The Golden Ratio

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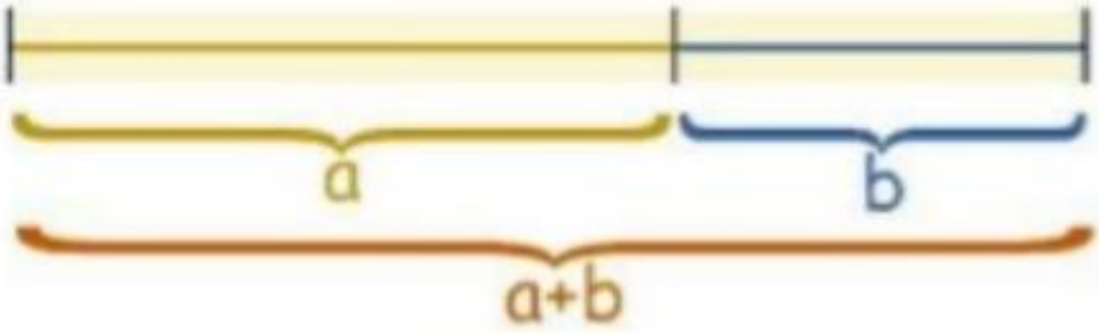
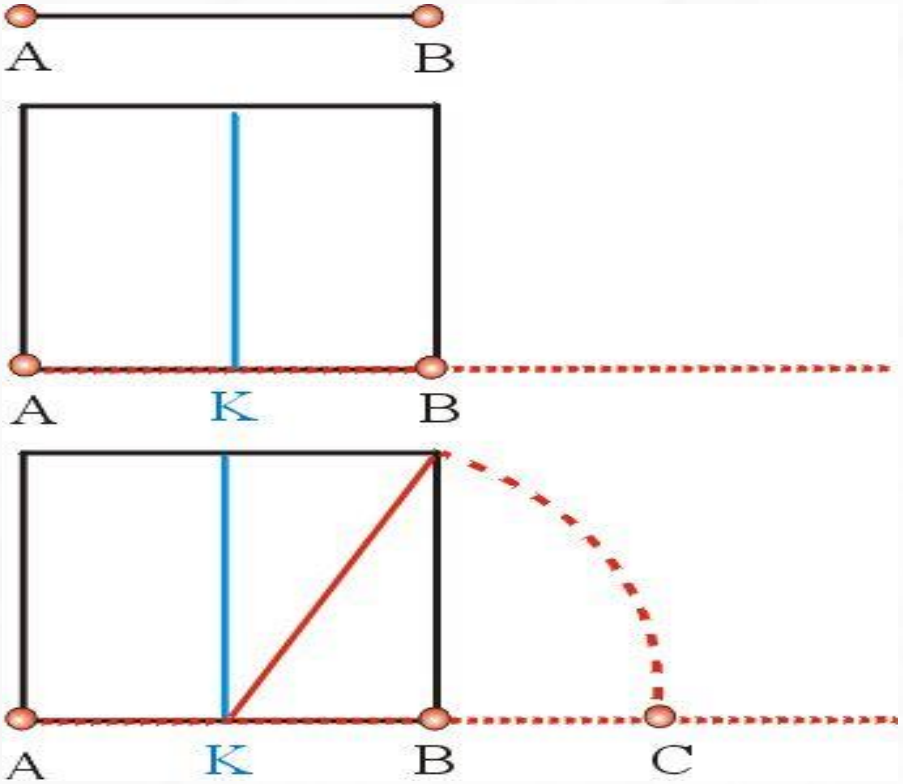
WHAT IS THE GOLDEN RATIO?

Golden ratio, also known as the golden section, golden mean, or divine proportion, in mathematics, the irrational number $(1 + \sqrt{5})/2$, often denoted by the Greek letter ϕ, and approximately equal to 1.618.

