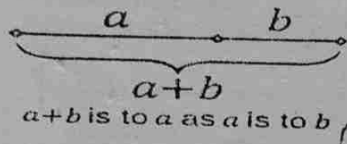


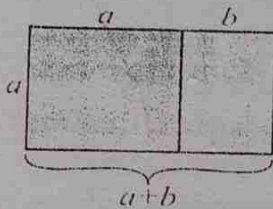
Golden Ratio

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Line segments in the golden ratio



A golden rectangle with longer side **a** and shorter side **b**, when placed adjacent to a square with sides of length **a**, will produce a similar golden rectangle with longer side **a+b** and shorter side **a**. This illustrates the relationship

$$\frac{a+b}{a} = \frac{a}{b} = \phi$$

In mathematics, two quantities are in the golden ratio if the ratio of their sum to the larger of the two quantities is the same as the ratio of the larger quantity to the smaller quantity. The figure on the right illustrates the geometric relationship.

Expressed algebraically, for quantities **a** and **b** with $a > b > 0$,

$$\frac{a+b}{a} = \frac{a}{b} = \phi$$

where the Greek letter phi (ϕ or Φ), represents the golden ratio. It is an irrational number that is a solution to the quadratic

equation $x^2 - x - 1 = 0$, with a value of:

$$\phi = \frac{1 + \sqrt{5}}{2} = 1.6180339887 \dots$$

The golden ratio is also called the golden mean or golden section (Latin: *sectio aurea*). Other names include extreme and mean ratio, medial section, divine proportion, divine section (Latin: *sectio divina*), golden proportion, golden cut, and golden number. Mathematicians since Euclid have studied the properties of the golden ratio, including its appearance in the dimensions of a regular pentagon and in a golden rectangle, which may be cut into a square and a smaller rectangle with the same aspect ratio. The golden ratio has also been used to analyze the proportions of natural objects as well as man-made systems such as financial markets, in some cases based on dubious fits to data. The golden ratio appears in some patterns in nature, including the spiral arrangement of leaves and other plant parts. Some twentieth-century artists and architects, including Le Corbusier and Salvador Dalí, have proportioned their works to approximate the golden ratio especially in the form of the golden rectangle, in which the ratio of the longer side to the shorter is the golden ratio. Believing this proportion to be aesthetically pleasing.