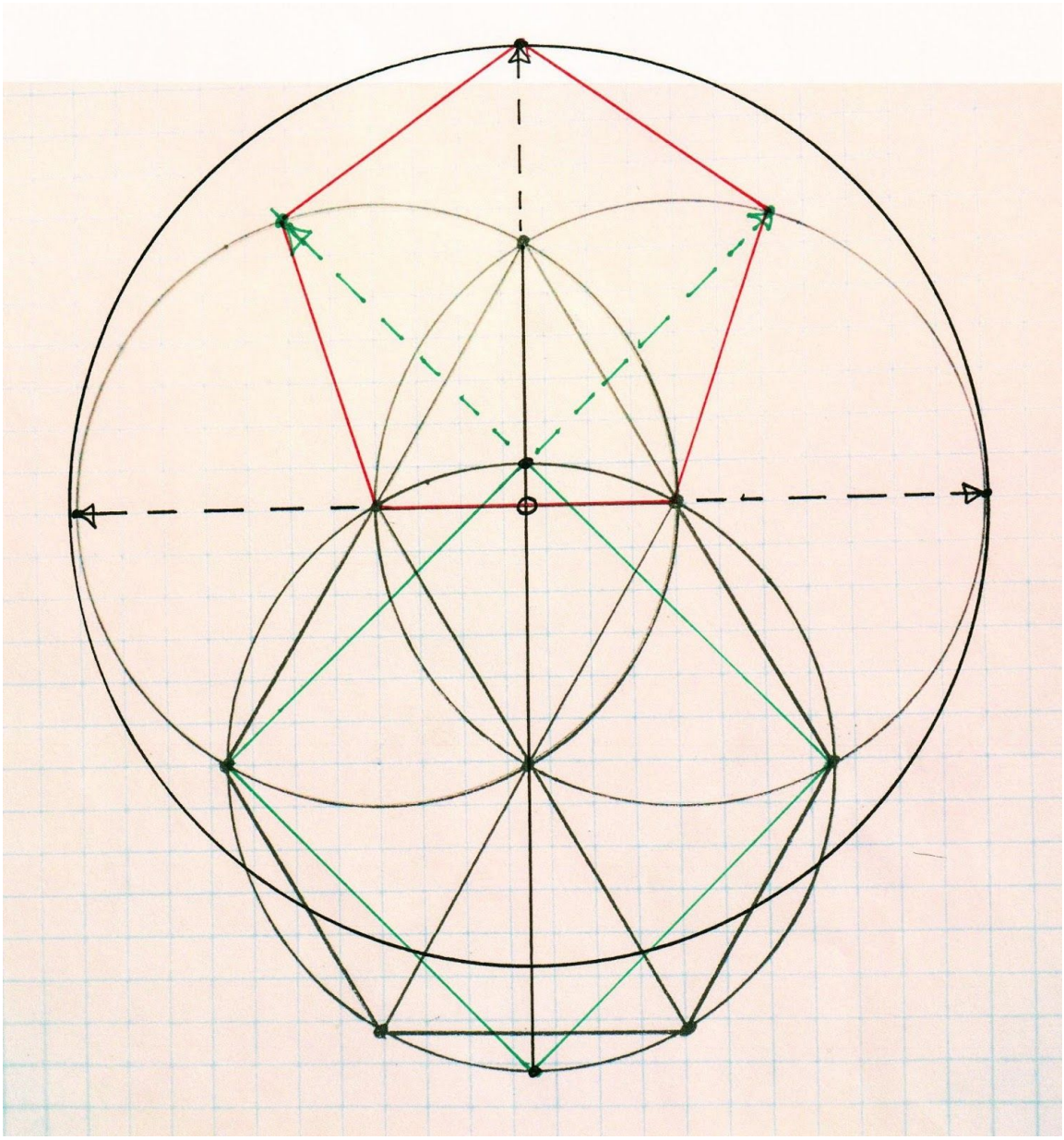
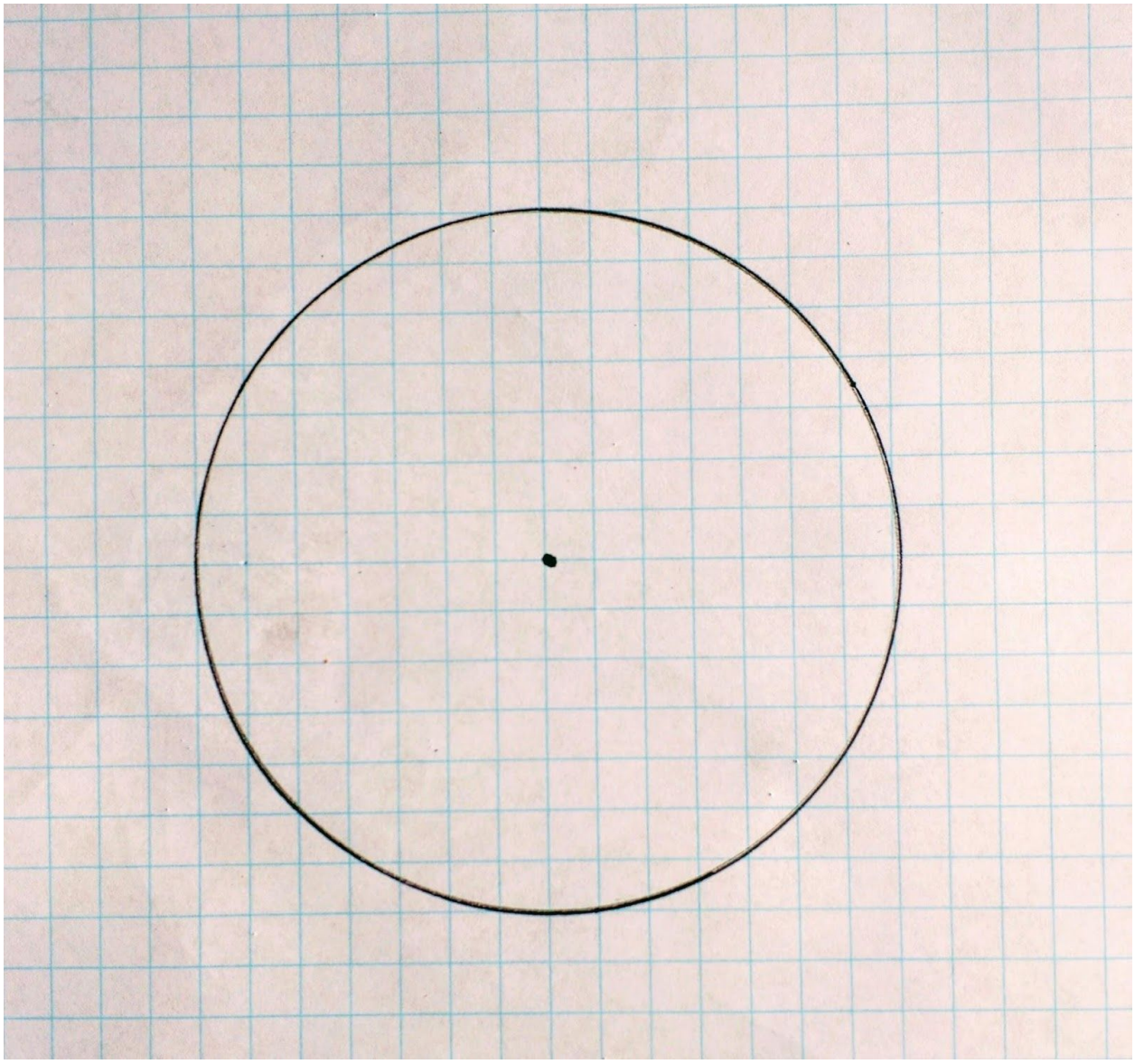
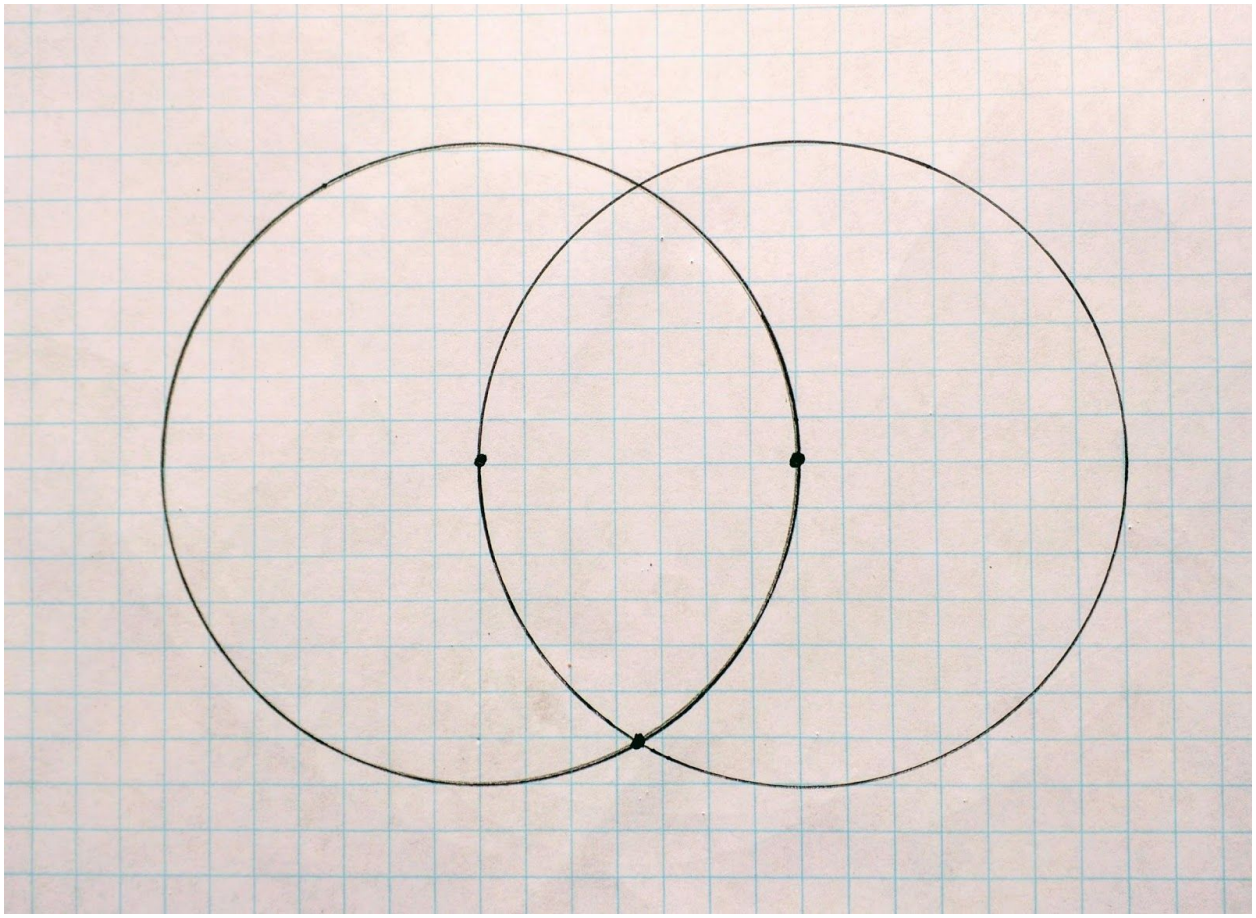
Albrecht Durer's Pentagon Construction



