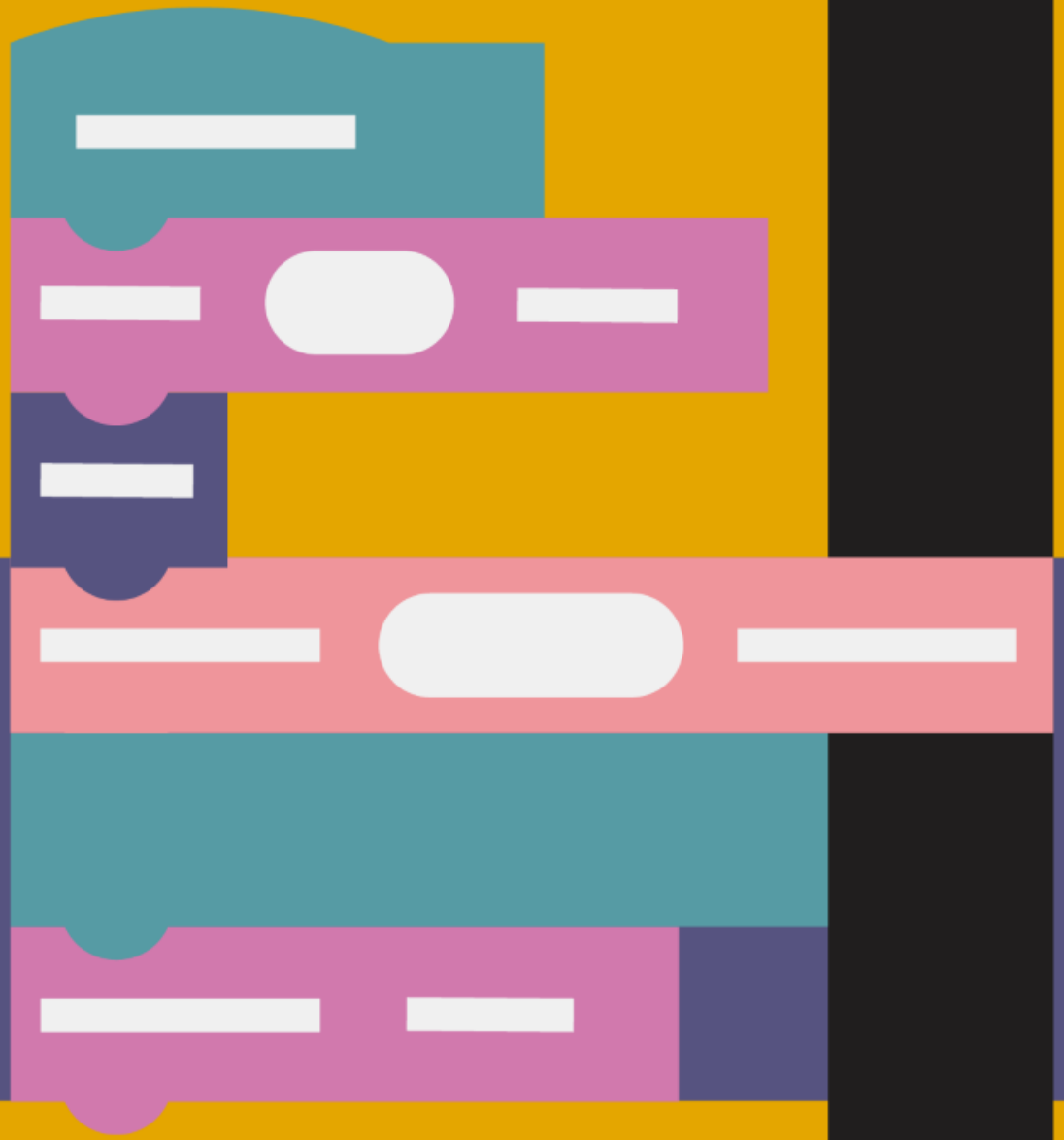

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FIBONACCI EXPLORER

1. Introduction
2. Theory
3. Activity setup
4. Coding
5. Activity summary

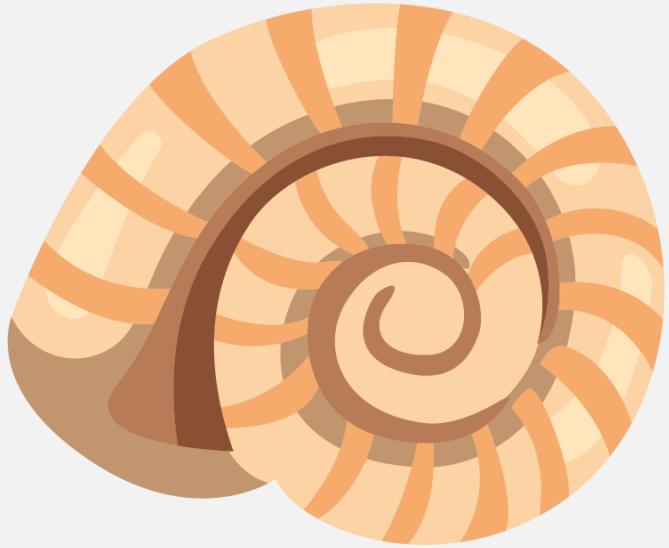
1 Introduction

Did you know that sunflowers, snails, and flowers are all connected to a magic number?

This number belongs to the **Fibonacci sequence**, a special list where each number is the sum of the two previous ones, like **0, 1, 1, 2, 3, 5, 8....** This pattern appears in nature and helps us understand how many things around us are organized.

In this class we will learn about this incredible sequence and program it in our Xploris, combining mathematics and technology to represent it visually.

Get ready to discover the magic of Fibonacci and how to bring it to life with coding!



2 Theory

