The nth Term of a Quadratic Sequence

ANSWERS

1

Find the nth term of

1, 7, 17, 31, 49

1	7	17	31	49
6	10	14	18	
	4	4	4	

halve the second difference

4 ÷ 2 = 2 so it starts $2n^2$

sequence	1	7	17	31	49
the n^2 part	2	8	18	32	50
what is left	−1	−1	−1	−1	−1

nth term $2n^2 - 1$

2

Find the nth term of

6, 12, 20, 30, 42

6	12	20	30	42
6	8	10	12	
	2	2	2	

halve the second difference

2 ÷ 2 = 1 so it starts $1n^2$

sequence	6	12	20	30	42
the n^2 part	1	4	9	16	25
what is left	5	8	11	14	17

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

3

Find the nth term of

5, 16, 33, 56, 85

5	16	33	56	85
11	17	23	29	
	6	6	6	

6 ÷ 2 = 3 so it starts $3n^2$

sequence	5	16	33	56	85
the n^2 part	3	12	27	48	75
what is left	2	4	6	8	10

nth term $3n^2 + 2n$

4

Find the nth term of

3, 6, 13, 24, 39

3	6	13	24	39
3	7	11	15	
	4	4	4	

4 ÷ 2 = 2 so it starts $2n^2$

sequence	3	6	13	24	39
the n^2 part	2	8	18	32	50
what is left	1	−2	−5	−8	−11

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

5

Find the nth term of 4, 5, 8, 13, 20, …

second difference 2, so n^2

what is left: 3, 1, −1, −3, −5

nth term $n^2 - 2n + 5$

6

Ring the sequences that are quadratic.

- 3, 8, 13, 18, 23
- **2, 5, 10, 17, 26**
- 1, 8, 27, 64, 125
- **0, 6, 16, 30, 48**

second differences the same every time

Answer the 2nd and the 4th

7

Find the nth term of 6, 20, 44, 78, …

second difference 10, so $5n^2$

what is left: 1, 0, −1, −2

nth term $5n^2 - n + 2$

8

Zara finds the nth term of 5, 17, 37, 65, 101, … She writes $8n^2 - 3$. Explain what Zara has done wrong. Then find the right nth term.

she did not halve the 8: it is $4n^2$

$8n^2 - 3$ gives 29 when n = 2, not 17

nth term $4n^2 + 1$

The nth Term of a Quadratic Sequence *further practice*

ANSWERS

9

Find the nth term of the sequence

3, 11, 21, 33, 47, …

second difference 2, so n^2

what is left: 2, 7, 12, …

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

10

Find the nth term of the sequence

−4, −5, −2, 5, 16, …

second difference 4, so $2n^2$

what is left: −6, −13, −20, …

nth term $2n^2 - 7n + 1$

11

Find the nth term of the sequence

9, 20, 35, 54, …

second difference 4, so $2n^2$

what is left: 7, 12, 17, 22

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

12

Pattern n is made of dots. Here are the first three patterns. Find the nth term for the number of dots. How many dots are in pattern 10?



Pattern 1 Pattern 2 Pattern 3

2, 6, 12, 20: second difference 2

nth term $n^2 + n$

Pattern 10 110 dots

13

Find the 10th term of the sequence

3, 10, 21, 36, …

nth term is $2n^2 + n$

$2 \times 100 + 10$

10th term 210

14

Is 150 a term of the sequence

6, 9, 14, 21, 30, … Explain how you know.

nth term is $n^2 + 5$

$n^2 = 145$, not a square number

Answer No

15

Find the nth term of the sequence

2, 7, 15, 26, 40, …

second difference 3: half of 3 is $\frac{3}{2}$

what is left goes up in halves

nth term $\frac{3}{2}n^2 + \frac{1}{2}n$

16

Ava says the sequence

3, 6, 11, 18, 27, … is linear, because it goes up every time. Is Ava right? Explain how you know.

differences 3, 5, 7, 9: not the same

the second difference is 2: quadratic

Answer No, it is $n^2 + 2$