

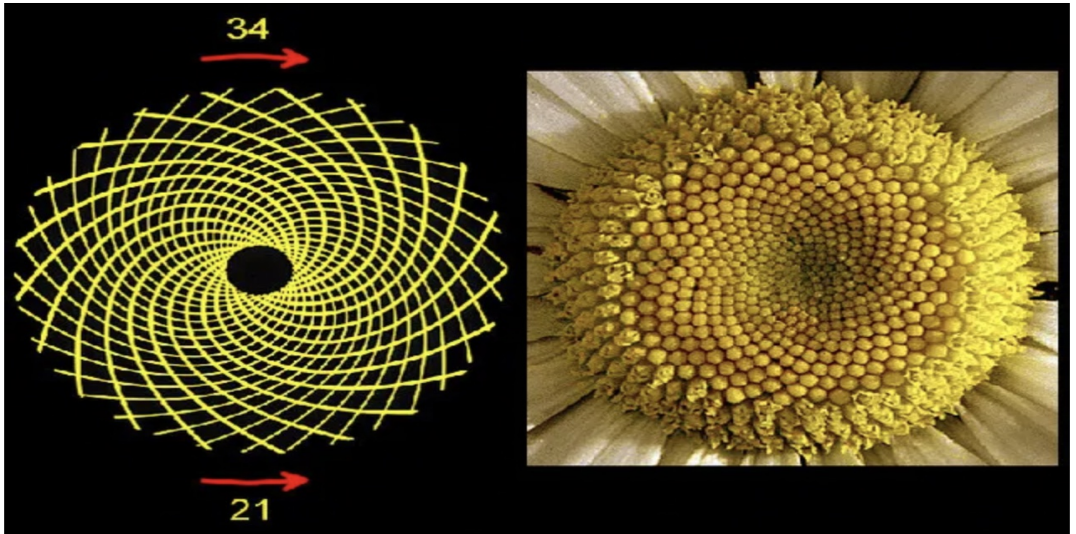
1. Flower petals



The number of petals in a flower consistently follows the Fibonacci sequence. Famous examples include the lily, which has three petals, buttercups, which have five (pictured at left), the chicory's 21, the daisy's 34, and so on. Phi appears in petals on account of the ideal packing arrangement as selected by Darwinian processes; each petal is placed at 0.618034 per turn (out of a 360° circle) allowing for the best possible exposure to sunlight and other factors.

2. Seed heads

The head of a flower is also subject to Fibonacci processes. Typically, seeds are produced at the center, and then migrate towards the outside to fill all the space. Sunflowers provide a great example of these spiraling patterns.



In some cases, the seed heads are so tightly packed that total number can get quite high — as many as 144 or more. And when counting these spirals, the total tends to match a Fibonacci number. Interestingly, a highly irrational number is required to optimize filling (namely one that will not be well represented by a fraction). Phi fits the bill rather nicely.

3. Pinecones



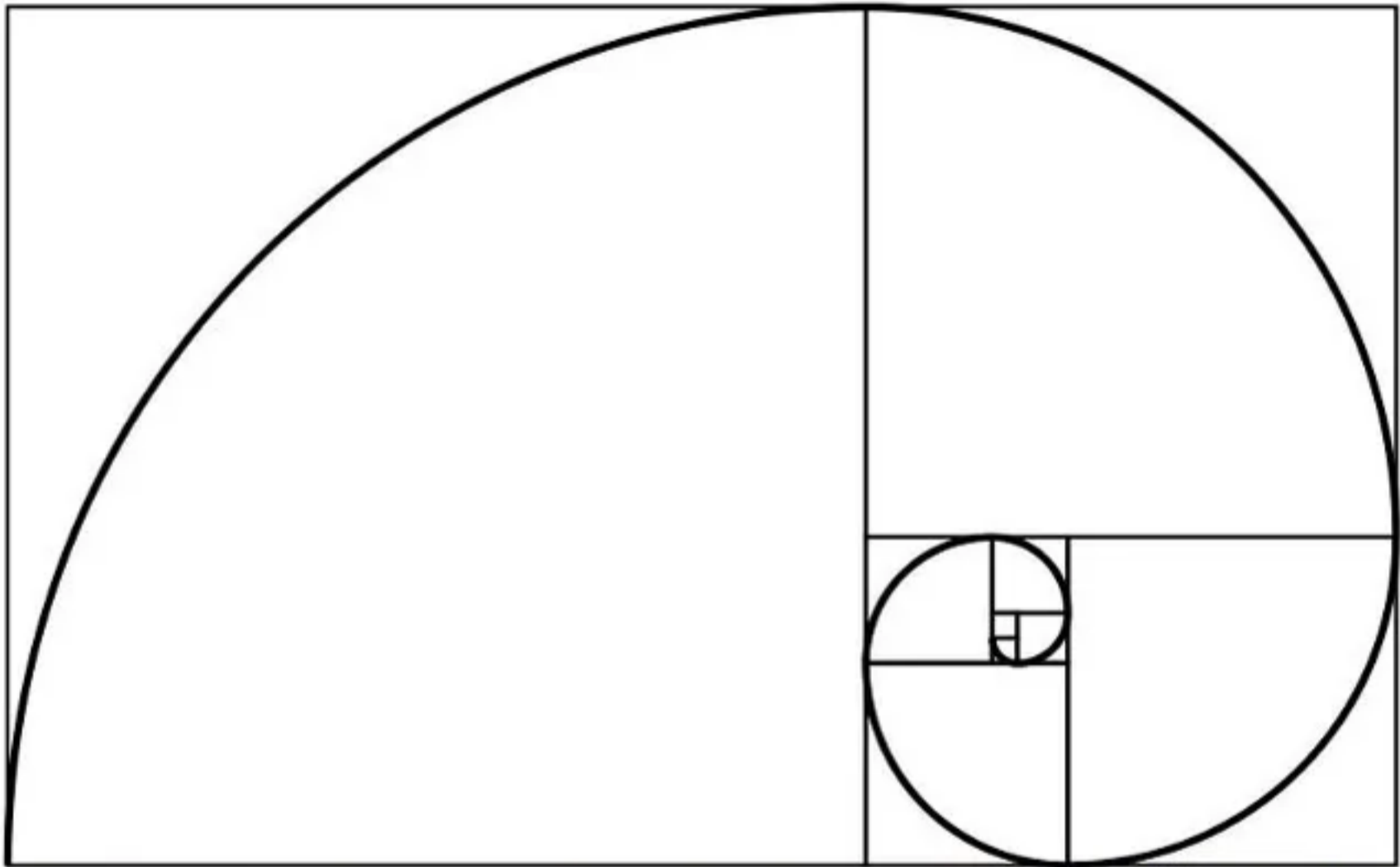
Similarly, the seed pods on a pinecone are arranged in a spiral pattern. Each cone consists of a pair of spirals, each one spiraling upwards in opposing directions. The number of steps will almost always match a pair of consecutive Fibonacci numbers. For example, a 3-5 cone is a cone which meets at the back after three steps along the left spiral, and five steps along the right.

4. Fruits and Vegetables

Likewise, similar spiraling patterns can be found on pineapples and cauliflower.

6. Shells

The unique properties of the Golden Rectangle provides another example. This shape, a rectangle in which the ratio of the sides a/b is equal to the golden mean (ϕ), can result in a nesting process that can be repeated into infinity — and which takes on the form of a spiral. It's call the logarithmic spiral, and it abounds in nature.



Snail shells and nautilus shells follow the logarithmic spiral, as does the cochlea of the inner ear. It can also be seen in the horns of certain goats, and the shape of certain spider's webs.

