Finding next term in a sequence

Finding the next term in a sequence calculator. Finding the next term in a geometric sequence. Finding the next term in a quadratic sequence. Finding the next term in a sequence worksheet. Formulating the rule in finding the next term in a sequence. Rules in finding the next term in a sequence. Formulating the rule in finding the next term in a sequence ppt. Which formula is most helpful in finding the next term of a sequence.

Given our generic arithmetic sequence... ... we can add the terms, called a series, as follows. There is a formula that can add a finite list of these numbers. It requires three pieces of information. The formula is... ...where Sn is the sum of the first n numbers, a1 is the first number in the sequence and one is the n Â° number in the sequence. If you want to see a derivation of this sum formula arithmetic series, watch this video.Ideo: Arithmetic Series: The Sum Formula Usually problems arise in both ways. Either the first number and the last number in the sequence are known or the first number in the sequence and the number of terms are known. The following two problems will explain how to find a sum of a finite series. Example 1: Find the sum of the series 5 + 8 + 11 + 14 + 17 + ... +128. In order to use the sum formula. We need to know some things. We need to know n, the number of terms in the series. We need to know a1, the first number, and a, the last number in the series. We don't know what the n value is. This is where we have to start. To find the n value, we use the formula for the series. We have already determined the formula for the sequence in a previous section. We found it as a = 3n plus 2. We will substitute in the last number of the series and solve the value n. a = 3n + 2128 = 3n + 2126 = 3n 42 = n = 42 There are 42 numbers in the series. We also know the d = 3, a1 = 5, and a42 = 128. We can substitute this number in the sum formula, as it is. Sn = (1/2) n (a1 + a) S42 = (1/2) (42) (5 + 128) S42 = (21) (133) S42 = 2793 This means that the sum of the first 42 terms in the series equals 2793. Example 2: Find the sum of the first 205 multiples of 7. First we need to figure out what our show looks like. We need to write more than seven and add them together, like this. 7 + 14 + 21 + 28 + ... + ? To find the last number of the series, we need the sum formula, we need to develop a formula for the series. So, we'll use the explicit rule or a = a1 + (n – 1) d. We can also see that d = 7 and the first number, a1, is 7. a = a1 + (n – 1) d a = 7 + (n – 1) (7) a = 7 + 7n – 7 a = 7n Now we can find the last term of the series. We can do that because we are told that there are 205 numbers in the series. We can find the 205th term using the formula. a = 7n an = 7 (205) an = 1435 This means the last number in the series is 1435. It means the show looks like this. 7 + 14 + 21 + 28 + ... + 1435 To find the sum, we will replace the information in the sum formula. We're going to replace a1 = 7, a205 = 1435 and n = 205. Sn = (1/2) n (a1 + an) S42 = (1/2) (205) (7 + 1435) S42 = (1/2) (205) (1442) S42 = (1/2) (1442) (205) S42 = (721) (205) S42 = 147 805 This means that the sum of the first 205 multiples of 7 is equal to 147,805. ideo: Arithmetic Sequence: Find the SumFinding the sum of a series: Data a1 and a Ã M #2 Una sequenza matematica Ã Sometimes the numbers in a sequence are defined in terms of a previous number in the list. Differentiating between different types of sequences Key points Key points The number of ordered elements (possibly infinite) is called the length of the sequence. Unlike a set, order is important and a particular term can appear several times in different places in the sequence. An arithmetic sequence is a sequence in which you get a term by adding a constant to a previous term of a sequence. Thus the term [latex]n[/latex]th can be described by the formula [latex]a_n = a_{n-1} + d [/latex]. A geometric sequence is a sequence in which you get a term of a sequence by multiplying the previous term by a constant. It can be described by the formula [latex]a_n=r \cdot a_{n-1}[/latex]. Keyword Sequence: An ordered list of elements, possibly infinite in length. finite: Limited, bound by limits. set: