

# Linear sequences

Topic cliff notes / objectives, key ideas and examples

## Learning objectives

- Find and use a linear sequence rule.
- Decide whether a value belongs to a sequence.

## Key ideas

- A linear sequence has a constant first difference.
- For first term and common difference, use this position-to-term rule.

$$u_n = dn + (a - d) \quad (\text{first term } a, \text{ difference } d)$$

- Term positions start at one unless the question states otherwise.
- Check a proposed rule using the first few positions.
- A sequence member must correspond to a positive whole-number position.

## Worked example

Find the position-to-term rule and the twentieth term.

$$5, 9, 13, 17, \dots : \quad d = 4, \quad a = 5$$

$$u_n = 4n + (5 - 4) = 4n + 1$$

$$u_{20} = 4(20) + 1 = 81$$

**Answer**

$$u_n = 4n + 1, \quad u_{20} = 81$$

## Quick example

Test whether the proposed value is a sequence member.

$$6n + 2 = 46 \implies n = \frac{44}{6} = \frac{22}{3}$$

This is not a whole-number position.

**Answer**

46 is not in the sequence

## Watch out

The common difference is only the coefficient of the position. Check the constant adjustment using the first term.

