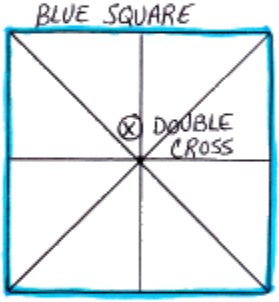
Squaring the Circle
with Golden Ratio Constructions

By Christopher Ricci

* FIGURE #1 *

BASE SQUARE construction using Golden Mean

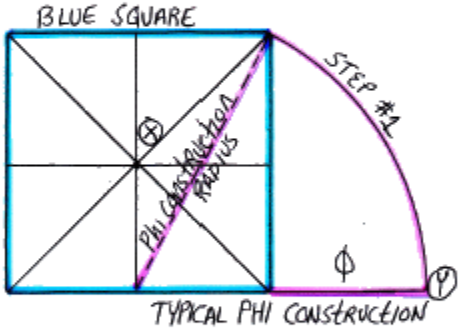
DRAW the Blue Square (chosen RANDOMLY) and Inscribe the Double Cross. Ascribe the letter ⊗ to the center point. This will be the first of two base squares required to produce the Golden Circle and the Golden Square.



*Note! FIVE additional steps ARE needed to CREATE the second base square (the Red Square). EACH of these steps will be highlighted Pink.

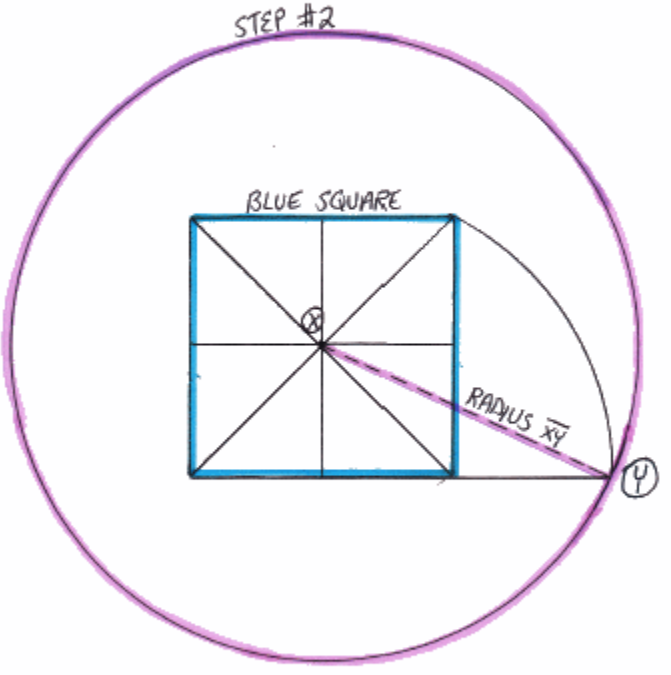
* FIGURE #2 *

* Step #1 = Make one standard Phi construction on the Blue Square as shown. Ascribe the letter (Y) to the endpoint



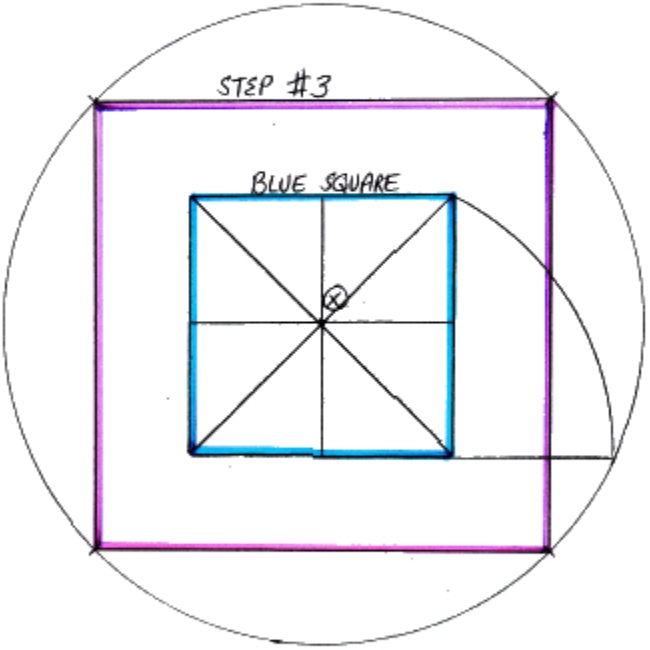
✱ FIGURE #3 ✱

✱Step #2= Using line segment $\overline{XY}$ AS A RADIUS, draw A complete circle AROUND the center point.



