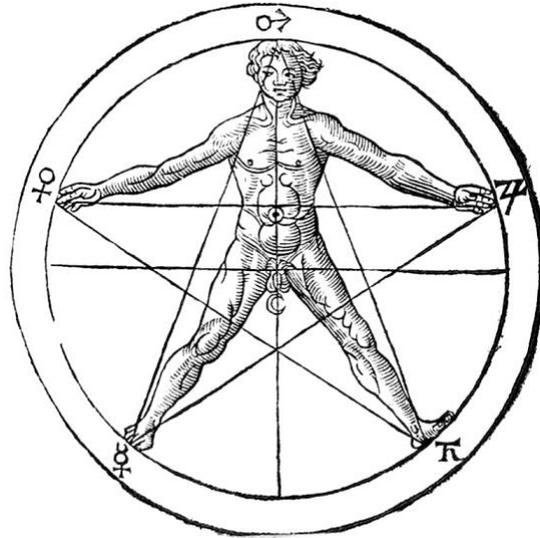


Φ CONSTRUCTION OF A PENTAGRAM Φ



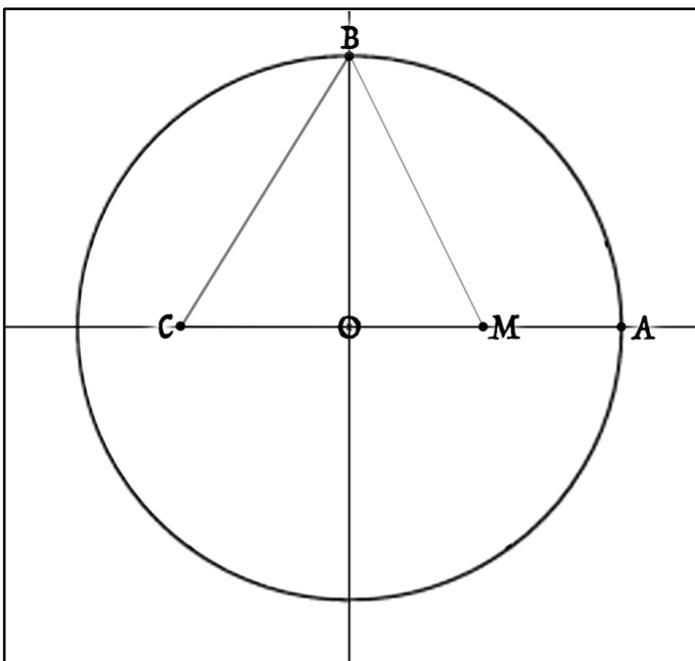
Heinrich Cornelius Agrippa:

Three books of occult philosophy, Book II. (part 3)- 1531 (1st ed.)

This particular image from English translation from 1650/51. Microcosm-Macrocosm. Geometry-Astro-nomy-logy

Homework: Construct a pentagram. [There is a video on our site showing you this construction.]

For this to work, you have to be very neat and accurate. Take your time. You won't know until you get to step 6 if you have been neat enough, because in step 6 you actually construct the pentagon and if you didn't do it neatly and accurately, the sides won't fit in the circle. If you don't have a compass, make one out of thin cardboard and a thumb tack or paper clip. [See Appendix 1 for instructions.]



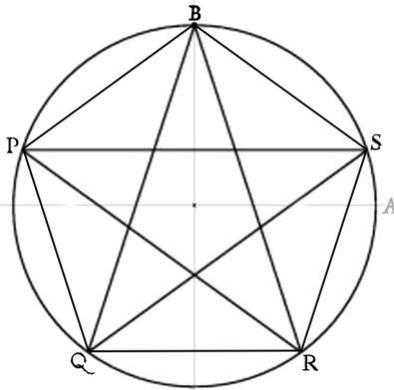
1) Start with a blank (preferably line-less) sheet of paper. Fold and lick (or cut) it to make a square.

2) Fold this square vertically and then horizontally to find the center of this square. Mark the center with a dot and label it "O." Then use a compass and draw a circle with a radius that approximates what you see to the left. Also, using a straight-edge, lightly draw lines on the vertical and horizontal folds and label the points "A" and "B" [3:00 and 12:00] as you see in the diagram on the left.

