

End-of-module challenge: pattern hunt

CURRICULUM ALIGNMENT

ALG.PRR.4a

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

ALG.PRR.4b

represent mathematical structures in multiple ways, including verbal expressions, diagrams and symbolic representations.

WHAT THIS LESSON TEACHES

A pattern has terms where term 1 is the first item and term n depends on n . Growing patterns add the same amount each step while repeating patterns cycle a fixed group.

→ The third slab is term 3.

→ Column 5 has 5 windows.

MODEL THIS ON THE BOARD

WRITING THE RULE FOR A GROWING BRICK PATTERN

- 1 Count bricks row by row: term 1 has **12**, term 2 has **24**, term 3 has **36**.
- 2 Notice each term adds **12** more bricks than the last.
- 3 Write the rule three ways: term n has 12 times n bricks.

LESSON ARC

Open with four school photos on the IWB and ask which pattern is easiest to describe down the phone — that phone test frames the whole assessment. Model two rules (growing window grid, repeating fence), then work the paving-slabs entry live, ranking three wordings from vague to position rule. Pupils then hunt solo with the clipboard checklist for three pattern types, and finish by designing one pattern with a rule sentence in the maths journal on squared paper.

TEACHING MOVES

1. **Getting Started.** Take exactly three hands-up answers, not open call-outs — you're seeding the idea that a pattern needs a rule you can say aloud, not settling which photo wins. Leave it deliberately unresolved; that judgement is the assessment.
2. **Watch and Notice.** Work each photo live rather than reading the descriptions as a script — let the class name the rule before you confirm it. Say the words 'term' and 'position rule' aloud as they come up, and hold the test line: 'could a friend predict the next term from your words alone?'
3. **Try It Together.** Pupils take turns at the board counting the slabs; work the three wordings in strict order so the class feels the jump from 'they keep going' (predicts nothing) to 'add one each step' to the position rule. Predict step 10 out loud before anyone counts that far, and get class agreement it passes the phone test.
4. **Class Challenge.** This is the assessed hunt — each pupil works solo with their own clipboard checklist, outdoors then back at seats. Circulate and push wording only: to 'the bricks go up', ask 'up by how much each time?' Mark against the phone test, not handwriting. If the yard's unusable, run the same checklist along a corridor and hall.
5. **Design Your Own Pattern.** Keep this tight: one designed pattern on squared paper, one clear rule sentence, one reflection line — this is the journal artefact you keep. Aim your circulating prompts at the

rule sentence, not the drawing; if it's drifting into a colouring job, ask 'could a classmate draw your fifth term from your words with no questions?'

6. **What Did We Notice?**. Display only — pupils read a classmate's rule and judge whether the words alone predict the next term. Revoice a strong one: 'so "it keeps going" doesn't tell us by how much — we need the step size or the position rule.'

COMMON MISCONCEPTIONS

⚠ Pupils write a rule that describes how the pattern looks but not how it changes — 'the bricks go up' or 'it keeps going bigger'.

Apply the phone test on the spot: read only their words back and ask 'from just that, what's the next term?' When they can't answer their own rule, ask 'up by how much each step?' and have them add the step size before ticking the checklist.

⚠ Pupils label a repeating pattern (tall-short-tall-short railings) as a growing pattern because they see it 'carrying on'.

Rebuild the two families on the board from the modelled photos: a growing pattern gets bigger each term; a repeating pattern cycles a fixed group with no change in size. Have the pupil point to which term the group starts repeating.

DIFFERENTIATION

EMERGING

- Point these pupils at the window grid or slab line first — a straightforward count-by-one growing pattern they've already seen modelled — before the repeating or position-rule targets.
- Let them sketch the first few terms on squared paper and count from the drawing before writing any words; the picture carries the counting so the rule sentence is the only new demand.

DEVELOPING

- After the three required patterns, ask them to rewrite one rule as a position rule ('term n has ...') rather than a step rule, and test it by jumping straight to term 8.
- Have them attempt the STRETCH checklist target and predict a far term (term 20) from their own wording alone.

PROFICIENT

- For the designed pattern, challenge them to build one whose rule multiplies rather than adds (e.g. 2, 4, 8, 16) and write a rule sentence a classmate could still follow — then have them narrate it aloud during the maths-talk as the exemplar to judge.

✂ **Cross-curricular:** Tie to Geography — hunt the same pattern types in the local built environment: brick courses, railings, or window rows on a nearby terrace or shopfront.

ANSWER KEY

c) bricks: $15 \times$ row; windows: column number

Q1: short

Q2: 3

Q3: 72

a) **Always** : The cycle length stays the same, so the sequence repeats exactly.

b) **Always** : Term n equals the step size times n for any growing pattern that starts at the step size.

c) **Sometimes** : True for a row of seats that grows by 2 a row; false for railings or tiles that repeat.

d) **Never** : You also need the rule for term n , such as 'term n is $2n + 1$ '.