Gallileo's Sidereus Nuncius: 1610 Proof

Or did the Telescope really disprove Ptolemy and prove Copernicus?

3rd International Conference on Absolutes
Houston, Texas, July 16-18, 2007

Motivation

Shown here is the typical scientific flowchart model taught for general public and colleges giving the impression that:

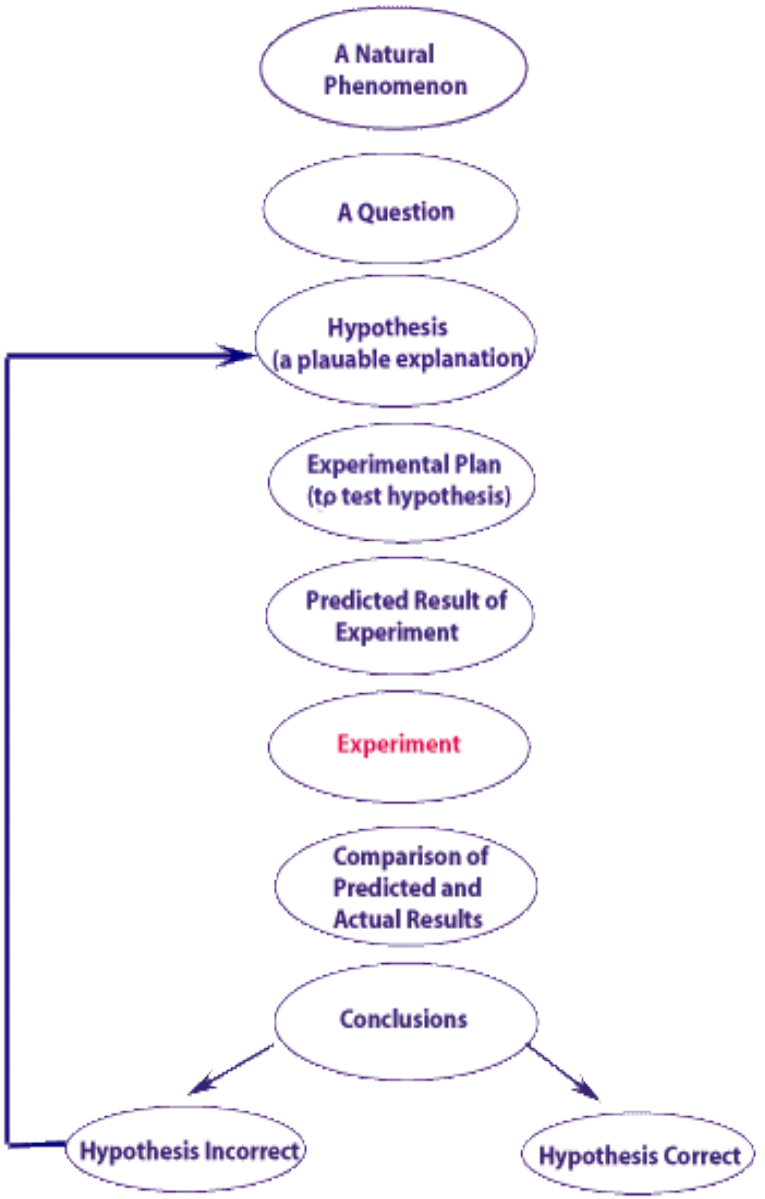
Science is accurate and free from dogma.

Science shows its ***good works*** though medicine by healing all manner of sickness and all manner of disease among the people.

The Jews answered him, saying, For a ***good work*** we stone thee not; but for blasphemy; and because that thou, being a man, makest thyself God.

And, yet, modern secular science proves that the science of the Torah is wrong.

How is this possible?

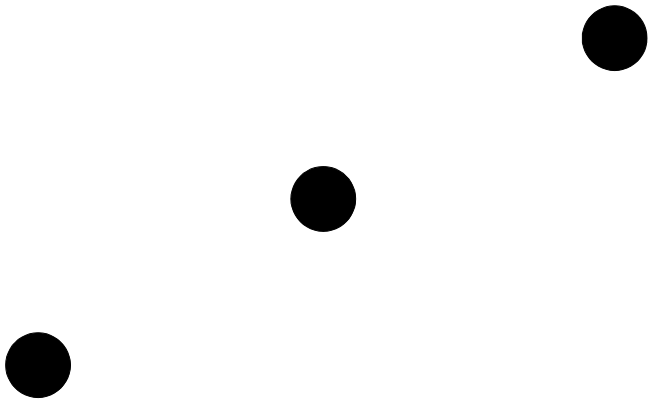


Scientific Collection of Data

A scientific theory or law represents an hypothesis, or a group of related hypotheses, which has been confirmed through repeated experimental tests.

