



Phi definition = ratio of the sides of the big rectangle is equal to the ratio of the sides of the smaller new rectangle made by using the smaller side of the big rectangle as the large side of the new smaller rectangle

$$\begin{aligned}
 \text{per definition:} & \quad x/1 = 1/x-1 \\
 \text{multiply by } x-1: & \quad x(x-1) = x-1/x-1 \\
 \text{simplify:} & \quad x^2-x = 1 \\
 \text{subtract 1:} & \quad x^2-x-1 = 0
 \end{aligned}$$

solve for x using quadratic formula for equations of the form $ax^2+bx+c=0$

quadratic formula is $(-b \pm [(b^2-4ac)]^{.5})/2a$

in this case $a=1, b=-1, c=-1$

substituting a, b, and c into the quadratic equation yields: $[1 \pm (1+4)^{.5}]/2$ or simplified, $(1 \pm 5^{.5})/2$

subtracting yields a negative result so that is discarded

adding yields $(1+5^{.5})/2 = 1.6180339\dots$

this is an awesome number, play with it on your calculator, put it in memory and raise it to different integer powers, take the inverse of it, it is the basis for the Lucas and Fibonacci numbers