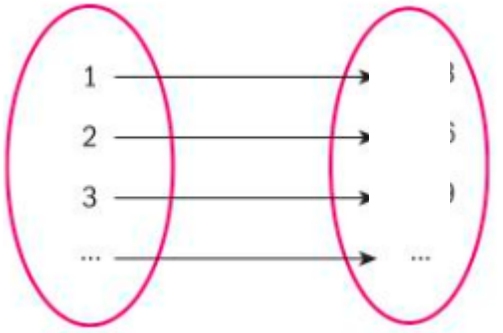
General Sequences

A _____ of numbers is a _____ of numbers (of _____ or _____ length)

arranged in an order that obeys a certain _____, called the _____ rule.

Example: *3, 6, 9, 12, 15, …*

For this sequence, complete the mapping diagram, write an n^{th} term rule.
Then, apply the rule to find the 20^{th} term in this sequence.



Quick Practice:

For each of the sequences

i 2, 4, 6, 8, 10, … **ii** $1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \ldots$

a Write down a general formula for the nth term. **b** Find the 12th term.

Arithmetic Sequences

A sequence in which the _____ between each term and its previous one remains _____ is called an _____ _____ .

The _____ _____ is called the _____ _____ .

1 Which of these sequences are arithmetic sequences? For those that are arithmetic, what is the common difference in each case?

a	2, 4, 6, 8, 10, ...	**b**	10, 12, 14, 16, ...
c	1, 10, 100, 1000, ...	**d**	10, 8, 6, 4, ...
e	$-1, -0.5, 0, 0.5, \ldots$	**f**	$\frac{7}{4}, \frac{3}{2}, \frac{5}{4}, 1, \ldots$
g	1, 3, 4, 7, 11, ...	**h**	$u_n = 5n + 2$
i	$a_n = 3n + 1$	**j**	$b_n = 2^n$
k	$t_n = 4 - 0.5n$	**l**	$r_n = n^2$

Pablo starts his first full time job. He is given the following salary schedule that shows his annual salary for his first five years on this new job.

Years in job (term number)	1	2	3	4	5
Annual salary (term)	39 000	39 900	40 800	41 700	42 600
Difference between terms	—	39 900 − 39 000 = 900			

Based on your work above, what is the common difference? d = _____

Pablo begins this job at the age of 24. He is curious what his salary will be when he is 65 years old if it continues to rise as in the first few years. Use the table below to find it.

Age	24	25	26	27	...		65
Number of term (n)	1	2	3	4	...		
Number of differences added (d = 900)	0	1	2		...		
Term (a_n)	39 000	39 000 + 900 = 39 900	39 000 + 2 × 900 = 40 800		...		

Now, write a general rule for Pablo's salary sequence using the arithmetic form:

$u_n = u_1 + (n - 1)d$

Use the rule you have created to find u_{42} (age 65). Does this match your result in the table above ?

Pablo decides to buy a car, but has to take out a bank loan to do so. Every month, the bank charges him interest. The table shows the amount that Pablo must pay each month. Fill the difference column as was done in the previous table.

Month	1	2	3	4	5
Payment ($)	55	52	49	46	43
Difference					

What is the common difference? d = _____ What is the first term? u_1 = _____

Write the general rule in the arithmetic form: $u_n = u_1 + (n - 1)d$

Use your rule to find the interest payment at month 15.

The general term (or nth term) of an arithmetic sequence with first term u_1 and common difference d is _____ where $n \in \mathbb{Z}^+$.

Quick Practice:

The first term of an arithmetic sequence is 5 and its common difference is $\frac{2}{3}$.

a Find the second and third terms of this sequence.

b Write down an expression for the nth term.

c Determine whether or not $\frac{49}{3}$ is a term of this sequence.

d Find the first term of this sequence that is greater than 25.

Consider the finite arithmetic sequence $-3, 5, \ldots, 1189$.

a Write down the common difference, d.

b Find the number of terms in the sequence.

The second term of an arithmetic sequence is 1 and the seventh term is 26.

a Find the first term and the common difference.

b Find the 100th term.