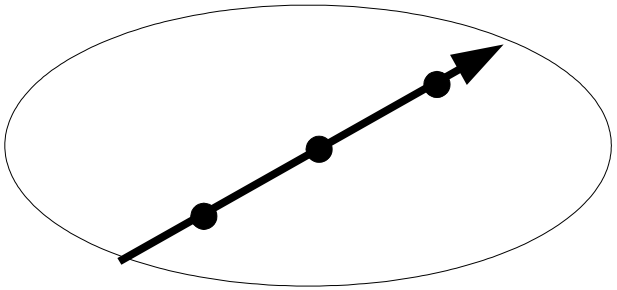
Let's start with a simple example,

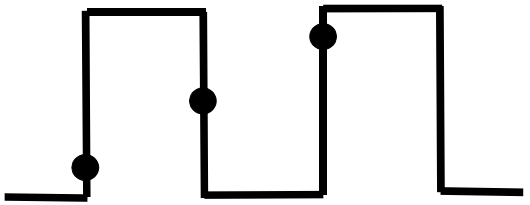
Given the following experimental data points, what curve fits it?

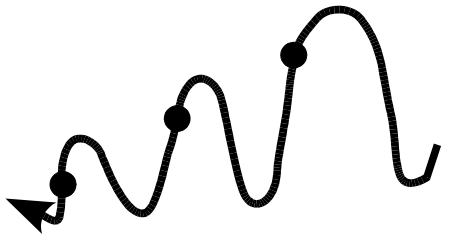


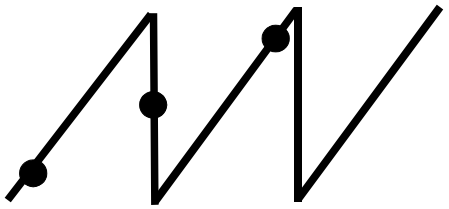
Scientific Hypothesis: Occam's Razor

Given the following experimental data points, what curve fits it?









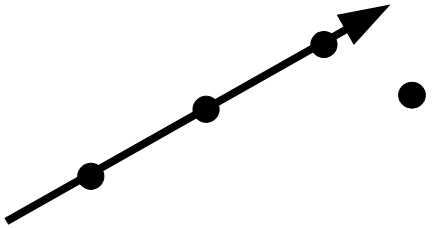
Occam's razor: The ***principle*** states that the explanation of any phenomenon should make as few assumptions as possible.

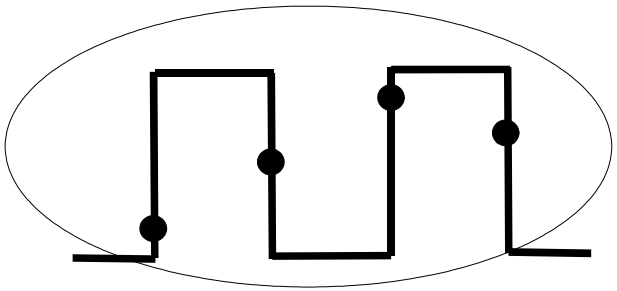
There is ***no proof*** that Occams razor is a ***law of nature.***

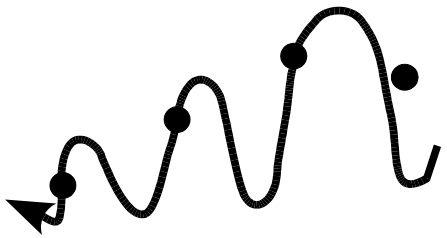
So, straightline (linear fit) model is the correct one according to the ***principles of science.*** Until a new point contradicts it.

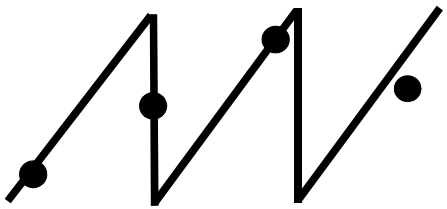
Scientific Falsification

The defining characteristic of a scientific theory is that it makes ***falsifiable*** or testable predictions about things not yet observed.









According to falsification, ***only case 2*** is the valid hypothesis.

That's what science wants you to believe.

In order to defend their theory, (say, ***case 1***) they argue

1) Measurement error within statistical distribution.

2) Measurements are transformed apriori.

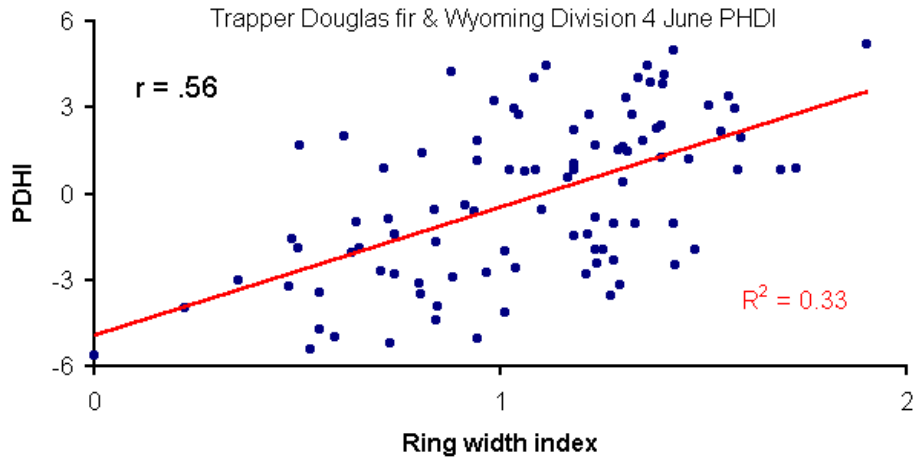
3) Measurements are filtered based on principals.

