

IS THE GOLDEN SECTION EVERYWHERE?

If you believe some people, then the Golden Section is to be found everywhere, including in:

- nature
- art
- architecture
- music

Do some research on the internet and find examples of each of these. You could investigate some of the claims you find, or look at the suggestions below.

1. *Phi* and the human body

One example of *phi* in nature is said to be the human body. Look at <http://goldennumber.net/body.htm> for instance. What do you think of such claims? To help you make up your minds, do a survey of people in your group. If you don't have access to this website, do your survey with people standing upright, arms by their sides, hands hanging loosely. You should measure:

- height
- distance from head to fingertips
- distance from head to elbows
- length of the forearms
- For each person, find the ratios of these lengths to each other. Are any of the ratios close to 1.618?

Clearly you need to take the accuracy of your measurements into account. There are two ways you might do this:

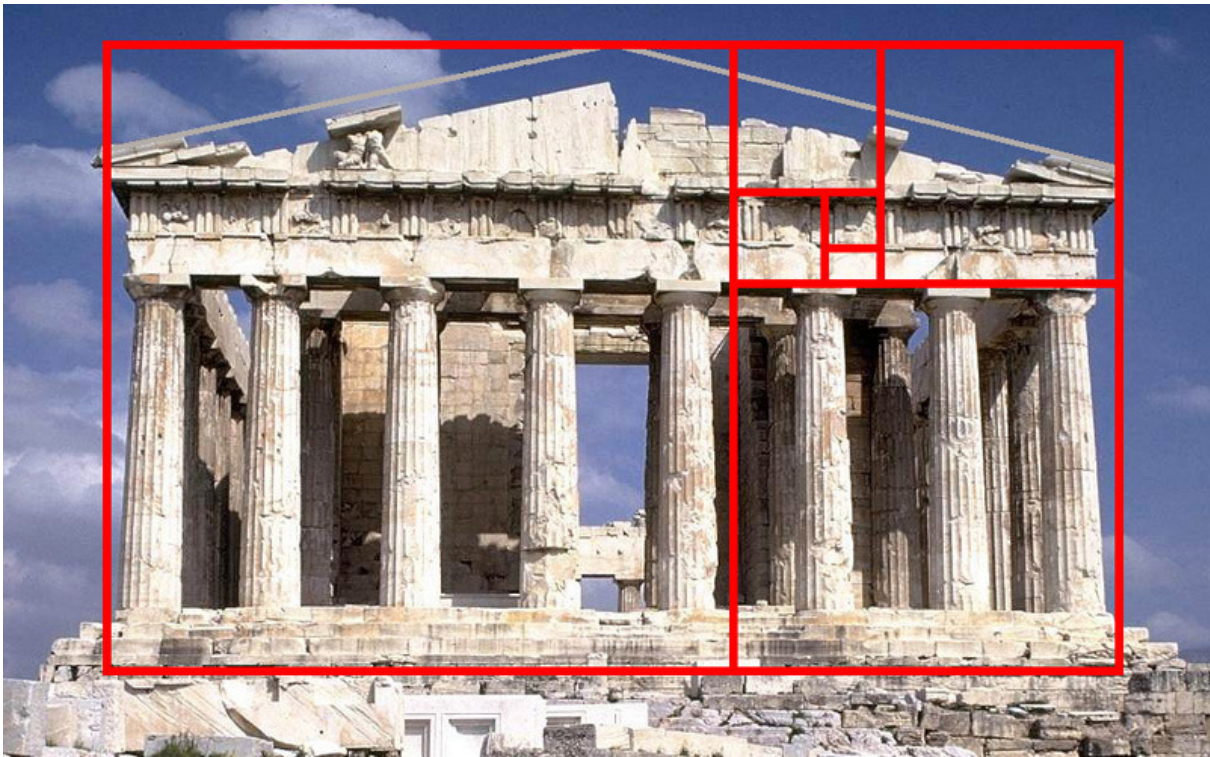
- Take three measurements in each case, and average them - does this affect your results?
- Estimate the error in your measurements. For each measurement you have made, decide on the smallest value you think it might be, and the largest. For instance, suppose that you measure someone's height as 175cm. If you think that your error might be ± 2 cm, then the smallest value would be 173cm and the largest 177cm. Now repeat your calculations of the ratios - what is the smallest value you get, and what is the largest?

Use the data you collect to decide whether you think the golden ratio is present in human proportions.

2. The Parthenon

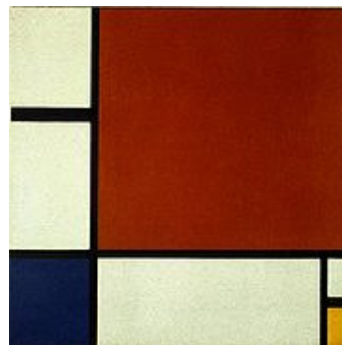
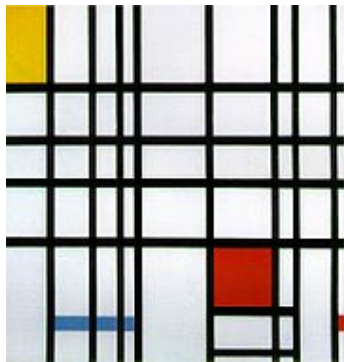
One of the most famous examples of the Golden Ratio is said to be the Parthenon. For an example, see <http://www.geom.uiuc.edu/~demo5337/s97b/art.htm> or use the image below.

- Measure the various rectangles on this or similar images.
- Work out the ratios of their widths to their lengths. How close are they to the value of *phi* - 1.618?
- Take the accuracy of your measurements and the thicknesses of the lines into account, in the same ways as described above.
- You might also want to think about the placing of the rectangles on the photo.
- What do you think? Are the dimensions of the Parthenon based on the Golden Ratio?



3. Modern art

Did the Dutch artist, Mondrian (1872-1944), use the Golden Ratio in some of his paintings? Here are two:



- Measure rectangles, and see if the ratios of their widths and lengths are equal to or close to *phi*.
- As in the other suggestions here, you should take account of the accuracy of your measurement in one or both of the ways given.