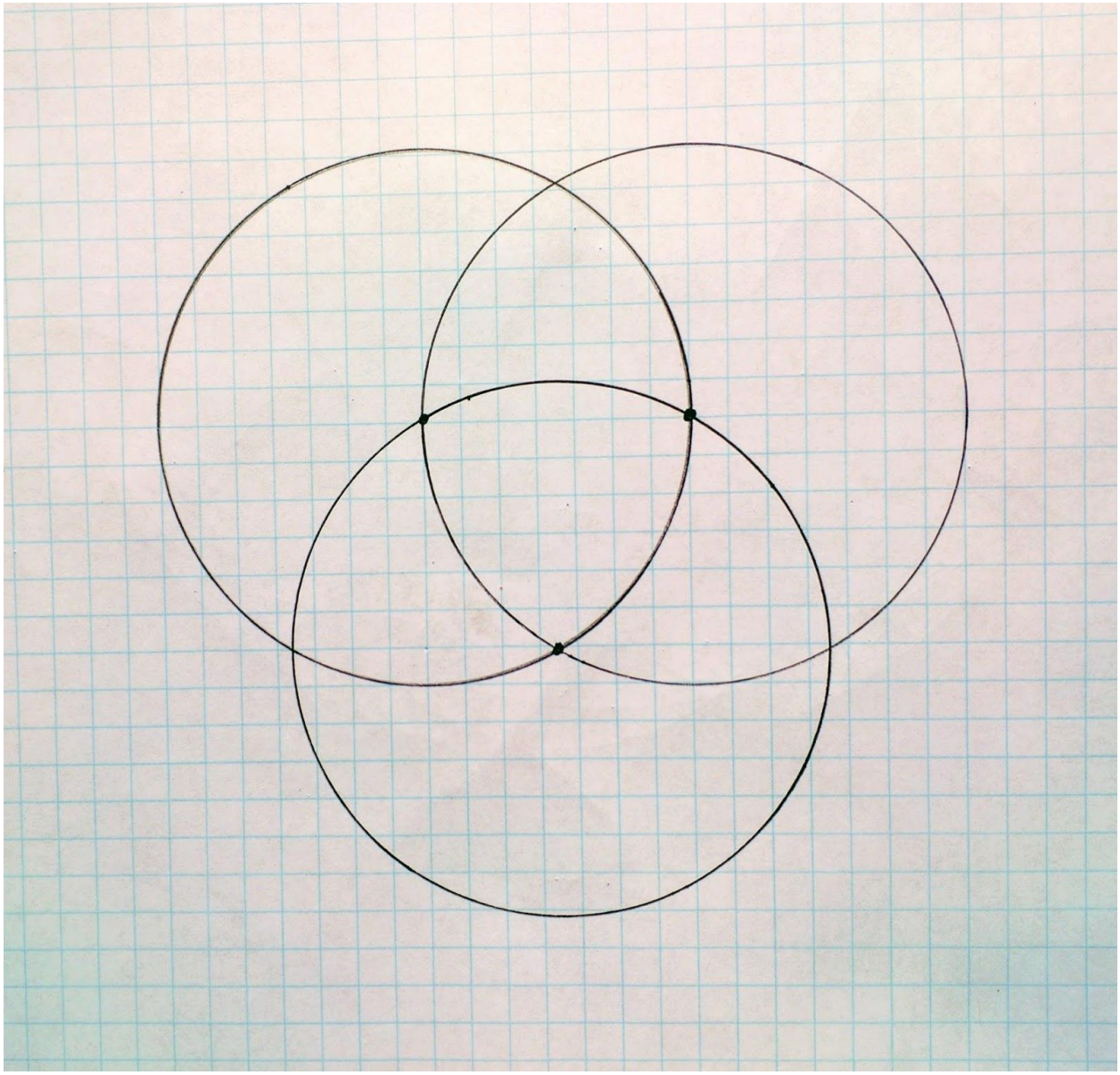
Going from a point, to a series of circles, then to a series of triangles and finally to a square, Renaissance artist/geometer Albrecht Durer developed a geometric progression that ultimately generates a pentagon--the ancient symbolic representation of the quintessential nature of the human form and being. The following sequence of steps reveals the geometric progression he may have taken:



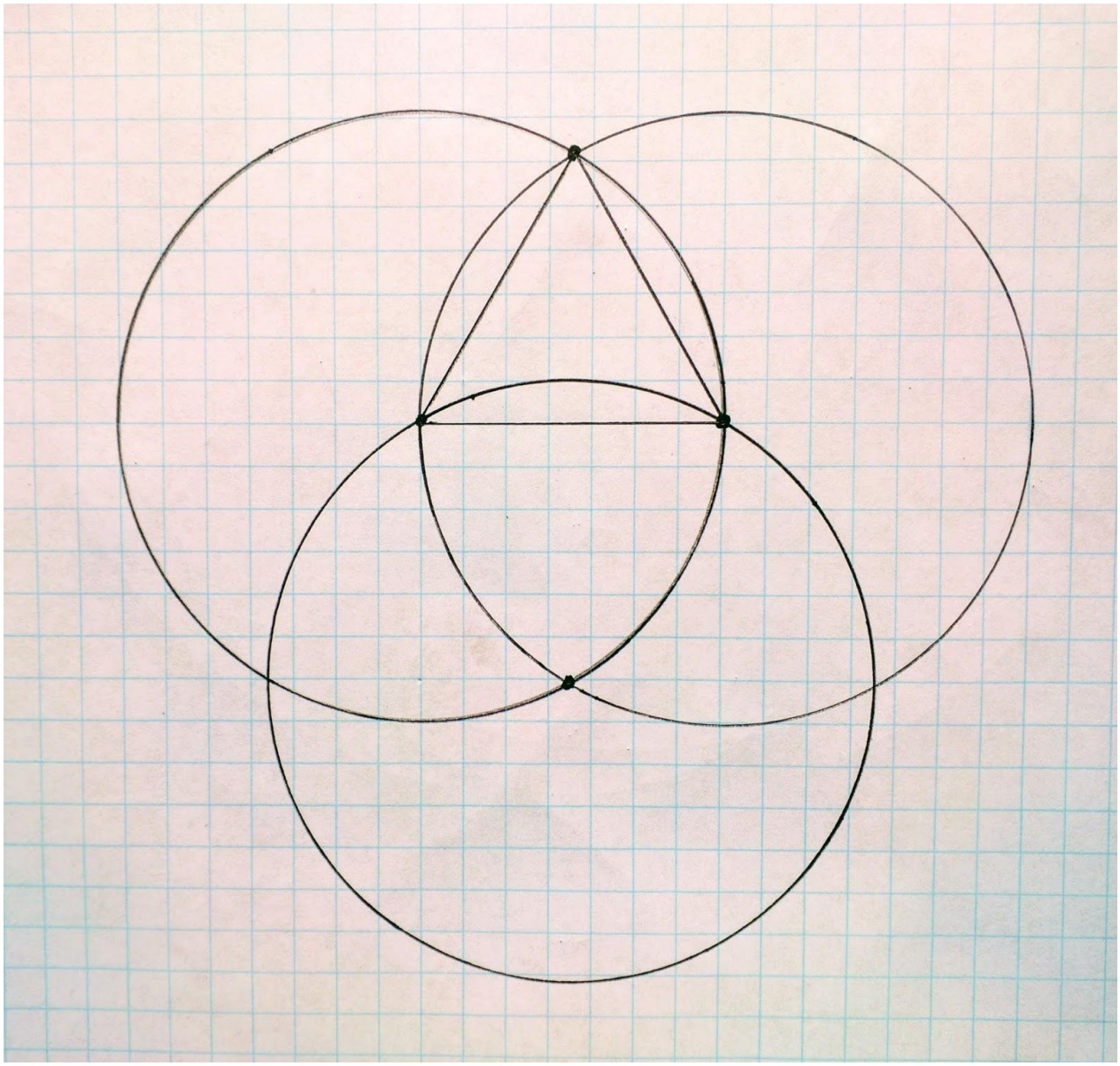
The First Step: Construct a circle. For the Egyptians, this figure represented their sun-god “Ra”. It also happens coincidently(?) to represent the atomic structure of hydrogen--which also happens to make up most of the sun’s mass. For the Greeks, this symbol took the name “Monad” (i.e. oneness). It represents self, truth, and indeed the universe (uni versus translates to one-turn--which also happens to be how you make a circle after stepping out a certain distance from a point with a compass).



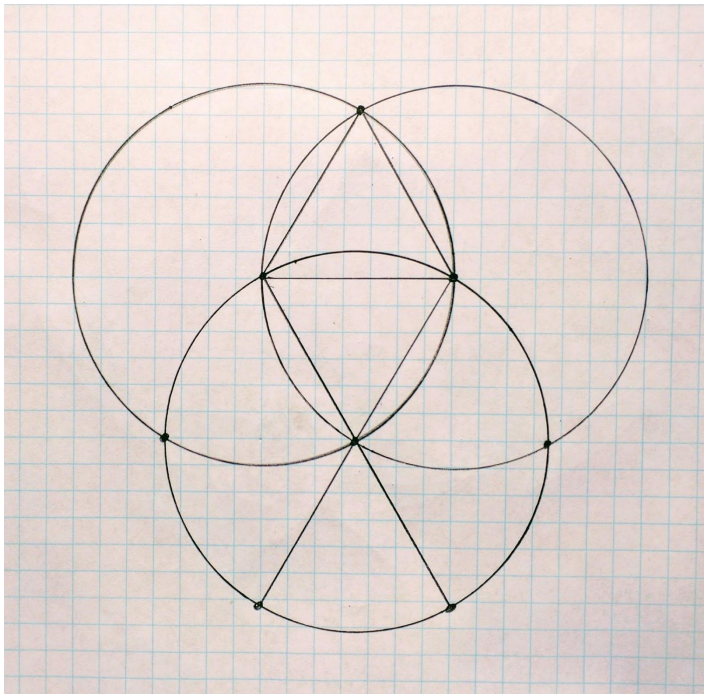
Second: Construct a second, same-sized circle by choosing a focal point (any point will do) on the rim of the first circle. We've just produced the Greek "Dyad"--a mirror of the Monad and thus a symbol of symmetry (i.e. same measure), duality, balance and the state of male and female.