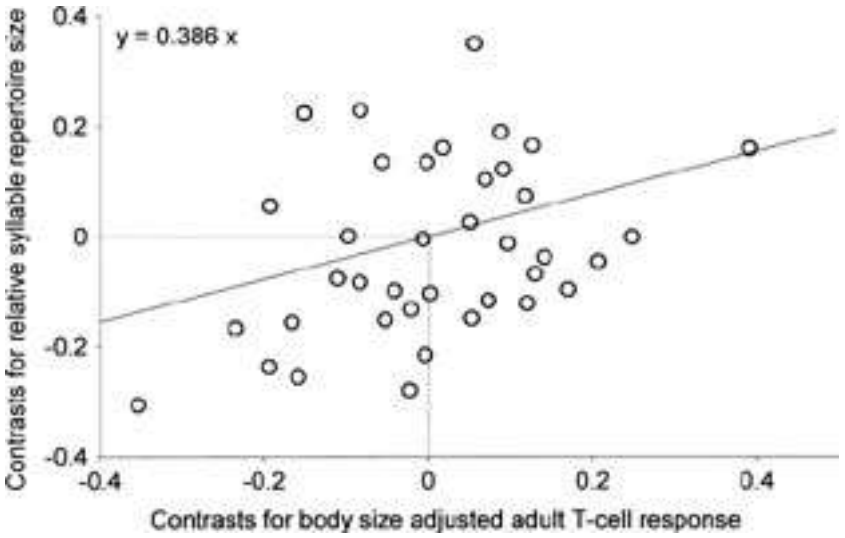
4) Measurements are discarded due to unknown error.

Falsification can be viewed as ***Proof by contradiction.***

Scientific Uncertainty

Tycho Brahe method: More data points will resolved the problem.





In 1900, a famous mathematician, David Hilbert, stated that ***"We must know, We will know."*** He believed all mathematical theorems can be derived from axioms.

In 1931, Gödel showed this was not true, revealing the limits of mathematical axiomatic logic. There is always some true statement that you can never prove.

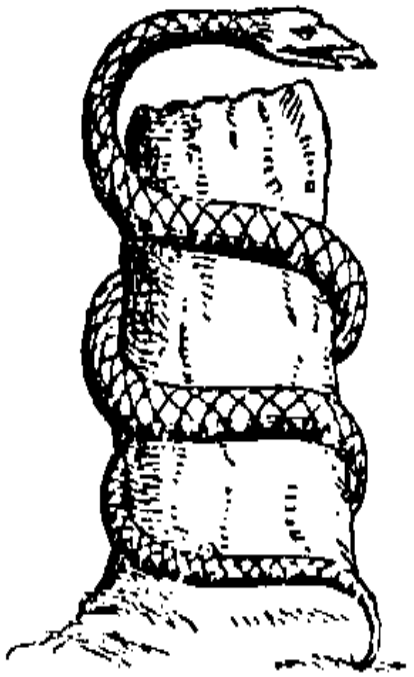
In 1927, Heisenberg stated, "The ***more precisely*** the position is determined, the ***less precisely*** the momentum is known in this instant, and vice versa." This Heisenberg uncertainty principle limits what science can actually know.

Mathematical Uncertainty

Four Problems Of Antiquity

Solution to which had been ***sought for thousands of years,***

were all impossible to solve, if one uses only compass and straightedge.



1) ***Squaring the circle***, Anaxagoras, 500-428BC
1882, Lindemann proved it to be impossible.

2) ***Doubling a cube,*** 430 BC
1837, Wantzel proved the task to be impossible.

3) ***Trisecting an angle***
1837, Wantzel proved the task to be impossible.

4) ***Constructing a regular heptagon,*** 7-sided polygon,
1837, Wantzel proved the task to be impossible.

Mathematical Science Endeavers

High Schools conviently study the quadratic only, giving the impression to the public of the ***perfection, elegance*** and ***simplicity*** of mathematics.

Typically, science wanders along a path of undying belief which ends in failure:

1) Finding the 2nd order closed form solution of $ax^2+bx+c=0$.
Solved geometrically by Diophantus, 210-290BC,

This is an ***simple*** and ***elegant*** solution according to science.

$$x=(-b\pm\sqrt{b^2-4ac})/2a$$

2) Tartaglia, 1534, ***unelegant*** solution for 3th order of $ax^3+bx^2+cx+d=0$.

3) Cardano, 1545, solution for 4th order of $ax^4+bx^3+cx^2+dx+e=0$.

4) Abel, 1824, the ***5th order and above*** are not solvable in radicals.

