Golden Ratio

Dear Friends,

In this article we shall get some information about a special ratio i. e a golden ratio

Are some numbers more important than others? Certainly numbers like the primes, pi and have properties that make them interesting to mathematicians.

One more such number is phi i.e. 1.61803….,a golden ratio

There are many different names for the golden ratio; The Golden Mean, Phi, the Divine Section, The Golden Cut, The Golden Proportion, The Divine Proportion, etc

Definitions of Golden Ratio

1**) Numeric definition**
Here is a 'Fibonacci series 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ..

If we take the ratio of two successive numbers in this series and divide each by the number before it, we will find the following series of numbers.

1/1 = 1
2/1 = 2
3/2 = 1.5
5/3 = 1.6666...
8/5 = 1.6
13/8 = 1.625
21/13 = 1.61538...
34/21 = 1.61904...

The ratio seems to be settling down to a particular value, which we call the golden ratio(Phi=1.618..).

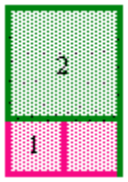
2) Golden Rectangle

We can notice if we have a 1 by 1 square and add a square with side one, then what we get is another golden rectangle. This could go on forever. We can get bigger and bigger golden rectangles, adding off these big squares.

Step 1 Start with a square 1 by 1
Step 2 Find the longer side (i.e 1)
Step 3 Add another square of that side to whole thing

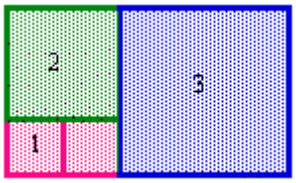
So we get a rectangle 2 x 1

Now the longer side is 2.Add a square of side 2.



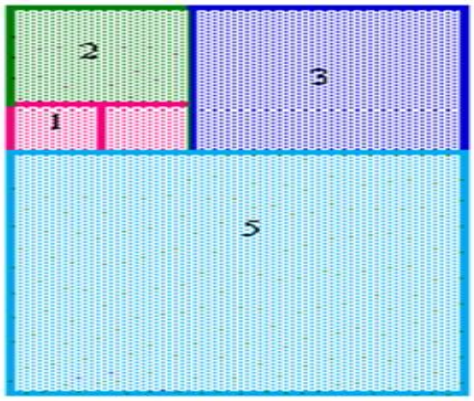
Now It is a rectangle 3 x 2.

Similarly we get next two rectangles :-



Now it is a rectangle 5 x 3.

Here the rectangle is 8 x 5.



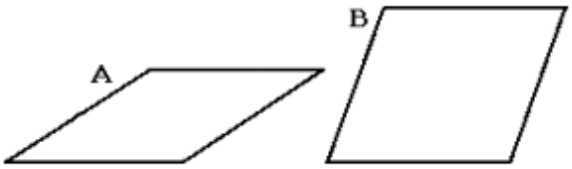
Here is the list of rectangles :-
1 x 1, 2 x 1, 3 x 2, 5 x 3, 8 x 5, 13 x 8, 21 x 13, 34 x 21……
if we take 2/1,3/2,5/3,…….and so on we find that the ratio comes closer and closer to 1.61803…..

Golden Ratio is an eye pleasing proportion.

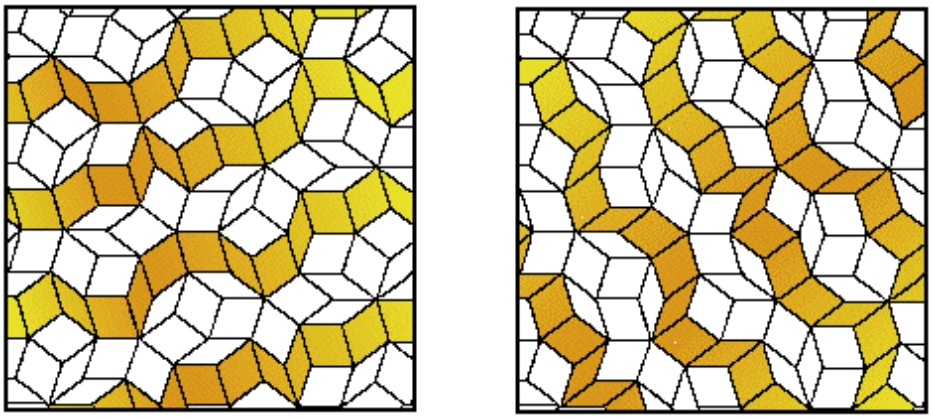
Golden ratio and Golden rectangles are used in art , architecture, sculpture and many other fields .Here are few examples.

Penrose Tilings

The British physicist and mathematician, Roger Penrose, has developed an aperiodic tiling which incorporates the golden section. The tiling is comprised of two rhombi, one with angles of 36 and 144 degrees (figure A, which is two Golden Triangles, base to base) and one with angles of 72 and 108 degrees (figure B).



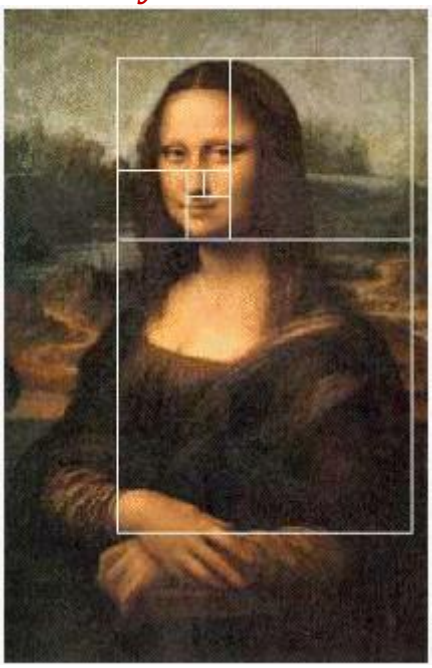
When a plane is tiled according to Penrose's directions, the ratio of tile A to tile B is the Golden Ratio.



In addition to the unusual symmetry, Penrose Tilings reveal a pattern of overlapping decagons. Each tile within the pattern is contained

within one of two types of decagons, and the ratio of the decagon populations is, of course, the ratio of the Golden Mean.

Mona-Lisa ***by Leonardo Da Vinci***



It is believed that Leonardo, as a mathematician tried to incorporate mathematics into art. This painting seems to be made purposefully line up with golden rectangle.

Credit Card

Credit cards are in the shape of a Golden Rectangle. If you ever need an easily accessible example of a golden rectangle illustrating the proportions of the golden section, all you need do is to pull out a credit card or drivers license.

Interesting Exercise:

Start with any number , say 4,prepare series 4,4,8 12,20,32,52……And see where ratios 4/4,8/4,12/8,20/12….settle down.