The nth term of a quadratic sequence

ANSWERS

1

Find the second difference of 2, 5, 10, 17, 26.

2	5	10	17	26
3	5	7	9	
2	2	2		

Second difference: 2

2

Find the second difference of 1, 7, 17, 31, 49.

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

Second difference: 4

3

Find the nth term of 4, 7, 12, 19, 28.

4	7	12	19	28
3	5	7	9	
2	2	2		

2 ÷ 2 = 1 n^2

sequence	4	7	12	19	28
the n^2 part	1	4	9	16	25
what is left	3	3	3	3	3

nth term: $n^2 + 3$

4

Find the nth term of 3, 9, 19, 33, 51.

3	9	19	33	51
6	10	14	18	
4	4	4		

4 ÷ 2 = 2 $2n^2$

sequence	3	9	19	33	51
the n^2 part	2	8	18	32	50
what is left	1	1	1	1	1

nth term: $2n^2 + 1$

5

Find the nth term of 5, 14, 29, 50, 77.

5	14	29	50	77
9	15	21	27	
6	6	6		

6 ÷ 2 = 3 $3n^2$

sequence	5	14	29	50	77
the n^2 part	3	12	27	48	75
what is left	2	2	2	2	2

nth term: $3n^2 + 2$

6

Find the nth term of 4, 10, 18, 28, 40.

4	10	18	28	40
6	8	10	12	
2	2	2		

2 ÷ 2 = 1 n^2

sequence	4	10	18	28	40
the n^2 part	1	4	9	16	25
what is left	3	6	9	12	15

nth term of what is left: $3n$

nth term: $n^2 + 3n$

7

Find the nth term of 5, 9, 15, 23, 33.

5	9	15	23	33
4	6	8	10	
2	2	2		

2 ÷ 2 = 1 n^2

sequence	5	9	15	23	33
the n^2 part	1	4	9	16	25
what is left	4	5	6	7	8

nth term of what is left: $n + 3$

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

8

Find the nth term of 3, 10, 21, 36, 55.

3	10	21	36	55
7	11	15	19	
4	4	4		

4 ÷ 2 = 2 $2n^2$

sequence	3	10	21	36	55
the n^2 part	2	8	18	32	50
what is left	1	2	3	4	5

nth term of what is left: n

nth term: $2n^2 + n$

The nth term of a quadratic sequence *further practice*

ANSWERS

9

Find the nth term of 0, 3, 8, 15, 24.

second difference 2: n^2; what is left −1, −1, −1

Answer: $n^2 - 1$

10

Find the nth term of 3, 12, 27, 48, 75.

second difference 6: $3n^2$; what is left 0, 0, 0

Answer: $3n^2$

11

Find the nth term of 6, 14, 24, 36, 50.

n^2; what is left 5, 10, 15, 20, 25: $5n$

Answer: $n^2 + 5n$

12

The nth term of a sequence is $n^2 + 4$.
Find the 10th term.

$10^2 + 4 = 100 + 4$

Answer: 104

13

A sequence starts 4, 12, 24, 40, 60.
Find its nth term and its 10th term.

$2n^2$; what is left 2, 4, 6, 8, 10: $2n$

$2 \times 100 + 2 \times 10 = 220$

Answer: $2n^2 + 2n$; 220

14

A marble rolls down a slope.
The distances make a quadratic sequence. How far has it rolled after 10 seconds?

seconds	1	2	3	4
distance (cm)	3	10	21	36

second difference 4: $2n^2$; what is left n

$2 \times 100 + 10 = 210$

Answer: 210 cm

15

The nth term of a sequence is $n^2 + 6$.
Is 150 in the sequence?
Show how you know.

$n^2 + 6 = 150$, so $n^2 = 144$

$n = 12$

Answer: Yes, the 12th term

16

Jo says the nth term of 2, 9, 20, 35, 54 is $4n^2 - 2$, because the second difference is 4. Explain her mistake and find the right nth term.

halve the 4: $2n^2$, not $4n^2$

what is left 0, 1, 2, 3, 4: $n - 1$

Answer: $2n^2 + n - 1$