Mathematical Science Endeavers

2) Tartaglia, 1534, solution for 3th order of $ax^3+bx^2+cx+d=0$.

$$p=\frac{c}{a}-\frac{1}{3}\left(\frac{b}{a}\right)^2 \qquad q=2\left(\frac{c}{3a}\right)^3-\frac{bc}{3a^2}+\frac{d}{a}$$

$$D=\left(\frac{p}{3}\right)^3+\left(\frac{q}{2}\right)^2$$

If a,b,c,d are real then
if $D>0$ then one real and two conjugate complex roots
if $D=0$ then three real roots of which two are equal
if $D<0$ then three unequal roots

$$u=\sqrt[3]{-\frac{q}{2}+\sqrt{D}} \qquad v=\sqrt[3]{-\frac{q}{2}-\sqrt{D}}$$

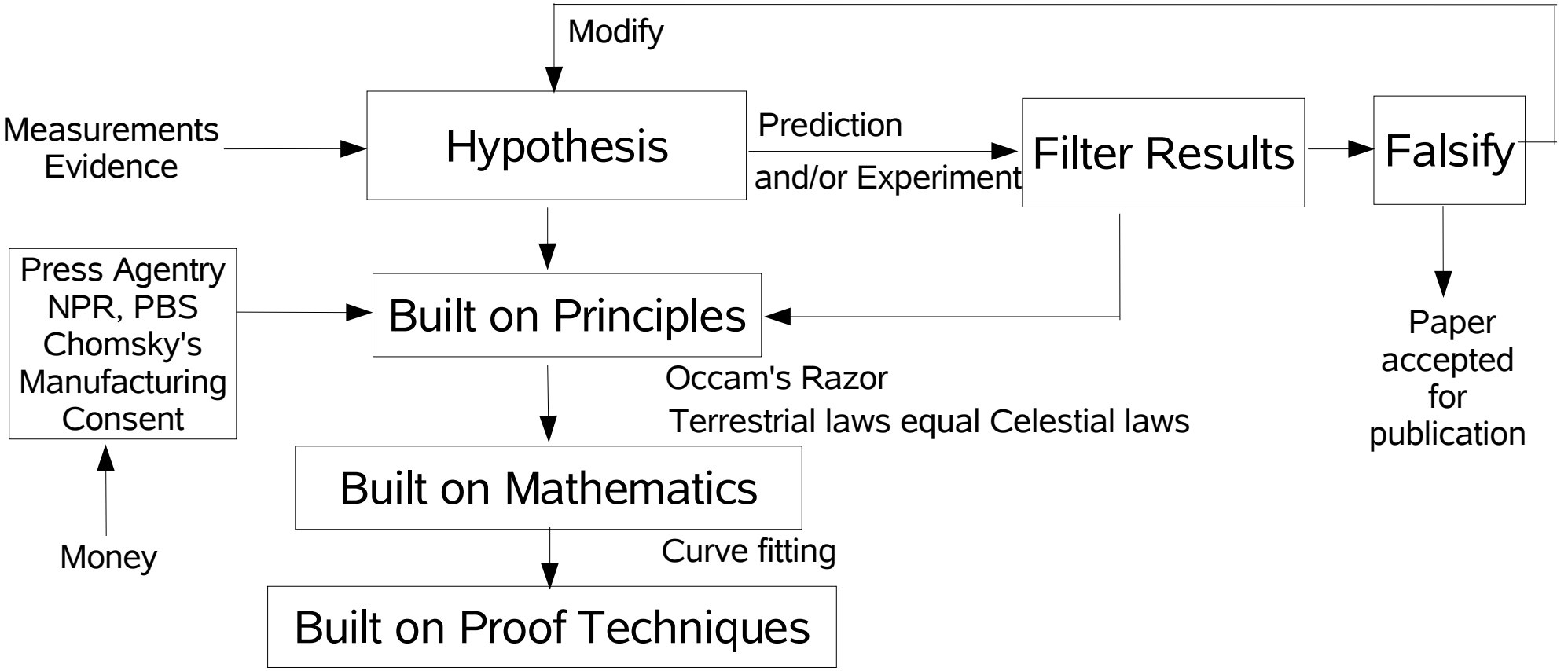
$$y_1=u+v \qquad y_2=-\frac{u+v}{2}+\frac{u-v}{2}i\sqrt{3} \qquad y_3=-\frac{u+v}{2}-\frac{u-v}{2}i\sqrt{3}$$

$$x_i=y_i-\frac{b}{3a}$$

Modern Science strives for ***simplicity*** and ***elegance.***
As you can see, it has lost it's luster, and thus not taught in public high school or univerisity core cirriculums.

Actual Scientific Research Model

The following shows the actual scientific investigation model including the publication of scientific papers is also controlled by this model.



This scope of this talk will now focus on the Geocentric and Heliocentric proofs.

