-half rule on the curved edge, then pair two halves into a whole. Pupils estimate one leaf together, then trace and tally in their copy. Student Activity Book desk work is three shapes, each wigglier than the last, finishing on their own traced hand.

TEACHING MOVES

1. **Getting Started.** Point to the leaf's curving edge and ask how you'd measure a shape with no straight sides — take two or three hands-up, not open call-outs. When someone says 'count the squares', don't resolve it; that's the next step's build.
2. **Watch and Notice.** Count the fully-covered squares aloud first and let pupils catch any you skip. Then point to a barely-clipped square and a clearly-more-than-half square in turn — 'does this one count?' — and make the balancing idea explicit: 'a bit too much here, a bit left out there, so it evens up.' Finger-trace two half-squares and pair them. Ask for a rough total before you announce one.
3. **Try It Together.** Run two separate tallies on the board — whole squares first with a running count, then part-squares. For each edge square make the class call out 'more than half — does it count?' before you mark it. Say plainly that two careful counters can land a square or two apart and both are fair.
4. **Trace and Tally in Your Copy.** Circulate as pupils set up their two columns. Watch specifically for anyone tallying every clipped square instead of only the more-than-half ones — that's the slip to catch here, not the arithmetic.
5. **Class Challenge.** Keep it brisk — pupils work all three shapes at their desks while you circulate, then the class confirms each estimate aloud at the end. When a pupil re-counts a shape and gets a slightly different total, bring that case to the whole class as live evidence that this is an estimate.

6. **What Did We Notice?.** Listen for pupils naming the part-squares as the source of the wobble. Revoice a strong answer: 'so the whole squares are certain, but the edge is where the estimate lives.'

COMMON MISCONCEPTIONS

⚠ Pupils count every square the shape touches as a whole one — so a square the leaf barely clips gets a full tally mark, and the estimate balloons.

Point to one barely-clipped square on the board and ask 'is more than half of it covered?' Line it up against one that clearly is. Restate the more-than-half rule and re-tally that edge together.

⚠ Pupils treat a slightly-different re-count as a mistake — 'I got 23 before and 25 now, so one of them is wrong.'

Reframe it: neither is wrong, because judging half-squares is a judgement call. Use it as the proof that counting squares gives an estimate, not an exact area — this is the maths-talk beat waiting to happen.

⚠ Pupils count the part-squares correctly but forget to pair the leftover halves, leaving them out of the total.

At the copybook check, ask a pupil to point at two half-covered squares on their traced shape and say aloud 'these two make one whole' before adding them into the part-square column.

DIFFERENTIATION

EMERGING

- Give the printed stone template (the gentlest curve) and have pupils tally only the whole squares first, so they get a certain number on the page before tackling the edge.
- Sit with the pupil for the first row of edge squares and decide 'more than half?' together aloud before they go on alone.

DEVELOPING

- After the stone, ask: if you shifted the whole grid half a square across, would your estimate change? Trace and re-tally to find out.
- Have them record not just the total but a range — 'somewhere between 22 and 25 cm²' — and justify the two ends.

PROFICIENT

- Teacher-narrated stretch at the IWB: 'if we halved the size of every grid square, would the estimate get closer to the true area or further away? Why?' Let pupils predict before reasoning it through, then pull them ahead into the Student Activity Book hand shape.

↗ **Cross-curricular:** Tie to Geography — pupils trace their home county onto squared paper and estimate its area, then compare whose county covers more squares.

ANSWER KEY

a) 51 cm²

b) 25 cm²

c) 20 cm²

Q1: 17.5 cm²

Q2: 30½ cm²

Q3: 17.5 cm²

Q4: 42.5 cm²

Q5: 56 cm²

a) Always — Curved edges mean part-squares make it impossible to be exact.

b) Never — Different choices on borderline part-squares can change the total.

c) Never — Only part-squares more than half are counted.

d) Always — They are completely inside so they add one each.

EXTENSION SHEET · STRETCH ANSWERS

S1: 63.89 m²

S2: 168 m²

S3: 240 m²

S4: 306 m²

S5: 201 m²