

In mathematics, two quantities are in the **golden ratio** if their ratio is the same as the ratio of their sum to the larger of the two quantities. The figure on the right illustrates the geometric relationship. Expressed algebraically, for quantities  $a$  and  $b$  with  $a > b > 0$ ,

Where the Greek letter phi represents the golden ratio. Its value is:

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

Ancient Greek mathematicians first studied what we now call the golden ratio because of its frequent appearance in geometry. The division of a line into "extreme and mean ratio" (the golden section) is important in the geometry of regular pentagrams and pentagons. Euclid's Elements provides the first known written definition of what is now called the golden ratio: "A straight line is said to have been cut in extreme and mean ratio when, as the whole line is to the greater segment, so is the greater to the lesser." Euclid explains a construction for cutting (sectioning) a line "in extreme and mean ratio", i.e., the golden ratio. Throughout the Elements, several propositions (theorems in modern terminology) and their proofs employ the golden ratio.