

# 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

Hundred Square · explore

## WHAT THIS LESSON TEACHES

The rule of a number pattern is the same amount it goes up or down by each time. You find the rule by looking at the jump between one number and the next.

→ In 3, 6, 9, 12 the step is 3, added each time.

→ 50, 45, 40, 35 counts back in 5s.

## MODEL THIS ON THE BOARD

### FIND THE NEXT NUMBER AFTER 3, 6, 9

- 1 Look at the jump from 3 to 6. The pattern goes up by 3.
- 2 Check the jump from 6 to 9. It also goes up by 3.
- 3 The rule is add 3 each time, so the number after 9 is 12.

## DISCUSSION STARTER

### REFLECT

Once you spotted the step, was it easy to keep the pattern going?

## LESSON ARC

Open with three short sequences on the board and press pupils for the jump, not just the next number — underline one hop (4 to 6) to name +2. Move to the number-line interactive and mark each example, including the make-or-break count-back 20, 18, 16. Pupils then chant running totals while four take turns shading step patterns on the hundred-square interactive. Copybook captures one 'add 4' pattern with its rule before the Class Challenge practice bank.

## TEACHING MOVES

1. **Getting Started.** Take three or four hands-up answers, not call-outs, and push every time for the how: 'how did you know?' Underline the jump from 4 to 6 on the board so the class sees the +2 you mean — the jump is what you're hunting all lesson.
2. **Watch and Notice.** On the number-line interactive, point to the gap between two markers and say 'the same hop every time' for each example. Save 20, 18, 16, 14 for last — before revealing, ask the class which way the hops point. The shrinking numbers mean the step is taken away, and that's the idea most will miss.
3. **Try It Together.** On the hundred-square interactive, call a round ('start at 5, count on in 5s'), send one pupil up to shade while the class chants the running total. After each round ask 'what stays the same about every shaded number?' Let the class spot that fives fall in two straight columns and tens in one.
4. **Write the rule in your copy.** Pupils write the first six numbers of 'count on in 4s from 0' then the rule in words: 'add 4 each time'. Walk the room glancing for anyone who slips to +5 or +3 partway down the column — catch it before they write the rule.

5. **Class Challenge.** Keep the board work brisk. Before each pattern ask the class 'is this going up or down?' — pause on the count-back ones (50, 45, 40 and 100, 90, 80, 70) where the step is taken away. Send pupils up, use the on-screen Check as your 'yes — that's it', and move on.
6. **What Did We Notice?.** Listen for pupils saying they add or take away the step rather than counting from the start. Revoice a strong answer: 'so once you know the jump, you can leap straight to the next number.' Name the count-back patterns as proof a step can be taken away, not only added.

### COMMON MISCONCEPTIONS

⚠ Pupils say the step in 20, 18, 16, 14 is 'plus 2' — they spot the gap of 2 but miss that the numbers are shrinking.

On the number-line interactive, point to which direction the hops travel — leftward, back down the line. 'The gap is 2, but which way are we hopping?' Have them say it as 'take away 2 each time' before reading the next number.

⚠ Pupils shade the hundred square or write the copybook pattern correctly for a few numbers, then drift — a 'count on in 4s' line goes 0, 4, 8, 12, 15, 19.

Stop at the slip and ask the pupil to read the jump between the last two correct numbers aloud. Re-anchor on the hundred-square interactive: the fours leave a regular diagonal trail, so a number out of step breaks the picture they can see.

### DIFFERENTIATION

#### EMERGING

- Keep these pupils on count-on-in-2s and -5s only at the hundred square — the steps with the clearest column pictures — while the class moves to tens and count-back.
- In the copybook, give them the first three numbers (0, 4, 8) already written so they continue rather than start cold.

#### DEVELOPING

- After the copybook 'add 4' pattern, ask them to start the same count-on-in-4s from 2 instead of 0 — does the rule still hold when it doesn't start at zero?
- Give a missing-number line: 30, \_\_, 50, 60 — find the gap and fill the hole, not just the end.

#### PROFICIENT

- Narrate a harder Class Challenge variant from the front: 'count back in 7s from 70' — no neat column on the grid, so they must hold the step in their head.
- Ask them to write a pattern that goes down and lands exactly on 0, then explain to the class how they chose the start number.

✂ **Cross-curricular:** Tie to music — clap a steady beat and count on in 4s with each clap, hearing the step as an even rhythm.

### ANSWER KEY

**Scaffold:** visual check on the page

**Q1:** 25

**Q2:** 41

**Q3:** 14

**a) Always :** That equal jump is exactly what the rule means.

**b) Always :** The rule stays the same for every step.

**c) Sometimes :** True for 2, 4, 6, 8; false for 20, 18, 16, which counts back.

**d) Never :** You need at least two numbers to see the size of the jump.

### EXTENSION SHEET · STRETCH ANSWERS

**S1:**  $\times 3 + 8$

**S2:** + 10

**S3:** + 11

**S4:** 2

**S5:** 43