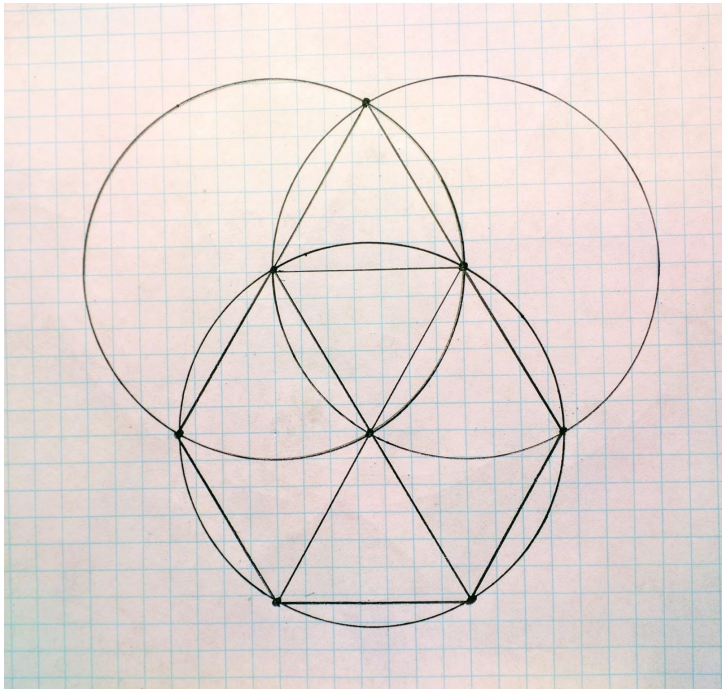
Third: Construct yet another circle using the lower rim intersection point of the first two circles as a focal point. We now have before us a representation of the Triad: An ancient symbol of birth, and later expressed in the trefoil tracery of Western cathedrals to symbolize the trinity. More recently, trinity became the symbol of radioactivity (action, reaction, resolution) and thus the operative name of the first nuclear bomb test.



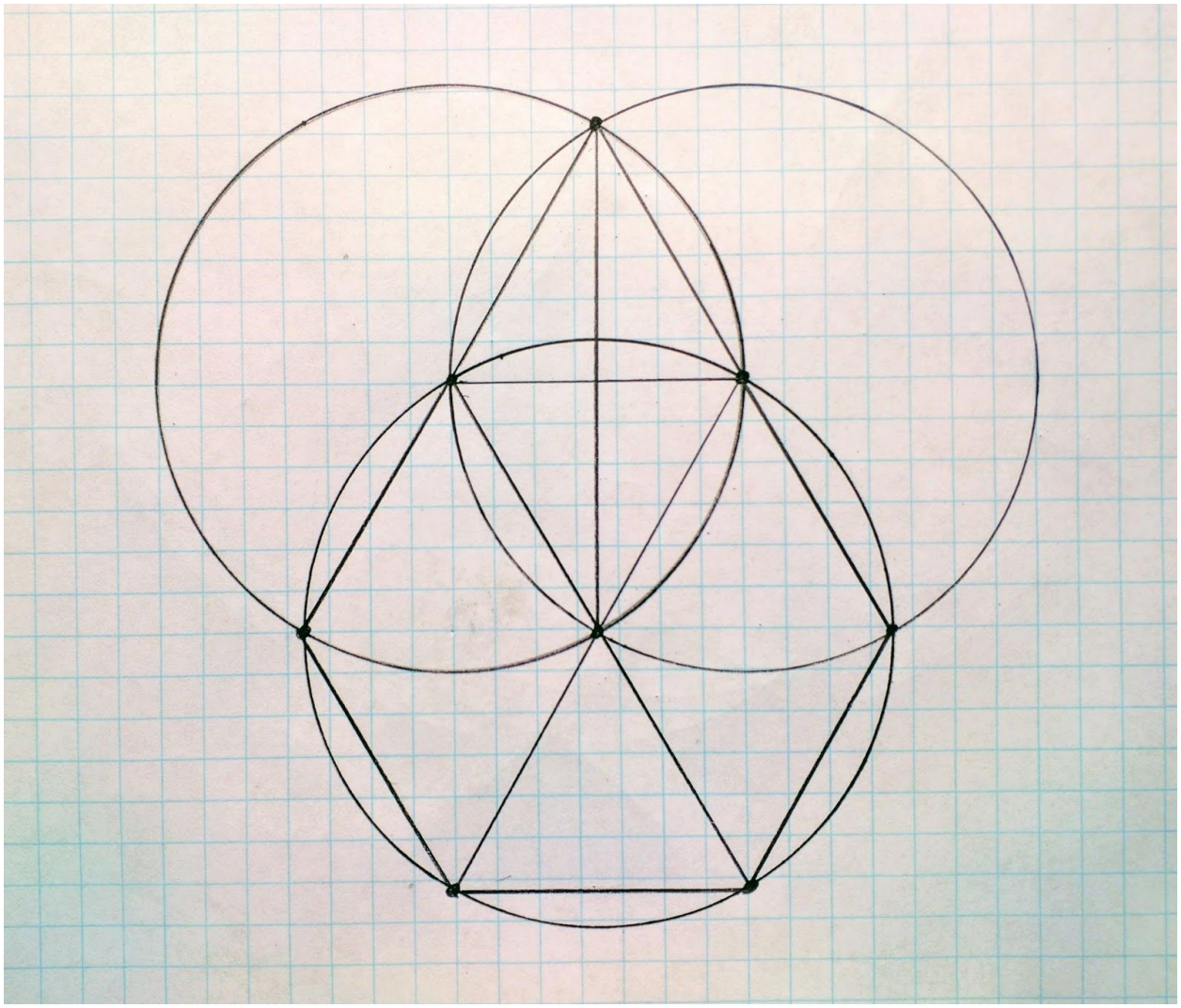
Fourth: By connecting the points provided by some of the circle's intersections, we can generate a two-dimensional shape with three angles--in this case an equal length, equal angle type of polygon (i.e. an equilateral triangle). For artisan builders, this triangle epitomizes stability and strength. (Unlike all other polygon-shaped structures, the equilateral triangle is the most resistant to distortion under load.)



Other intersection points allow us to create a second, bilaterally symmetrical triangle below the first.

