LEARNING RESOURCE

FIBONACCI SPIRAL

Fibonacci was a mathematician who lived between 1170 and 1250 in Pisa, Italy.

As a boy he was obsessed with numbers, always thinking about them. He was so obsessed that he often forgot about the world around him and did not realise when people were talking to him. Because of this he was sometimes called “Blockhead” (because it was like talking to a block of stone).

His real name was Leonardo Pisano Bogollo, “Fibonacci” was his nickname. Roughly translated, it means “the son of Bonacci”. His father was a merchant, who travelled to Algeria and other north African countries.

As he grew older, he joined the family business, often travelling with and then for his father. His obsession with maths grew as he was introduced to different systems of numbers and counting.

Due to his travels Fibonacci came across and introduced the Hindu-Arabic number system to Europe:

Hindu-Arabic	0	1	2	3	4	5	6	7	8	9
Western Arabic-Indic	٠	١	٢	٣	٤	٥	٦	٧	٨	٩
Eastern Arabic-Indic (Persian and Urdu)	۰	۱	۲	۳	۴	۵	۶	۷	۸	۹
Devanagari (Hindi)	०	१	२	३	४	५	६	७	८	९

He also popularised the decimal system in Europe; before that we had used Roman numerals, which made calculations very difficult.

In his lifetime Fibonacci became most famous and revered Mathematician of his time (possibly all time), but he is probably most famous for a pattern of numbers that we now refer to as the Fibonacci Sequence…

…0, 1, 1, 2, 3, 5, 8, 13…

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Can you work out the pattern? What do you need to do to get the next number?

What are the next 7 numbers in the sequence? (answers at end of resource)

The amazing thing about this sequence is that it is also found in nature. We call it the golden ratio and it helps to describe how petals are positioned in plants, how seeds are arranged, the structure of shells, all sorts of things.

The following instructions are going to help get you started with creating your very own Fibonacci Spiral, just like these images here.

MATERIALS

- Paper (squared maths paper or graph paper if possible – but not essential, you may also wish to use different coloured paper)
- Pencil
- Ruler
- Colouring pencils (optional)

PREPERATION

- None required

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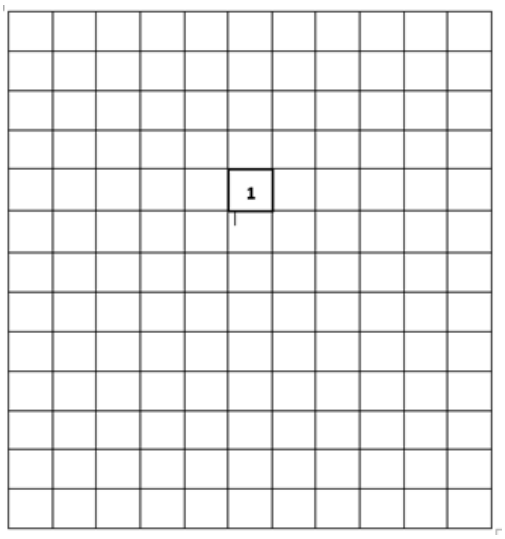
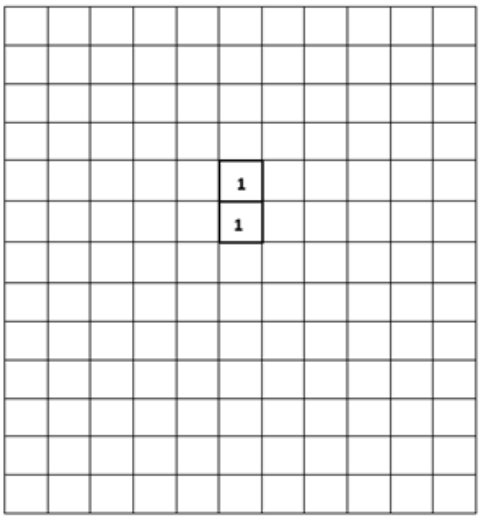
INSTRUCTIONS

