



Exploring mathematics: maths in nature and art

Spirals in nature

Presenter

This is a nautilus, a primitive mollusc that uses its shell to keep it buoyant. The nautilus has survived in a form that's been relatively unchanged for over five hundred million years.

It builds a shell, up to 30 cm in diameter, which is a triumph of natural engineering and geometry.

This cross section shows how the shell is made up chambers, each of the same basic shape, but built progressively larger as the nautilus grows.

The chambers are filled with gas and liquid, which it can control to keep buoyant.

The geometry of the nautilus shell can be expressed mathematically, by saying that each chamber is related to the next by the same rotation and scaling relative to the centre of the shell. In this case the rotation angle is about π by eight radians, and the scale factor is about 1.06, with only small variations from chamber to chamber.

This repeated rotation and scaling gives the nautilus a spiral shell. It's approximately an equally angular spiral.