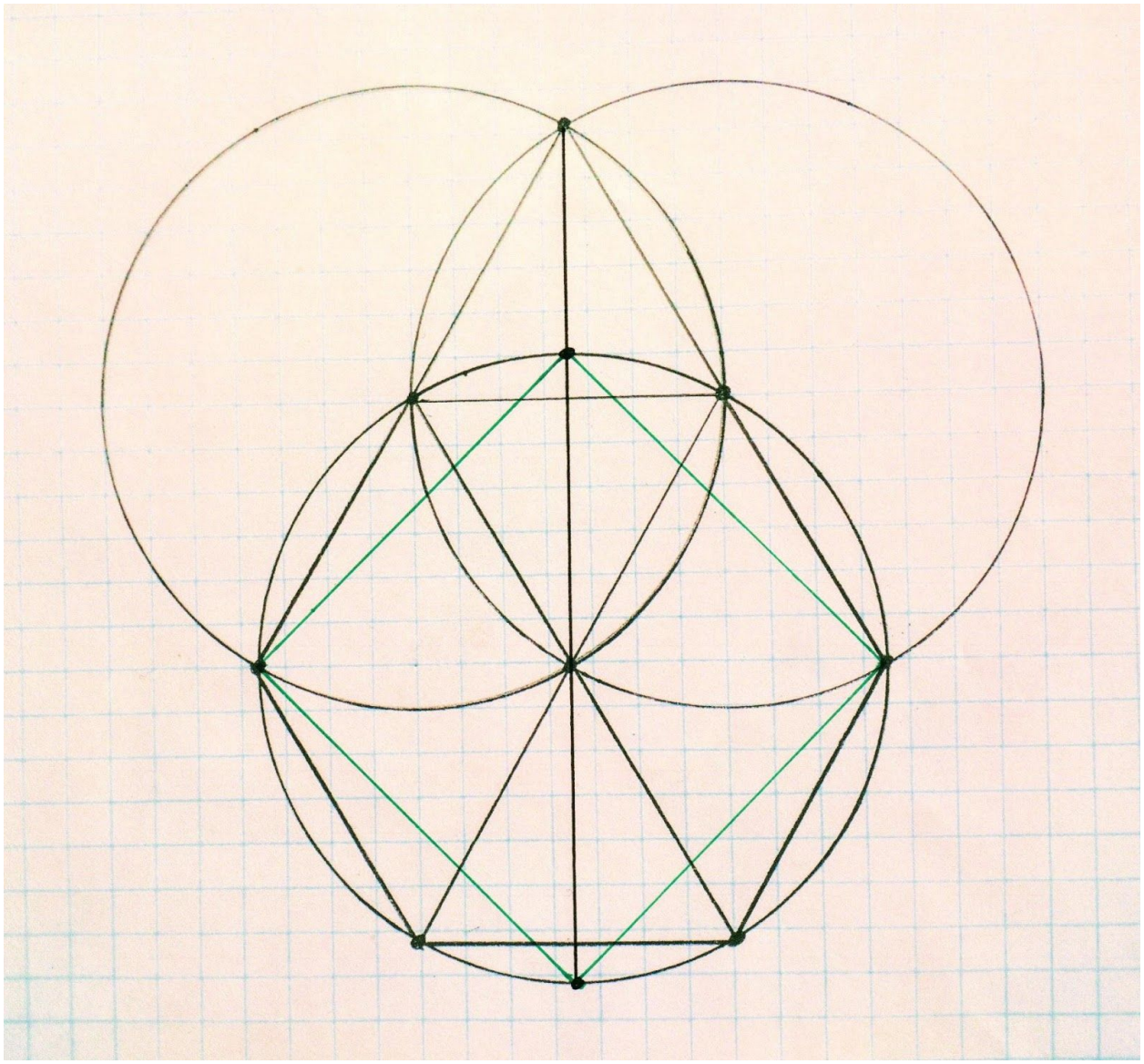


Continuing to fill in equal triangles creates a hexagon--an ancient symbol of creation (six days worth to be specific) and a modern representation of the carbon molecule--the fundamental building block of life forms (at least in this solar system if not galaxy).

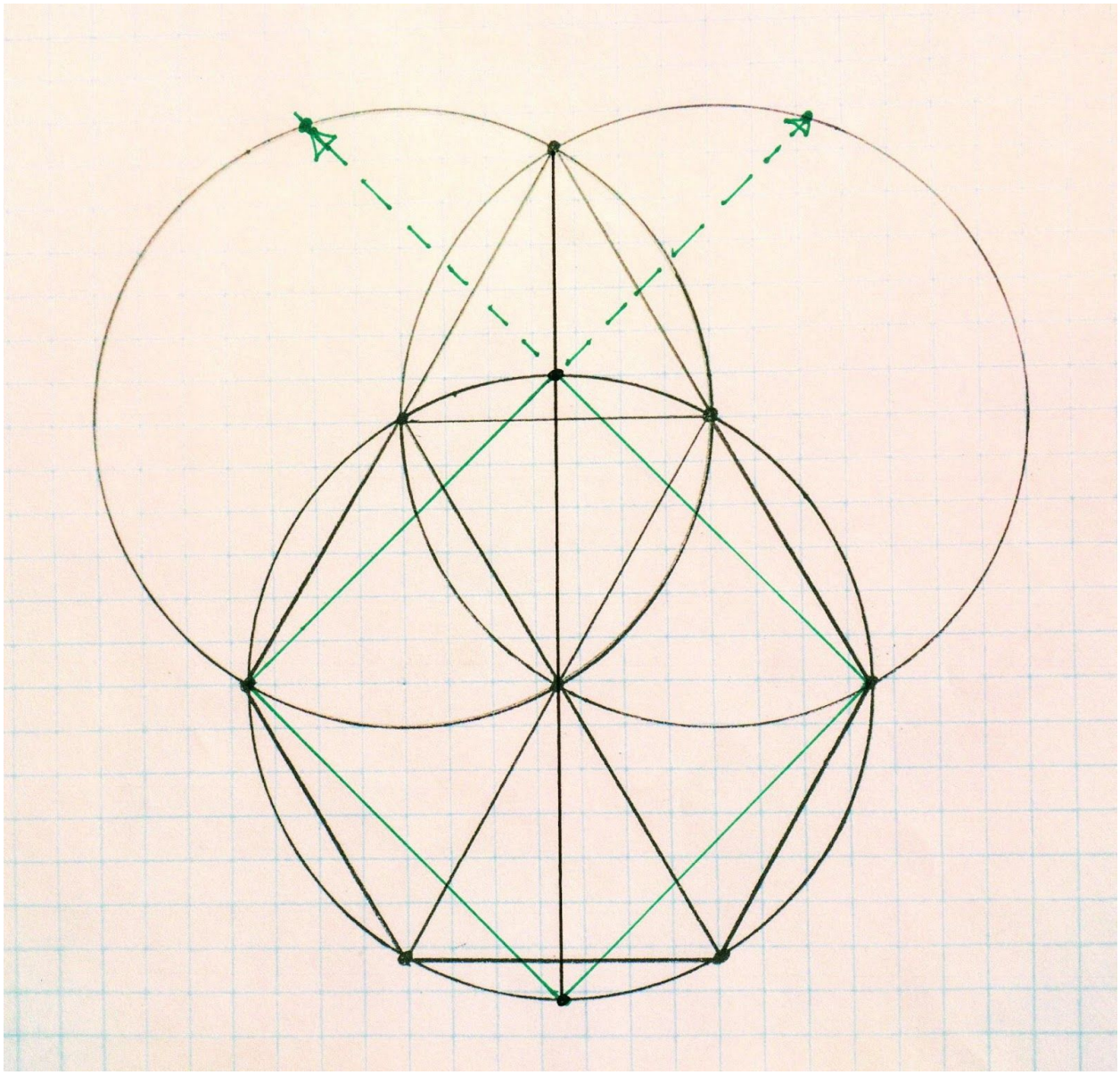


Fifth (We are not counting the last step that generated the hexagon because its creation is not strictly necessary and was not used by Durer):

