Exploring the Golden Ratio with Geometer’s Sketchpad

**Measuring the Golden Ratio**

*i)* Draw a line segment in a new input window. Then add a point to the interior of this line segment. Label the diagram as follows:

![Diagram of line segment with points A, C, and B]

*ii)* Measure the distances from $A$ to $B$, from $A$ to $C$, and from $C$ to $B$.

Recall that this line is said to be divided by the *golden ratio* if $\frac{AB}{AC} = \frac{AC}{CB}$. We are now going to determine this value.

*iii)* Using the GSP calculator, compute $\frac{AB}{AC}$ and $\frac{AC}{CB}$. Slide the point $C$ along the line segment $AB$ until these two quotients are equal. What value do you obtain?

**The Golden Rectangle**

*i)* Construct a rectangle $R_1$ in which the side lengths are in a Golden Ratio to each other. Such a rectangle is called a Golden Rectangle.

*ii)* Measure the length $l$ of the shorter side of $R_1$ and then cut off a square from the rectangle of side length $l$. This leaves you with a smaller rectangle $R_2$. Now, measure the two side lengths for $R_2$ and compute the ratio of the longer side length to the shorter. What value do you obtain?

*iii)* Repeat *ii)* with $R_2$. What happens in this case? How does the concept of similarity arise in this construction?
This process can actually be continued ad infinitum producing an infinite
number of nested Golden Rectangles. In fact, the Golden Rectangle is the
only rectangle where removing a square produces a similar rectangle. The
sequence of rectangles converge to (but never reach!) to a point that has been
called “The Eye of God”. For more information on the Golden Ratio see The
Golden Ratio: The Story of Phi, The World’s Most Astonishing Number, by
Mario Livio.