

Fibonacci Lesson

Performance Objectives

- Learn what the Fibonacci Sequence is and where we can find it in the real world
- Learn how the Fibonacci Sequence works
- Create a Fibonacci Sequence on paper
- Create a Fibonacci Sequence Python program
- Create Fibonacci squares that make up a Logarithmic Spiral (Golden Spiral) on paper

Discussion

What is the Fibonacci Sequence? Where can we find it in nature? Show examples of the fibonacci logarithmic spiral in nature: the spiral in a snail's shell, pinecones, flowers (pollen), even a cinnamon roll! The sequence is named after the italian mathematician (12th cent.). He broke the spirals down into a special mathematical sequence.

Activity: Finish the Fibonacci Sequence

0, 1, 1, 2, __, __, __, __

The first two items in the sequence are 0 and 1. You get the next number by adding up the previous two numbers. So, $0+1=1$; $1+1=2$; $2+1=3$; and so on.

See if you can finish the sequence above on your sheet of paper.

So how can these numbers make up the spiral we see in nature? We'll start by drawing the sequence as squares. Each number will have its own square.

Activity: Make a Fibonacci Square

Note: Depending on the student's age/capabilities, have them create a fibonacci spiral with squares by free-hand or with a ruler.

- 1) Draw a 1 x 1 square in the middle of the graph paper.
Then, draw another one right next to it.
- 2) Now add a 2 x 2 square
- 3) Now add a 3 x 3 Square
- 4) Now add a 5 x 5 square!
- 5) Try drawing what's next, if you have room!

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Using a Ruler:

1. First, draw two squares side by side. Use your ruler to make them 0.5 cm square.
2. Now make a 2×2 square on top of the first square. So if the first square was 0.5 cm, the 2×2 square would be 1 cm square, right?
3. Continue this pattern, making each square the next size in the Fibonacci sequence. So after the 2×2 square, you would make a 3×3 square (1.5 cm \times 1.5 cm), then a 5×5 (2.5 cm \times 2.5 cm), and so on. This is just like what you did with the graph paper, only using a ruler. Keep going until you have made a square that is 21×21 (10.5 cm \times 10.5 cm).
4. Each square will have an edge that is the sum of the two squares before it, just like in the Fibonacci sequence.

For advanced students (if material apply): With a compass, make an arc in the squares with a radius the size of the edge of the square. Don't get nervous about these big words; they just mean that the arc will be one-quarter of a circle. The arcs in the first squares will be really, really tiny. But look how they grow!