

God – the great geometer

[Religion](#), [God](#)



Since the dawn of mathematics, humans have tried to use its methods to answer this question: What are we, and everything around us, made of? The ancients believed that the world was made up of four basic "elements": earth, water, air, and fire- "for the Creator compounded the world out of all the fire and all the water and all the air and all the earth, leaving no part of any of them nor any power of them outside" 1. Around 350 BC, the ancient Greek philosopher Plato, in his book *Timaeus*, theorized that these four elements were all aggregates of tiny solids (in modern parlance, atoms).

He went on to argue that, as the basic building blocks of all matter, these four elements must have perfect geometric form, namely the shapes of the five "regular solids" that so enamoured the Greek mathematicians -- the perfectly symmetrical tetrahedron, cube, octahedron, icosahedron, and dodecahedron. As the lightest and sharpest of the elements, said Plato, fire must be a tetrahedron. Being the most stable of the elements, earth must consist of cubes. Water, because it is the most mobile and fluid, has to be an icosahedron, the standard solid that rolls most easily.

As to air, he observed, somewhat strangely, that "... air is to water as water is to earth," 2 and concluded, even more mysteriously, that air must therefore be an octahedron. Finally, so as not to leave out the one remaining regular solid, he proposed that the dodecahedron represented the shape of the entire universe. To our modern eyes, it is hard to believe that an intellectual giant such as Plato could have proposed such a whimsical theory. What on earth led him to believe that the geometer's regular solids could possibly underlie the structure of the universe?

In fact, although the particulars of his theory can easily be dismissed as fanciful, the philosophical hypotheses backing it up are exactly the same as those that drive present day science. Namely, that the universe is assembled in an ordered fashion that can be understood using mathematics. To Plato, as to many others, as Creator of the universe, god must surely have been a geometer. Or, as the great Italian scientist Galileo Galilei wrote in the seventeenth century, " In order to understand the universe, you must know the language in which it is written.

And that language is mathematics. " 3 As a way to show how much Plato believed that god was a geometer he said " God ever Geometrizes" 4 It is important to remember that all the founding fathers of modern science were religious men eager to show the glory of God by giving people a better understanding of 'His' wonderful creations. They imagined God very much as Plato had - as a geometer. Mathematics, Galileo said, was the language in which all nature was written. And so the most important task of reborn science was to discover the mathematical laws by which God had created the world.

Rene Descartes - another founding father of modern science - invented a new mathematics along with a whole new framework for the religious-scientific worldview. In this view, God was not only a geometer, but a 'Grand Engineer' Using mathematical laws, God had not only created a cosmic clockwork, but had put into it incessant smaller mechanical inventions such as plants, animals and people. Descartes was adamant there was no fundamental difference between man-made machines such as clocks, grain

mills, or jewelled golden wind-up birds that sang and the living, breathing mechanisms God had created.

He was certain that God's were more complex, but man could learn that complexity. This became the dominant worldview of all science. Geometric shapes, in various combinations, are behind the forms of everything that exists in this world, from the motions of the heavenly bodies to the structure of atoms. They can be heard as harmonies in music. They can be experienced in good social relationships and in the order of one's own mind. The Creator's first act was bring order to chaos by enclosing it in a sphere - the most perfect figure in geometry.

He then " separated the light from the darkness" That operation is depicted in creative geometry by drawing a circle around a central point and constructing a square inside it. (Figure 1) A circle contained within that square has an area of half the original circle, so the light within it and the darkness around it are equal. Next, he separated the dry land from the ocean. To imitate that, you divide the inner circle into six parts by use of the compass. Inside it you can then draw a rhombus, a diamond shape made up of two equilateral triangles.

The diagram now contains an inner circle and two concentric rings. Their respective areas, beginning at the centre, are 1, 2 and 3. This diagram has numbers and measures attached to it. The first, outer circle represents the whole universe and the 12 gods or astrological dominants that rule it. Its area is therefore 'factorial 12' - meaning the numbers from 1 to 12 multiplied

together. From that you can calculate that the radius of the inner circle is 5,040, or factorial 7.

This inner circle with radius 5,040 (or $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7$) represents the 'sublunary' world, or world beneath the moon, in which we live. It is called the cosmological circle or Holy City diagram. Even as recently as 1956, Paul Dirac, one of the founders of quantum mechanics, wrote " a physical law must possess mathematical beauty" 5 When it comes, to quantum mechanics, mathematics becomes even more complicated, and Margaret Wertheim once said "" These days, God isn't a geometer, he does origami. " People have now realised how complicated the geometry of the universe is.

Supposedly, over the door of the academy of Plato and the Pythagoreans were the words " Let on one ignorant of geometry enter" 6 This certainly show how important these people felt that geometry was particularly in it's relation to god. Lynn Arthur Steen described mathematics as " the science of pattern" 7. All these more modern mathematicians and scientists that I have mentioned echo Plato's assertion that 'God ever geometrizes'. Geometry involves exact figures such as are not really to be found in our everyday world. Bertrand Russell is good on this point.

He speaks of how " This suggests the view that all exact reasoning applies to ideal as opposed to sensible objects... mathematical objects... if real at all, are eternal and not in time. Such eternal objects can be conceived as God's thoughts. Hence Plato's doctrine that God is a geometer... ". 8 There were only six planets known in Kepler's time: Mercury, Venus, Earth, Mars, Jupiter

and Saturn. Kepler wondered why only six? Why not twenty or a hundred? (he was that convinced that everything in nature, created by god must have a mathematical link and a symmetry) Why did they have the spacing between their orbits that Copernicus deduced?

There were known to be five regular or "Platonic" solids, whose sides were regular polygons, as known to the ancient Greek mathematicians after the time of Pythagoras. Kepler thought that the two numbers were connected, that the reason there were only six planets was because there were only five regular solids, and that these solids, inscribed or nested one within another, would specify the distances of these planets from the Sun. In these perfect forms, he believed he had recognized the invisible supporting structures for the spheres of the six planets.

The connection between the solids of Pythagoras and the disposition of the planets could admit but one explanation: the hand of god, geometer.

Symmetry in nature is varied and widespread- in water, a cylinder, bark of a tree, stones, convection, corn circles, the human body, starfish, step patterns of a cat, a camel, an elephant, a horse, crystals, the Milky Way, the oscillations of the sun, worms, frogs, snails, pigeon flight (all of these are mentioned in the book 'Fearful Symmetry- is god a geometer? See footnotes).

There are many different 'types of geometry which god uses- Euclidean geometry for the bodily form, conformal geometry to map ones visual senses to the brain, differential geometry to string muscle fibres through one's heart, Riemannian geometry to bend the universe and create gravity,

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symplectic geometry to let there be light. But perhaps this is not so- the aforementioned are all human inventions, things that humans have created to help us lump natural phenomena into categories that are small enough for our simple minds to encompass.

We like easy and straightforward patterns. Humans attempt to comprehend the intricate geometry in nature, and each time a new type is discovered, we attempt to handle it, and point out imperfections- but god accepts them without doubt. So, we can see that god is a geometer, although he/she is much better at it than we are, or ever can be. As Kepler and the Greeks saw god as 'Geometer', and Newton saw God as 'Watchmaker', we now see god as a 'Computational Process'- the idea steadily gets more complex as the years go on and we realise the complexity of the universe.