Quadratic Patterns (Second Differences)

A sequence is quadratic if the second difference (the difference between the first differences) is constant. Use the tables below to find the first and second differences for each sequence.

Part A: Finding Differences

1. Determine if the sequence $5, 8, 13, 20, 29, \ldots$ is linear or quadratic.

Term Number (n)	1	2	3	4	5
Term Value	5	8	13	20	29
First Difference					
Second Difference					

Conclusion: _____

2. Determine if the sequence $1, 6, 15, 28, 45, \ldots$ is linear or quadratic.

Term Number (n)	**1**	**2**	**3**	**4**	**5**
Term Value	1	6	15	28	45
First Difference					
Second Difference					

Conclusion: _____

3. Determine if the sequence $4, 7, 10, 13, 16, \ldots$ is linear or quadratic.

Term Number (n)	1	2	3	4	5
Term Value	4	7	10	13	16
First Difference					
Second Difference					

Conclusion: _____

4. Determine if the sequence $1, 0, -1, 0, 3, \ldots$ is linear or quadratic.

Term Number (n)	1	2	3	4	5
Term Value	1	0	-1	0	3
First Difference					
Second Difference					

Conclusion: _____

5. The second difference of a quadratic sequence is 4. The first two terms are 10 and 16. Find the next three terms.
Next three terms: _____

6. Find the next two terms of the quadratic sequence: $1, 5, 12, 22, \ldots$
Next two terms: _____

Part B: Finding the Rule for Quadratic Patterns

7. The quadratic sequence is $2, 6, 12, 20, 30, \ldots$

(a) Find the rule for the n-th term (T).

Rule: _____

(b) Use your rule to find the 10th term in the sequence.

10th Term: _____

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8. Find the rule for the n-th term (T) of the sequence: $3, 8, 15, 24, 35, \ldots$

Rule: _____

9. A quadratic sequence has the rule $T = n^2 + 5n - 1$. Which term in the sequence has a value of 69?

Term number (n): _____

10. The number of square tiles needed to build a patio of width n follows the sequence $3, 10, 21, 36, \ldots$

(a) Find the rule for the number of tiles (T) required for a patio of width n.

Rule: _____

(b) Use your rule to find how many tiles are needed for a patio of width 8.

Tiles for width 8: _____

11. The quadratic sequence is $1, 6, 17, 34, 57, \ldots$

Find the rule for the n-th term (T).

Rule: _____

12. Find the rule for the n-th term (T) of the sequence:
$10, 16, 26, 40, 58, \ldots$

Rule: _____

13. A quadratic rule is $T = 3n^2 - 2n + 5$. Find the 12-th term (T_{12}) of the sequence.

12th Term: _____