jch: investmentmanagement

The mathematical truth that is the "Fibonacci Sequence" appears throughout nature from the smallest pinecone or Nautilus Shell to the largest Galactic Nebulae!

Fibonacci, real name Leonardo of Pisa, came up with his Fibonacci Sequence in 1202 whilst trying to work out how fast rabbits could breed if given ideal circumstances!

Before Fibonacci wrote his work, the Fibonacci numbers had already been discussed by Indian scholars such as Gopala (before 1135) and Hemachandra (c.1150) who had long been interested in rhythmic patterns that are formed from one beat and two beat notes or syllables.
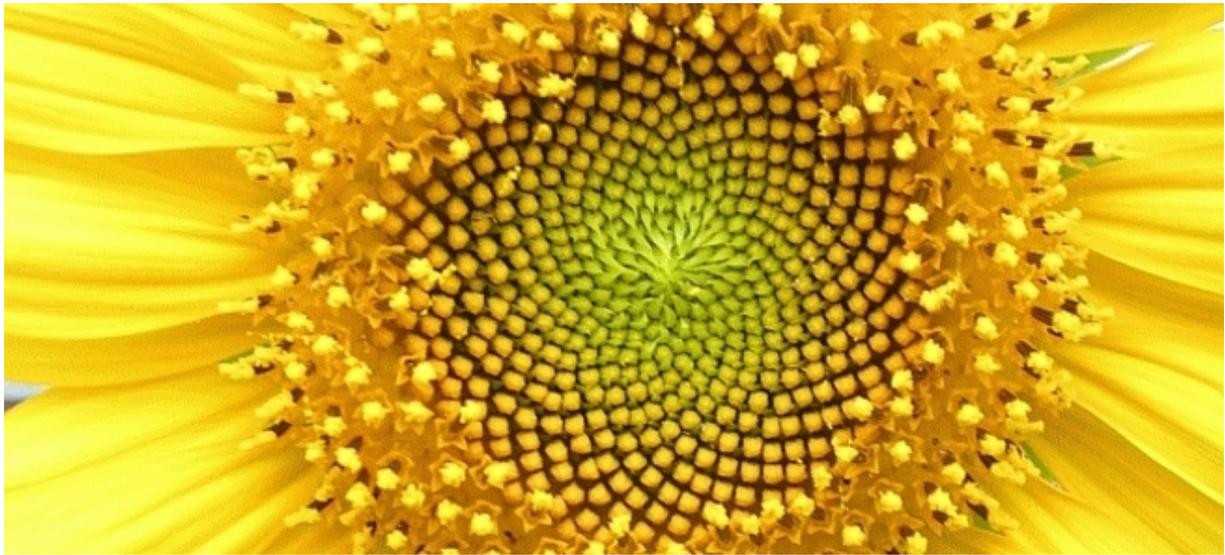
Check out the number of spirals in a sunflower head, or a pinecone or a pineapple. They will go in two directions and the number of spirals in each direction will respond to a consecutive pair in the following sequence, where each number is the sum of the previous two:

0 1 1 2 3 5 8 13 21 34 55 89 144 233 377 610

The sunflower will typically have 34 clockwise spirals and 55 anticlockwise. Nature uses Fibonacci numbers because this efficient formula packs seeds, leaves, spirals etc in the most efficient way possible. Nature loves economy!

The maths:

If we divide each by the number after it we get

1/1	=	1
2/1	=	2
3/2	=	1.5
5/3	=	1.666...
8/5	=	1.6
13/8	=	1.625
21/13	=	1.61538...

The ratio evens out to 1.618. If the successive numbers are divided by the number before then the ratio is inversed, levelling out at 0.618. This known as the Golden Ratio – phi.

To get the Golden Angle, multiply the ratio by 360° = 222.5°.

Subtract from 360° to find the measurement of the angle: 137.5°. The angle between each consecutive sunflower seed growing out from the centre is 137.5°.

Golden rectangles and spirals:

The diagrams (below) illustrate how the Golden Spiral works. This Golden Proportion has been used by artists, architects, designers and musicians. From Leonardo de Vinci's Vitruvian Man to playing cards and credit cards. All Fibonacci shapes!