3) Using your compass, find the midpoint between O and A and label it M. [If you are not sure how to find a midpoint, see Appendix 2 at the end of this PDF.]

4) Using any old sheet of paper or the straight-edge as a ruler, measure the distance MB exactly and transfer that measurement onto the horizontal line with one end at M. Call the other end of this measurement, "C." I.e. the distance MB = MC. [See figure.]

5) Again using a sheet of paper as a ruler, very accurately measure the distance between C and B. This is the objective—the length of CB. This is the measurement of a side of the pentagon inscribed in this circle.



6) Use the measurement, CB, to mark off a pentagon. Starting at B, just walk this measurement [CB] around the circle. Meaning, BP, PQ, QR, RS, and SB are all CB in length. It is at this point that you will see how careful you have been. If all went well, you will walk this measurement around the circle in exactly 5 steps. If you are off by more than a little bit, you might have to start all over again and up your game in terms of accuracy. Once you have 5 equally-spaced set of dots at B, P, Q, R, and S, then connect the dots with lines and you get a pentagon.

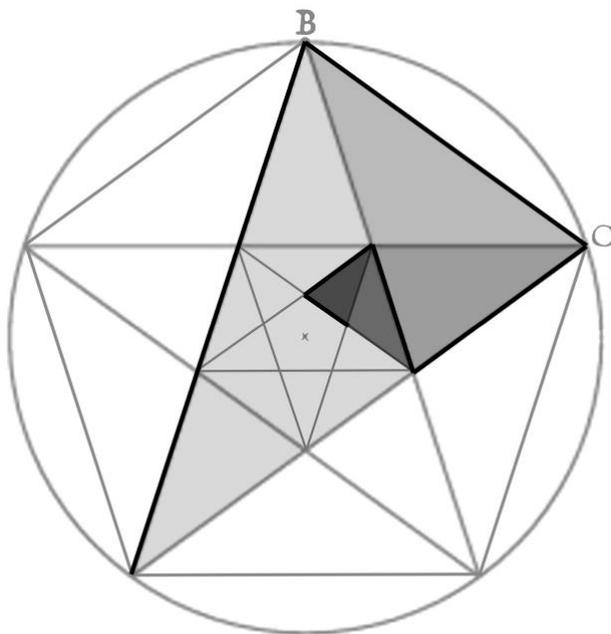
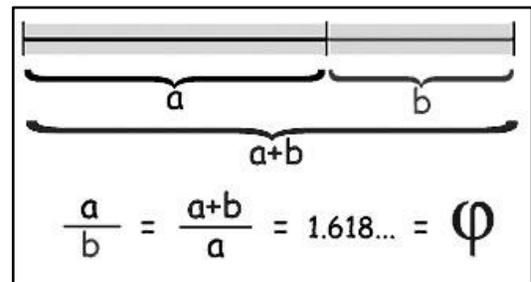
9) Keep connecting the dots across from each other and you get a star. The combined construction is a pentagram. [Place candles at all intersections and sing something creepy.]

10) Notice that the center of the star is another pentagon. [If you connect those vertices you get another star with another pentagon.... You could go on and on forever.]

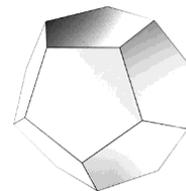
All straight line segments in this diagram relate to one another by the Golden Section or Golden Ratio.

Notated either *phi*, or one over *phi*.

$$\phi \cong 1.618 \quad \text{or} \quad 1/\phi \cong 0.618$$



Look at all the similar triangles in the diagram to the left. All are Golden Isosceles Triangles, meaning that their bases relate to their sides by the Golden Ratio, ϕ . And these Golden Relations can be scaled up to 3D... the dodecahedron, the Platonic Solid with 12 pentagonal faces.



ϕ is everywhere in the dodecahedron.

