Name	Date started	Target end date

WJEC GCSE Mathematics and Numeracy (Double Award) — Question Pack

Generating terms of a sequence from an nth-term rule and finding the nth term of a linear (and quadratic) sequence. Includes diagram-pattern sequences

REVISE
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2.12 — Linear sequences & nth term

Spec 2.3.1, 2.3.2, 2.3.3, 2.3.4 — Unit 2 (no calculator)

Generating terms of a sequence from an nth-term rule and finding the nth term of a linear (and quadratic) sequence. Includes diagram-pattern sequences. Sourced from legacy WJEC GCSE Mathematics Higher non-calculator papers, organised for revision under the 2025 spec.

2025 SPECIFICATION

Estimated time for entire question pack: ~44 minutes

*Derived from the GCSE Higher pace of **~1.5 min/mark** (29 marks across 10 questions).*

*You are advised to **not** attempt to complete all of this in one sitting.*

ABOUT THIS QUESTION PACK

This is a **focused single-topic practice pack**, not a single mock paper. Questions are organised against the 2025 specification. Questions are ordered chronologically by sitting, with custom-written and SAM questions at the end.

INSTRUCTIONS

Use black ink or black ball-point pen. Show all working — method marks are awarded for clear setup.

*A calculator is **not** permitted on any question in this pack (Unit 2 is the non-calculator paper).*

Linear sequences & nth term — what the new spec asks

WJEC GCSE Mathematics (first teaching 2025) · Unit 2: non-calculator.

Generating terms 2.3.1

- Substitute $n = 1, 2, 3, \ldots$ into the rule.
- Evaluate carefully — watch signs and powers.
- List as many terms as the question asks for.

Linear nth term 2.3.2

- Common difference d multiplies n.
- Constant c = first term $-d$.
- Verify by substituting $n = 1$ and $n = 2$.

Far terms 2.3.3

- Once the rule is found, use it for any n.
- Don't list out all preceding terms by hand.
- Show the substitution clearly.

Quadratic sequences 2.3.4

- Constant second difference $\Rightarrow$ quadratic.
- $a = \frac{\text{second diff}}{2}$.
- Find b and c by comparing values at $n = 1, 2$.

Crib sheet »

Linear sequences & nth term in one page

Quick-reference notes — revisit before each question. Don't use during the questions.

What "nth term" means

The nth term is a rule giving the value of any term, where n is the term number (1, 2, 3, …).

If the rule is $3n + 2$: 1st term is $3(1) + 2 = 5$, 2nd is 8, 3rd is 11, …

Linear sequence rule

$$n\text{th term} = dn + c$$

d = common difference (constant gap between terms).

c = 1st term $-d$.

Sequence $5, 8, 11, 14, \ldots$: $d = 3$, $c = 5 - 3 = 2$, rule is $3n + 2$.

Worked example

Find the nth term of $8, 11, 14, 17, \ldots$.

Common difference $d = 3$. First term is 8, so $c = 8 - 3 = 5$.

nth term $= 3n + 5$. Check: $n = 1 \to 8$ ✓, $n = 2 \to 11$ ✓.

Finding the 100th term

Once you have the rule, substitute n.

$3n + 2$ at $n = 100$: $3(100) + 2 = 302$.

Don't hand-list 100 terms — use the rule.

Sequence from a diagram

Count squares/dots in each pattern: that's your sequence.

E.g. $4, 7, 10, 13, \ldots \Rightarrow d = 3, c = 1$, nth term $= 3n + 1$.

Cross-check with one of the diagrams.

Quadratic sequences (preview)

If the gap between terms is itself changing, the sequence is quadratic (n^2 involved).

Constant *second* difference $= 2a$ where the nth term is $an^2 + bn + c$.

$2, 5, 10, 17, \ldots$: second diff $= 2$, so $a = 1$. Rule $= n^2 + 1$.

Generate from a rule

Given nth term $= n^2 - 6$: substitute $n = 1, 2, 3, \ldots$.

$1 - 6 = -5, 4 - 6 = -2, 9 - 6 = 3, 16 - 6 = 10, \ldots$

List the first few terms with care over signs.