Aristotelian Logic

- Aristotle's Logic is a formal method of argumentation,
- which consists of definitions, *axioms*, *rules*, and *deductions*.
- *Axioms* - Self evident truths, sources of law, canon, admissible evidence.
- *Rules, Exegesis* - Set of rules stating what counts as a valid deduction or proof.
- *Theorem, hypothesis, inference* - Any sentence that can be proved in the system.
- Aristotles basic rule (i.e. exegesis) is the syllogism (chain of reasoning or logic):

All men are mortal	Major premise:	All M are P
<u>All Greeks are men</u>	<u>Minor premise:</u>	<u>All S are M</u>
All Greeks are mortal	Conclusion:	All S are P

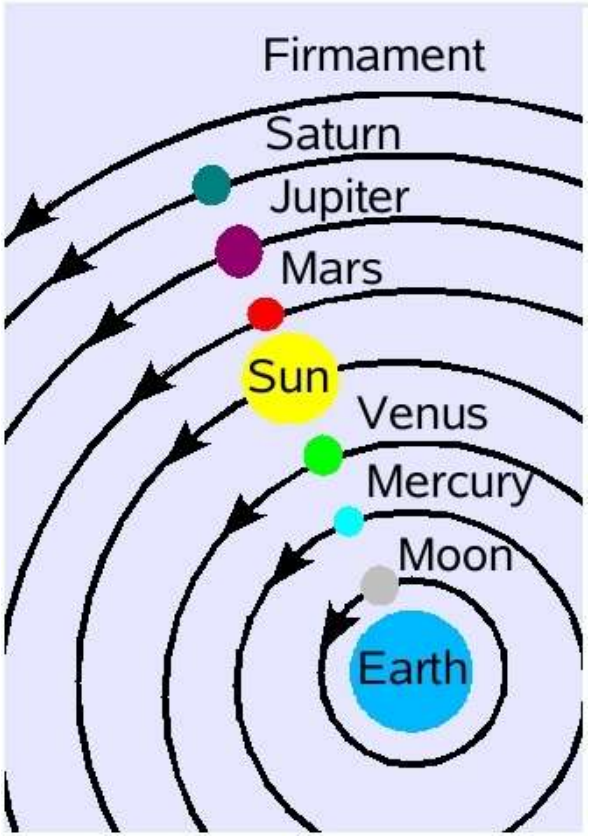
Consistency - none of the conclusions of the system contradict one another.
Soundness - rules of proof will never allow a false inference from a true premise.

Logical Deduction and Euclid's Elements

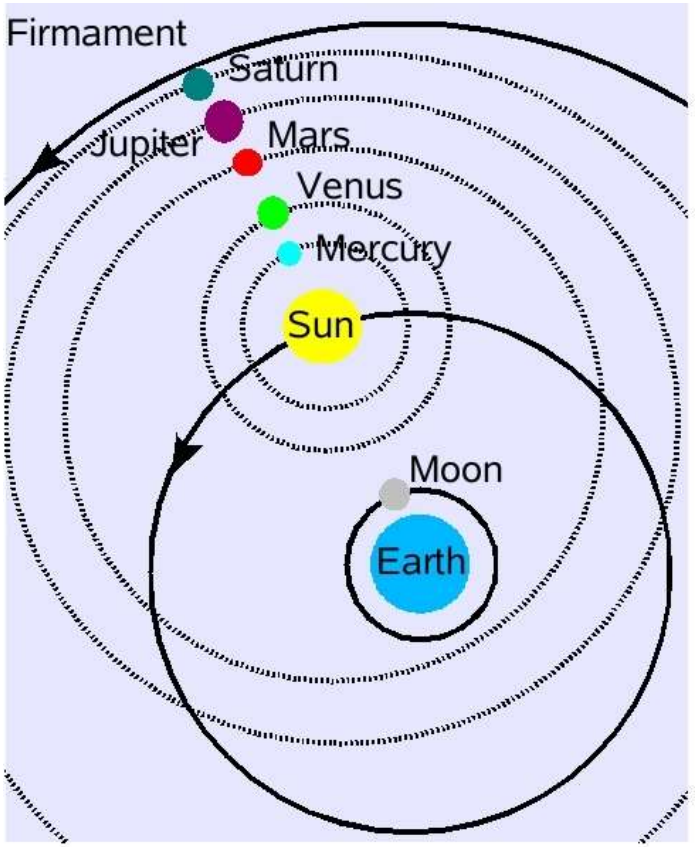
	Sadducees	Pharisees	Catholic	Euclid's Elements 300BC, 13 books
Definitions	Words are context free.	Words are context sensitive.	Words are context sensitive.	1. A point is that which has no part. 2. A line is breadthless length. ...
Axioms *or* *principles*	Torah	Torah Prophets Writings Talmud	Tanakh Apocrypha Gospels Canon Law Aquinas	1. Two points form a straight line, 2. Line segment is contain in a line, 3. Point & line form a circle, 4. Right angles all equal, 5. Line & point form a Parallel line.
	Priests, Literal.	Rabbi, Debates.	Pope, Councils.	Straight edge, compass, pencil.
Rules *or exegesis*	Passover, No afterlife.	Passover, Afterlife.	Easter, Afterlife.	Pythagorean's theorem.

