Worksheet Fibonacci2

Teacher

Student

Class

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History of mathematics for young mathematicians
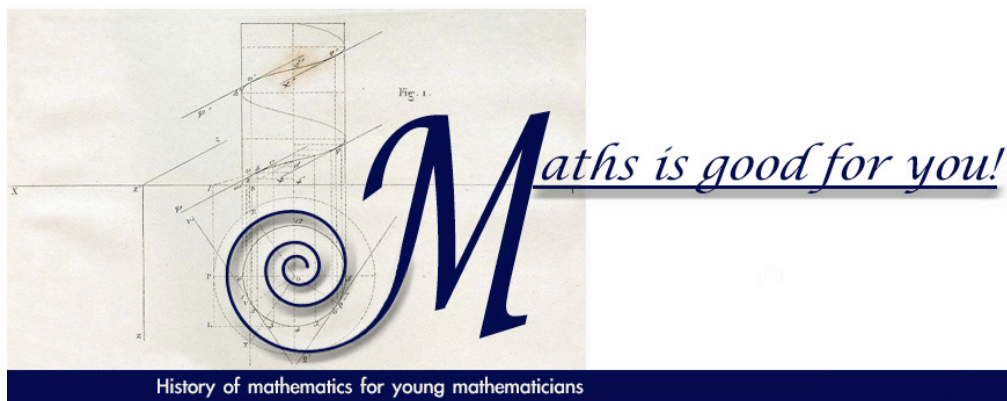
Fibonacci Number Sequence

Fibonacci's number sequence looks like this: 1, 1, 2, 3, 5, 8, 13, ... You always get the new term in the sequence by adding the previous two terms.

You can easily calculate many of the terms of Fibonacci's sequence in Excel. Start Excel and in the new spreadsheet make the tree columns with the following headings:

	A	B	C
1	term	Fibonacci's numbers	ϕ

In the column A enter numbers from 1 to 3. Once you do this, you can select these first three numbers and drag them downwards. The computer will recognise the pattern and continue with other counting numbers.

Now go to column B and enter first few terms of Fibonacci's sequence. It is enough to enter 1 in B2 and 1 again in B3. In B4 enter the formula

=B2+B3

Now press 'enter', and your term no. 3 will be calculated. By dragging the formula from cell B4 downwards you will get other terms in Fibonacci's sequence.

Find about 40 terms for the sequence.

You will get the approximations for ϕ in the column C by entering another formula.

The golden number Phi or ϕ

The number ϕ appears in nature in many ways. If you use this number, you can construct a rectangle which is called the Golden Rectangle – but there is another worksheet to help you do this – the worksheet Fibonacci No. 3.

You can get the approximations to number ϕ when you divide a term from Fibonacci's sequence by the previous term.

Remember that ϕ is the ratio between the larger and preceding term in Fibonacci's number sequence. Don't enter anything in C2 – start from C3.

In C3 enter the formula

=B3/B2

You can drag this formula downwards to get approximations to ϕ.

You will notice that the further you go the values for ϕ are more and more accurate. However, ϕ is an irrational number and doesn't have an exact value – so your calculations are really just approximations, however many terms of the Fibonacci's sequence you chose to look at.

The seeds in sunflowers follow the pattern of the spiral which can be constructed in a Golden Rectangle – by using the number ϕ.

The flowers of some cacti also follow the same pattern.

Some shells have the exact shape as algorithmic spiral which can be built using the number ϕ.