

Algebra investigation: patterns and rules

MODULE 10 · ALGEBRA — PATTERNS, RULES AND NUMBER SENTENCES

ALGEBRA

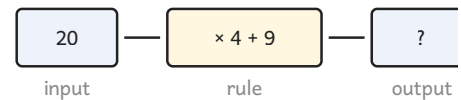
HOW TO ANSWER TODAY

- **Function machine.** Do EACH step of the rule in order to the input.
Rule $\times 4 + 2$, input $5 \rightarrow 5 \times 4 = 20, + 2 = 22$
- **Find the rule.** Look at how each input changes to its output. Try $\times$ first, then $+$ or $-$.
 $3 \rightarrow 6, 5 \rightarrow 10, 7 \rightarrow 14 \rightarrow$ rule is $\times 2$
- **Solve for x.** Do the OPPOSITE operation to both sides. $+$ becomes $-$; $\times$ becomes $\div$.
 $x + 7 = 15 \rightarrow x = 15 - 7 = 8 \cdot 3x = 21 \rightarrow x = 21 \div 3 = 7$

★ STRETCH PROBLEMS

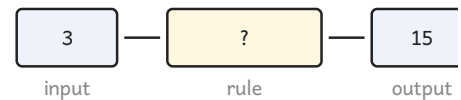
- 1 On the school nature walk, Cian threads a bracelet using beads in a repeating pattern: green, green, blue, blue, green, green, blue, blue, green, green, blue. What colour bead comes next, and what is the repeating unit?

- 2 In Aoife's 4th class maths game, a function machine follows the rule multiply by 4, then add 9. Aoife feeds in the number 20. What number comes out of the machine?



- 3 Aoife is threading beads onto a string for the school craft table. She makes a repeating pattern: red, blue, red, blue, red, blue, red. What colour bead comes next, and what is the repeating unit of the pattern?

- 4 At the school sports day, the teacher gives out points for each lap run in the relay race. When a team runs 3 laps they get 15 points, 9 laps gives 33 points, and 10 laps gives 36 points. What is the rule that turns the number of laps into the number of points?



- 5 Some pupils are already lined up at the door before going to the yard. When 6 more pupils join the line, there are 17 pupils in total. If x is the number of pupils who were lined up first, then $x + 6 = 17$. How many pupils were lined up first?

Find x so the scale balances.

● INVESTIGATE

How does your pattern grow?

Build a growing pattern with sticks, cubes or drawings (for example a row of squares or triangles). Record how many pieces you need for steps 1, 2, 3 and 4. Find the **rule**, then predict step 10 and step 20 without building them.