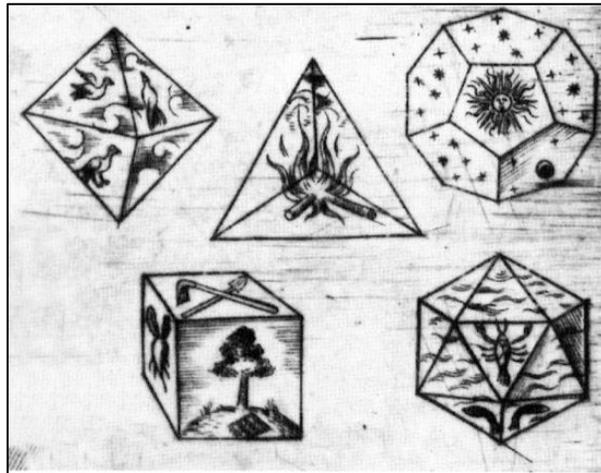
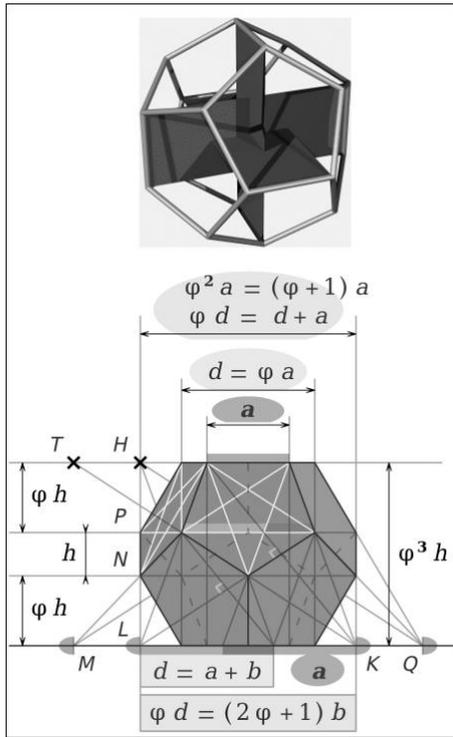


FIGURE 2.2. The regular polyhedra and their elements
From *Harmonice mundi*

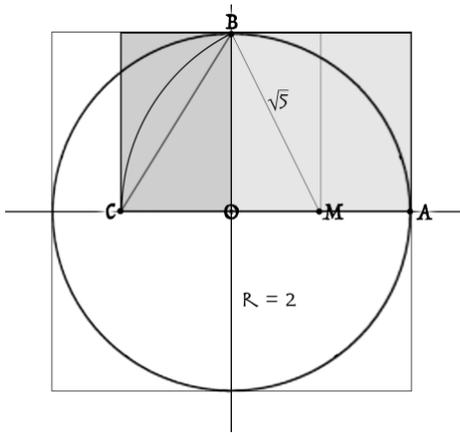
“Platonic” Polyhedra with corresponding elemental images

- 4 faces: Tetrahedron – fire
- 6 faces: Cube – earth
- 8 faces: Octahedron – air
- 12 faces: Dodecahedron – ether
- 20 faces: Icosahedron – water

Left: Analysis of Golden relationships in the dodecahedron.

The dodecahedron was associated with the aether, quintessence, the fifth element... the stuff of the heavens.

Right: Diagrams of the 5 Elements from Kepler's *Harmonices mundi* (1619).

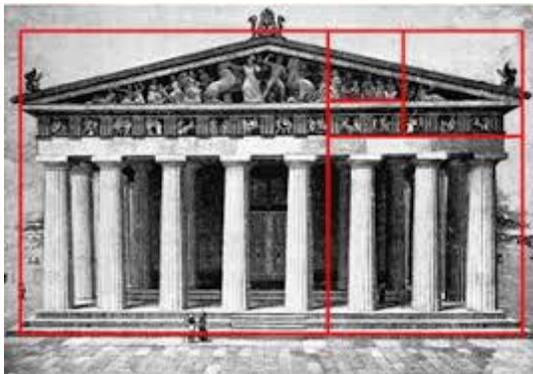


There is also a rectangular version. The lengths of the sides are related by the Golden Ratio. We actually constructed it in our pentagram construction. See diagram at left.