Deduction

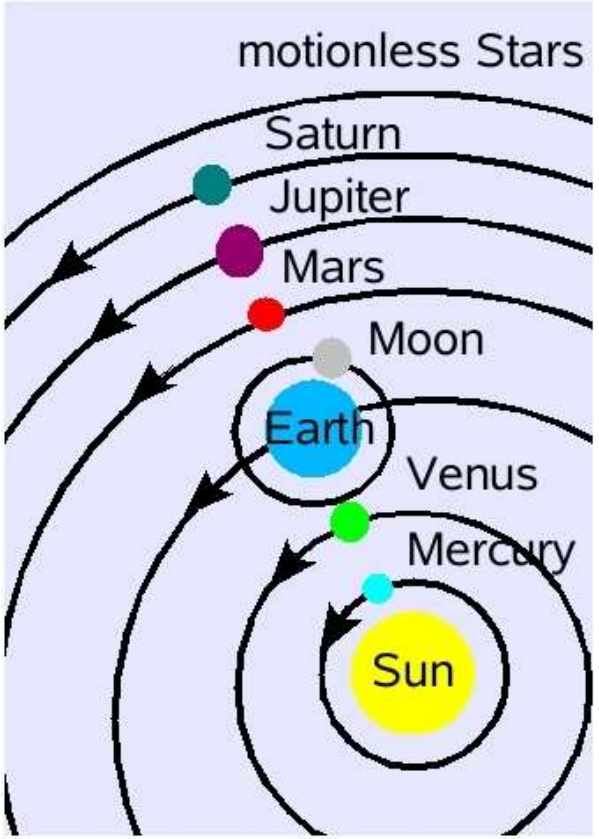
How do the Heaven's Go?



322BC Aristotle,
150AD Ptolemy



1601AD Tycho Brahe



230BC Aristarchus,
1543AD Copernicus

1471BC Moses
1204AD Maimonides
Geocentric: Earth Center

Heliocentric: Sun Center

Aristotle's Gravity Axioms

"Everything that is in motion must be moved by something." (Physics, Book VII)

"The motion of everything that is in process of locomotion is either ***circular*** or ***rectilinear*** or a compound of the two." (Physics, Book VIII)

"The term, ***heavy***, to that which naturally moves towards the center,
and ***light*** to that which moves naturally away from the center." (Physics, Book VIII)

"We must show not only that the heaven is one, but ... exempt from ***decay*** and generation, the heaven is eternal." (De Caelo, On the Heavens, Book I)

Summary of Aristotle's Axioms

- Natural Place, Natural Motion, and Violent Motion.
- Heavy bodies fall faster than light bodies.
- *Horror vacui*, Nature abhors a vacuum.
- *Terrestrial* laws are different than *Celestial* laws
- Four *Terrestrial* Elements
  - Rectilinear motion,
  - Finite, decayed motion,
  - Upward: Air, Fire,
  - Downward: Earth, Water
- Fifth C*elestial* Element
  - Circular motion,
  - Uniform,
  - Infinite,
  - Ether

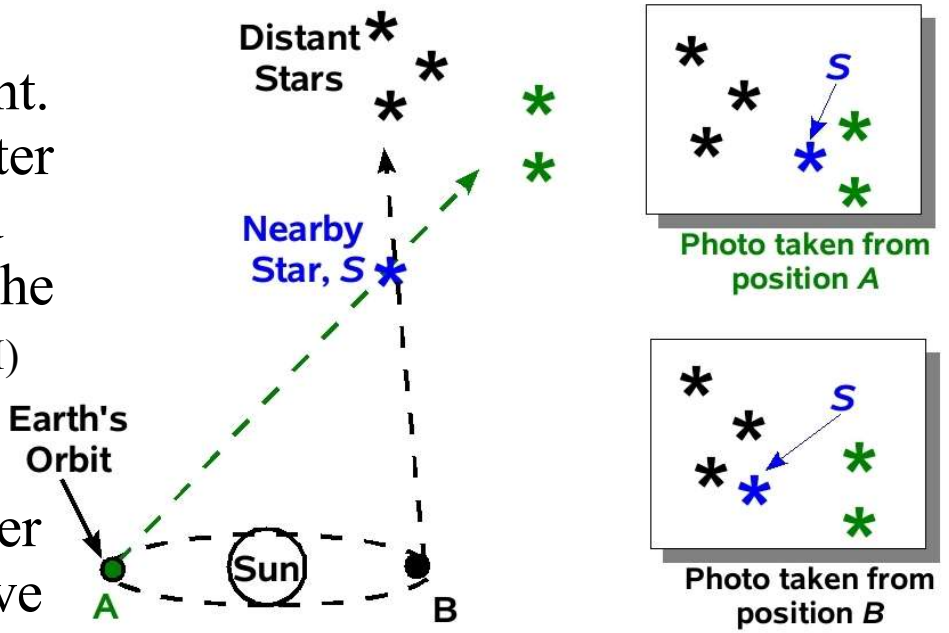
Footnote: Is Aristotle that far off? modern jargon, earth(solid phase), water(liquid phase), air(gaseous phase).

Aristotle's Proof of Geocentric Earth.

"As to the position of the earth, then, this is the view which some advance, and the views advanced concerning its rest or motion are similar."