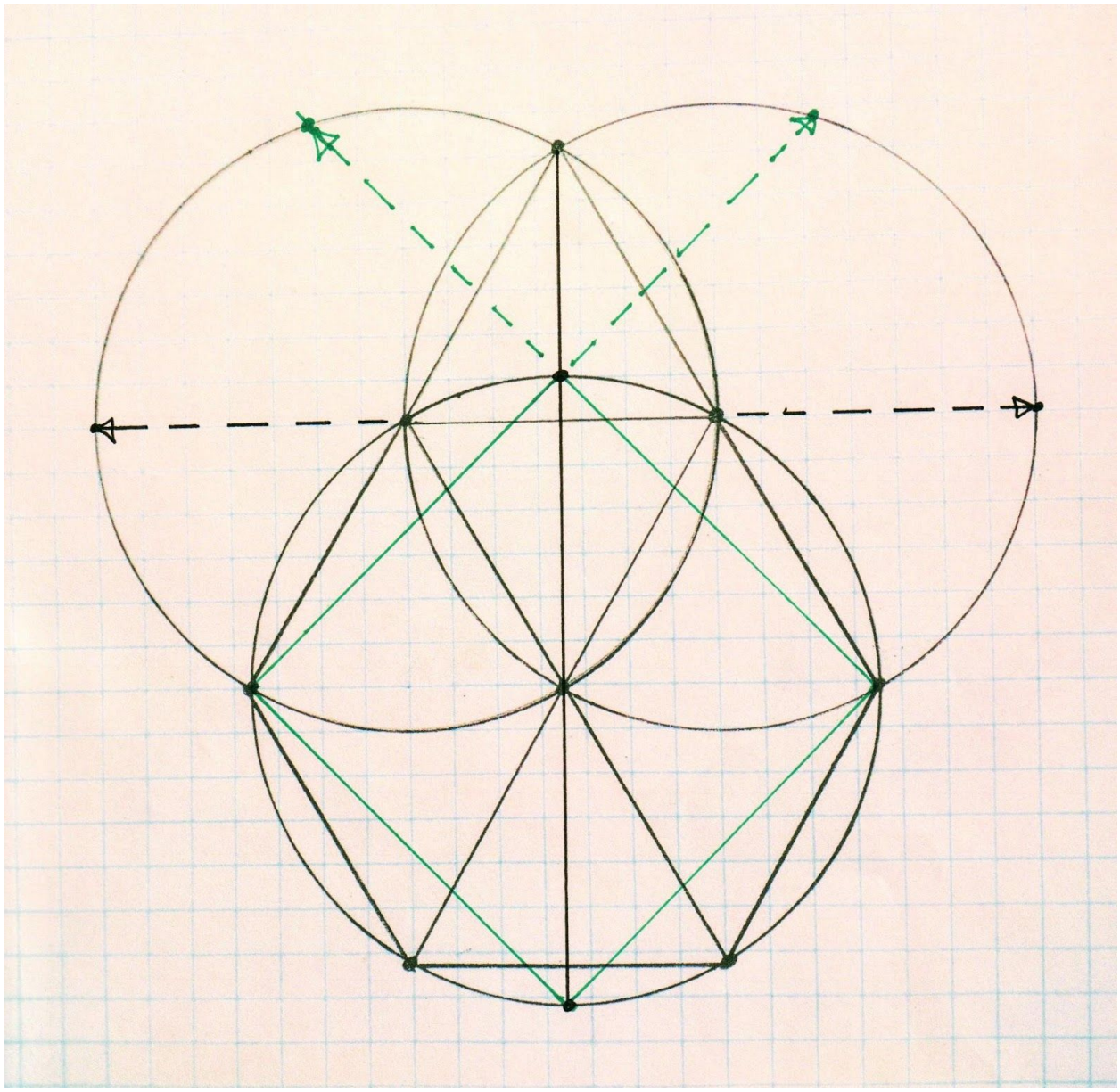
Draw a line between the upper and lower rim intersection points of the first two circles (the Dyad). The line connecting the Dyad's focal points is now bisected (i.e. cut exactly in two).



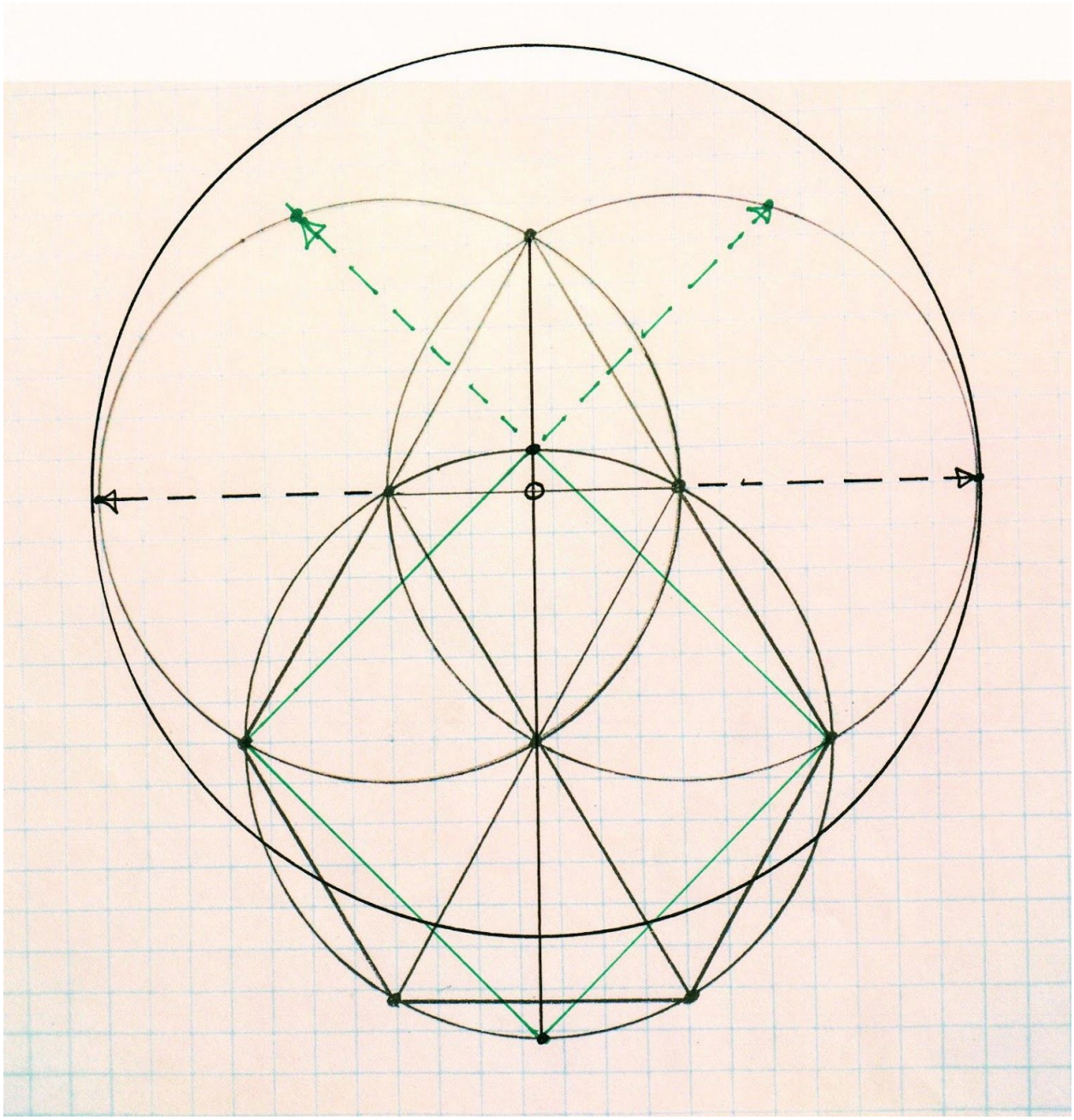
Continue the bisect line down to the bottom of the third circle and make a point on the rim. Also make a point where the bisect line passes through the top of the bottom circle. Connecting the four points as shown above, a describes a perfect square. Across many ancient cultures, this shape was symbolic of the earth, likely because four distinct and easily detectable events happen with precise regularity in this realm (equinox and solstice).



