Remember:

	Arithmetic sequence (cd d , 1 st term u_0)	Geometric sequence (cr r , 1 st term u_0)
Recursive formula	$\forall n \in \mathbb{N}, u_{n+1} = u_n + d$	$\forall n \in \mathbb{N}, u_{n+1} = u_n \times r$
Explicit formula $(p \in \mathbb{N}, p \le n)$	$\forall n \in \mathbb{N}, u_n = u_0 + nd$ $u_n = u_p + (n - p)d$	$ \forall n \in \mathbb{N}, u_n = u_0 \times r^n \\ u_n = u_p \times r^{n-p} $
Series	$S_n = \frac{n+1}{2}(u_0 + u_n)$	$S_n = \frac{u_0(r^{n+1} - 1)}{r - 1}$

A series is the sum of the terms of a sequence.

For a finite sequence u_1 , u_2 , u_3 ,..., u_n with *n* terms, the corresponding series is $u_1 + u_2 + u_3 + \cdots + u_n$.

The sum of this series is $S_n = u_1 + u_2 + u_3 + \dots + u_n$.

A1 Join London Marathon - United Kingdom - Sunday 27 April 2025

The London Marathon has been one of the most beloved events worldwide for more than three decades. Touting participation rates around 36,000, runners crowd the streets of downtown London as they race to the end of the 26.2-mile race course. Most of the runners compete for their favorite charity or to raise funds for those in need.



A marathon that is characterized by crazy costumes, everything goes, which is why it is such a huge attraction for both runner and spectator alike. From Batman to Superman, super elite athletes to beginners get in on the fun by making themselves stand out and not being too serious in the face of competition.



Officially named the TCS London Marathon, it is open to anyone who is willing to put themselves out there, train, and race toward the finish line. The route runs directly through the city centre, hitting Thames, Blackheath and Greenwich along the way, which makes it the perfect way to see London for the first time all on foot. Other famous sites along the way are Buckingham Palace, the Tower of London and the London Eye. Termed the "historical jog around London", people from all over the globe participate in this fantastic event. Created by Christ Brasher, a winner of the New York Marathon, its mission was to unite the world in running while running for any cause that people wanted. Raising millions of dollars every year, it not only produces some of the most accomplished athletes, but it also helps people around the world who need support and money.

1 What is this text about? (what, when, where, who, why)

Let's imagine a runner preparing himself for the London marathon. He covered 3.10 miles (mi) yesterday. As of today, he decides to increase the distance by 0.31 mi every day.

Things to think about using the hints below:

- 2 How many days does the runner have to prepare himself to run a whole marathon?
- 3 Will he be ready for the London Marathon?

Hints:

- Let (d_n) be the runner's distance covered on the n^{th} day starting today with n belonging to \mathbb{N} . Then, $d_0 = 3.10$ and $d_1 = 3.41$.
- Find the recursive formula.
- Identify the sequence.
- Find the explicit formula.
- Solve an equation or program an algorithm using the Python language.

Dessert:

- 4 How many miles will the runner run in total to prepare the London marathon?
- **5** Is it possible to find the sum of an infinite arithmetic series? geometric series?

A2

Charlotte is attempting to cycle 2,000 km in 30 days to raise money for charity. She cycled 40 km on the first day, and each day she will cycle 2 km further than the day before.

Things to think about:

- **a** How far will Charlotte cycle on the:
 - i 2nd day ii 10th day

b How far will Charlotte have cycled in total after:

- i 2 days ii 10 days iii 20 days?
- **c** Can we find the answers to a and b without having to calculate the distance cycled on each of the days?
- d Will Charlotte achieve her goal of cycling 2,000 km in 30 days?

From Haese Mathematics book

iii 20th day?



Work with miles as a unit but you can convert at the end to compare with more familiar units of length in your country.