Fibonacci was an Italian mathematician born in 1170, who loved numbers and learned math while traveling through different countries. One day, Fibonacci wrote a problem about rabbits: **If you have a pair of rabbits and every month they reproduce, how many rabbits will you have after a year?**

To solve it, he discovered a list of special numbers, where each number is the **sum of the two previous ones:**

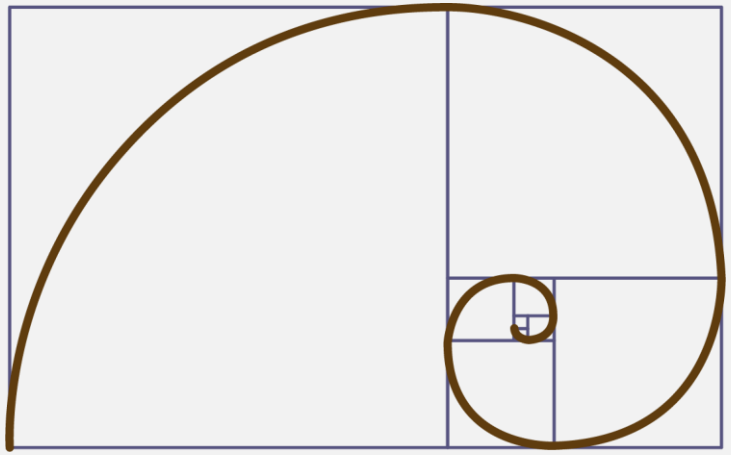
0 + 1 = 1
1 + 1 = 2
1 + 2 = 3
2 + 3 = 5 y and so on.

This is the famous **Fibonacci sequence**!

Even more incredible is that these numbers appear in **nature itself**, in **flowers**, **shells** and **sunflowers.** Fibonacci became famous for finding something magical in numbers.

Now we are going to represent this magic sequence using programming blocks with our Xploris. It will be fun and we will learn a lot while coding!

0,1,1,2,3,5,8,13,21....