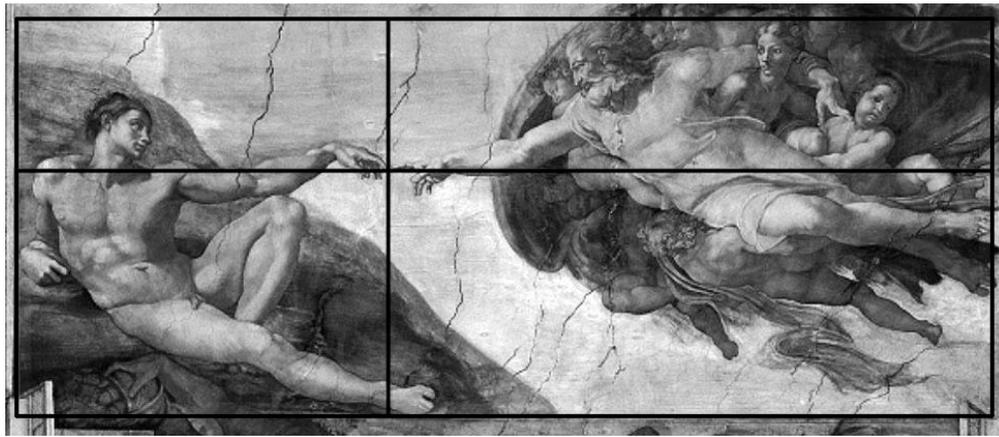
From this construction the Golden Spiral can also be constructed.

[See Video]

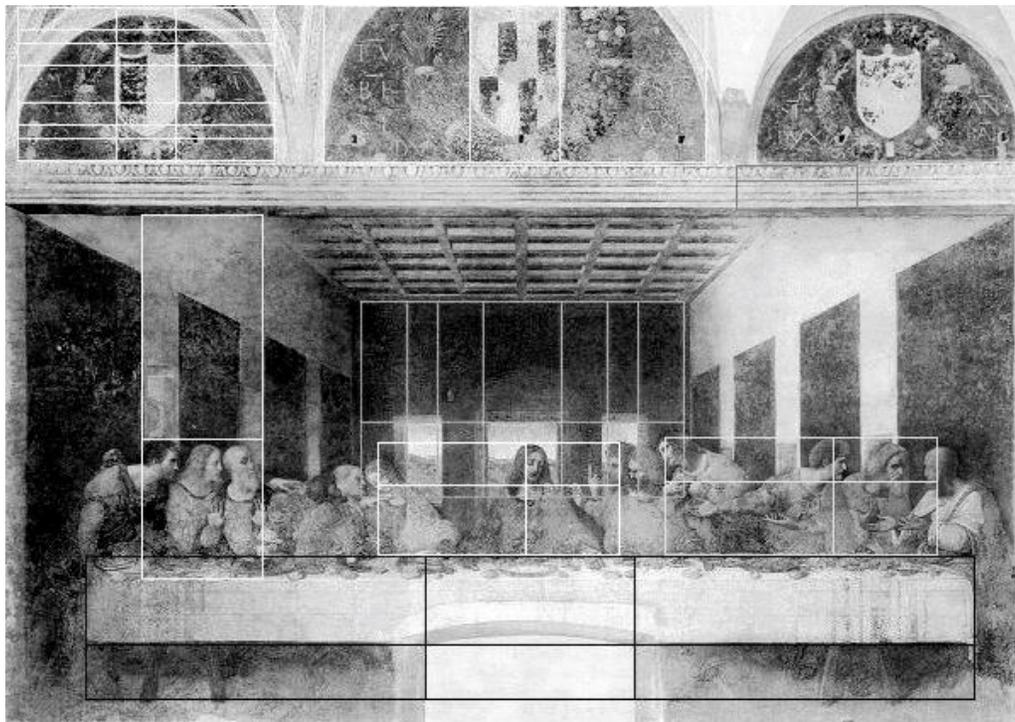
Let loose the quacks!
There is a cottage industry of finding the Golden Ratio in anything and everything.
All hell breaks loose...



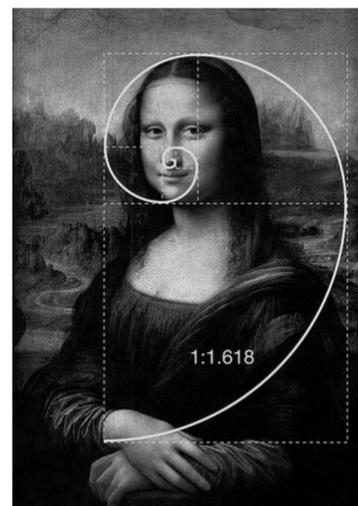
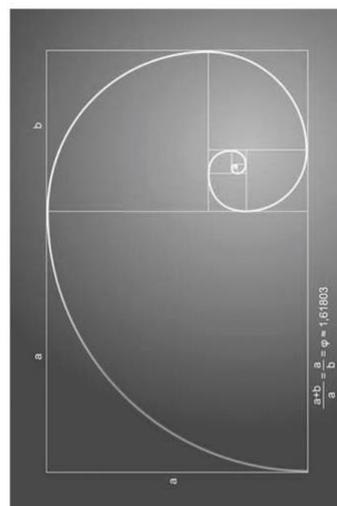
Parthenon, Athens, Greece (5th century BC) [1 : φ] [Reasonable-ish]