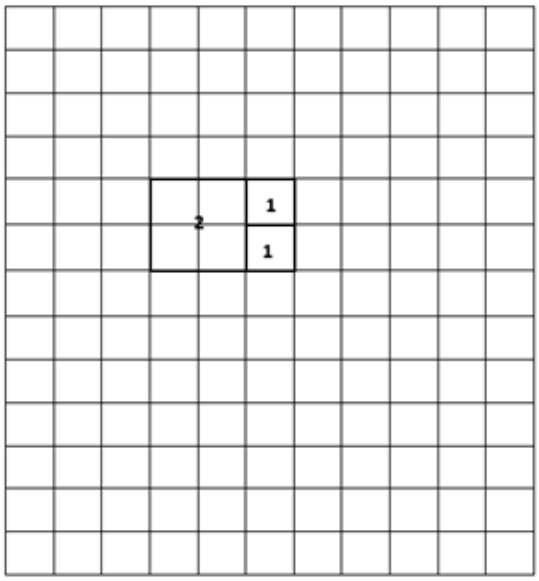
1. In the middle of your paper draw a 1cm x 1cm square (or cut one out of coloured paper and stick it down).



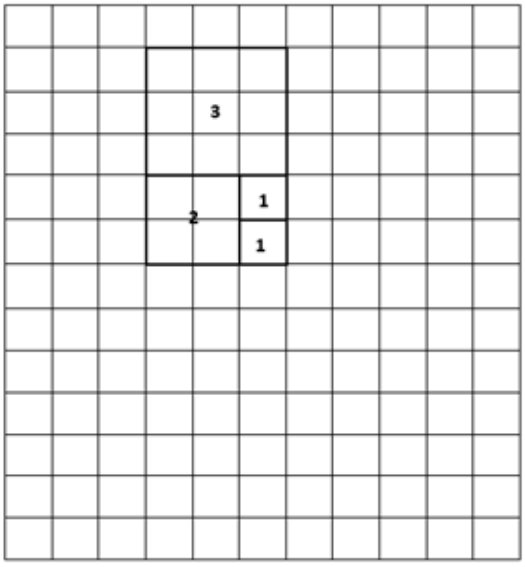
2. Now make another 1cm x 1cm square, right under the first one.



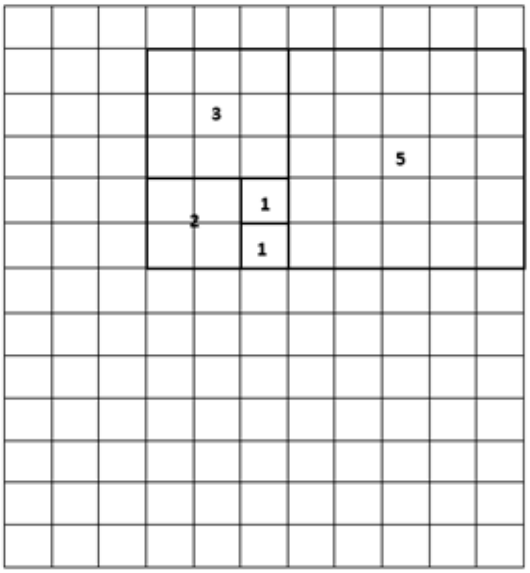
3. Now make a 2cm x 2cm square and place it to the left of the first 2 squares.



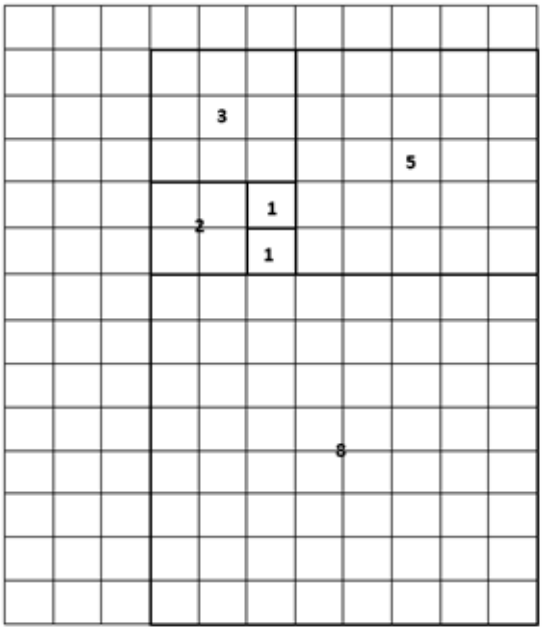
4. Now make a 3cm x 3cm square and place it above the ones already in place on your paper.



