

APs and GPs: Find the Sequence

Once students have met APs and GPs and the appropriate formulae they need to spend some time understanding how each formula relates to the sequence. Below are two versions of 'Find the Sequence'. In each case clues are given. The first task is more straightforward. The basic information about the AP or GP is given and the sequence can be constructed easily from the first set of cards. Students should then be given the next two sheets and asked to find the inductive definition and the algebraic definition of each sequence and then check by substitution that they are correct.

The second task is more challenging and requires more insight into the structure of APs and GPs. Having identified the sequences, students should write the appropriate formulas by the sequence again checking by substitution.

The tasks can be followed up with some open questions such as:

Find an arithmetic progression that includes the number 20.

Find a geometric progression that includes the number 3.

Give me an example of an AP that has $u_3 = 7$.

How can you tell whether or not a sequence of numbers is an AP or GP or neither?

Give me an example of a GP that has $u_2 = 20$.

Give me an example of an Arithmetic Progression that has $S_4 = 20$.

Give me an example of a Geometric Progression that has a sum to infinity.

Find the Sequence 1

A.P. $a = 3 \quad d = 2$	G.P. $a = 4 \quad r = \frac{1}{2}$
A.P. $a = 4 \quad d = -2$	G.P. $a = 4 \quad r = 3$
A.P. $a = 3 \quad d = 4$	G.P. $a = 3 \quad r = 2$
A.P. $a = 4 \quad d = 3$	G.P. $a = 3 \quad r = -2$
A.P. $a = 3 \quad d = -2$	G.P. $a = 2 \quad r = 4$

$u_1 = 3$ $u_{n+1} = u_n - 2$	$u_1 = 3$ $u_{n+1} = u_n + 4$
$u_1 = 4$ $u_{n+1} = \frac{1}{2}u_n$	$u_1 = 4$ $u_{n+1} = u_n - 2$
$u_1 = 3$ $u_{n+1} = -2u_n$	$u_1 = 3$ $u_{n+1} = 2u_n$
$u_1 = 3$ $u_{n+1} = u_n + 2$	$u_1 = 2$ $u_{n+1} = 4u_n$
$u_1 = 4$ $u_{n+1} = 3u_n$	$u_1 = 4$ $u_{n+1} = u_n + 3$

$$u_n = 2n + 1$$

$$u_n = 3 \times 2^{n-1}$$

$$u_n = 3n + 1$$

$$u_n = 4 \times \left(\frac{1}{2}\right)^{n-1}$$

$$u_n = 4 \times 3^{n-1}$$

$$u_n = 6 - 2n$$

$$u_n = 4n - 1$$

$$u_n = 5 - 2n$$

$$u_n = 3 \times (-2)^{n-1}$$

$$u_n = 2 \times 4^{n-1}$$

Find the Sequence 2

Arithmetic $d = 4$ $u_5 = 19$	Arithmetic $u_3 = 7$ $u_4 = 12$
Arithmetic $d = -3$ $S_{10} = -15$	Arithmetic $a = 11$ $u_{10} = 38$
Geometric $a = 3$ $S_2 = 24$	Arithmetic $a = 4$ $d = 12$
Geometric $r = 3$ $S_4 = -40$	Geometric $r = 3$ $u_4 = 54$

<i>Geometric</i> $u_3 = 25$ $u_4 = 125$	<i>Geometric</i> $a = 3$ $u_4 = 375$
<i>Arithmetic</i> $S_4 = 10$ $S_3 = 6$	<i>Arithmetic</i> $u_{10} = 65$ $u_{20} = 125$
<i>Geometric</i> $S_2 = 15$ $S_3 = 35$	<i>Geometric</i> $u_3 = 9$ $u_5 = 144$
<i>Geometric</i> $a = 3$ $r = 4$	<i>Arithmetic</i> $a = 4$ $S_3 = 18$