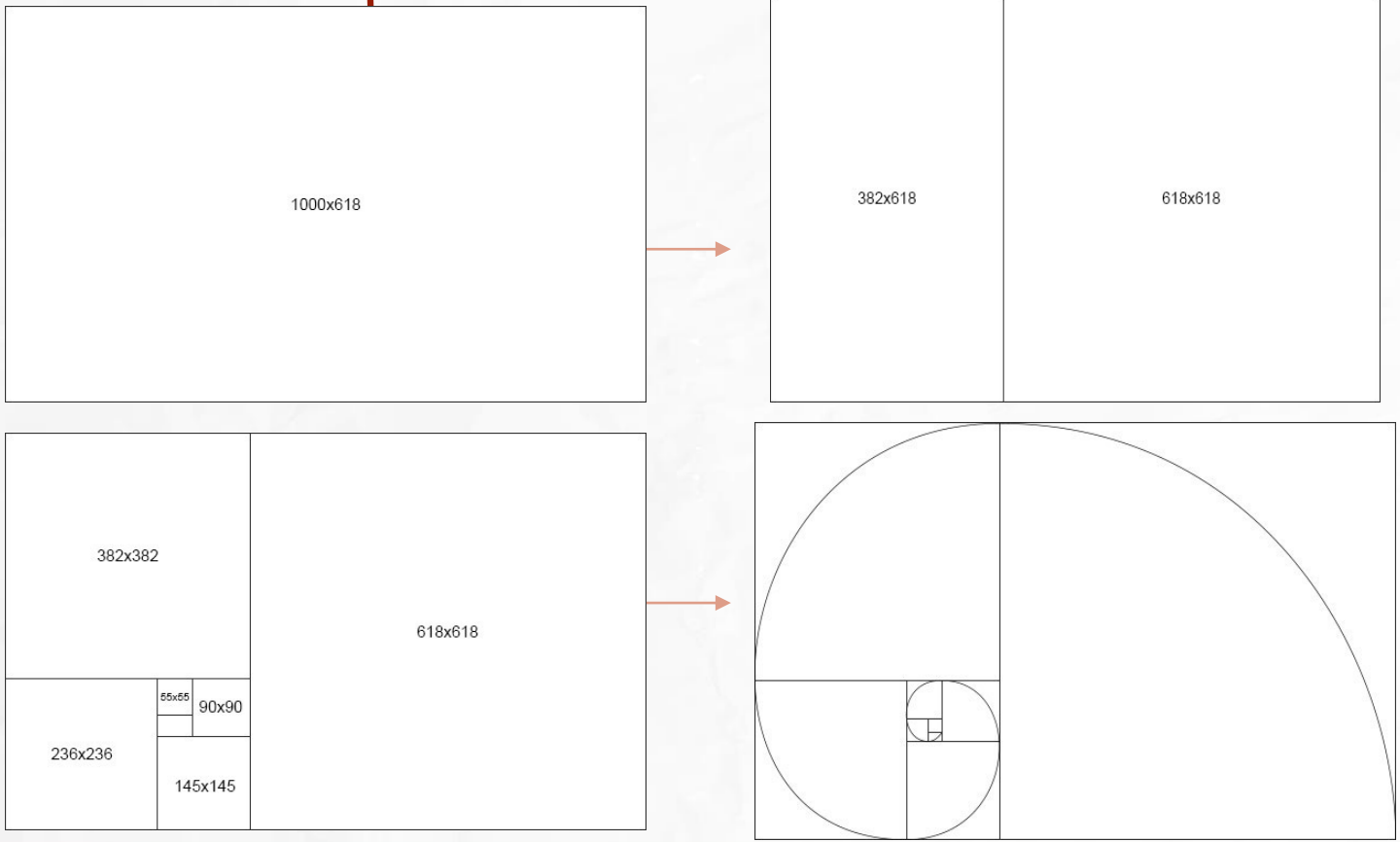


$$\frac{a}{b} = \frac{a+b}{a} = 1.618\ldots = \varphi$$

Construction of the Golden Rectangle



The Golden Spiral



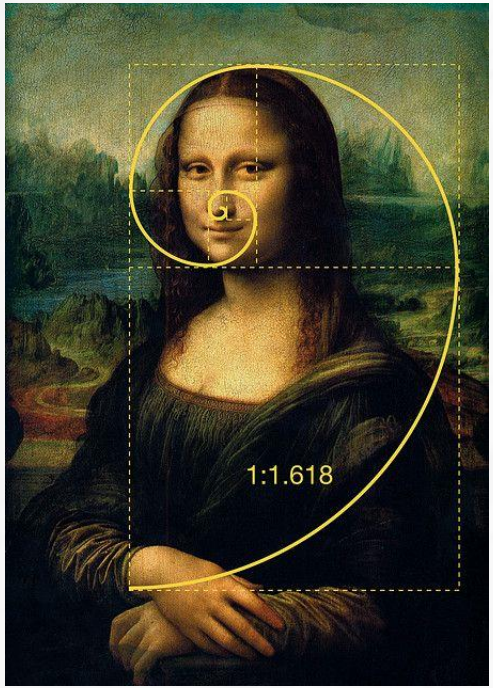
Relationship to Fibonacci sequence

Fibonacci Numbers: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987, 1597, ...

