

BACCALAUREAT GENERAL
EPREUVE SPECIFIQUE DES SECTIONS EUROPEENNES
MATHEMATIQUES - ANGLAIS

SUJET 23

THE PROBLEM OF STAIRS
Sequences

Sujet comportant une page. L'usage de tout modèle de calculatrice, avec ou sans mode examen est autorisé.

In mathematics, the Fibonacci numbers, commonly denoted F_n form a sequence, called the **Fibonacci sequence**, such that each number is the sum of the two preceding ones, starting from 0 and 1.

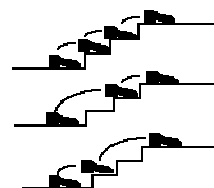
- Fibonacci numbers are named after Italian mathematician Leonardo of Pisa, later known as Fibonacci. They appear to have first arisen as early as 200 BC in work by Pingala on enumerating possible patterns of poetry formed from syllables of two lengths. In his 1202 book *Liber Abaci*, Fibonacci introduced the sequence to Western European mathematics, although the sequence had been described earlier in Indian mathematics.
- Applications of Fibonacci numbers include computer algorithms such as the Fibonacci search technique and the Fibonacci heap data structure. They also appear in biological settings, such as branching in trees, the arrangement of leaves on a stem, the fruit sprouts of a pineapple, the flowering of an artichoke, an uncurling fern and the arrangement of a pine cone's bracts.

https://en.wikipedia.org/wiki/Fibonacci_number

1) What does this text deal with?

Exercice :

There is an n -step stair. Someone standing downstairs climbs either 1 or 2 steps at a time. In how many ways can he get to the top?



- 1- Let u_n be the sequence, such as $u_1 = 1, u_2 = 1$ and $u_{n+2} = u_{n+1} + u_n$.
 - a. Compute the next 3 terms?
 - b. Is it the Fibonacci sequence?
- 2- How many ways are there to climb to the top if it is a 1-step stair? a 2-step stair? a 3-step stair? a 4-step stair?
- 3- What do you notice? Make a conjecture.
- 4- Do you have any idea how to prove it?

Le sujet doit être restitué à la fin de l'épreuve.