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Quadratic Sequence nth Term Worksheet

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

Show all your working clearly.

Sequence 1

5, 11, 19, 29, 41

Sequence 2

4, 10, 18, 28, 40

Sequence 3

7, 15, 25, 37, 51

Sequence 4

3, 7, 13, 21, 31

Sequence 5

2, 8, 16, 26, 38

Sequence 6

6, 12, 20, 30, 42

Sequence 7

9, 17, 27, 39, 53

Sequence 8

1, 7, 15, 25, 37

Sequence 9

8, 16, 26, 38, 52

Sequence 10

0, 6, 14, 24, 36

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Sequence 11

10, 18, 28, 40, 54

Sequence 12

-1, 5, 13, 23, 35

Sequence 13

12, 22, 34, 48, 64

Sequence 14

-2, 4, 12, 22, 34

Sequence 15

14, 26, 40, 56, 74

Sequence 16

-3, 3, 11, 21, 33

Answer Key

Below are the nth term expressions for each sequence, found using the standard method for quadratic sequences.

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Sequence 1

5, 11, 19, 29, 41

nth term: $n^2 + 3n + 1$

Sequence 2

4, 10, 18, 28, 40

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Set up equations:

- $a + b + c = 4$
- $4a + 2b + c = 10$
- $9a + 3b + c = 18$ Solve: $a = 1, b = 3, c = 0$ **nth term:** $n^2 + 3n$

Sequence 3

7, 15, 25, 37, 51

First differences: 8, 10, 12, 14 Second differences: 2, 2, 2 Equations:

- $a + b + c = 7$
- $4a + 2b + c = 15$
- $9a + 3b + c = 25$ Solve: $a = 1, b = 3, c = 3$ **nth term:** $n^2 + 3n + 3$

Sequence 4

3, 7, 13, 21, 31

First differences: 4, 6, 8, 10 Second differences: 2, 2, 2 Equations:

- $a + b + c = 3$
- $4a + 2b + c = 7$
- $9a + 3b + c = 13$ Solve: $a = 1, b = 1, c = 1$ **nth term:** $n^2 + n + 1$

Sequence 5

2, 8, 16, 26, 38

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Equations:

- $a + b + c = 2$
- $4a + 2b + c = 8$
- $9a + 3b + c = 16$ Solve: $a = 1, b = 3, c = -2$ **nth term:** $n^2 + 3n - 2$

Sequence 6

6, 12, 20, 30, 42

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Equations:

- $a + b + c = 6$
- $4a + 2b + c = 12$
- $9a + 3b + c = 20$ Solve: $a = 1, b = 3, c = 2$ **nth term:** $n^2 + 3n + 2$

Sequence 7

9, 17, 27, 39, 53

First differences: 8, 10, 12, 14 Second differences: 2, 2, 2 Equations:

- $a + b + c = 9$
- $4a + 2b + c = 17$
- $9a + 3b + c = 27$ Solve: $a = 1, b = 3, c = 5$ **nth term:** $n^2 + 3n + 5$

Sequence 8

1, 7, 15, 25, 37

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Equations:

- $a + b + c = 1$
- $4a + 2b + c = 7$
- $9a + 3b + c = 15$ Solve: $a = 1, b = 3, c = -3$ **nth term:** $n^2 + 3n - 3$

Sequence 9

8, 16, 26, 38, 52

First differences: 8, 10, 12, 14 Second differences: 2, 2, 2 Equations:

- $a + b + c = 8$
- $4a + 2b + c = 16$
- $9a + 3b + c = 26$ Solve: $a = 1, b = 3, c = 4$ **nth term:** $n^2 + 3n + 4$

Sequence 10

0, 6, 14, 24, 36

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Equations:

- $a + b + c = 0$
- $4a + 2b + c = 6$
- $9a + 3b + c = 14$ Solve: $a = 1, b = 3, c = -4$ **nth term:** $n^2 + 3n - 4$

Sequence 11

10, 18, 28, 40, 54

First differences: 8, 10, 12, 14 Second differences: 2, 2, 2 Equations:

- $a + b + c = 10$

- $4a + 2b + c = 18$
- $9a + 3b + c = 28$ Solve: $a = 1, b = 3, c = 6$ **nth term:** $n^2 + 3n + 6$

Sequence 12

-1, 5, 13, 23, 35

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Equations:

- $a + b + c = -1$
- $4a + 2b + c = 5$
- $9a + 3b + c = 13$ Solve: $a = 1, b = 3, c = -5$ **nth term:** $n^2 + 3n - 5$

Sequence 13

12, 22, 34, 48, 64

First differences: 10, 12, 14, 16 Second differences: 2, 2, 2 Equations:

- $a + b + c = 12$
- $4a + 2b + c = 22$
- $9a + 3b + c = 34$ Solve: $a = 1, b = 3, c = 8$ **nth term:** $n^2 + 3n + 8$

Sequence 14

-2, 4, 12, 22, 34

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Equations:

- $a + b + c = -2$
- $4a + 2b + c = 4$
- $9a + 3b + c = 12$ Solve: $a = 1, b = 3, c = -6$ **nth term:** $n^2 + 3n - 6$

Sequence 15

14, 26, 40, 56, 74

First differences: 12, 14, 16, 18 Second differences: 2, 2, 2 Equations:

- $a + b + c = 14$
- $4a + 2b + c = 26$
- $9a + 3b + c = 40$ Solve: $a = 1, b = 3, c = 10$ **nth term:** $n^2 + 3n + 10$

Sequence 16

-3, 3, 11, 21, 33

First differences: 6, 8, 10, 12 Second differences: 2, 2, 2 Equations:

- $a + b + c = -3$
- $4a + 2b + c = 3$

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- $9a + 3b + c = 11$ Solve: $a = 1, b = 3, c = -7$ **nth term:** $n^2 + 3n - 7$