

Patterns & Relationships — Practice Worksheet

Part A — Finding & generalising rules

A growing pattern increases by the same amount each step. We record each position and its term in a table, then **generalise** the rule that links them — first in words, then using a symbol such as n for the position.

Growing Pattern → Generalising the Rule



Term 1

Term 2

Term 3

Position (n): 1 2 3 4 n

Sticks: 4 7 10 13 $3n + 1$

Rule: multiply the position by 3, then add 1 $\rightarrow 3n + 1$

Each new square adds 3 sticks; the single extra stick at the start is the constant.

Worked example. The pattern 4, 7, 10, 13, ... goes up by 3 each time. The rule is "multiply the position by 3, then add 1", or $3n + 1$. Check position 4: $3 \times 4 + 1 = 13$. ✓

The number you add each step becomes the number you *multiply* the position by. Then adjust with a + or – constant so position 1 comes out right.

Continue the pattern

Q1. 4, 7, 10, 13, _____, _____. What is added each time? _____

Q2. 40, 35, 30, _____, _____. Is this increasing or decreasing? By how much? _____

Position-to-term tables

Q3. Complete the table for the rule "multiply position by 2, then add 1".

Position (n)	1	2	3	4	5
Term	3	5	_____	_____	_____

Q4. For the matchstick pattern in the picture (4, 7, 10, 13, ...), how many sticks are at **position 6**? At **position 10**?

Generalise the rule (words, then symbols)

Q5. Write in words the rule linking each term to its position for: 5, 8, 11, 14, ...

Q6. Write the same rule using n (the position number). _____

Q7. A pattern follows the rule $2n + 3$. List the first four terms. _____

Create

Q8. Invent your own increasing pattern, draw the first 3 terms with counters or sticks, and write its rule in words and in symbols.
