

Number patterns and sequences: find the rule

CURRICULUM ALIGNMENT

ALG.PRR.3a

identify rules that describe the structure of a pattern and use these rules to make predictions.

INTERACTIVES Number Line · challenge, display, explore

WHAT THIS LESSON TEACHES

A sequence is a list of numbers that follow each other in a set order. To find the rule, look at how the numbers change from one step to the next, then do the same thing every time.

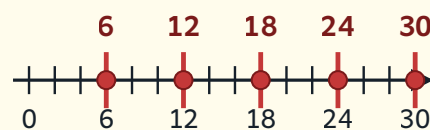
→ In 5, 10, 15, 20 the rule is add 5.

→ In 2, 4, 8, 16 the rule is double each time.

MODEL THIS ON THE BOARD

FIND THE RULE

- 1 Look at the jumps on the number line: from 6 to 12 is add 6.
- 2 Check the next jumps: 12 to 18 and 18 to 24 are also add 6 each time.
- 3 The rule is the same every step, so add 6 again: $24 + 6 = 30$.



DISCUSSION STARTER

REFLECT How do you check that the rule you found really works for every term?

LESSON ARC

Open with 4, 8, 12, 16 on the IWB and ring the jumps as pupils name them, fixing the word 'rule'. Hop along the number-line interactive for three worked types: add 3, take away 5, and the doubling sequence where the jumps grow. Pupils take turns at the board for Try It Together, then write three sequences with arrows and rules in their copies. The Class Challenge bank runs the same three rule types, closing with a doubling stretch.

TEACHING MOVES

1. **Getting Started.** Take three hands-up answers, not call-outs. Write 4, 8, 12, 16 and ring each jump as a pupil names it. When you hear 'add 4', revoice it as 'the rule' — that's the word the whole lesson hangs on.
2. **Watch and Notice.** Hop the number-line interactive one example at a time and let the class call the rule before you confirm. Slow right down on the doubling sequence — point out the jumps are NOT equal, they grow, and ask 'how is this different from add 3?'
3. **Try It Together.** Read a sequence, a pupil hops the marker and names the rule, then keep the watching class in it: ask 'is the jump the same size each time?' for a quick hands-up. Watch 1, 3, 5, 7 — pupils say 'add 1' because the numbers are close; count the hop to show it's 2.

4. **Write the Rule in Your Copy.** Walk the room glancing at the rule under each sequence — no marking. Watch for 'add 6' written under 2, 4, 8, 16; nudge those pupils to check the second jump, where add-6 falls apart.
5. **Class Challenge.** Keep the board work brisk — pupils take turns, hit Check, class confirms, move on. Don't re-explain each one. On the final 1, 2, 4, 8, ask 'is the jump the same every time, or does it grow?' before the Check confirms the next term is 16.
6. **What Did We Notice?.** Put 2, 4, 6, 8 beside 2, 4, 8, 16 — same start, different journey. Revoice the key idea: it's the rule, not the starting number, that makes a sequence what it is.

COMMON MISCONCEPTIONS

⚠ A pupil reads 1, 3, 5, 7 and says the rule is 'add 1' — they see numbers close together and assume the smallest jump.

Hop the marker on the number line from 1 to 3 and count aloud: one, two — that's two hops. The gap is 2, not 1. Have the pupil count each remaining jump the same way before naming the rule.

⚠ A pupil writes 'add 6' under 2, 4, 8, 16 — they read only the first jump (2 to 4... no, 4 to 8 is 4, 8 to 16 is 8) and lock in one number as the rule.

Ask them to write the size of each jump above the arrows: 2, 4, 8. Once they see the jumps themselves change, the 'add the same amount' story breaks — name it as a doubling rule, where the jump grows.

DIFFERENTIATION

EMERGING

- Stay on add and take-away sequences with equal jumps; let the doubling examples wash over for now. Pupils hop the number-line marker and count each jump aloud before writing the rule.
- In the copy, give the first sequence (3, 6, 9, 12) with the arrows already drawn so pupils only write the rule, not build the layout.

DEVELOPING

- After the copybook page, hand a pupil a doubling sequence with a gap: 3, 6, __, 24 — fill the blank and justify which rule made it.
- Ask for the rule AND the next term written out, so they go one number past where the sequence stops.

PROFICIENT

- While the class finishes the Class Challenge, pose at the board: write me two sequences that both start at 2 but reach 16 in completely different ways — name both rules.
- Pull these pupils ahead into the Student Activity Book page early and ask them to invent a doubling sequence that passes 100, explaining how fast it gets there.

✂ **Cross-curricular:** Tie to PE — pupils score a beanbag-throw game where each round's points double, and read off the doubling sequence their scores make.

ANSWER KEY

b) add 5

c) 25

Q1: add 3

Q2: add 3

Q3: take away 5

Q4: double each time

Spot:

Niamh started doubling after 20 instead of keeping the rule add 5. The next two terms are 25, 30.

EXTENSION SHEET · STRETCH ANSWERS

S1: 1

S2: 18

S3: -6

S4: 11

S5: -16

Investigation: Invent a pattern — open-ended; scan pupils' working for valid solution paths rather than a single answer.