Michelangelo, *Creation of Man*, Sistine Chapel Ceiling, ca. 1510. [1 : 1 + φ] [Pushing it]



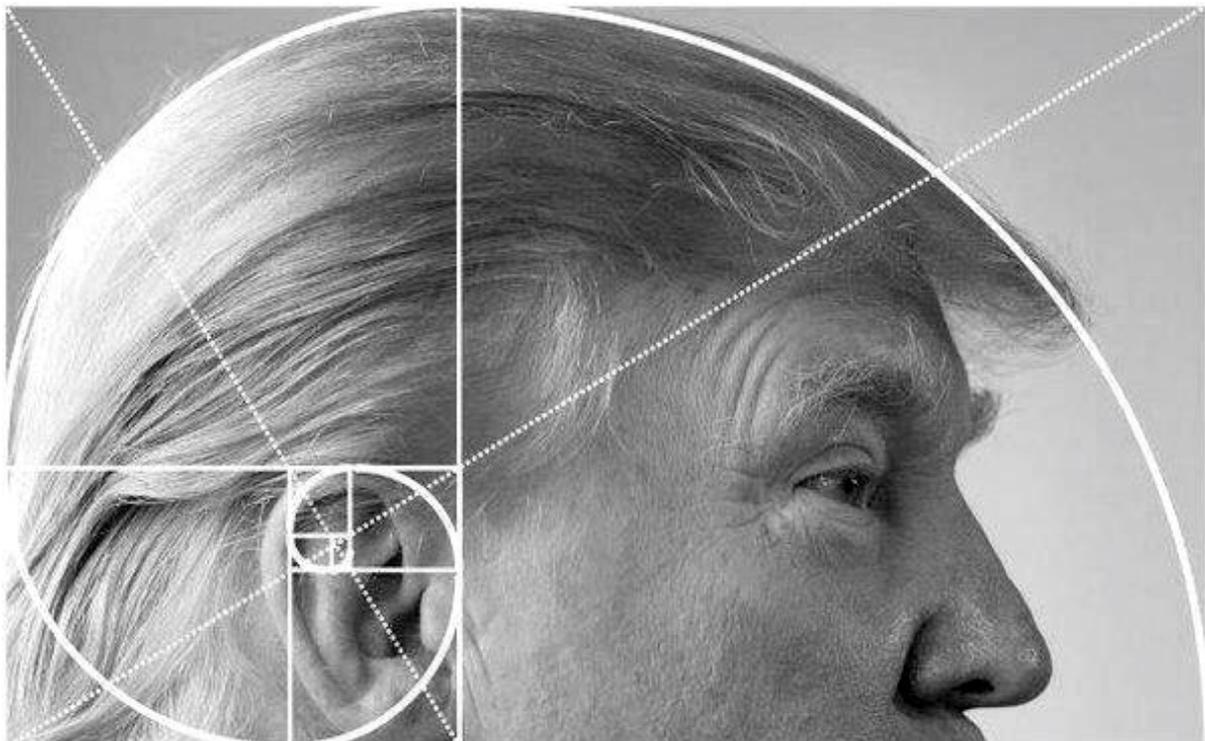
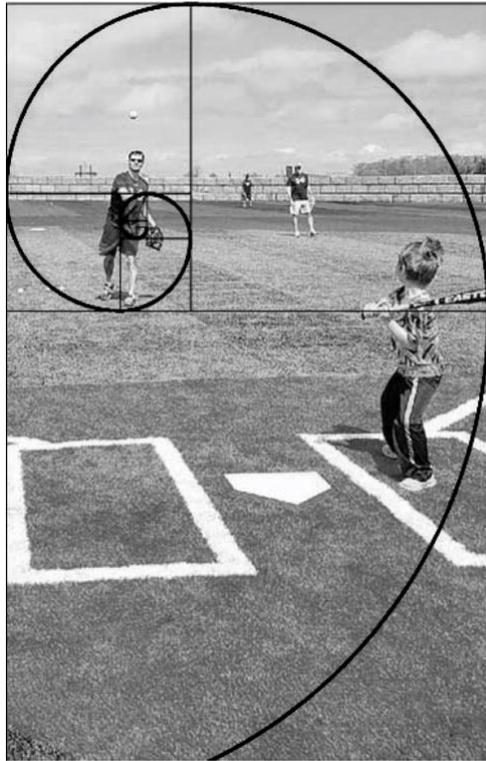
Leonardo da Vinci, *The Last Supper* (1490s) [φ is everywhere... focusing on Jesus' neck. What might that mean?]