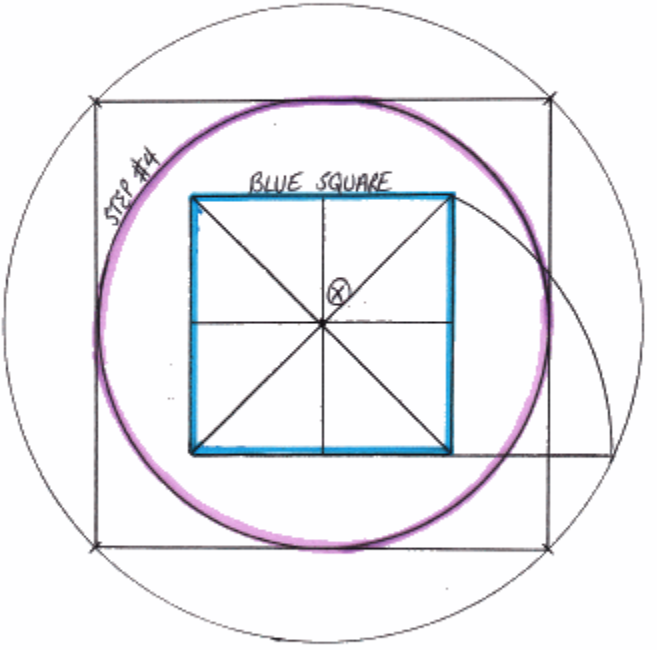
✱ FIGURE #4 ✱

✱ Step #3 = Draw a square inside that circle.



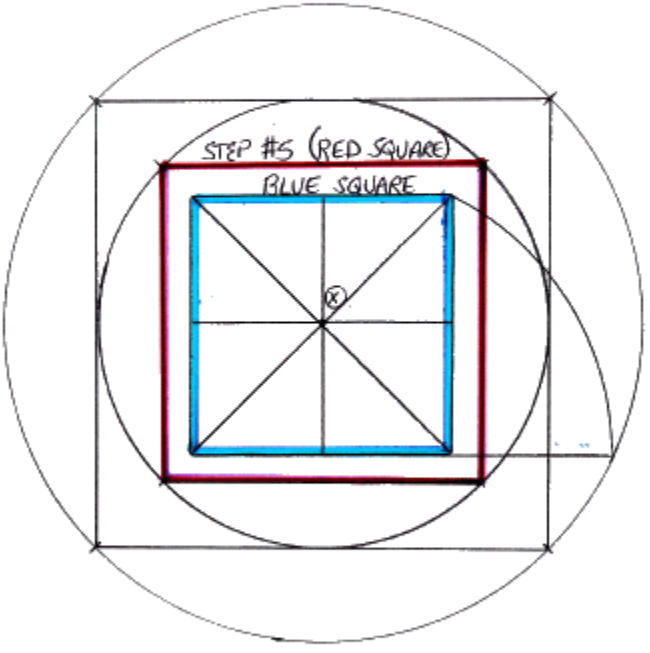
✱ FIGURE #5 ✱

✱Step # 4= Draw a circle inside that square.



✱ FIGURE #6 ✱

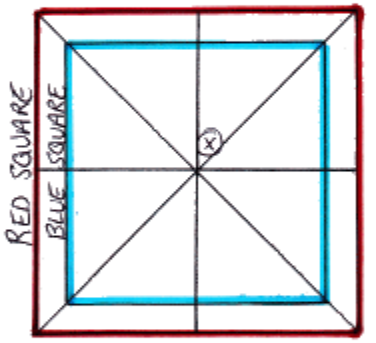
✱Step #5= Draw a square inside that circle. This is our second base square (the Red Square). It is exactly 1.5x the size of the Blue Square.



✱ FIGURE #7 ✱

Isolate the two BASE SQUARES

ERASE everything except the two colored squares and the double cross. We now have the two elementary squares from which to construct the Golden Circle & Golden Square.