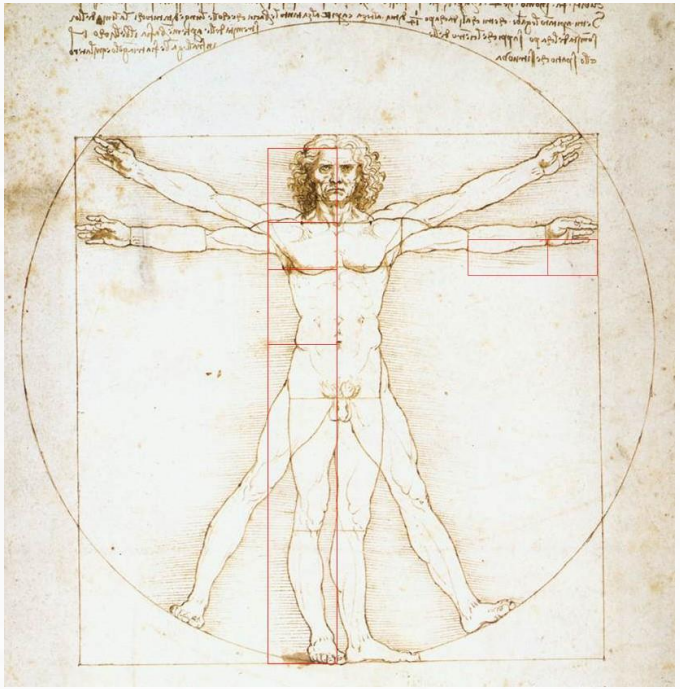
A closed-form expression for the Fibonacci sequence involves the golden ratio:

$$F(n) = \frac{\varphi^n - (1-\varphi)^n}{\sqrt{5}} = \frac{\varphi^n - (-\varphi)^{-n}}{\sqrt{5}}$$

The Golden ratio in Art



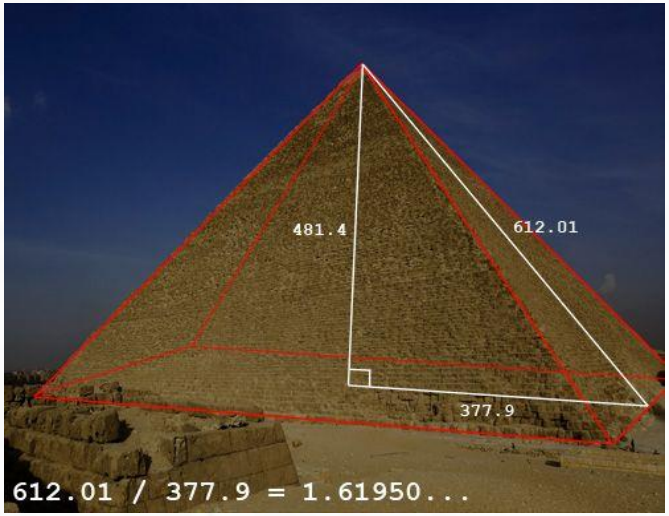
“Mona Lisa”



“Vitruvian Man”

