

Starter

Sequences and Iterative Processes

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Contents

Questions and short answers

▶ Starter 1

Worked solutions

▶ Starter 1

Starter 1

1. Find the next two terms:

5, 9, 13, 17, ...

2. Find an n th term for:

8, 13, 18, 23, ...

3. A population starts at 200 and grows by 5% each year.

Complete the table.

n	P_n
0	200
1	—
2	—
3	—

4. An iterative process is

$$U_{n+1} = U_n + 4, \quad U_1 = 3$$

Complete the table.

n	U_n
1	3
2	—
3	—
4	—

Starter 1

1. Find the next two terms:

5, 9, 13, 17, ...

21, 25

2. Find an n th term for:

8, 13, 18, 23, ...

$5n + 3$

3. A population starts at 200 and grows by 5% each year.

Complete the table.

n	P_n
0	200
1	210
2	220.5
3	231.525

4. An iterative process is

$$U_{n+1} = U_n + 4, \quad U_1 = 3$$

Complete the table.

n	U_n
1	3
2	7
3	11
4	15

Worked Solution: Starter 1, Question 1

Question: Find the next two terms:

$$5, 9, 13, 17, \dots$$

Worked Solution: The terms increase by 4 each time:

$$9 - 5 = 4, \quad 13 - 9 = 4, \quad 17 - 13 = 4.$$

So the next two terms are

$$17 + 4 = 21 \quad \text{and} \quad 21 + 4 = 25.$$

Thus the sequence continues

$$5, 9, 13, 17, 21, 25, \dots$$

Worked Solution: Starter 1, Question 2

Question: Find an n th term for:

$$8, 13, 18, 23, \dots$$

Worked Solution: The terms increase by 5 each time, so the n th term has the form

$$5n + c.$$

Using the first term, $n = 1$ gives

$$5(1) + c = 8,$$

so

$$c = 3.$$

Therefore the n th term is

$$5n + 3.$$

Check: $n = 2$ gives $10 + 3 = 13$, $n = 3$ gives $15 + 3 = 18$, and so on.

Worked Solution: Starter 1, Question 3

Question: A population starts at 200 and grows by 5% each year. Complete the table.

n	P_n
0	200
1	?
2	?
3	?

Worked Solution: Each year the population is multiplied by

$$1 + \frac{5}{100} = 1.05.$$

Therefore

$$P_1 = 200 \times 1.05 = 210,$$

$$P_2 = 210 \times 1.05 = 220.5,$$

$$P_3 = 220.5 \times 1.05 = 231.525.$$

Equivalently, $P_n = 200(1.05)^n$. The completed table is:

n	P_n
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Worked Solution: Starter 1, Question 4

Question: An iterative process is

$$U_{n+1} = U_n + 4, \quad U_1 = 3.$$

Complete the table.

n	U_n
1	3
2	?
3	?
4	?

Worked Solution: The recurrence says that each term is the previous term plus 4. Hence

$$U_2 = 3 + 4 = 7,$$

$$U_3 = 7 + 4 = 11,$$

$$U_4 = 11 + 4 = 15.$$

The completed table is:

n	U_n
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