

Growing patterns: the staircase

CURRICULUM ALIGNMENT

ALG.PRR.2

identify and express relationships in patterns, including growing or shrinking shape patterns and number sequences.

INTERACTIVES

Pattern Blocks · display, explore

Number Line · challenge

WHAT THIS LESSON TEACHES

A growing staircase pattern gets bigger by the same amount at every step. That fixed amount is the growing rule for every new tower.

→ Towers of 1, 2, 3, 4 squares grow by +1 each time.

→ In 2, 4, 6 the growing rule is +2 so the next tower has 8 squares.

MODEL THIS ON THE BOARD

NEXT STEP OF THE 1, 2, 3 STAIRCASE

- 1 Look at the towers already built: 1 square, then 2 squares, then 3 squares.
- 2 Each tower is one square taller than the last, so the growing rule is +1.
- 3 Step 4 must follow the same rule: $3 + 1 = 4$.
- 4 Build a tower of 4 squares beside the others to finish the staircase.

LESSON ARC

Open on the school-door steps image and take two or three ideas for what step 5 would look like. Model two cube staircases on the interactive — heights 1, 2, 3, 4 then 2, 4, 6 — and write the growing rule under each once the class names it. Together, build tower 4 on the 1, 2, 3 staircase, saying +1 before the cubes land. Pupils draw towers of 1–4 in their copybooks. Class Challenge shifts the same rules onto a number line. Close by contrasting growing with repeating patterns.

TEACHING MOVES

1. **Getting Started.** Leave the school-door steps image up as pupils settle. Take two or three answers about step 5, then park the idea — do not build it yet. Signal that the on-screen cubes will settle the question.
2. **Watch and Notice.** Run the first staircase (1, 2, 3, 4). Ask ‘how much does it grow at every step?’ before you write +1 under it. Switch to 2, 4, 6 and hold for +2. Point: both grow, but by different amounts. Write each growing rule only after the class has named it.
3. **Try It Together.** Towers 1, 2 and 3 are already on the grid. Demand the growing rule (+1) out loud before any pupil places tower 4. Rotate a few pupils so more than one child builds the fourth tower; class agrees or corrects in unison.
4. **Draw the staircase in your copy.** Pupils draw towers of 1, 2, 3 and 4 squares in their maths copy. Walk the room checking heights climb in order — this is whole-class copybook practice, not marking.
5. **Class Challenge.** One challenge at a time on the number line. Before each mark, ask ‘how much does it grow each step?’ so the rule is named first. Check the answer as a class, then move on briskly. Watch for counting on by 1 when the rule is +2; lean on the missing-middle item (1, 2, __, 4) to lock the gap as the rule.

6. What Did We Notice?. Ask how a growing pattern differs from a repeating one. Revoice: a repeating pattern copies its chunk; a growing pattern adds the same amount every time. Head off ‘it just gets bigger somehow’ — push for the same amount each step.

COMMON MISCONCEPTIONS

⚠ Pupils keep counting on by 1 even when the staircase is 2, 4, 6 — they treat every grow as +1. Freeze the board on 2, 4, 6. Point at the gap between 2 and 4, then 4 and 6: ‘Same jump both times — how big is the jump?’ Write +2 under the staircase and rebuild the next tower only after the class says the rule.

⚠ On a missing-middle item like 1, 2, __, 4, pupils guess any taller tower instead of using the gap as the rule. Cover the blank and ask only ‘how much from 1 to 2?’ then ‘how much from 2 to 4?’. Once both gaps are +1, the missing height has to be 3. Mark it only after the rule is said.

⚠ Pupils say a growing pattern ‘just gets bigger’ and cannot name a fixed amount each step. Revoice against the repeating-pattern contrast on the board: repeating copies a chunk; growing adds the same amount every time. Have the pupil tap the +1 or +2 written under the staircase before they build again.

DIFFERENTIATION

EMERGING

- Keep them on the +1 staircase only (1, 2, 3, 4) during Class Challenge while the board moves to +2; they can still name the rule and mark the next height.
- During the copybook draw, pre-sketch four tower bases in their maths copy so they only add the correct number of squares on each.

DEVELOPING

- After they mark the next number, ask them to say the height two steps further on without building it — still using the same growing rule.
- On the missing-middle round, ask them to justify why 3 is the only height that fits before the class confirms.

PROFICIENT

- Stretch on the IWB: ‘If this staircase grows by +2 and step 1 has 3 squares, what do steps 2, 3 and 4 look like?’ — narrate while a fast finisher places the towers.
- Once the Class Challenge bank is done, send them ahead into the Student Activity Book page while peers finish board turns.

✚ **Cross-curricular:** Link to the real school steps or yard stairs — count how each tread rises by the same amount, like the +1 cube staircase.

ANSWER KEY

a) +1

c) 12

Q1: 7

Q2: 16

Q3: +1 each step

Q4: 20

a) Always : Each tower is exactly one taller than the last, so the rule is always +1.

b) Always : That fixed amount is the definition of the growing rule.

c) Never : The growing rule must stay the same size each time, not change.

d) Never : A growing staircase gets taller; a repeating pattern keeps the same chunk.

EXTENSION SHEET · STRETCH ANSWERS

S1: 45

S2: 38

S3: 60

S4: 40