

Goals

This fortnight we are going to:



- General Patterns (concepts common to all patterns)
- Notation used in the unit
- Arithmetic Progressions (nth term, sum to nth term, using both graphical and algebraic representations, applications)
- Geometric Progressions (nth term, sum to nth term, using both graphical and algebraic representations)

Theoretical Components

Make notes on the following chapters and websites:

Maths Quest 12 Further Mathematics

- 5A - Recognition of Arithmetic Sequences
- 5B - Finding the terms of an Arithmetic Sequences
- 5C - The sum of a given number of terms of an Arithmetic Sequences
- 5D - Recognition of Geometric Sequences
- 5E - Finding the terms of a Geometric Sequences
- 5F - The sum of a given number of terms of a Geometric Sequences
- 5G - Applications of Geometric Sequences

Check out the following websites:

- <https://www.mathsisfun.com/algebra/sequences-series.html>
- https://www.varsitytutors.com/hotmath/hotmath_help/topics/arithmetic-sequences.html
- <https://www.youtube.com/watch?app=desktop&v=pXo0bG4iAyg&feature=youtu.be>
- <https://www.mathsisfun.com/algebra/sequences-sums-geometric.html>

Practical Components

Do the following questions:

Organise your solutions neatly in your exercise book.

You will require Chapter 5 of Maths Quest 12 Further Mathematics (pdf – Google Classroom)

- 5A: 9, 12, 14, 15
- 5B: 1a, 1f, 2a, 2c, 3a, 3b, 4, 7, 9, 18, 20
- 5C: 1a, 4a, 4d, 6, 14, 17-19
- 5D: 9, 13-16
- 5E: 1a, 1f, 4a, 5b, 16-20
- 5F: 1a, 3a, 8-11
- 5G: 1, 3, 5, 7, 9, 13-14

Investigation

See the following page

Other

Validation task due Week 4 Wednesday (10/08/22) during your lesson (Line 6: come in at 1:20 pm)

Week 4 Lecture on Friday

Week 4/5 Investigation

The Fibonacci and Lucas Sequences

Leonardo Fibonacci of Pisa was a mathematician in the 12th century, Italy. He discovered a number series from which one can derive the Golden Mean by charting the population of rabbits. Here is the beginning of the sequence:

$$1, 1, 2, 3, 5, 8, 13, 21, 34, \dots$$

The Lucas numbers or Lucas series are an integer sequence named after the mathematician François Édouard Anatole Lucas (1842-1891). The sequence named after him is closely related to the Fibonacci sequence.

These sequences are defined recursively by:

$$F_1 = 1, F_2 = 1, F_n = F_{n-1} + F_{n-2}, \text{ for } n \geq 3$$

$$L_1 = 1, L_2 = 3, L_n = L_{n-1} + L_{n-2}, \text{ for } n \geq 3$$

Each number is the sum of the two preceding numbers.

1. Write out the first 12 terms of each sequence.
2. Explain why every third term of each sequence is even and the rest are odd.
3. Write out the sequence $L_1 + F_1, L_2 + F_2, L_3 + F_3, \dots$ and $L_1 - F_1, L_2 - F_2, L_3 - F_3, \dots$
4. How do the two sequences relate to the Fibonacci sequence?