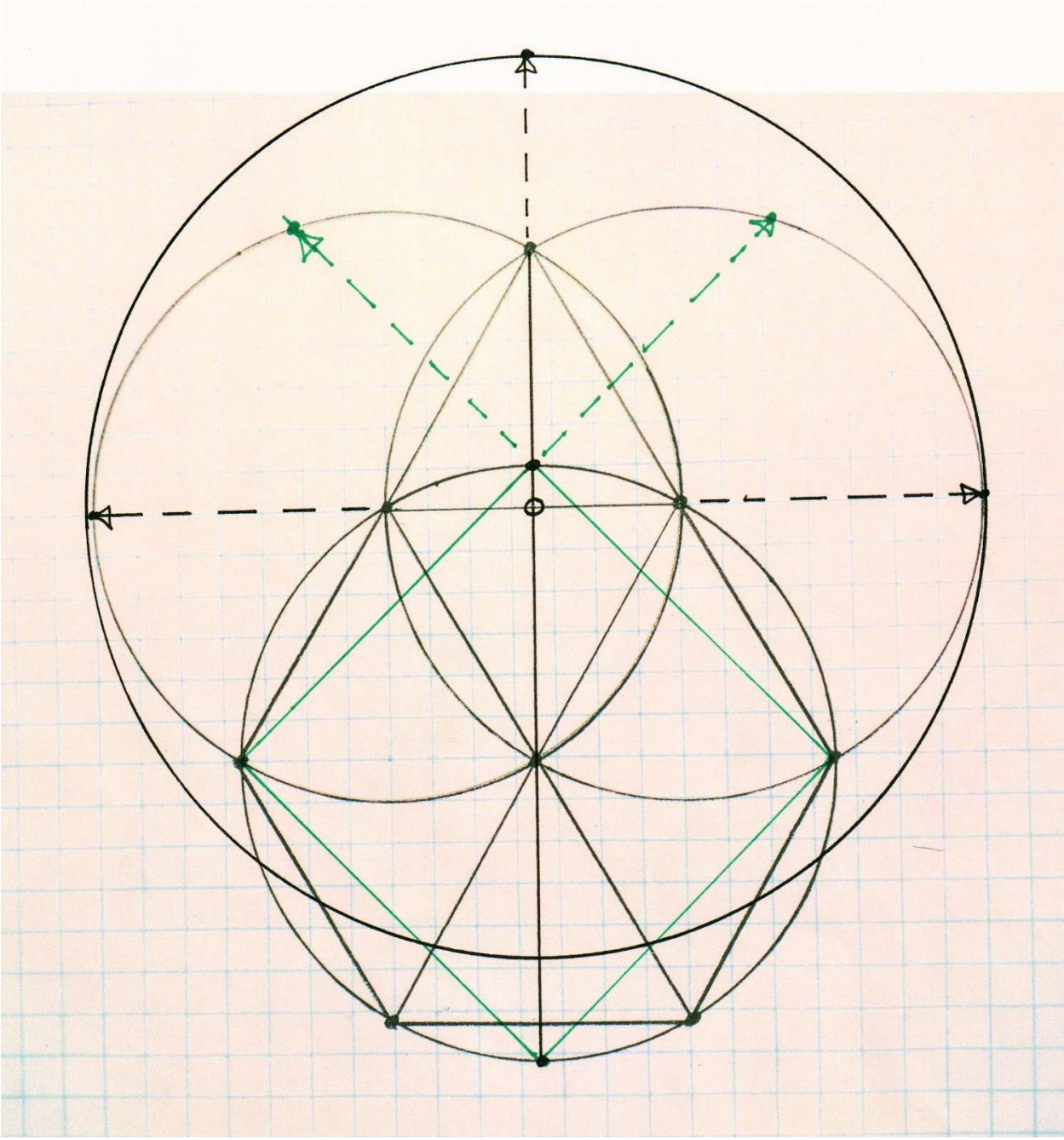
Sixth step: Extend the lines of the square up until they intersect the first two circle's rims as shown above.