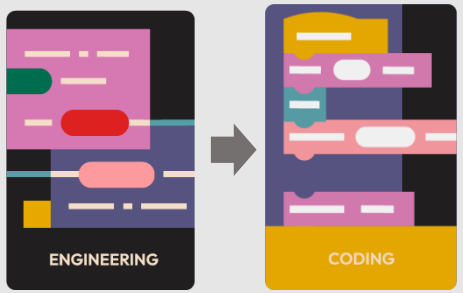


3 Activity setup

Turn on your Xploris and connect it to your computer or tablet.

Open the XploriLab software on your computer or tablet.

Once inside XploriLab, select the icon to connect the device via cable or bluetooth as applicable.



Go to the ENGINEERING section and then to CODING.

4 Coding

1

Use the clear screen block in the DISPLAY group to clear the screen of our device. This step will ensure that we have a clean space to display the results of our programming.

Note: If you don't find the block right away, you can scroll the Display section to search for it.
Let's place it as the **first block** in our program

2

From the LOOPS group, use the forever block.

This block will allow us to repeat indefinitely the instructions that we place inside it.

Let's drag the **“Forever”** block and place the following instructions inside it!

4 Coding

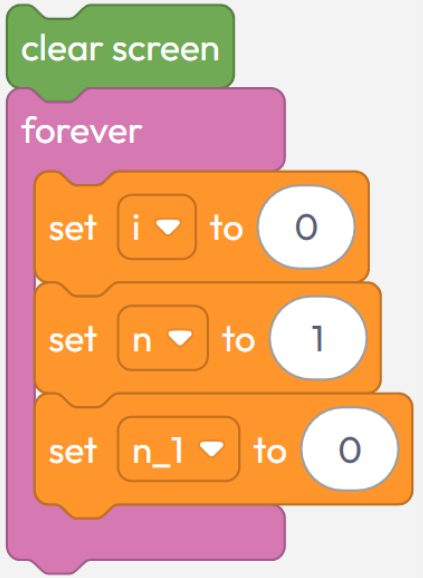
3

- In the VARIABLES group, click on the Create variable option three times to create the following variables: **“i”**, **“n”**, and **“n_1”**.
- Use the set i to block to assign the initial values:

i = 0
n = 1
n_1 = 0

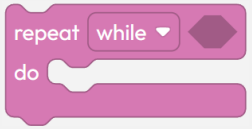
To establish these initial values, use blocks of numbers from the MATH group.

Note: Remember that these variables are essential for calculating the Fibonacci sequence. Make sure you set them correctly before moving on to the next step!



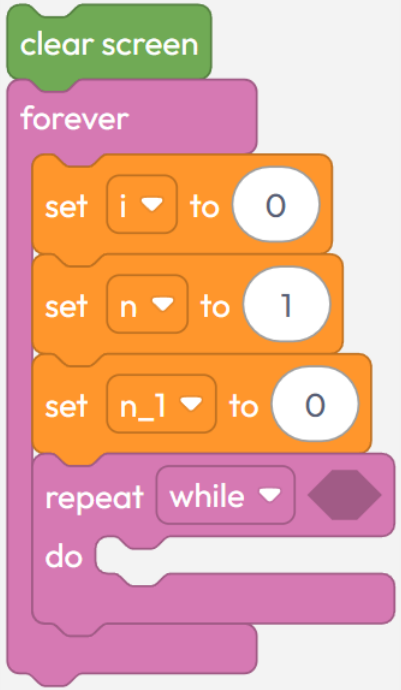
4 Coding

4

- In the LOOPS group, select the 

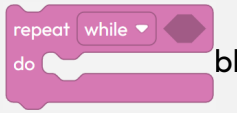
block, which can be configured with **“While”** or **“Until”.**

Action:
For this case, select **“While”** by clicking on the corresponding option.



