

# 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 →  $3n + 1$

*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.