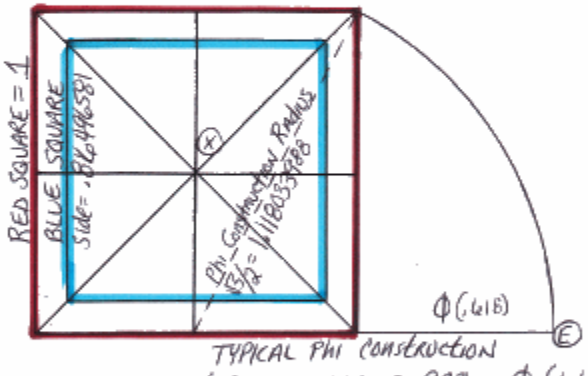


✱ Note = Like I said before, the presentation could easily begin here because there is no doubt these diagrams can be produced with compass & straightedge. However, I do think that the fact we utilized A Phi construction to obtain them is noteworthy & ought to be accentuated.

✱ FIGURE #8 ✱

BEGIN CONSTRUCTION of the GOLDEN SQUARE

Make one standard Phi construction on the Red Square & label the endpoint with letter (E). Assuming the side length of the Red Square = 1, the following calculations will result:

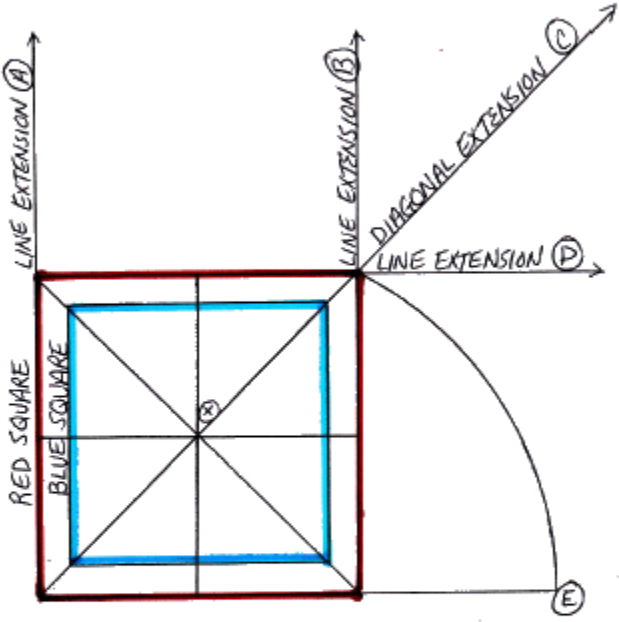


SIDE (1) + .618033988 = Φ (1.618)

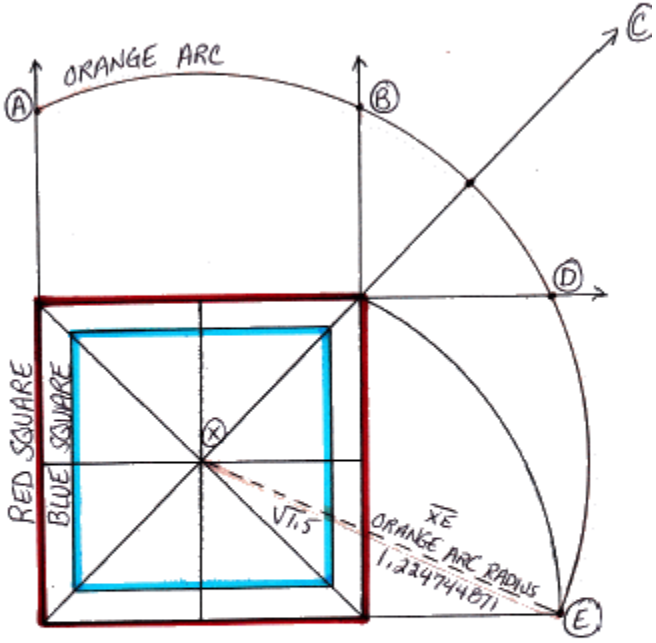
Constitutes one side of the Golden Square. Hence, it's AREA upon completion will equal Φ^2 (2.618033986)

✱ FIGURE #9 ✱

Extend the selected lines & diagonal as shown. Assign letters A through D to them accordingly.



