Algebra investigation: patterns and rules

MODULE 10 · ALGEBRA — PATTERNS, RULES AND NUMBER SENTENCES ALGEBRA

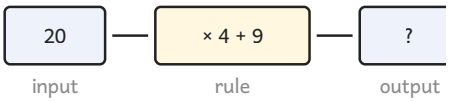
HOW TO ANSWER TODAY

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

STRETCH PROBLEMS

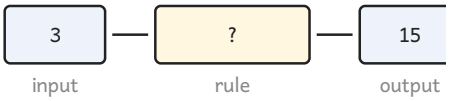
1. On the school nature walk, Cian threads a bracelet using beads in a repeating pattern: green, green, blue, blue, green, green, blue, blue, green, green, blue. What colour bead comes next, and what is the repeating unit?

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?

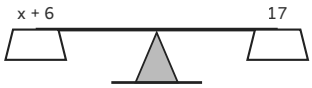


3. Aoife is threading beads onto a string for the school craft table. She makes a repeating pattern: red, blue, red, blue, red, blue, red. What colour bead comes next, and what is the repeating unit of the pattern?

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.