4 Coding

5

To set the logical condition for the 

block, follow these steps:

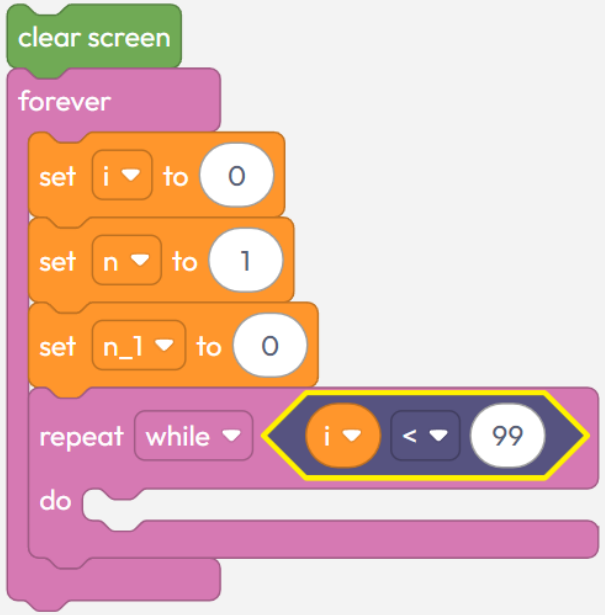
- Select the logical 

block from the LOGIC group and place it within the loop condition space.
- Click on the “=” symbol and change it to “<” to indicate that the condition will be **“less than”.**
- From the VARIABLES group, select the variable block 

and place it on the left side of the logic block.
- From the MATH group, select a block of numbers and assign it the value 

, placing it on the right-hand side of the condition.

In this way, the loop will be executed while the value of “i” is less than 99.



4 Coding

6

To prepare the screen to clearly display the Fibonacci numbers.

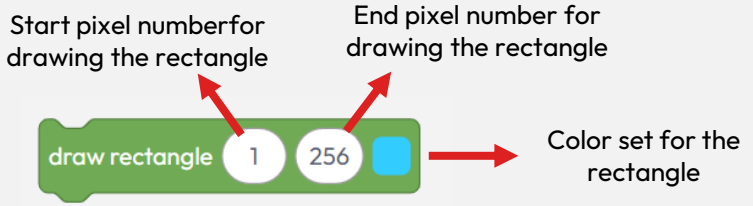
- Use the 

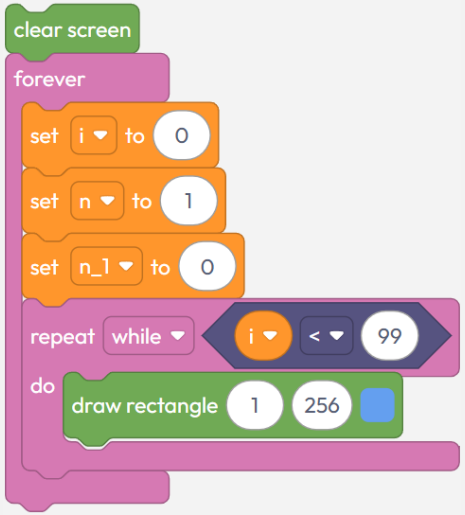
block from the DISPLAY group:

This block will draw a blue rectangle on the screen as a background for the numbers.

- For selecting the parameters of 

use the number blocks in the MATH group.