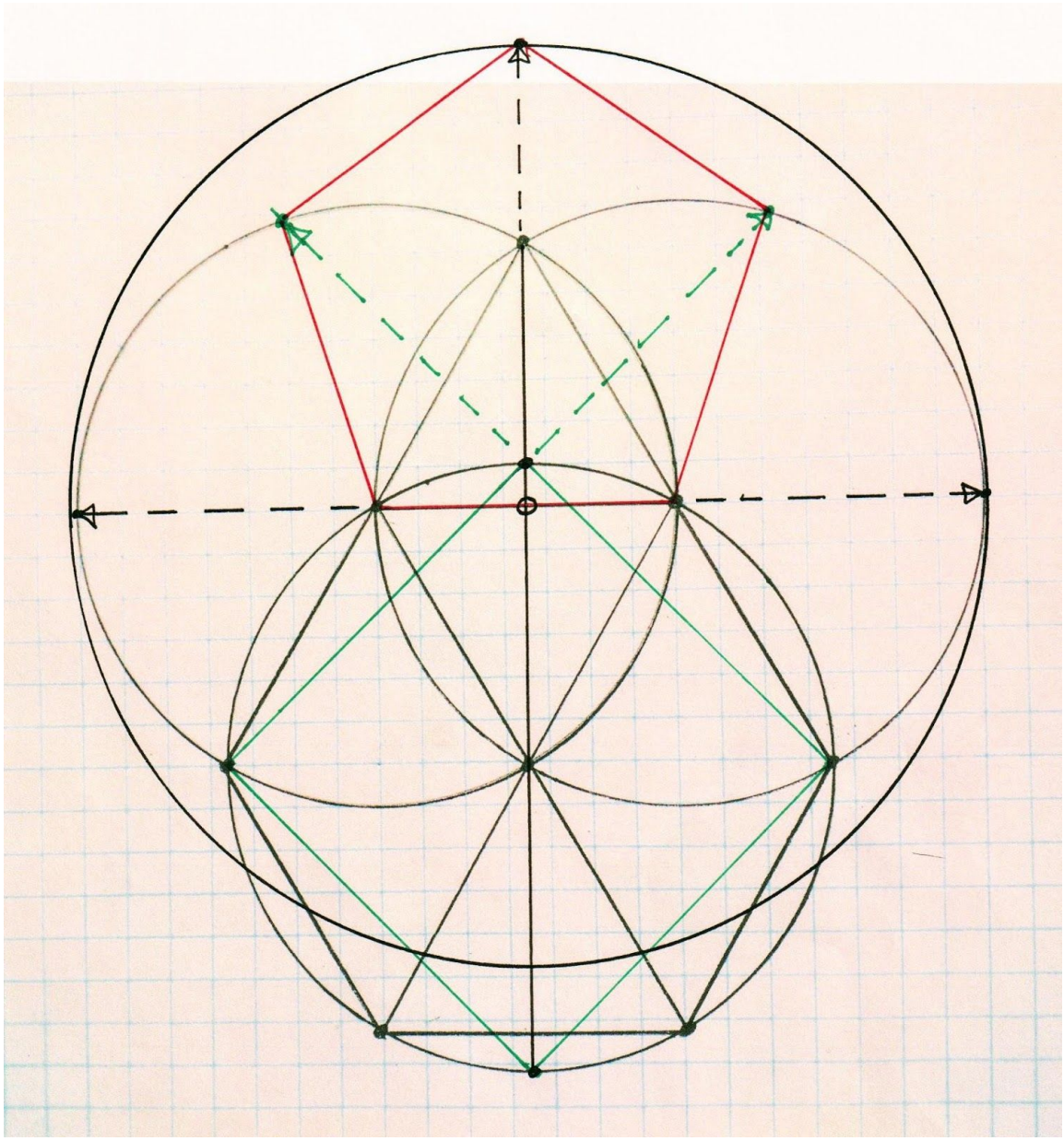
Seventh: Extend the line segment that was formed between the focal points of the first two circles so that they intersect the outer rims as shown.



Eighth: Next, using the span between the intersection of the bisected line and the outside of the first circle as a radius construct a fourth circle (the Greek “Tetrad”).

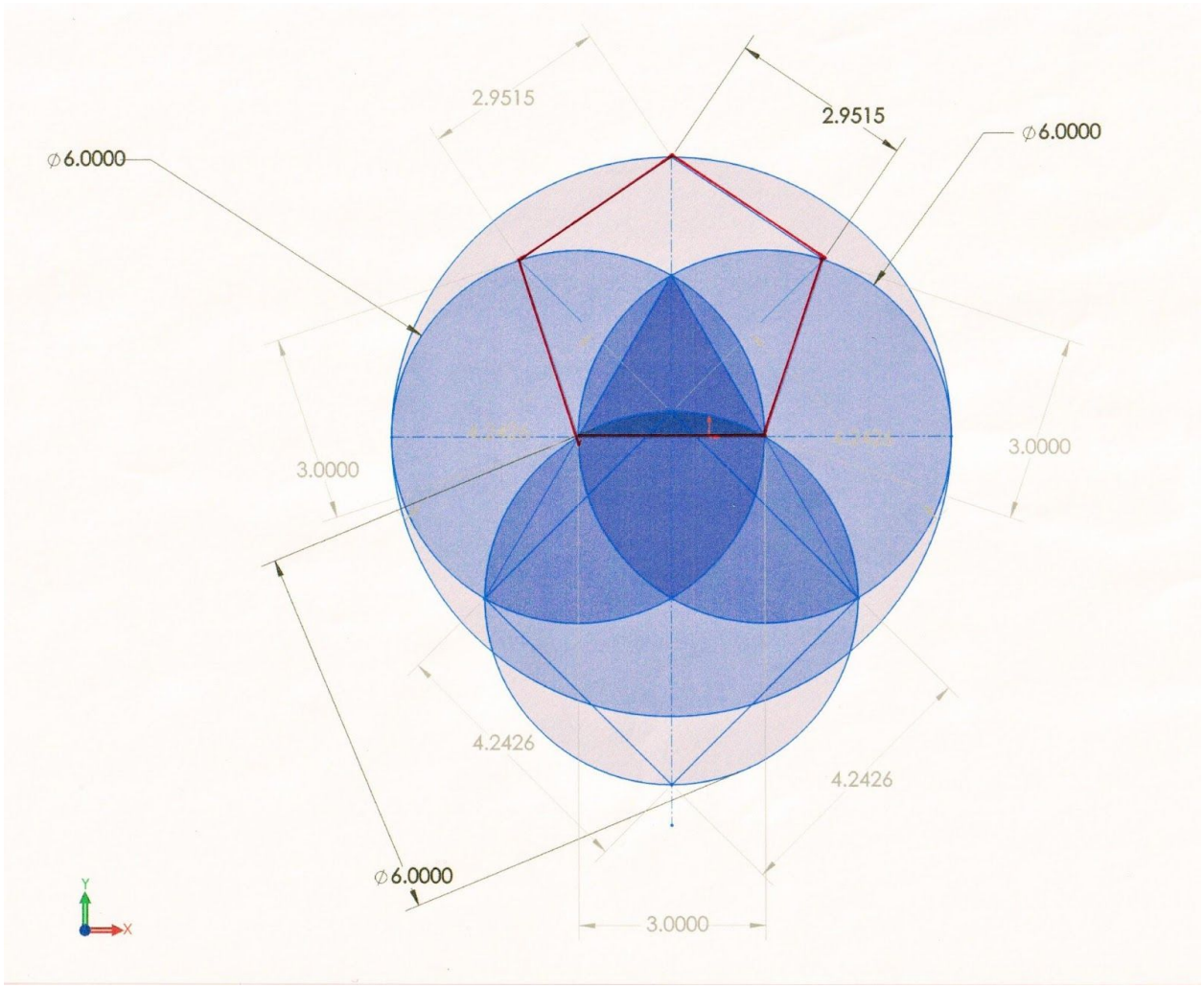


Ninth: Extend the vertical bisection line up to meet the rim of the Tetrad.



Tenth: Finish the construction by connecting the five points as shown. We have now created a pentagon. Its traditional symbology is prodigious, representing the five elements (spirit, water, fire, earth, and air) and the five vertices of the human form (which also subtends into five fingers and toes, not to mention the five senses). It is the quintessent (i.e. five essences), geometric expression of life itself.

Ah yes, but is it *really* a pentagon? The answer is yes and no. It is a shape with five straight sides, but unless the sides are of equal length and its vertices meet at equal angles it is not a “regular” pentagon but only an approximation of one. To find out, we ran the construction through a CAD program:



Rendering courtesy of McCluen Design

As you can see, the answer is no: It is not a regular pentagon. (The sides are not equal in length). But it's incredibly close to being one! The bottom line: Durer’s construction was not meant to be mathematically rigorous, but rather a familiar and efficient way to present the primary body of symbolically significant shapes that man has played with since the dawn of curiosity and craft.