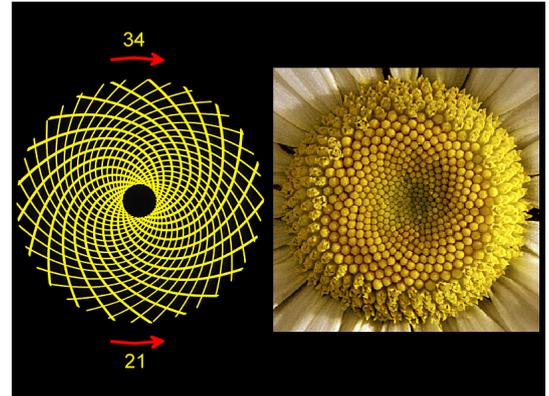


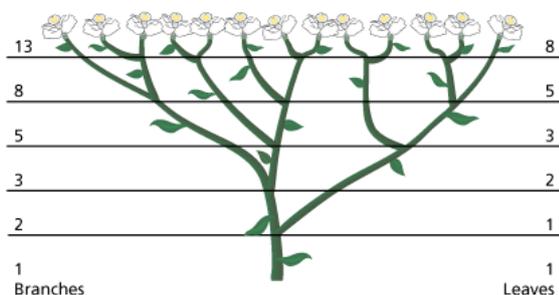
## The GOLDEN RATIO in NATURE

Calla lilies have 1 petal, iris have 3 petals, buttercups have 5, clematis flowers have 8, ragwort have 13, asters have 21 ... If you look in a garden, you will discover that for many flowers the number of petals is one of the pattern 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

Those numbers, called Fibonacci numbers, are also common in flower-heads. You'll see that the small florets are arranged in spirals running clockwise and anticlockwise. The number of spirals in each direction is a Fibonacci number. In this example, there are 34 clockwise spirals and 21 anticlockwise spirals.



It's not just flowers that contain Fibonacci spirals: the same pattern exists in pine cones, pineapple skin, broccoli florets and cauliflowers.



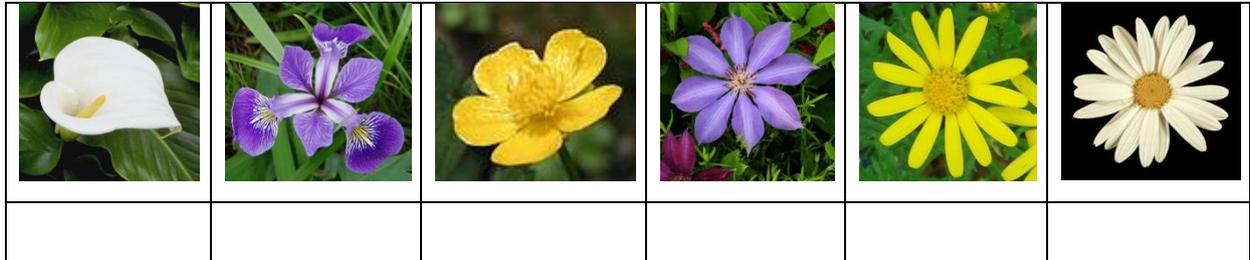
Fibonacci numbers also appear in leaves, branches and stalks. Plants often produce branches in a winding pattern as they grow. If you count upwards from a low branch to the next branch directly above it, you'll often find you've counted a Fibonacci number of branches.

Why do Fibonacci numbers keep cropping up Nature so often? It seems it's because they provide the best way for packing seeds, petals or leaves into a limited space without large gaps or awkward overlaps.

## The GOLDEN RATIO in NATURE

### Task 1

Write the names of the flowers in the appropriate boxes:



### Task 2

Draw on the circle besides a green arrow that shows a clockwise direction and a red arrow that shows an anticlockwise direction.



### Task 3

Find the clue for the pattern of the sequence of numbers: 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

Complete it with the next five terms.

### Task 4

Unscramble the word COFCINFABI to know the name of this Italian mathematician: \_\_\_\_\_



### Task 5

Calculate ratios of consecutive terms from the sequence. What seems to be the value of this ratio as the numbers increase?

### Task 6

Is the Fibonacci pattern systematically working in Nature? Give other examples and find counterexamples (personal research).

What could be an explanation for such a high frequency?