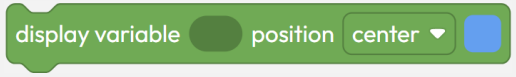




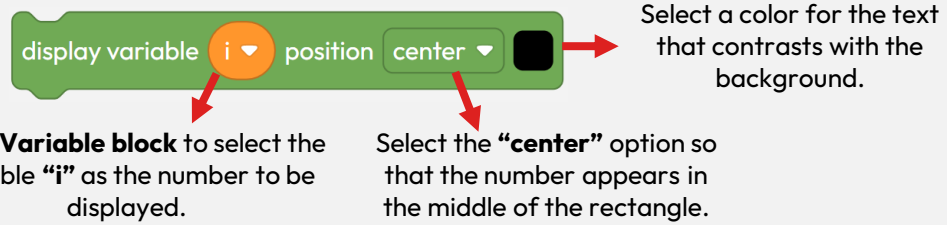
4 Coding

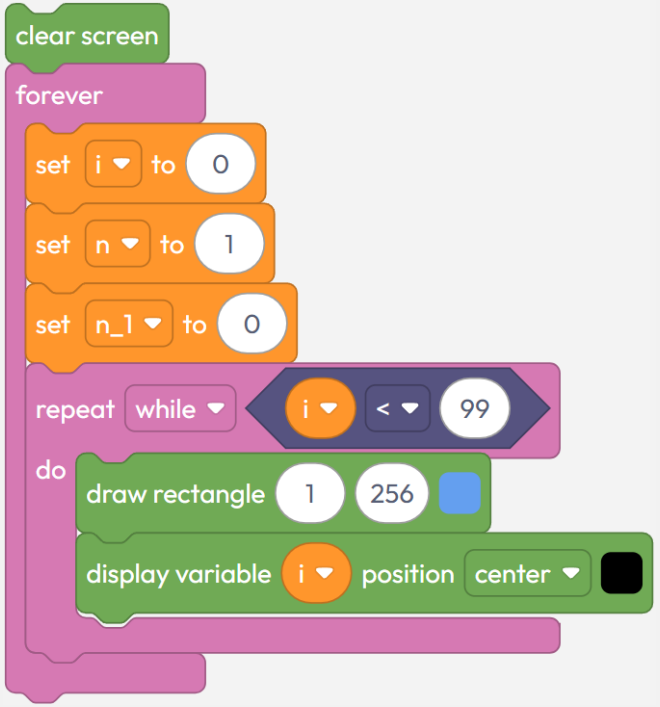
7

Show the number “i”, which is the number in the Fibonacci series

- Use the 

block from the DISPLAY group:





4 Coding

8

In order for the variables to change correctly according to the logic of the Fibonacci sequence, we need to update the value of i using the variable blocks for "**n_1**" and "**n**".

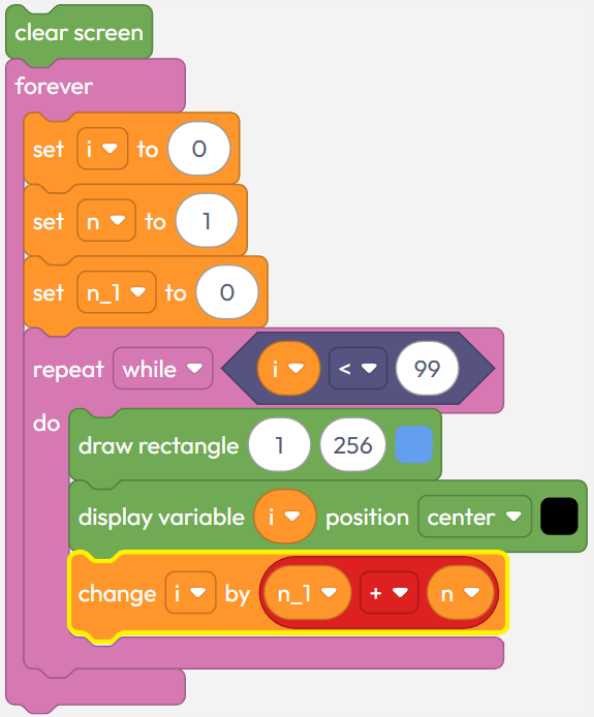
- In the VARIABLES group, select the set i to block and configure it for the "**i**" variable.
- In the assignment space, use an + operation block from the MATH group.

In the block "+", enter:

n_1 on the left-hand side, using a variable block from the VARIABLES group.

n is on the right-hand side, also using a variable block from the VARIABLES group.

Note: Make sure you use Variable blocks for n_1 and n. This guarantees that the values of the variables are added together correctly to calculate the next number in the Fibonacci sequence.

