# The First Term Of A Sequence Is 19. The Term-to-termrule Is To Add 14 Each Time.What Is The Nth Term

**The First Term Of A Sequence Is 19. The Term-to-termrule Is To Add 14 Each Time. What Is The Nth Term**

Understanding sequences is a fundamental aspect of mathematics, especially in algebra and arithmetic progressions. When dealing with sequences, recognizing the pattern and formulating a general term allows for efficient calculation of any term within the sequence. In this article, we will explore a specific sequence where the first term is 19, and each subsequent term is obtained by adding 14 to the previous term. Our goal is to derive a formula for the Nth term of this sequence, allowing us to determine the value of any term based on its position, N.

## Understanding the Sequence

Before delving into the formula, it’s essential to comprehend the nature of the sequence in question.

### Initial Term

The sequence begins with the first term:
- a1 = 19

### Pattern Rule

The rule for generating subsequent terms is:
- Add 14 to the previous term

This rule suggests that the sequence is an arithmetic progression (AP), where each term increases by a constant difference.

## Arithmetic Progressions (AP) Explained

An arithmetic progression is a sequence of numbers where each term after the first is obtained by adding a fixed number, called the common difference (d), to the preceding term.

## General Form of an AP

The Nth term of an arithmetic sequence can be expressed as:
- an = a1 + (n - 1) d

Where:
- an = the Nth term
- a1 = the first term
- d = common difference
- n = position of the term in the sequence

## Application to Our Sequence

In our specific sequence:
- a1 = 19
- d = 14

Thus, the general formula for the Nth term becomes:
- an = 19 + (n - 1) 14

# Deriving the Nth Term Formula

Let's derive the formula step-by-step.

## Step 1: Identify the first term and common difference

From the problem:
- First term (a1) = 19
- Common difference (d) = 14

## Step 2: Write the general formula for an AP

The Nth term is given by:
- an = a1 + (n - 1) d

## Step 3: Substitute known values

Plugging in the known values:
- an = 19 + (n - 1) 14

## Step 4: Simplify the expression

Distribute the 14:

- an = 19 + 14n - 14

Combine like terms:
- an = 14n + (19 - 14)
- an = 14n + 5

This is the explicit formula for the Nth term.

# Final Formula for the Nth Term

Based on the above derivation, the Nth term of the sequence is:

- **$a_n$ = 14n + 5**

This formula allows us to find any term in the sequence simply by plugging in the value of N.

# Examples of Calculating Specific Terms

Let's see how this formula works with some specific values of N.

## Example 1: Find the 1st term

- a1 = 14(1) + 5 = 14 + 5 = 19

This matches the initial term given, confirming the formula's correctness.

## Example 2: Find the 5th term

- a5 = 14(5) + 5 = 70 + 5 = 75

## Example 3: Find the 10th term

- a10 = 14(10) + 5 = 140 + 5 = 145

# Applications and Importance of the Nth Term Formula

Having a formula for the Nth term is valuable in many contexts:

- **Predicting future terms:** Quickly find any term without listing all previous terms.
- **Solving problems involving sequences:** For example, when given a term's position, determine its value directly.
- **Modeling real-world situations:** Such as financial calculations involving regular increments or physics problems with uniform acceleration.

## Additional Tips for Working with Arithmetic Sequences

To effectively work with sequences like this, keep the following tips in mind:

1. **Identify the pattern:** Confirm that the sequence is arithmetic by checking the differences between successive terms.
2. **Write the general formula:** Use the pattern to derive the explicit formula for the Nth term.
3. **Verify your formula:** Plug in known values to ensure the formula produces correct results.
4. **Use the formula for quick calculations:** This saves time, especially for large N.

## Conclusion

In summary, the sequence starting with 19 and increasing by 14 each time is an arithmetic progression with a first term of 19 and a common difference of 14. The explicit formula for the Nth term, derived from the properties of arithmetic sequences, is:

- an = 14n + 5

Using this formula, you can determine the value of any term in the sequence efficiently. Recognizing the pattern and understanding how to formulate the general term are essential skills in algebra and mathematical problem-solving, applicable across various fields including finance, physics, and computer science.

# Frequently Asked Questions

## What is the first term of the sequence?

The first term of the sequence is 19.

## What is the rule for generating subsequent terms in the sequence?

To get each new term, add 14 to the previous term.

## How do you find the nth term of the sequence?

Use the formula for an arithmetic sequence: nth term = first term + (n - 1) × common difference.

## What is the common difference in this sequence?

The common difference is 14.

## What is the formula for the nth term of this sequence?

The nth term $T_n = 19 + (n - 1) \times 14$.

## Calculate the 5th term of the sequence.

$T_5 = 19 + (5 - 1) \times 14 = 19 + 4 \times 14 = 19 + 56 = 75$.

## What is the 10th term of the sequence?

$T_{10} = 19 + (10 - 1) \times 14 = 19 + 9 \times 14 = 19 + 126 = 145$.

## If the 7th term is 111, is that consistent with the sequence formula?

Yes, $T_7 = 19 + (7 - 1) \times 14 = 19 + 6 \times 14 = 19 + 84 = 103$. Since 111 does not match this, the 7th term would be 103, so 111 is not correct for this sequence.

## How can you verify the nth term formula for this sequence?

By calculating several terms using the formula and comparing them to manually generated terms to ensure consistency.

## What is the significance of the common difference in an arithmetic sequence?

The common difference indicates how much each term increases or decreases from the previous one, defining the sequence's pattern.