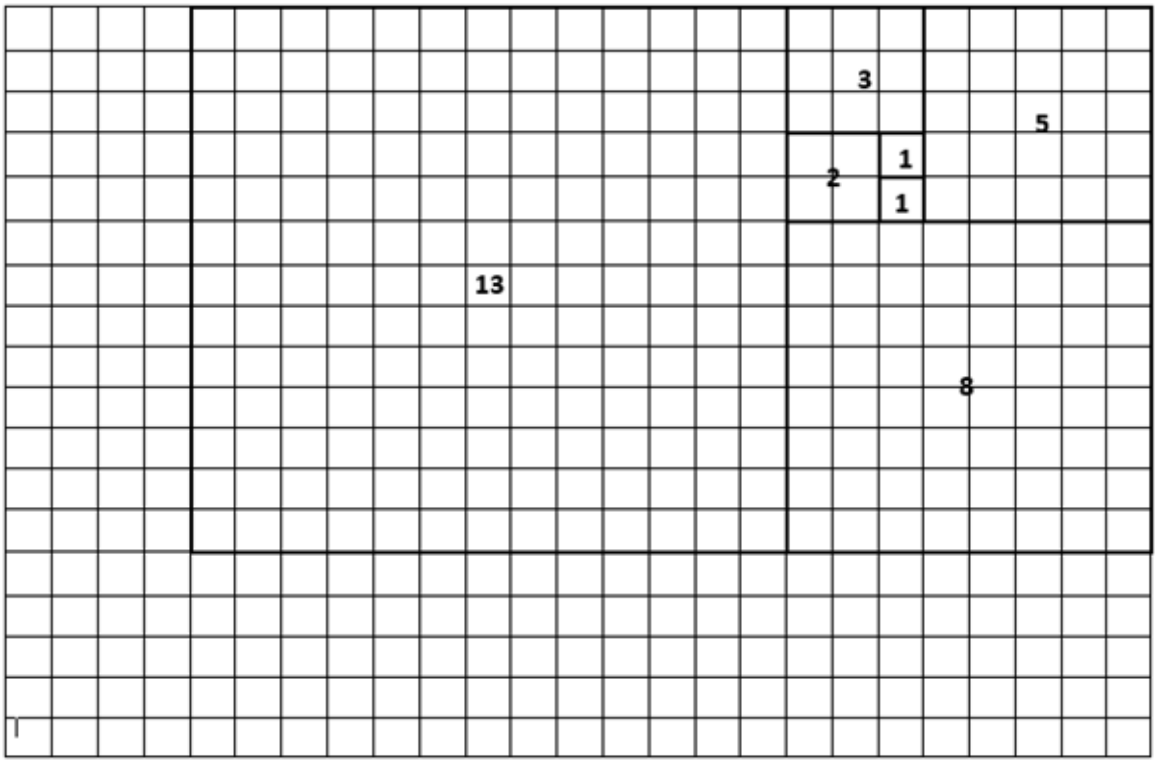
5. Now make a 5cm x 5cm square and place it to the right of the ones already in place