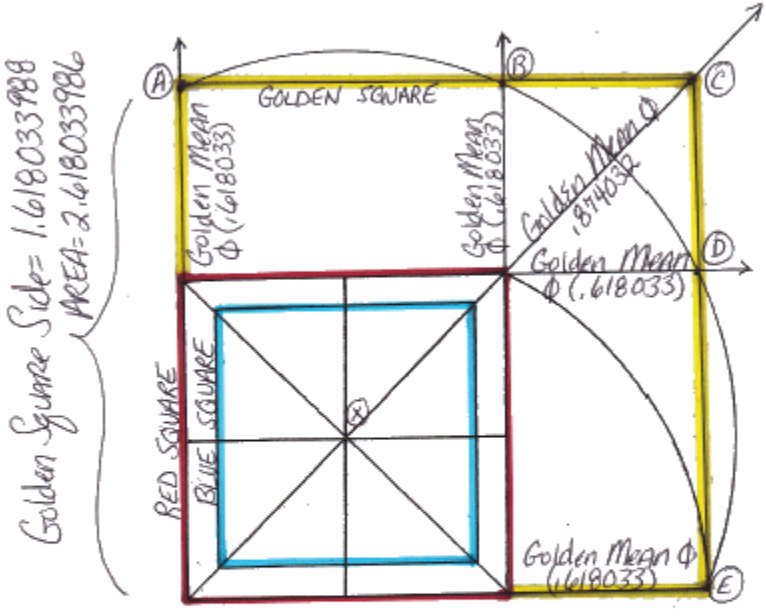
✱ FIGURE #10 ✱
ORANGE ARC CONSTRUCTION



✱ Using line segment $\overline{XE}$ as a radius, draw an arc counter-clockwise such that it intersects all the extensions

✱ FIGURE #11 ✱

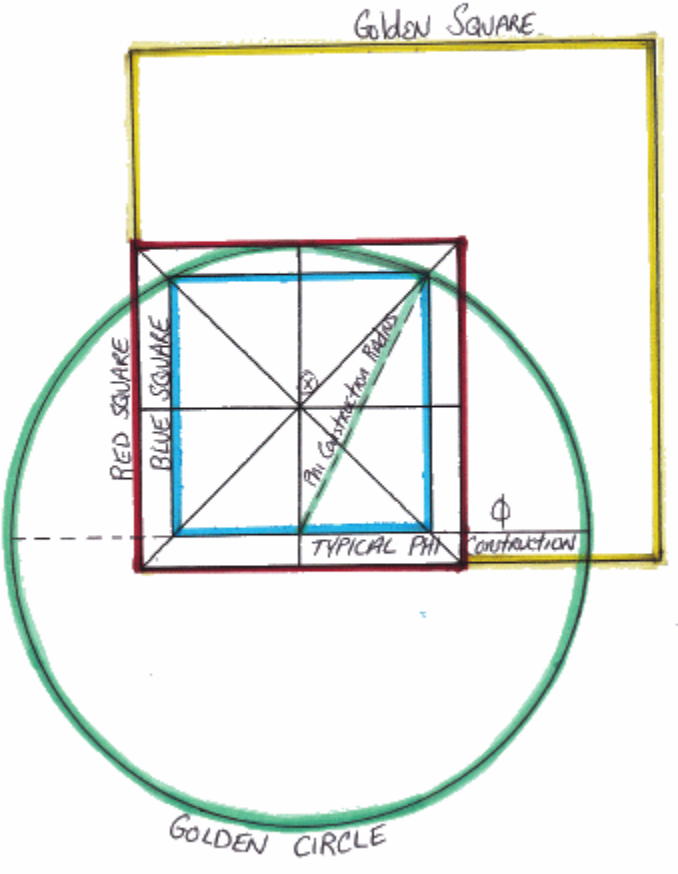
COMPLETE THE GOLDEN SQUARE



✱ Extend RAY $\overrightarrow{AB}$ & $\overrightarrow{ED}$ until they converge on point © on extended diagonal. The Golden Square is now complete; (Colored Gold).

✱ FIGURE #12 ✱

✱ Construct the Golden Circle = Make one standard Phi construction on the Blue Square. One complete Rotation completes the Golden Circle: (Colored GREEN)



* FIGURE #13 *

MERGER OF Golden CIRCLE + Golden SQUARE

This step is optional & only serves to enhance the visual effect. This is similar to the image one would expect to find when researching this topic.

CALCULATIONS

$$\frac{Phi^2/5 = (.523606797)}{Pi/6 = (.523598776)} = 1.000015319 = \frac{\text{Golden Square } (2.618033986)}{\text{Golden Circle } (2.6179938B)}$$

Yields Approximate Value for Pi

Golden SQUARE AREA (2.618033986) $\times$ 6/5 = 3.1416040784 Difference = 0.00004813