Additional Material for Sequences in GeoGebra

Sequence

A sequence is a collection of numbers which are written in some order.

Consider the following lists of numbers:

0, 1, 2, 3, 4, 5, 6,7,8,9,10, 11,...

– 3, –2, –1, 0, 1, 2, 3, . . .

Each of the numbers in the list is called a term.

Arithmetic Progression (AP)

Arithmetic progression is a list of numbers in which each term is obtained by adding a fixed number to the preceding term except the first term.

a, a+d, a+ 2d, a+ 3d, a+ 4d, . . .a+nd

This fixed number is called the common difference of the AP. This number can be positive, negative or zero.

The terms of an arithmetic progression are given by the rule:
$S_n = a + (n-1)d$
where S_n is the **nth** term, **a** is the first term, **n** is the term number and **d** is the common difference.

Sum of the Arithmetic Progression is given by the formula:

$S_n = n/2\{2a+(n-1)d\}$

The arithmetic mean for any n positive numbers a_1, a_2, a_3, ... a_n is given by

A.M $= (a_1 + a_2 + a_3 + ... + a_n)/2$

If **a, b, c** are in AP, then **b=(a+c)/2** and **b** is called the arithmetic mean of **a** and **c**.

Geometric Progression(GP)

A geometric progression, is a sequence where each new term after the first is obtained by multiplying the preceding term by a constant **r**.

This number **r** is the common ratio.

$r = a_2/a_1 = a_3/a_2 = ... a_n/a_{n-1}.$

If the first term of the sequence is '**a**' then the geometric progression is given by

$a, ar, ar^2, ...ar^{n-1}, ar^n.$

The **nth** term of the geometric sequence is given by the formula,

$a_n = ar^{n-1}$

The sum of the n terms of geometric series is given by:

$Sn = a + ar + ar^2 + ar^3 + ... + ar^{n-1},$

$S_n = a(r^n-1)/(r-1)$

Geometric Mean is given by $\sqrt{(ab)}$.

Example.

If $a_1 = 1$, $a_2 = 5$, $a_3 = 25$ and $n = 8$. Find the 8th term.

$a_8 = a_1 r^{8-1}$

$a_8 = (1)(5)^7$

$a_8 = 5^7 = 78125.$