6. Now make an 8cm x 8cm square and place it below the ones already in place

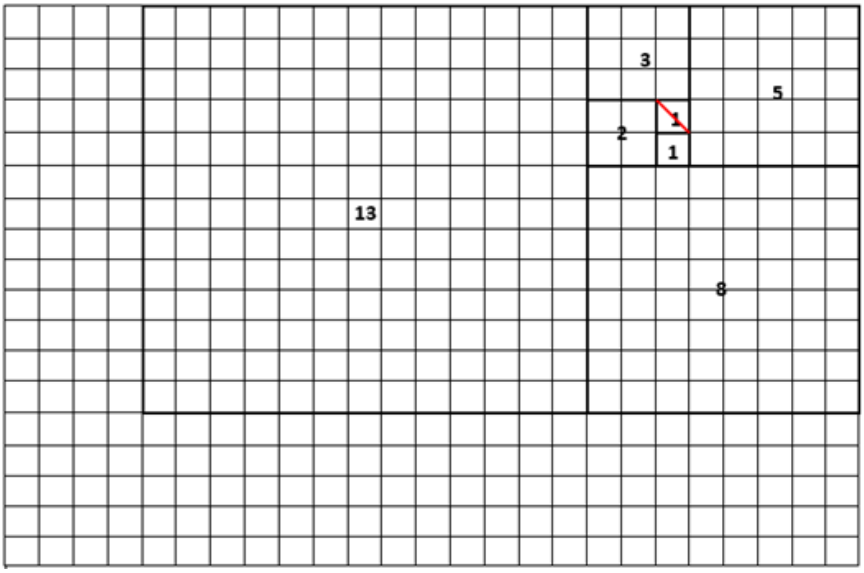


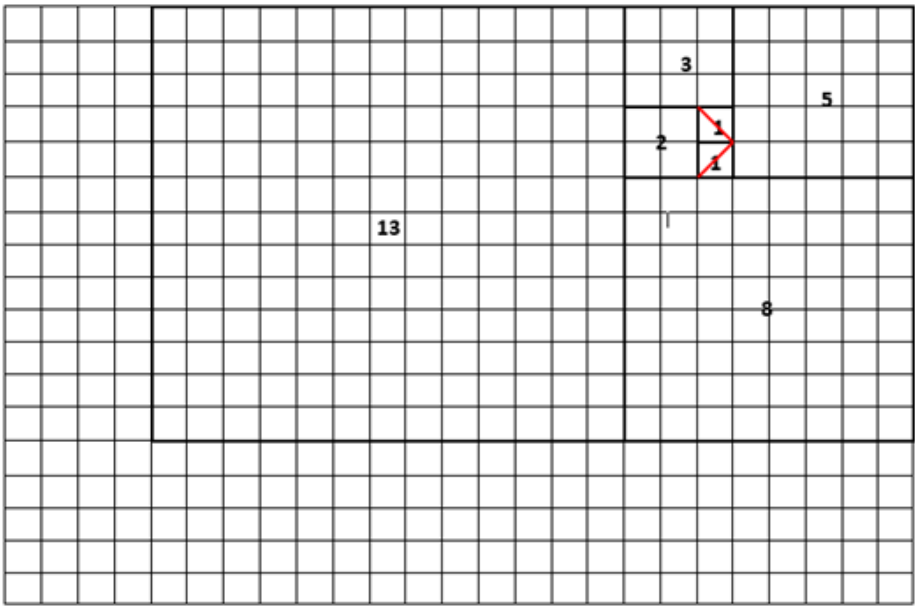
7. Now make a 13cm x 13cm square and place it to the left of the ones already in place



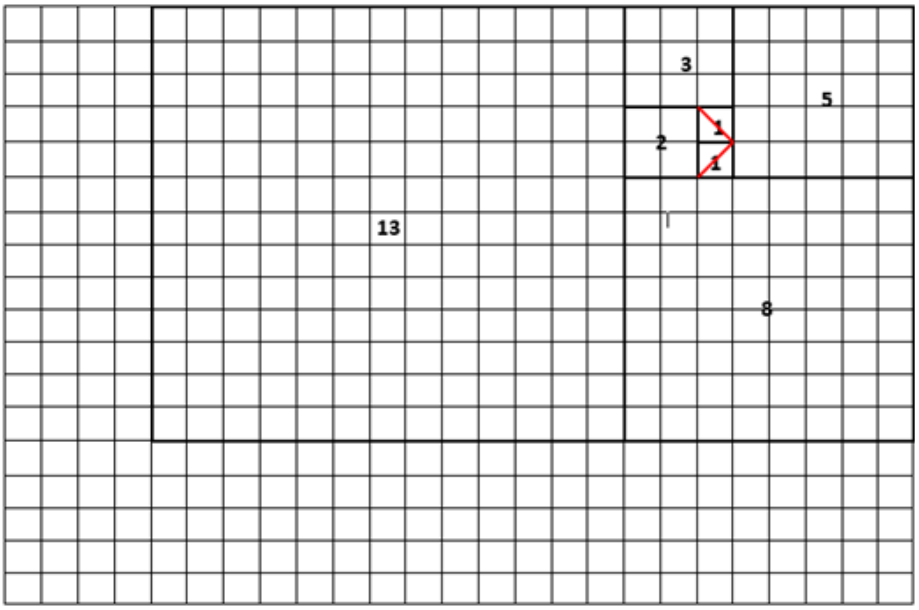
8. Keep going as far as you can making bigger and bigger squares using the numbers from the Fibonacci sequence, just remember to keep placing them in the same direction; these instruction said to place the second block underneath the first, next one to the left, next one above, next one to the right, the next one underneath, then to the left, then above, then to the right and so on. You may need to add more paper to keep going

