# Sequences

A sequence is a list of numbers; the numbers in this list are called 'terms' of the sequence and are linked to each other by a mathematical rule (formula).
A series is when you add up the terms of a sequence; For instance, <1, 2, 3, 4, …> is a sequence, with terms '1', '2', '3', '4', etc,. The terms of a sequence are usually named '$a_n$', with the subscripted letter '$n$'. So, the second term of a sequence is named '$a_2$', and '$a_{12}$' would be the twelfth term.
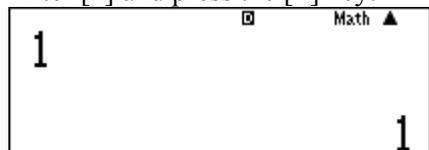Partial sums ($S_n$) indicate the adding together of terms. For example, the 4$^{th}$ partial sum ($S_4$) of the series above is the sum '1 + 2 + 3 + 4', and equals 10. So, $S_n$= 10.
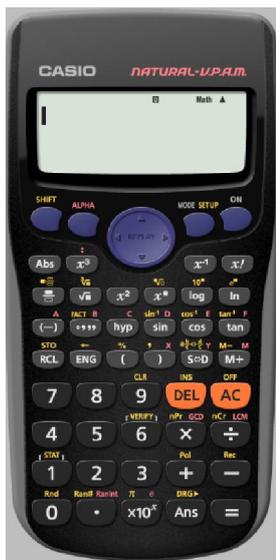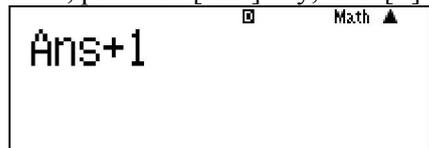
Set the up calculator to **COMP MODE**.

```
1:COMP   2:STAT
3:VERIF
```
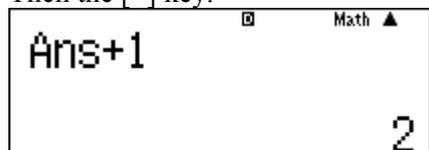
**Example 1:** Generate the sequence <1, 2, 3, 4, …>
Enter [**1**] and press the [=] key.

```
1

        1
```

Now, press the [**Ans**] key, then [+] [**1**]

```
Ans+1
```

Then the [=] key.

```
Ans+1

        2
```

The [=] key again.

```
Ans+1

        3
```

The [=] key again.

```
Ans+1

        4
```
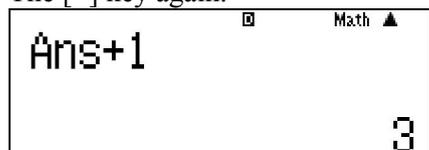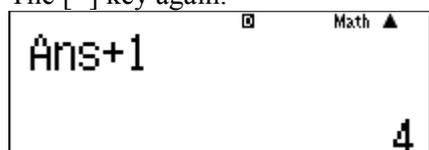
And [=] key again…

Press [**AC**] to **Clear** the screen.
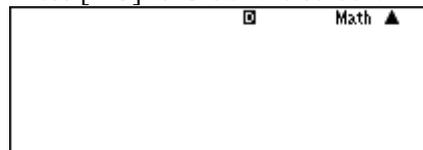
**Example 2:** Generate the sequence <4, 7, 10, 13, …>

```
4

        4
```

Now, press the [**Ans**] key, then [+] [**3**]

```
Ans+3

        7
```

Then the [=] key.

```
Ans+3

        10
```

The [=] key again.

```
Ans+3

        13
```

The [=] key again.

```
Ans+3

        16
```
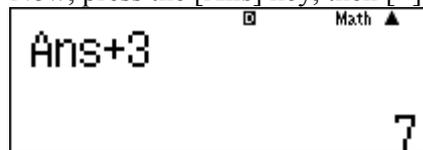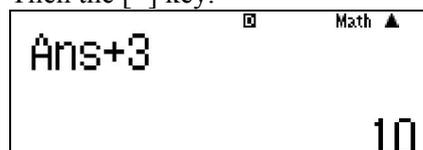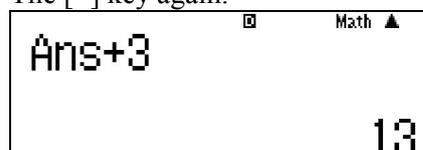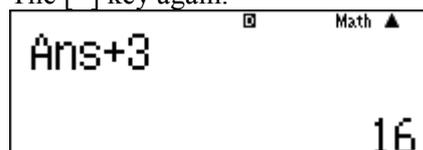
And [=] key again…

Press [**AC**] to **Clear** the screen.
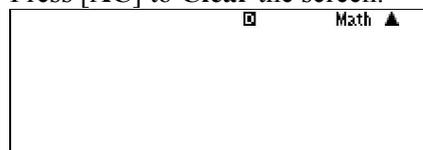
**Example 3:** Generate the sequence <1, 2, 4, 8, …>
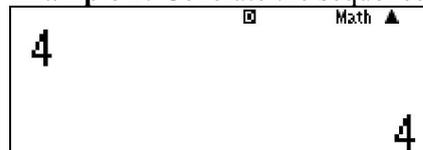Enter [**1**] and press the [=] key.
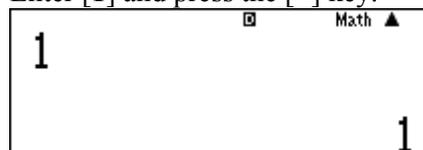
```
1

        1
```

Now, press the [**Ans**] key, then [×] [**2**]

Ans×2

Then the [=] key.