"For here too there is no general agreement. All who deny that the earth lies at the center think that it revolves about the center, and not the earth only but, as we said before, the counter-earth as well." (On the Heavens, Book II)

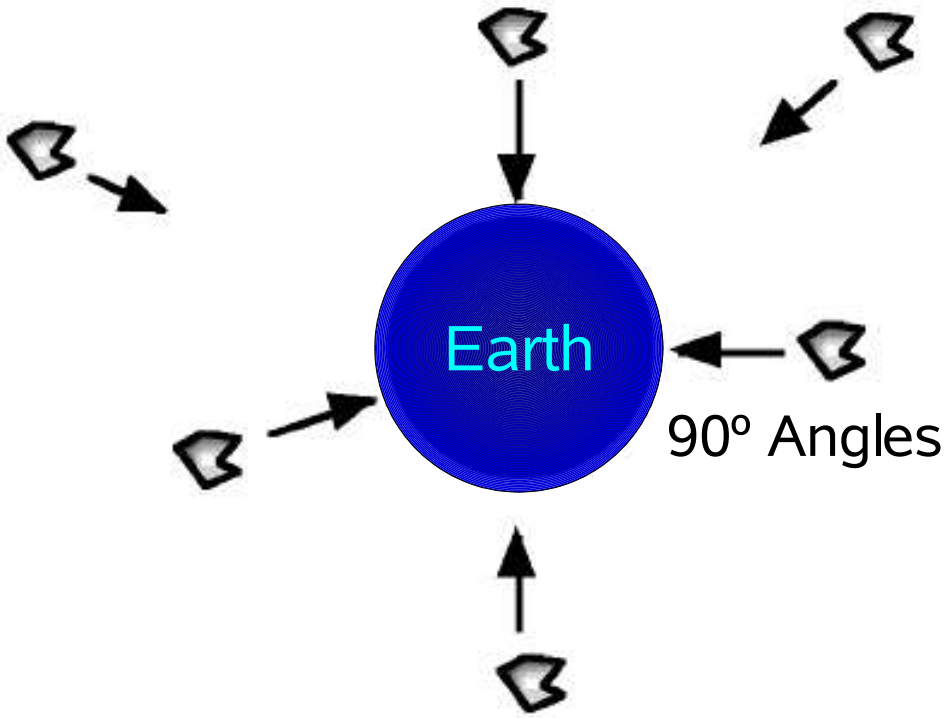
Parallax Argument (orbit): "The earth, then, also, whether it move about the center or as stationary at it, must necessarily move with two motions. But if this were so, there would have to be ***passings and turnings of the fixed stars.*** Yet no such thing is observed. The same stars always rise and set in the same parts of the earth."



Aristotle's Proof of Geocentric Earth.

Heavy/Light Argument (center):
"Heavy bodies moving towards the earth do not parallel but so as to make ***equal angles,*** and thus to a single center, that of the earth.

It is clear, then, that the earth must be at the center and immovable, not only for the reasons already given, but also because ***heavy bodies*** forcibly thrown quite straight upward return to the point from which they started, even if they are thrown to an infinite distance."



Who is Galileo?

- 1564, Galileo Galilei was born in Pisa, part of the Grand Duchy of Tuscany. Cosimo II's father, Ferdinando I, had hired Galileo to tutor his children part of the year.

- March 1610, *Sidereus Nuncius*, or Starry Messenger, is published showing telescopic observations of the craters of the Earth's moon, and the four moons of Jupiter.

• Is dedicated to Cosimo II de Medici, Grand Duke of Tuscany, in honor of the house of his prospective patron: the moons of Jupiter are named Medicean Stars.

• Is then appointed for life as "*Chief Mathematician of the University of Pisa and Philosopher and Mathematician to the Grand Duke*" of Tuscany.

• 1613, *Letters on Sunspots,* showed that the Sun has sunspots and rotates.

• 1615, *Letter to the Grand Duchess of Tuscany*, Book of Nature vs. Book of Heaven.

Edict of 1616, that all writing about Copernicus be limited to the hypothetical.

Who is Galileo?

- 1632, *Dialogue Concerning the Two Chief World Systems,* proof by tides.

- Galileo was summoned to Rome by the Inquisition on 23 September 1632, following publication of his Dialogue

• 1633, was condemned to life imprisonment, for having disobeyed a 1616 injunction by Cardinal Bellarmino "...*not to defend or teach the Copernican doctrine*...".

• As a special favor to Grand Duke Ferdinand II de' Medici, the Pope allows Galileo to stay at the residence of the Tuscan ambassador and is forbidden social contacts.

• Cosimo II's father, Ferdinando, had hired Galileo to tutor his children part of the year, so he was known to Cosimo II.

•1642 buried, 1737 was reburied on Roman Catholic sacred ground, 1741 was formally rehabilitated.

Galileo's view of the Bible

In 1615, Galileo wrote a letter to the Grand Duchess of Tuscany.

- "The reason produced ***for condemning the opinion that the earth moves*** and the sun stands still in many places ***in the Bible*** one may read that the sun moves and the earth stands still.

- "Since the Bible cannot err; it follows as a necessary consequence that anyone takes a erroneous and heretical position who maintains that the sun is inherently motionless and the earth movable.

- "From these things it follows as a necessary consequence that, ***since the Holy Ghost did not intend to teach us whether heaven moves or stands still***, whether its shape is spherical or like a discus or extended in a plane, nor whether the earth is located at its center or off to one side, then so much the less was it intended to settle for us any other conclusion of the same kind."