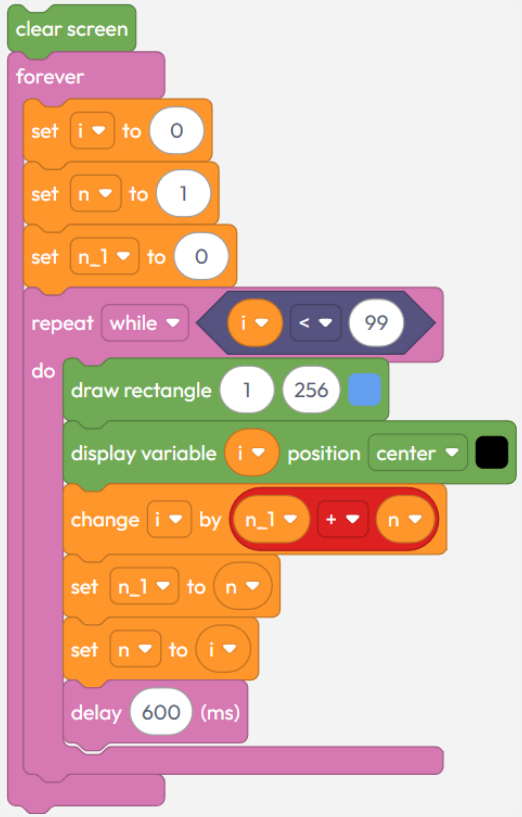


4 Coding

9

To keep progressing in the Fibonacci sequence, we need to update the variables to reflect the next number in the series. Additionally, we'll add a 600 ms delay to ensure the results are displayed clearly before the next Fibonacci number is being displayed.

- From the VARIABLES group, add two set i to blocks:
  - In the first block, set n_1 to take the value of the variable n.
  - In the second block, set n to the value of the variable i.
- From the LOOPS group, add a delay 100 (ms) block below the variable updates.
  - Set the delay 100 (ms) time to 600 ms.



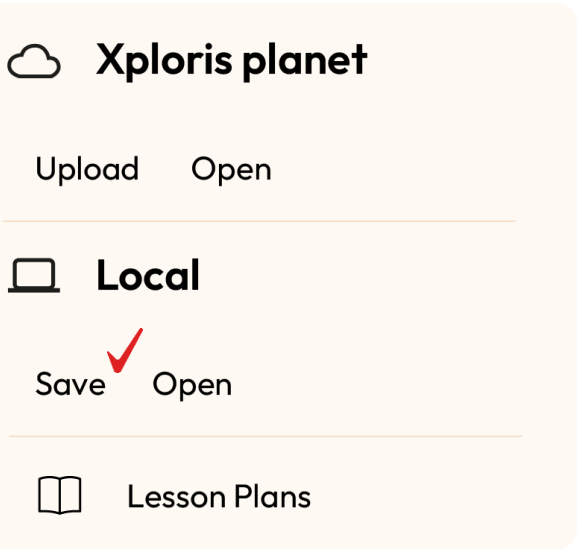
4 Coding

To make sure that the program works correctly, we will follow these final steps:

Press the three-bar icon at the top and select the “Save” option. Then, assign a name and save your program.

Press the “Upload” button in the Xplorilab interface. This will transfer the program to the Xploris device.

Once the program is loaded, press the “Play” button on Xplorilab software. Look at the device screen and you will see how the Fibonacci sequence is displayed.



5 Activity summary

We learned what is the Fibonacci sequence, and its importance in nature and mathematics.

We designed a program to represent the Fibonacci sequence on the screen of our Xploris.

We use different programming blocks, such as:

- **Display:** to show the numbers on the screen.
- **Logic:** to establish conditions in the program.
- **Variables:** to store and update the values of the sequence.
- **Math:** to perform the necessary mathematical operations.
- **Loops:** to repeat the instructions automatically.

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