Common traps

- Writing dn alone and forgetting c.
- Mixing up c with the first term (they're only equal when $d = 0$).
- Using the wrong common difference — always check by substituting $n = 1$.

Examiner only

2. The nth term of a sequence is given by $n^2 + 7$.

Write down the first three terms of this sequence. [2]

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.....

1st term = ... 2nd term = ... 3rd term = ...

3. Circle the correct answer for each of the following.

(a) $x^3 \times x^6 =$ [1]

x^{36} $x^{0.5}$ x^2 x^9 x^{18}

.....

(b) $(7x - 5y) - (3x + 2y) =$ [1]

$4x - 3y$ $4x - 7y$ $4x + 3y$ $-4x + 7y$ $-4x - 7y$

.....

.....

(c) A car travels x miles in 30 minutes.
Its average speed in miles per hour is [1]

$\frac{x}{2}$ $\frac{x}{30}$ $2x$ $\frac{2}{x}$ $30x$

.....

.....

Examiner only

6. *(a)* Rearrange the following formula to make x the subject.
Give your answer in its simplest form. [3]

$$2(x + y) = 7y - 3$$

(b) Write down the nth term of the following sequence. [2]

3, 6, 11, 18, 27, …

Examiner only

1. *(a)* Write down the nth term of the following sequence. [2]

8, 11, 14, 17, ...

(b) Make t the subject of the formula $r = 3t - 8$. [2]

(c) A rectangle has a length of $(x + 5)$ cm and a width of $(2x - 3)$ cm.
Its perimeter is 46 cm.

Calculate the value of x. [4]

Examiner only

3. *(a)* Write down the first three terms of the sequence whose nth term is given by $n^2 - 6$. [2]

1st term = ... 2nd term = ... 3rd term = ...

(b) Write down an expression for the nth term of the following sequence. [2]

5, 11, 17, 23, …

Examiner only

1. *(a)* Write an expression for the nth term of the following sequence. [2]

2 7 12 17 .....

.....

.....

nth term = ...

(b) The first four diagrams in a sequence are shown below.

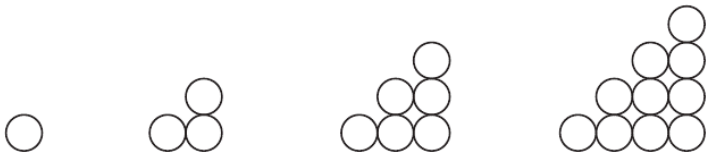

Diagram 1 Diagram 2 Diagram 3 Diagram 4

Complete the following subtraction. [1]

Number of circles in Diagram 17	–	Number of circles in Diagram 16	=	

(c) The first three diagrams in another sequence are shown below.

Diagram 1 Diagram 2 Diagram 3

Give an expression, in terms of n, for the number of dots (●) in Diagram n.
You must simplify your expression. [2]

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Examiner only

15. The first four terms of a sequence are

3, 9, 19, 33, ...

Find the 100th term of the sequence. [3]

Examiner only

3. (a) Simplify each of the following.
Circle your answer in each case.

(i) $m^4 \times m^3 =$ [1]

m^7 m^{12} m^{43} $7m$ $12m$

(ii) $\frac{m^{15}}{m^5} =$ [1]

m^{75} $\frac{1}{m^3}$ m^3 m^{10} $\frac{1}{m^{10}}$

(b) Write down an expression for the nth term of the following sequence. [2]

4, 11, 18, 25, ...

(c) List all of the integers that satisfy the following inequality. [2]

$$13 < 2n < 19$$

Integers are .....

Examiner only

3. (a) Write down an expression for the nth term of the following sequence. [2]

11, 15, 19, 23, ...

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(b) The nth term of a different sequence is given by $n^2 - 5$.
Write down the first three terms of this sequence. [2]

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First three terms are ....., ..., ...

Examiner only

16. The first four terms of a sequence are

2, 11, 26, 47, ...

Find the nth term of the sequence.
Hence, find the 250th term. [3]

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nth term = ...

250th term = ...