

Sunflower and the Golden Number

Question 1.

Examine the sunflower below. The sunflower seeds appear along “growth spirals”. You can see a set of spirals running in a counterclockwise direction, and another set in the clockwise direction. It is (just barely) possible to count the number of spirals in both directions ; can you try to do it ?

Question 2. If you divide these two numbers, which number do you get ?



In nature, spirals and their 3D counterparts helices (spiraling around cylinders or cones) abound : shells of snails or mollusks, horns, viruses, the plant structure of stalks, of stems (e.g; peas, ferns, honeysuckle), of flowers (“hearts” of sunflowers), of fruits or cones (scales of pinecone or a pineapple, seed dots on some strawberries). Other examples are found in tornado paths, galaxies, whirlpools, draining water, etc. The human umbilical cord is a triple helix formed from one vein and two arteries that coil to the left. And of course the DNA molecule forms a double helix.

So spirals and helices appear at the base of almost everything in the living world : formation, growth and motion. Logarithmic spirals share more generally with fractals a property that is crucial in growth patterns : their self-similarity (they keep the same shape as they grow). As nature is governed by genetic codes and growth patterns, it is not surprising to detect the appearance of spirals and helices in so many different areas.

Vocabulary.

Clockwise : dans le sens des aiguilles d’une montre **Counterclockwise** ; the other way around ! **Seed** : graine **Spiral** /'spaiərəl/
barely : à peine **counterpart** : homologue, équivalent, pendant **to abound** : abonder **shell** : coquille **snail** : escargot,
horn : corne **stalk, stem** : tige **fern** : fougère **honeysuckle** : chèvrefeuille **pinecone** : pomme de pin **pineapple** : ananas
whirlpool : tourbillon **to coil** : enrouler