

SEQUENCES

What Are Sequences?

A **sequence** is an ordered list of numbers. Sequences are the result of a pattern or rule. A pattern or rule can be every other number or some formula such as $y = 2x + 3$.

- When a pattern or rule is given, a sequence can be found.
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Sequences can be arithmetic or geometric.



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Sequences can be used to determine a pattern or rule. This can also be related to functions, where for each x , a rule is followed to produce a result, y .

For the following sequence, 5, 6, 7, 8, 9, 10, what is the pattern?

Since the sequence starts at 5 and continues with each consecutive number, the rule is $x + 5$ when x starts at 0.

When an **arithmetic sequence** is given and asked for the next three numbers, the first step is to look at the numbers for some kind of relationship. A common pattern used is numbers that are multiples of a number. Once a pattern is established, follow the pattern to give the next numbers.

In the example below, what are the next three numbers?

Ex. 1, 1, 2, 3, 5, 8, 13, _____, _____, _____... → 21, 34, and 55

The pattern is that each number equals the addition of the two previous numbers. The next three numbers are 21, 34 and 55. This sequence is called the **Fibonacci sequence** because it was first described by Leonardo Fibonacci. If the pattern is given, simply follow the pattern to find the numbers in the sequence.

Geometric sequences contain figures or information with regards to figures.



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experiment. She has the students line up in a row. She picks the first student, then the fourth student, then the ninth student and so on. If there are 29 students in the class, how many were picked?

Ex. The sequence is 1, 4, 9, 16, 25, 36...

Since there are 29 students in the class, the teacher picked the first, fourth, ninth, sixteenth and twenty-fifth students for a total of 5 students.

Try This!

1. What is the **pattern** of the sequence: 2, 4, 6, 8, 10...?

2. What is the **pattern** of the sequence: 0, 1, 1, 2, 4, 8, 16...?

3. What are the next three numbers of the **sequence**: -1, 0, 3, 8...?

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PREVIEW

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6. A musician is playing notes on a piano; he plays the first key, the fifth key, tenth key and so on. If there are 88 keys on his piano, how many keys did he play?