9. Finally, once you have drawn all the squares that you can manage, it is time to create the spiral. Draw a diagonal a line from the top left to the bottom right-hand of the first 1cm x 1cm square you drew.

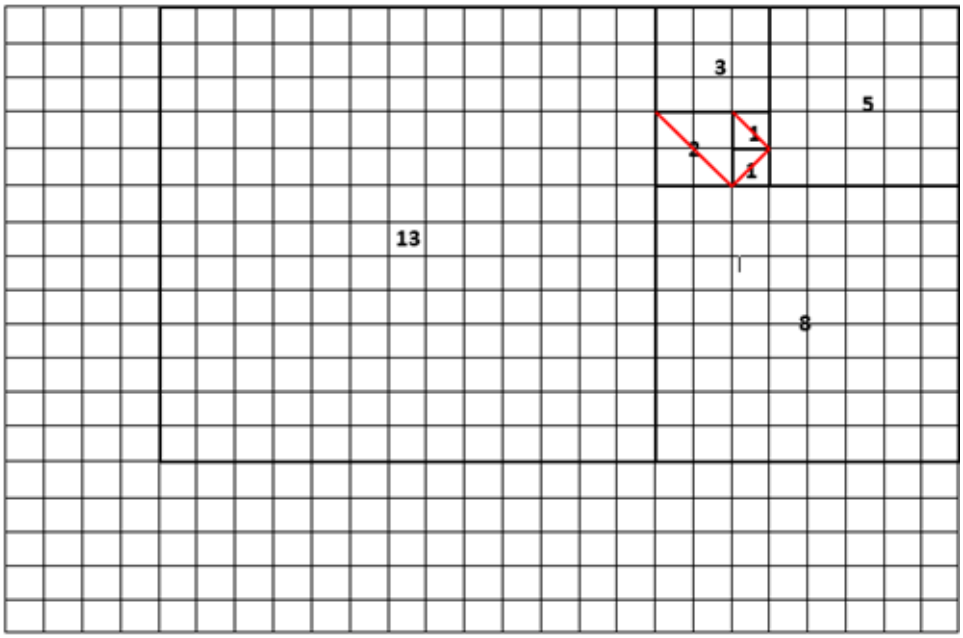




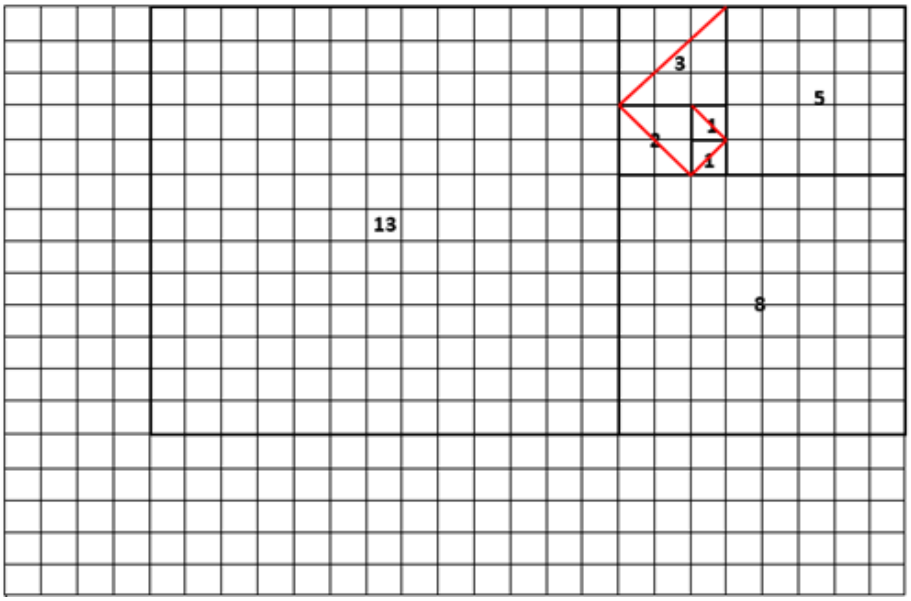
10. Next draw from the top right-hand to the bottom lefthand side of the second 1cm x 1cm square you drew.



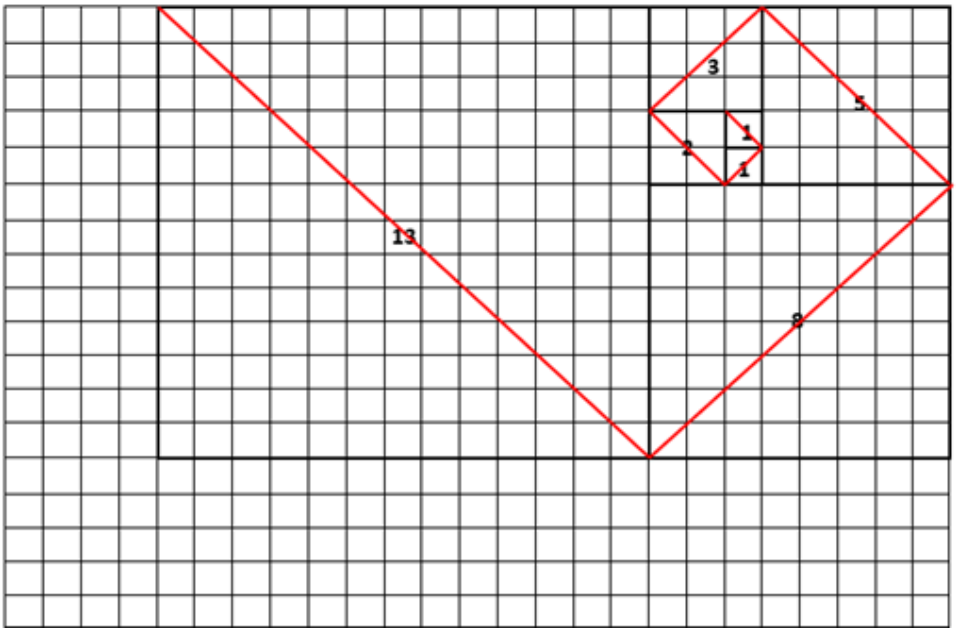
11. Then carry on from the bottom right to the top lefthand side of the 2cm x 2cm square.



12. Bottom Left, to top righthand side of the 3cm x 3cm square.



13. You should be able to see the pattern forming now – keep going through all of your squares.



EXTENTSION

- How large can you make your Fibonacci Spiral?
- Do you have to use centimetres (cm) as a unit?
- Can you make a 3 dimensional Fibonacci spiral? (maybe by making and using boxes instead of squares)
- What other patterns can you find in the sequence?

THE MAGIC OF THE MATHS

In the Fibonacci Sequence each number is found by adding up the two numbers before it.

- 1 + 0 = 1; 0,1,1
- 1 + 1 = 2; 0,1,1,2
- 2 + 1 = 3; 0,1,1,2,3
- The 5 is found by adding the two numbers before it (3+2),

Next 7 numbers in Fibonacci Sequence are; 21, 34, 55, 89, 144, 233, 377

How far can you take this sequence?