Ans×2

2

The [=] key again.

Ans×2

4

The [=] key again.

Ans×2

8

And [=] key again…

Ans×2

16
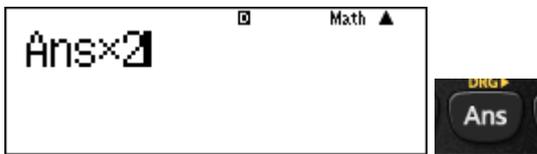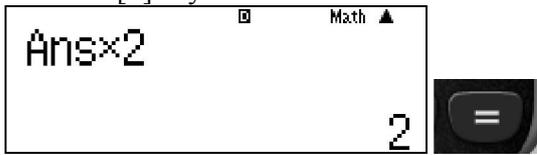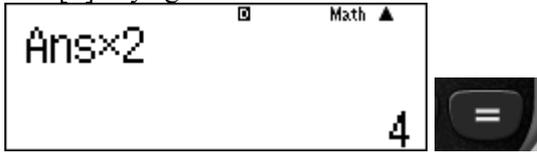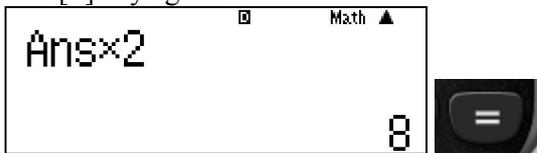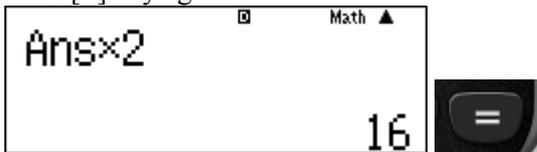
**Example 4:** Generate the sequence <1, -2, 4, -8, …>
Enter [**1**] and press the [=] key.
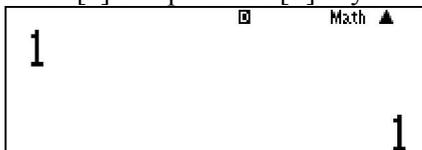
1

1

Now, press the [**Ans**] key, then [×] [**-2**]

Ans×-2

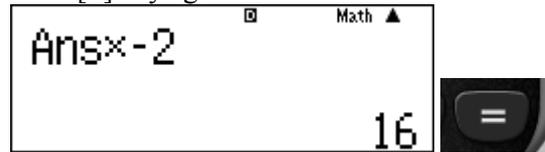Then the [=] key.

Ans×-2

-2

The [=] key again.

Ans×-2

4

The [=] key again.

Ans×-2

-8

And [=] key again…

Ans×-2

16
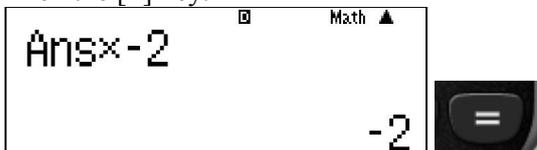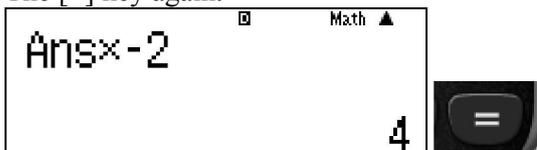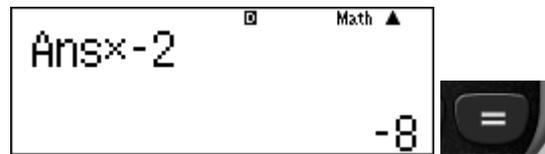
An **arithmetic** sequence is a sequence with the difference between two consecutive terms constant. The difference is called the common difference, $d$. In general, $a$ is the first term of the sequence and $n$ is the term number
This is adding (or subtracting) as illustrated in Examples 1 and 2.
The general rule in generating each term is:
$$a_n = a + (n - 1)d$$

A **geometric** sequence is a sequence with the ratio between two consecutive terms constant. This ratio is called the common ratio, $r$. In general, $a$ is the first term of the sequence and $n$ is the term number
This is multiplying (or dividing) as illustrated in Examples 3 and 4.
The general rule in generating each term is:
$$a_n = ar^{(n - 1)}$$

**Practice for arithmetic sequences:**
Find the next three terms:
3, 10, 17, 24, 31, _____, _____, _____

Find the 25th term:
53, 50, 47, 44, 41, … _____

Find the 20th term:
25, 40, 55, 70, 85, … _____

Find the 75th term:
88, 81, 74, 67, 60, … _____

Antonio received a bonus of $50 for working the day after Thanksgiving, plus his regular wage of $9.45 an hour. If his total wages for the day were $135.05, how many hours did he work?

**Practice for geometric sequences:**
Find the next three terms:
128, 64, 32, 16, 8, _____, _____, _____ .

Find the 9th term:
0.01, 0.1, 1, 10, 100, … _____

Find the 7th term:
1, 6, 36, 216, 1,296, … _____

Find the 11th term:
1, –2, 4, –8, 16, … _____

Wikitoria makes $18.50 per hour. Every three months, she is eligible for a 2% raise. How much will she make, an hour, in 2 years time, if she gets a raise every time she is eligible?