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Sequences

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Sequences — Student Worksheet*. Question numbers match exactly: definitions and rules D1–D6, linear sequences L1–L8, quadratic sequences N1–N7, geometric sequences G1–G7, special sequences S1–S6, recognising and generating R1–R6, using the nth term P1–P6, applications A1–A5, the Mixed Review MR1–MR10, and the examination questions Q1–Q8 of Part III.
Each solution names the method being used and shows the differences or ratios in full. Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Every nth term is checked against at least two of the original terms, exactly as the notes recommend. Depth is scaled to difficulty — brief for basic questions, fuller for the quadratic and problem-solving ones.

4.1 Solutions — Key Definitions and Rules

Solution D1

(a) a_1 is the first term: $\boxed{6}$
(b) a_4 is the fourth term: $\boxed{27}$
(c) Each term is 7 more than the one before, so the rule is

$$\boxed{\text{start at 6 and add 7 each time}}.$$

Solution D2

Start at 40 and take away 6 repeatedly:

$$40, \quad 40-6=34, \quad 34-6=28, \quad 28-6=22$$

$$\boxed{40,\ 34,\ 28,\ 22}$$

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Solution D3

Substitute $n = 1, 2, 3, 4, 5$ into $a_n = 4n + 5$:

$$a_1 = 9, \quad a_2 = 13, \quad a_3 = 17, \quad a_4 = 21, \quad a_5 = 25$$

$$\boxed{9,\ 13,\ 17,\ 21,\ 25}$$

The terms go up by 4 each time, matching the coefficient of n.

Solution D4

Substitute $n = 1, 2, 3, 4$ into $a_n = n^2 + 3$:

$$1 + 3 = 4, \quad 4 + 3 = 7, \quad 9 + 3 = 12, \quad 16 + 3 = 19$$

$$\boxed{4,\ 7,\ 12,\ 19}$$

Note the differences $3, 5, 7$ are *not* constant — this is a quadratic sequence.

Solution D5

(a) The terms rise by 7 each time:

$$\boxed{\text{start at 2 and add 7 each time}}.$$

(b) With $d = 7$ the nth term has the form $7n + c$. Using $a_1 = 2$:

$$7(1) + c = 2 \implies c = -5 \implies \boxed{a_n = 7n - 5}.$$

(c) The **position-to-term rule** is the one to use, because it gives any term directly from its position. The term-to-term rule would mean working out all 99 earlier terms first.

$$a_{100} = 7(100) - 5 = \boxed{695}.$$

Solution D6

Substitute $n = 1, 2, 3$ into $a_n = 30 - 4n$:

$$30 - 4 = 26, \quad 30 - 8 = 22, \quad 30 - 12 = 18 \implies \boxed{26,\ 22,\ 18}$$

The sequence is $\boxed{\text{decreasing}}$, because the coefficient of n is -4: each time n goes up by 1, the term falls by 4.

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Preview ends here

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