

Quadratic Sequences: Nth Term Expression $an^2 + bn + c$

1.The first 5 terms of a quadratic sequence are: 7, 14, 25, 40, 59

Find an expression, in terms of n , for the n th term of this sequence.

2.The first 5 terms of a quadratic sequence are: 3, 8, 17, 30, 47

Find an expression, in terms of n , for the n th term of this sequence.

3.The first 5 terms of a quadratic sequence are: 5, 11, 21, 35, 53

Find an expression, in terms of n , for the n th term of this sequence.

4.The first 5 terms of a quadratic sequence are: 10, 19, 32, 49, 70

Find an expression, in terms of n , for the n th term of this sequence.

5.The first 5 terms of a quadratic sequence are: 6, 13, 24, 39, 58

Find an expression, in terms of n , for the n th term of this sequence.

6.The first 5 terms of a quadratic sequence are: 4, 11, 22, 37, 56

Find an expression, in terms of n , for the n th term of this sequence.

7.The first 5 terms of a quadratic sequence are: 2, 7, 16, 29, 46

Find an expression, in terms of n , for the n th term of this sequence.

8.The first 5 terms of a quadratic sequence are: 9, 18, 31, 48, 69

Find an expression, in terms of n , for the n th term of this sequence.

9.The first 5 terms of a quadratic sequence are: 8, 17, 30, 47, 68

Find an expression, in terms of n , for the n th term of this sequence.

1. Sequence: 7, 14, 25, 40, 59

First differences: 7, 11, 15, 19 Second differences: 4, 4, 4 Let n th term be $an^2 + bn + c$

- $a = \frac{\text{second difference}}{2} = \frac{4}{2} = 2$
- First term: $a + b + c = 7$
- Second term: $4a + 2b + c = 14$
- Third term: $9a + 3b + c = 25$

Set up equations:

1. $a + b + c = 7$
2. $4a + 2b + c = 14$
3. $9a + 3b + c = 25$

Substitute $a = 2$:

1. $2 + b + c = 7 \Rightarrow b + c = 5$
2. $8 + 2b + c = 14 \Rightarrow 2b + c = 6$

Subtract (1) from (2): $(2b + c) - (b + c) = 6 - 5 \Rightarrow b = 1$ Then $c = 5 - 1 = 4$

So n th term: $2n^2 + n + 4$

2. Sequence: 3, 8, 17, 30, 47

First differences: 5, 9, 13, 17 Second differences: 4, 4, 4 $a = 2$

- First term: $a + b + c = 3$
- Second term: $4a + 2b + c = 8$

Substitute $a = 2$:

1. $2 + b + c = 3 \Rightarrow b + c = 1$
2. $8 + 2b + c = 8 \Rightarrow 2b + c = 0$

Subtract: $(2b + c) - (b + c) = 0 - 1 \Rightarrow b = -1$ $c = 1 - (-1) = 2$

n th term: $2n^2 - n + 2$

3. Sequence: 5, 11, 21, 35, 53

First differences: 6, 10, 14, 18 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 5$
- $4a + 2b + c = 11$

$$2 + b + c = 5 \Rightarrow b + c = 3 \quad 8 + 2b + c = 11 \Rightarrow 2b + c = 3$$

$$\text{Subtract: } (2b + c) - (b + c) = 3 - 3 \Rightarrow b = 0 \quad c = 3 - 0 = 3$$

nth term: $2n^2 + 3$

4. Sequence: 10, 19, 32, 49, 70

First differences: 9, 13, 17, 21 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 10$
- $2 + b + c = 10 \Rightarrow b + c = 8$
- $4a + 2b + c = 19 \Rightarrow 8 + 2b + c = 19 \Rightarrow 2b + c = 11$

$$\text{Subtract: } (2b + c) - (b + c) = 11 - 8 \Rightarrow b = 3 \quad c = 8 - 3 = 5$$

nth term: $2n^2 + 3n + 5$

5. Sequence: 6, 13, 24, 39, 58

First differences: 7, 11, 15, 19 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 6 \Rightarrow 2 + b + c = 6 \Rightarrow b + c = 4$
- $4a + 2b + c = 13 \Rightarrow 8 + 2b + c = 13 \Rightarrow 2b + c = 5$

$$\text{Subtract: } (2b + c) - (b + c) = 5 - 4 \Rightarrow b = 1 \quad c = 4 - 1 = 3$$

nth term: $2n^2 + n + 3$

6. Sequence: 4, 11, 22, 37, 56

First differences: 7, 11, 15, 19 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 4 \Rightarrow 2 + b + c = 4 \Rightarrow b + c = 2$
- $4a + 2b + c = 11 \Rightarrow 8 + 2b + c = 11 \Rightarrow 2b + c = 3$

$$\text{Subtract: } (2b + c) - (b + c) = 3 - 2 \Rightarrow b = 1 \quad c = 2 - 1 = 1$$

nth term: $2n^2 + n + 1$

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7. Sequence: 2, 7, 16, 29, 46

First differences: 5, 9, 13, 17 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 2 \Rightarrow 2 + b + c = 2 \Rightarrow b + c = 0$
- $4a + 2b + c = 7 \Rightarrow 8 + 2b + c = 7 \Rightarrow 2b + c = -1$

Subtract: $(2b + c) - (b + c) = -1 - 0 \Rightarrow b = -1$ $c = 0 - (-1) = 1$

nth term: $2n^2 - n + 1$

8. Sequence: 9, 18, 31, 48, 69

First differences: 9, 13, 17, 21 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 9 \Rightarrow 2 + b + c = 9 \Rightarrow b + c = 7$
- $4a + 2b + c = 18 \Rightarrow 8 + 2b + c = 18 \Rightarrow 2b + c = 10$

Subtract: $(2b + c) - (b + c) = 10 - 7 \Rightarrow b = 3$ $c = 7 - 3 = 4$

nth term: $2n^2 + 3n + 4$

9. Sequence: 8, 17, 30, 47, 68

First differences: 9, 13, 17, 21 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 8 \Rightarrow 2 + b + c = 8 \Rightarrow b + c = 6$
- $4a + 2b + c = 17 \Rightarrow 8 + 2b + c = 17 \Rightarrow 2b + c = 9$

Subtract: $(2b + c) - (b + c) = 9 - 6 \Rightarrow b = 3$ $c = 6 - 3 = 3$

nth term: $2n^2 + 3n + 3$

10. Sequence: 1, 6, 15, 28, 45

First differences: 5, 9, 13, 17 Second differences: 4, 4, 4 $a = 2$

- $a + b + c = 1 \Rightarrow 2 + b + c = 1 \Rightarrow b + c = -1$
- $4a + 2b + c = 6 \Rightarrow 8 + 2b + c = 6 \Rightarrow 2b + c = -2$

Subtract: $(2b + c) - (b + c) = -2 - (-1) \Rightarrow b = -1$ $c = -1 - (-1) = 0$

nth term: $2n^2 - n$