Architects from the ancient times are said to have used the golden ratio in buildings.


Without document evidence, it is difficult to decide if and to what extent the golden ratio has been used to proportion ancient buildings. Moreover, measurements in situ vary so much that experts still doubt.

However, documents from the Middle Age clearly state the use of the golden ratio in Architecture. Actually, medieval builders of churches and cathedrals approached the design of their buildings using pentagons and pentagrams -two geometric shapes strongly linked with $\phi$ - as basic tools for their works. Gothic roses are perfect examples of these.


During the Renaissance, Italian scholars and architects such as Luca Pacioli and Leon Battista Alberti promoted the use of the golden ratio also called divine proportion, referring to the human body proportions. In Spain, the front of the University of Salamanca has been designed according to the golden ratio.

Contemporary architecture shows many examples of the use of the golden ratio. The Guggenheim museum in New York was designed by the American architect Franck Lloyd Wright in the XXth century. It is shaped like the golden spiral- a
 geometric interpretation of the golden number.


Le Corbusier as for him was influenced by the Italian Renaissance architects, reviving the human body proportions linked with the golden ratio. He created the Modulor, a new system of measures intended to architecture in opposition to the metric system that he considered did not fit to human scale. Actually proportions in buildings were copied from the ideal human body proportions.

## Task 1

1. Work out the ratios of the lengths to the widths of the rectangles shown on the Parthenon in Athens.
2. Some people claim is based on golden rectangles. What do you think?
3. Could the Giza pyramid have been designed with the golden ratio?

## Task 2

1. Find out the golden rectangle on the front of the University of Salamanca.
2. Draw it besides. Check the ratio of the length to the width is $\phi$.

## Task 3



Draw a square of side 1 in the centre of a small-squared paper sheet. Connect the upper right corner to the lower left corner with an arc of circle from below.

Draw another square of side 1 to the left of the first one. Continue the arc of circle from the lower right corner to the upper left corner. Draw a square of side 2 on the top of the two small squares, and continue the arc of circle. Draw a square of side 3 to the right of the rectangle made of the three previous squares, and continue the arc. Go on until your sheet is filled with the spiral.

## Task 4

1. Complete the pattern of the sides of the squares: $1,1,2,3$, $\qquad$ ,...
2. Work out the ratios of consecutive numbers. What ratios do you obtain as the numbers in the sequence increase?
3. Unscramble the words to find the name of the spiral you drew in task 3.


## Task 5

Teach the students from the other groups how to build a spiral.

