# 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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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?