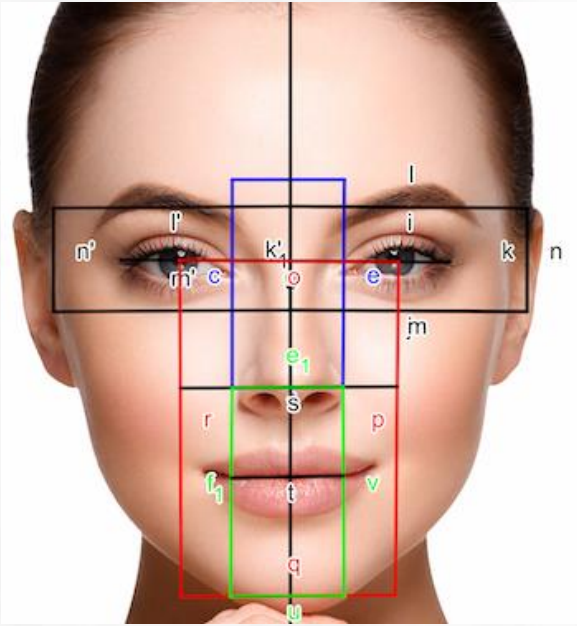
The Golden Ration in Architecture

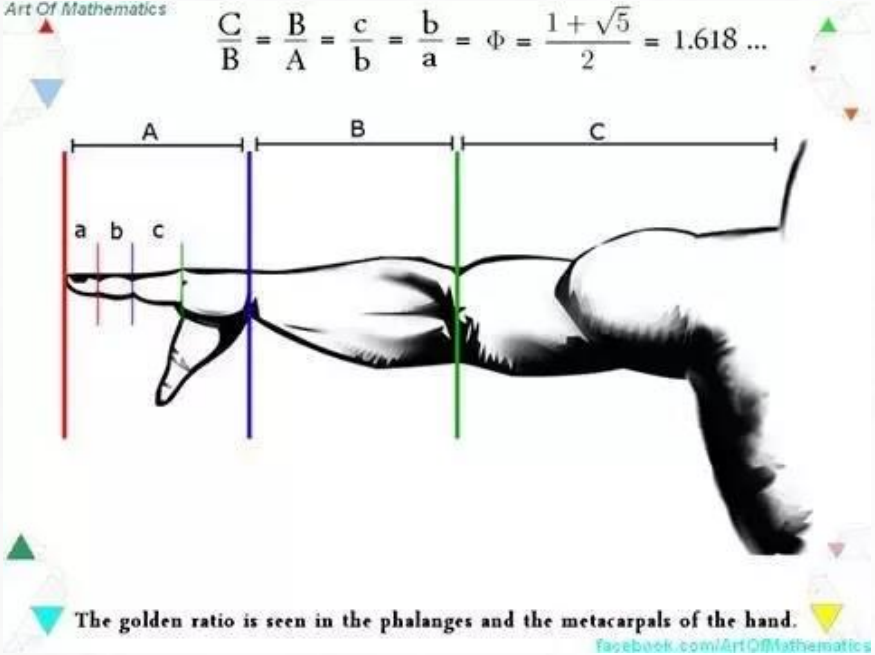
Parthenon in Athens



Egyptian Pyramid

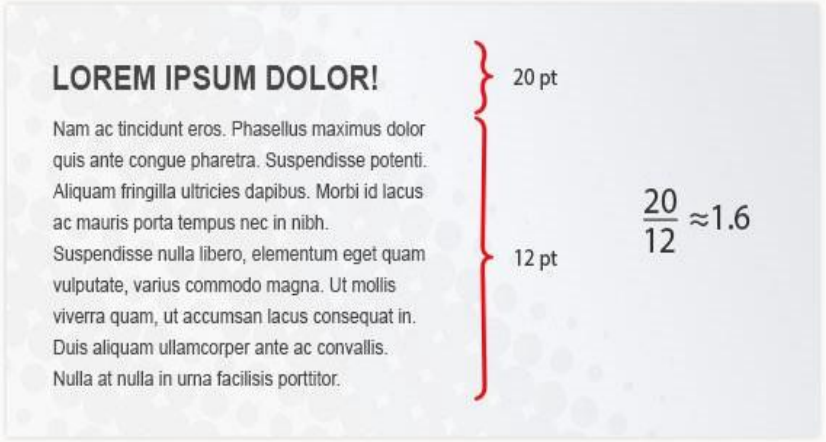
The Golden Ratio in Human





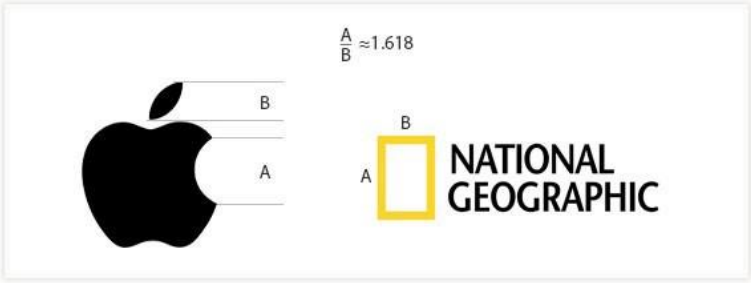
The Golden Ratio in **Nature**

Applications



Typography

Sizing/cropping images



Logo design

"Some of the greatest mathematical minds of all ages, from Pythagoras and Euclid in ancient Greece, through the medieval Italian mathematician Leonardo of Pisa and the Renaissance astronomer Johannes Kepler to present-day scientific figures such as Oxford physicist Roger Penrose have spent endless hours over this simple ratio and its properties. ... Biologists, artists, musicians, historians, architects, psychologists, and even mystics have pondered and debated the basis of its ubiquity and appeal. **In fact, it is probably fair to say that the Golden Ratio has inspired thinkers of all disciplines like no other number in the history of mathematics."**

-Mario Livio

Resources and References

- https://www.goldennumber.net/
- https://slideuplifts.medium.com/learn-the-science-of-proportions-the-golden-ratio-5f6c0f1b576
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- http://www.geom.uiuc.edu/~demo5337/s97b/art.htm
- http://www.mcs.surrey.ac.uk/Personal/R.Knott/Fibonacci/fibnat.html