A collection of zero or more objects, possibly infinite in size, and neglecting any order or repetition of the objects that may be contained within it. In mathematics, a sequence is an ordered list of objects. As a set, it contains members (also called elements or terms). The number of ordered (possibly infinite) elements is called the length of the sequence. Unlike a set, order is important and a particular term can appear several times in different places in the sequence. For example, [latex] (M, A, R, Y) [/latex] is a sequence of letters different from [latex] (A, R, M, Y) [/latex], in terms of sorting, and [latex] (1, 1, 2, 3, 5, 8) [/latex], which contains the number 1 in two different positions, is a valid sequence. Sequences can be finite, as in this example, or infinite, as the sequence of all integers also positive [latex] (2, 4, 6, \cdots) [/latex]. Finite sequences are sometimes known as strings or words and infinite sequences as streams. Examples and Notation Finite and Infinite Sequences A more formal definition of a finite sequence with terms in a set [latex]S[/latex] is a function from [latex]\left \{ 1, 2, \cdots, n \right \}[/latex] to [latex]S[/latex] for some [latex]n > 0[/latex]. An infinite sequence in [latex]S[/latex] is a function from [latex]\left \{ 1, 2, \cdots \right \}[/latex] to [latex]S[/latex]. For example, the sequence of prime numbers [latex] (2,3,5,7,11, \cdots) [/latex] is the function [latex]1\rightarrow 2, 2\rightarrow 3, 3\rightarrow 5, 4\rightarrow 7, 5\rightarrow 11, \cdots[/latex] A sequence of a finite length n is also called Finite sequences include the empty sequence [latex] (\quad) [/latex] without elements. Recursive sequences Many of the sequences you will encounter in a math class are produced by Formula, where some operations are performed on the previous member of the [LATEX] A_ {N-1} [/ LATEX] sequence to give the next member of the sequence [LATEX] A_N [/ LATEX]. These are called recursive sequences. Arithmetic sequences An arithmetic sequence (or linear) is a sequence of numbers in which each new term is calculated by adding a constant value to the previous end. An example is [LATEX] (10,13,16,19,22,25) [/ LATEX]. In this example, the first term (we will call [LATEX] A_1 [/ LATEX]) is [LATEX] 10 [/ LATEX], and the common difference ([LATEX] D [/ LATEX]) Â «That is the difference between Two adjacent numbersÂ »is [LATEX] 3 [/ LATEX]. The recursive definition is therefore [LATEX] DisplayStyle {A_N = A_ {N-1} +3, A_1 = 10} [/ LATEX] Another example is [LATEX] (25,22,19,16,13, 10) [/ LATEX]. In this example [LATEX] A_1 = 25 [/ LATEX], and [LATEX] D = -3 [/ LATEX]. The recursive definition is therefore [LATEX] DisplayStyle {A_N = A_ {N-1} -3, A_1 = 25} [/ LATEX] in both these examples, [LATEX] N [/ LATEX] (the number of terms) It is [LATEX] 6 [/ LATEX]. Geometric sequences A geometric sequence is a list in which each number is generated by multiplying a constant for the previous number. An example is [LATEX] (2,6,18,54,162) [/ LATEX]. In this example, [LATEX] A_1 = 2 [/ LATEX] and the common ratio ([LATEX] R [/ LATEX]) Â «ie, the relationship between two adjacent numbersâ € è 3. So the recursive definition is [latex] a_n = 3a_ {n-1}, A_1 = 2 [/ LATEX] Another example is [LATEX] (162.54.18.6.2) [/ LATEX]. In this example [LATEX] A_1 = 162 [/ LATEX], and [LATEX] DisplayStyle {R = frac {1} {3}} [/ LATEX]. Then the recursive formula is [LATEX] DisplayStyle {A_N = frac13 CDOT A_ {N-1}, A_1 = 162} [/ LATEX] In both examples [LATEX] N = 5 [/ LATEX]. Explicit definitions An explicit definition of an arithmetic sequence is the one in which the term [LATEX] N [/ LATEX] is defined without referring to the previous term. This is more useful, because it means that you can find (for example) the twentieth term without finding all the other intermediate terms. To find the explicit definition of an arithmetic sequence, start writing the terms. Suppose our sequence is [LATEX] T_1, T_2, Dots [/ LATEX]. The first term is always [LATEX] T_1 [/ LATEX]. The second term rises from [LATEX] D [/ LATEX], and therefore is [LATEX] T_1 + D [/ LATEX]. The third term rises again [LATEX] D [/ LATEX], and therefore is [LATEX] (T_1 + D) + D, [/ LATEX] Â, or in other words, [LATEX] T_1 + 2D [/ LATEX]. So let's see that: [latex] displaystyle {begin {align} t_1 & = t_1 _ t_2 & = t_1 + d _ t_3 & = t_1 + 2d t_4 & = t_1 + 3d vdots end { Align}} [/ LATEX] and so on. From here you can see the generalization that: [LATEX] T_N = T_1 + (N-1) D [/ LATEX] which is the explicit definition we were looking for. The explicit definition of a geometric sequence is obtained in a similar way. The first term is [LATEX] T_1 [/ LATEX]; The second term is [LATEX] R [/ LATEX] times that, or [LATEX] T_1R [/ LATEX]; The third term is [LATEX] R [/ LATEX] times that, or And so on. So the general rule is:\cdot r^{n-1}[/latex] The General Term of a Sequence Given terms in a sequence, it is often possible to find a formula for the general term of the sequence, if the formula is a polynomial. Practice Finding a Formula for the General Term of a Sequence Key Takeaways Key Points Given the terms in a sequence generated by a polynomial, there is a method to determine the formula for the polynomial. By hand, you can take the differences between each term, then the differences between the differences in terms, etc. If the differences become constant, the sequence is generated by a polynomial formula. Once a constant difference is reached, equations can be solved to generate the formula for the polynomial. Sequence of Key Terms: A set of things close to each other in a given order; a set of general terms: A mathematical expression containing variables and constants which, by substituting the integer values for each variable, produces a valid term in a sequence. Given several terms in a sequence, it is sometimes possible to find a formula for the general term of the sequence. This formula will produce the term [latex]n[/latex]th when a value for the integer [latex]n[/latex] is put in the formula. If a sequence is generated by a polynomial, this fact can be detected by noting if the calculated differences become constant at the end. Linear polynomials Consider the sequence: [latex]5, 7, 9, 11, 13, \dots[/latex] The difference between [latex]7[/latex] and [latex]5[/latex] is [latex]2[/latex]. The difference between [latex]7[/latex] and [latex]9[/latex] is also [latex]2[/latex]. In fact, the difference between each pair of terms is [latex]2[/latex]. Since this difference is constant, and this is the first set of differences, the sequence is given by a first degree (linear) polynomial. Suppose the formula for the sequence is given by [latex]an+b[/latex] for some constants [latex]a[/latex] and [latex]b[/latex]. Then the sequence looks like: [latex]a+b, 2a+b, 3a+b, \dots[/latex] The difference between each term and the term after which is [latex]a[/latex]. In our example, [latex]a=2[/latex]. You can solve for [latex]b[/latex] using one of the terms in the sequence. Using the first number in the sequence and the first term: [latex]\displaystyle{\begin{align} 5 &= a+b\ b &= 5-a\ b &= 5- (2) \ b &= 3 \end{align} }[/latex] Thus, the [latex]n[/latex]th term of the sequence is given by [latex]2n+3[/latex]. Quadratic Polynomials Suppose the term [latex]n[/latex]th of a sequence was given by [latex]an^2+bn+c[/latex]. Then the sequence would look like: [latex]a+b+c, 4a+2b+c, 9a+3b+c, \dots[/latex] This sequence was created by connecting [latex]1[/latex] for [latex]n[/latex], [latex]2[/latex] for [latex]n[/latex], [latex], [latex], 3[/latex] for [latex]n[/latex], etc. If we start at the second term, and they subtract the previous term from every term in the sequence, we can get a new sequence composed of the It would be: [LATEX] 3A + B, 5A + B, 7A + B, Dots [/ LATEX] Now, we take the differences between the terms in the new sequence. The second sequence of differences is: [LATEX] 2A, 2A, 2A, 2A, DOTS [/ LATEX] The calculated differences have converged to a constant after the second sequence of differences. This means that it was a second order sequence (quadratic). Working backwards, we could find the general term for any quadratic sequence. Example Consider the sequence: [LATEX] 4, -7, -26, -53, -88, -131, DOTS [/ LATEX] The difference between [LATEX] -7 [/ LATEX] and [LATEX] 4 [/ LATEX] is [LATEX] -11 [/ LATEX], and the difference between [LATEX] -26 [/ LATEX] and [LATEX] -7 [/ LATEX] is [LATEX] -19 [/ LATEX]. Finding all these differences, we get a new sequence: [LATEX] -11, -19, -27, -35, -43, Dots [/ LATEX] This list is still still constant. However, finding the difference between terms once again, we get: [LATEX] -8, -8, -8, Dots [/ LATEX] This fact tells us that there is a polynomial formula that describes our sequence. Since we had to make differences twice, it is a second degree (quadratic) polynomial. We can find the formula realizing that the constant term is [LATEX] -8 [/ LATEX], and which can also be expressed by [LATEX] 2A [/ LATEX]. Then [LATEX] A = -4 [/ LATEX]. Then we note that the first element in our first list of differences is [LATEX] -11 [/ LATEX], but generally supposed to be [LATEX] 3A + B [/ LATEX], so we must have [LATEX] 3 (-4) + B = -11 [/ LATEX], and [LATEX] B = 1 [/ LATEX]. Finally, note that the first deadline in the sequence ì [LATEX] 4 [/ LATEX], and can also be expressed by [LATEX] A + B + C = -4 + 1 + C [/ LATEX] Thus, [LATEX] C = 7 [/ LATEX], and the formula that generates the sequence is [LATEX] -4A ^ 2 + B + 7C [/ LATEX]. General polynomial sequences This method of finding differences can be extended to find the general term of a polynomial sequence of any order. For higher orders, it will take more revolutions to take differences for the differences to become constant, and more rear replacement will be necessary to solve for the general term. General conditions of non-polynomial sequences Some sequences are generated by a general term that is not a polynomial. For example, the geometric sequence [LATEX] 2, 4, 8, 16, DOTS [/ LATEX] is given by the general term [LATEX] 2 ^ N [/ LATEX]. Because this term is not a polynomial, take the differences will never cause a constant difference. The general terms of non-polynomial sequences can be found for observation, as above, or by other means that are at our range per hour. Date any general term, the sequence can be generated by connecting the following values of [LATEX] N [/ LATEX]. Series and Sigma Notation Sigma Notation, denoted by the Greek letter Uppercase Sigma [LATEX] Left (SIGMA RIGHT), [/ LATEX] is used to represent the sumsâ € "a series of numbers to add together. Calculate the sum of a series in sigma notation Key Takeaways Key Points A series is a synthesis performed on a list of numbers. Each term is added to the next, next, in a sum of all terms. The Sigma notation is used to represent the sum of a series. In this form, the Greek letter signed [latex]\left (\Sigma \right)[/latex] is used. The range of terms in the sum is represented in numbers below and above the symbol [latex]\Sigma[/latex], called indexes. The lowest index is written under the symbol and the largest index is written above. Summary of key terms: A series of items to be added or added. Mr. Mick: The symbol [latex]\Sigma[/latex], used to indicate the sum of a set or series. Summation is the operation of adding a sequence of numbers, resulting in sum or total. If the numbers are added sequentially from left to right, any intermediate result is a partial sum. The numbers to be added (called addends, or sometimes summands) can be whole, rational numbers, real numbers or complex numbers. For finite sequences of such elements, the sum always produces a well defined sum. A series is a list of numbers, such as a sequence, but instead of listing them, the more signs indicate that they should be added. For example, [latex]4+9+3+2+17[/latex] is a series. This particular series adds up to [latex]35[/latex]. Another series is [latex]2+4+8+16+32+64[/latex]. This series is added to [latex]126[/latex]. Sigma Notation One way to compactly represent a series is with sigma notation, or sum notation, which resembles this: [latex]\displaystyle{\sum _{n=3}^{7}{n^2}}[/latex] The main symbol seen is the capital Greek letter sigma. Indicates a series. To "pack" this notation, [latex]n=3[/latex] represents the number in which to start counting ([latex]3[/latex]), and the [latex]7[/latex] is the point in which to stop. For each term, connect the value of [latex]n[/latex] in the given formula ([latex]n^2[/latex]). This particular formula, which we can read as "the sum as [latex]n[/latex] goes from [latex]3[/latex] to [latex]7[/latex] of [latex]n^2[/latex]," means: [latex]\displaystyle{3^2 + 4^2 + 6^2 + 7^2}[/latex] More generally, the sigma notation can be defined as: [latex]\displaystyle{\sum _{ I=m}^{ n}{ x_i Translation: In this formula, I represent the sum index, [latex]x_i[/latex] is an indexed variable that represents each successive term in the series, [latex]m[/latex] is the lower limit of the sum, and [latex]n[/latex] is the upper limit of the sum. The "[latex]i = m[/latex]" under the summing symbol means that the [latex]i[/latex]] index starts equal to [latex]m[/latex]. The index, [latex]i[/latex], is increased by [latex]1[/latex] for each subsequent term, stopping when [latex]i=n[/latex]. Another example is: [latex]\displaystyle{\begin{align} \sum_{i=3}^6 (i^2+1) &= (3^2+1)+(4^2+1)+(5^2+1)+(6^2+1)\ &=10+17+26+37\ &=90}end{align} }[/latex] This series is added to [latex]90.[/latex] Soscrivere: [latex]\displaystyle \sum_{i=3}^6 (i^2+1)=90[/latex] Altre forme di Sigma Notation Notation omits the definition of the index and the limits of sum when these are clear from the context. For example: [latex]\displaystyle{\sum x_i^2=\sum _{ i=1 }^n x_i^2}[/latex] Recurring definitions A recurring definition of a function defines its values for some inputs in terms of values of the same function for other inputs. Use a recurring formula to find specific terms of a sequence In mathematical and computer logic, a recursive definition, or inductive definition, is used to define an object in terms of itself. The recurrent definition of an arithmetic sequence is: [latex]a_n=a_{n-1}+d[/latex]. The recursive definition of a geometric sequence is: [latex]a_n=r \cdot a_{n-1}[/latex]. In mathematical and computer logic, a recursive definition, or inductive definition, is used to define an object in terms of itself. A recurring definition of a function defines the function values for certain inputs in terms of the same function values for other inputs. For example, factorial [latex]n![/latex] is defined by the rules: [latex]0!=1[/latex] [latex](n+1)!=(n+1)n![/latex] This definition is valid because, for all [latex]n[/latex], recursion eventually reaches the basic case of [latex]0[/latex]. For example, we can calculate [latex]5![/latex] by realizing that [latex]5!=5\cdot 4![/latex], and that [latex]4!=4\cdot 3![/latex], and that [latex]3!=3\cdot 2![/latex], and that [latex]2!=2\sstyle 1! Putting together all this you get: [latex]\displaystyle{\begin{align} 5! &=5\cdot 4\cdot 3\cdot 2 \\cdot 1\ &= 120 \end{align} }[/latex] Recurring form for sequences When discussing arithmetic sequences, you may have noticed that the difference between two consecutive terms in the sequence could be written in general: [latex]a_n=a_{n-1}+d[/latex] The above equation is an example of a recurring equation since the term [latex]n[/latex]th can only be calculated considering the previous term in the sequence. Compare this with the equation: [latex]a_n=a_1+d(n-1).[/latex] In this equation, you can directly calculate the nth-term of the arithmetic sequence without knowing the previous terms. Depending on how the sequence is used, both the recurring and non-recurring definition could be more useful. A recurring geometric sequence follows the formula: [latex]a_n=r\cdot a_{n-1}[/latex] An applied example of a geometric sequence involves the spread of the flu virus. Suppose each infected person infects two other people, so that the terms follow a geometric sequence. The flu virus is a geometric sequence: Each person infects two other people with the flu virus, making the number of people newly infected the nth term in a geometric sequence. Using this equation, the equation recurring for this geometric sequence is: [latex]a_n=2 \cdotRecursion RecursionThey are extremely powerful. You can solve any term in the series simply by knowing the previous terms. As you can see from the previous examples, calculating and using the previous term [latex]a_{nÃ¢Â¤Â¤1}[/latex] can be a much simpler calculation than getting [latex]a_{n}[/latex] from zero using a general formula. This means that using a recursive formula when using a computer to manipulate a sequence could mean that the calculation will be completed quickly.