Leonardo da Vinci, *The Mona Lisa* (ca. 1505)

[φ up the nose. Leonardo must have used the Golden Ratio! The nose proves it!]

Once you start looking it's everywhere!... [Random images take on new meaning.]
Just search the internet and find the Golden Ratio in the most mundane things...
What does it all mean!?!





M. C. Escher

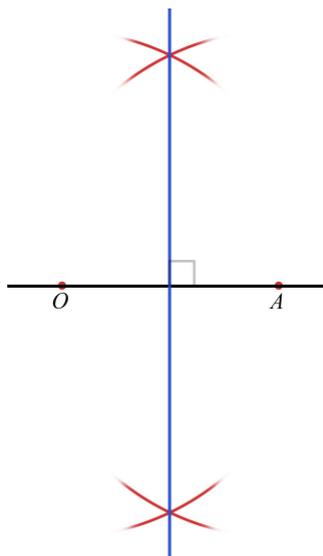
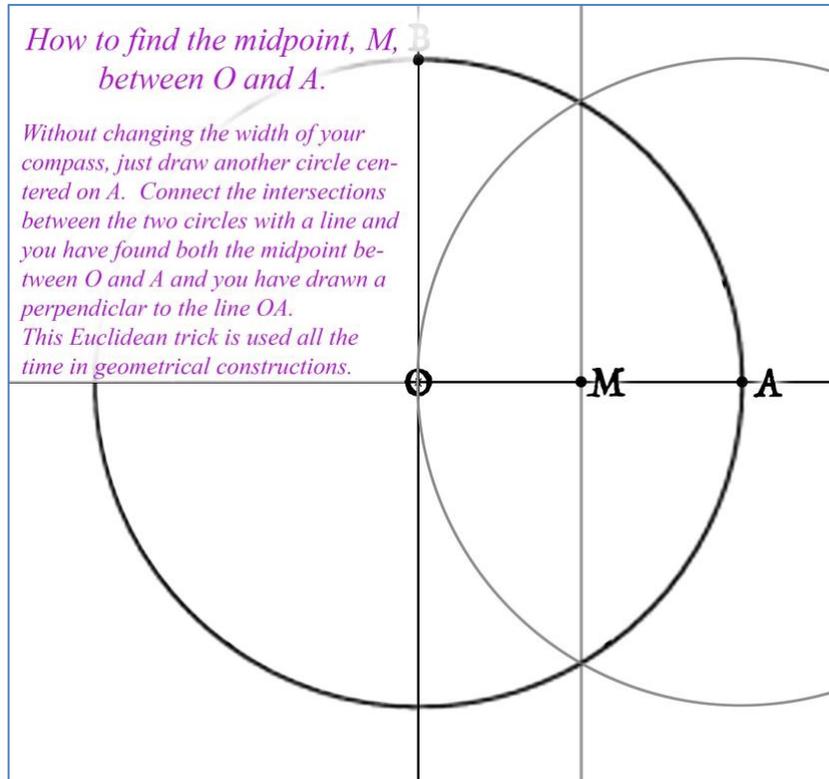
Appendix 1

DIY Home-made Beam Compass.

Level: Easy

See Video.

Appendix 2



More generally, to find the midpoint of OA , set your compass to a size that is approximately the distance between O and A .

Then draw intersecting arcs [red] above and below the line, one centered on O and the other on A .

Connect the points made by the intersections and the line [blue] will be both perpendicular to OA , and it will also bisect it, meaning that it will divide OA exactly in half.