# Additional Resources

Understanding the First Term of a Sequence and Its Progression: An In-Depth Exploration

When delving into the world of sequences and series, one of the foundational concepts students encounter is understanding how a sequence begins and how it progresses. In this comprehensive review, we will explore the specific sequence where the first term is 19, and the term-to-term rule involves adding 14 each time. We aim to understand how to find the n-th term of this sequence, the underlying formulas, and the practical applications of such sequences.

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# Introduction to Sequences and Their Importance

Sequences are ordered lists of numbers following a specific pattern or rule. They are fundamental in mathematics because they model real-world phenomena such as population growth, financial calculations, and computer science algorithms. Understanding sequences helps in recognizing patterns, making predictions, and solving complex problems.

Why is understanding the first term and the pattern important?
- It provides a starting point for generating subsequent terms.
- It allows us to formulate explicit rules (formulas) for any term.
- It helps in summing sequences and solving problems involving large terms efficiently.

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# Defining the Sequence: First Term and Term-to-Term Rule

Given data:

- First term ($a_1$): 19
- Term-to-term rule: Add 14 each time

This describes an arithmetic sequence, characterized by a common difference, which in this case is 14.

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# What Is an Arithmetic Sequence?

An arithmetic sequence is a sequence of numbers where each term after the first is obtained by adding a fixed number, called the common difference, to the previous term.

General form:

$a_n = a_1 + (n - 1) d$

Where:
- $a_n$ = the n-th term
- $a_1$ = the first term
- d = common difference
- n = position of the term in the sequence

Key features:

- The sequence progresses linearly.
- The difference between consecutive terms remains constant.
- The sequence can be increasing or decreasing depending on the sign of d.

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# Applying the Formula to Our Sequence

Given:

- $a_1 = 19$
- d = 14

Objective:

Find the n-th term, $a_n$.

Step-by-step process:

1. Identify the knowns:

- $a_1 = 19$
- $d = 14$

2. Write the general formula:

$a_n = a_1 + (n - 1) d$

3. Substitute the known values:

$a_n = 19 + (n - 1) 14$

4. Simplify:

$a_n = 19 + 14n - 14$

$a_n = (19 - 14) + 14n$

$a_n = 5 + 14n$

This is the explicit formula for the n-th term of our sequence.

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# Understanding the Explicit Formula: $a_n = 14n + 5$

The derived formula:

$a_n = 14n + 5$

What does this tell us?

- For any position n, you can directly compute the term without calculating all previous terms.
- The sequence's terms grow linearly with n.
- The sequence begins when n=1:

$a_1 = 14(1) + 5 = 14 + 5 = 19$ (matches given first term)

- For n=2:

$a_2 = 14(2) + 5 = 28 + 5 = 33$

- For n=3:

$a_3 = 14(3) + 5 = 42 + 5 = 47$

And so on.

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## Practical Examples and Applications

Understanding how to find the n-th term is valuable in various contexts:

- Predicting future terms: For example, what is the 10th term?

$a_{10} = 14(10) + 5 = 140 + 5 = 145$

- Determining the term at a specific position: For example, at which position does the sequence reach 200?

Solve for n:

$14n + 5 = 200$

$14n = 195$

$n = 195 / 14 \approx 13.93$

Since n must be an integer, the sequence does not reach exactly 200, but it surpasses it at n=14:

$a_{14} = 14(14) + 5 = 196 + 5 = 201$

- Summing the first n terms: Use the sum formula for arithmetic series (which we will discuss later).

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## Visualizing the Sequence

Graphing the sequence can offer insights into its behavior:

- The x-axis: term position (n)
- The y-axis: term value ($a_n$)

Plotting points shows a straight line with a slope of 14, confirming the linear growth.

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## Limitations and Considerations

While the sequence is straightforward, it’s important to recognize:

- The sequence is infinite; it continues indefinitely as n increases.
- The sequence is linear, so no oscillations or complex patterns occur.
- If the common difference were negative, the sequence would decrease over time.

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## Extensions and Related Concepts

Once you understand this sequence, you can explore:

- Sum of the first n terms:

Sum $S_n = n/2 (a_1 + a_n)$

- Finding specific terms with non-integer positions: In some applications, approximations are necessary.

- Sequences with different rules, such as geometric sequences where each term multiplies by a common ratio.

- Recursive definitions: defining a sequence where each term depends on the previous one, e.g., $a_n = a_{n-1} + 14$.

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## Summary and Key Takeaways

- The sequence begins with a first term ($a_1$) of 19.
- The term-to-term rule is to add 14 each time, indicating an arithmetic sequence.
- The explicit formula for the n-th term is $a_n = 14n + 5$.
- To find the n-th term, substitute the value of n into this formula.
- Understanding this process equips you to analyze similar sequences, predict future terms, and apply the concepts to real-world problems.

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## Final Words

Mastering the understanding of sequences, especially simple arithmetic ones, forms a critical foundation in mathematics. Recognizing the importance of the first term, the common difference, and how to derive explicit formulas allows for efficient calculations and deeper insights into patterns. Whether dealing with sequences in pure mathematics or practical applications like finance, engineering, or computer science, these concepts are invaluable.

Remember:
- Always identify the first term and the rule.
- Use the explicit formula for quick calculations.
- Confirm your understanding through examples and visualization.

With this comprehensive understanding, you are well-equipped to handle more complex sequences and series, building on this fundamental knowledge.

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End of detailed review.

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