OBSERVAT. SIDEREAE

dum datarum. Depressiores insuper in Luna cernuntur magnæ maculæ, quàm clariores plagæ; in illa enim tam crescente, quam decrescente semper in lucis tenebrarumque confinio, prominente hinc inde circa ipsas magnas maculas contermini partis lucidioris; veluti in describendis figuris observauimus; neque depressiores tantummodo sunt dictarum macularum termini, sed æquabiliores, nec rugis, aut asperitatibus interrupti. Lucidior verò pars maximè propè maculas eminet; adeò vt, & ante quadraturam primam, & in ipsa fermè secunda circa maculam quandam, superiorem, borealem nempè Lunæ plagam occupantem valdè attollantur tam supra illam, quàm infra ingentes quædã eminentiæ, velut appositæ præseferunt delineationes.

Hæc

Galileo's Sidereus Nuncius

• In March 1610, Galileo wrote a small book, called Starry Messenger.

- By pointing his 20x telescope to the heavens, he discovered mountains and craters on the moon, four moons of Jupiter, and countless stars never before seen.

- Moon's craters: contradicts the Aristotelean claim which argued that since the heavens were more perfect than the earth, the heavenly bodies must be perfectly smooth spheres.

- Four moons of Jupiter: contradicts the Aristotelean claim which argued against the motion of the earth about the sun on the basis that the moon would be left behind.

Galileo's Sidereus Nuncius: 1610 Proof

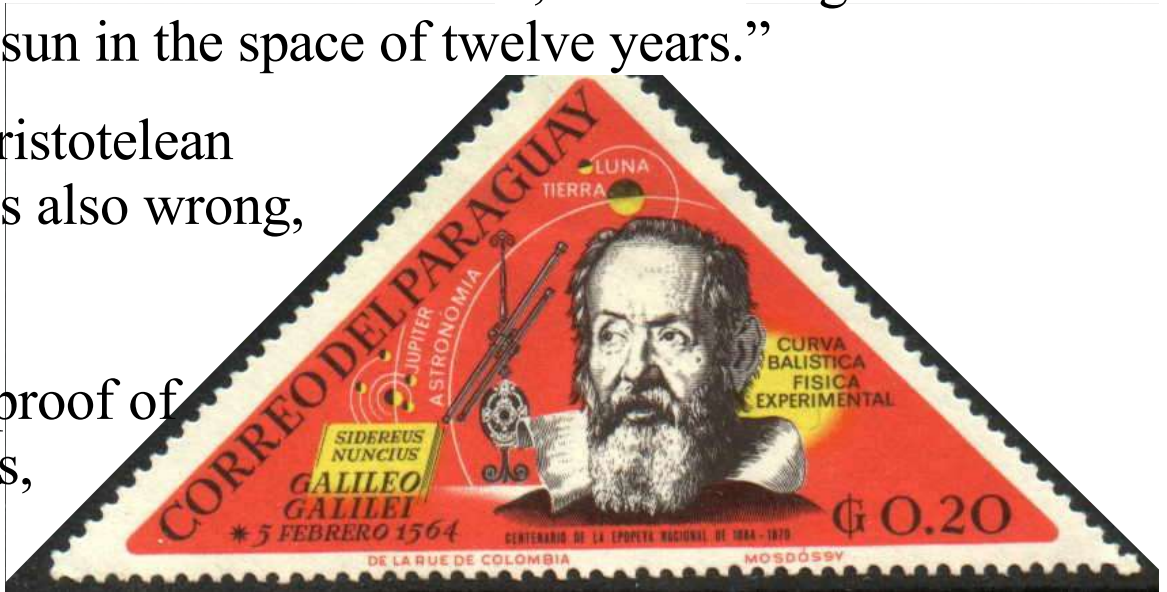
- Galileo concludes by saying,: “Here ***we have a fine and elegant argument for quieting the doubts*** of those who, while accepting with tranquil mind the revolutions of the planets about the sun in the Copernican system, are mightily disturbed to have the moon alone revolve about the earth and accompany it in annual rotation about the sun.”

- “Some have believed that this structure of the universe should be rejected as impossible.”

- “But now we have not just one planet rotating about another while both run through a greater orbit around the sun; our eyes show us four stars which wander about Jupiter as does the moon around the earth, while all together trace out a grand revolution about the sun in the space of twelve years.”

• <u>Galileo's chain of logic</u> is that if Aristotelean Cosmology is wrong, then Ptolemy is also wrong, thus Copernicus is right.

• Say what? What does the physical proof of the moon crater's and Jupiter's moons, have say about the earth moving!



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Recommended Popular Reading Books

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Fred Hoyle, "Nicolaus Copernicus," 1973, Harper & Row Publishers.
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Additional Popular Reading

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Sir Thomas L. Heath, "Greek Astronomy," 1932, 1991, Dover Publications.

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Galileo, "Starry Messenger," 1610, http://www.historyguide.org/earlymod/starry.html

Unused Slides

Galileo's view of the Bible

Now let us consider the extent to which the famous passage in Joshua can be accepted without altering the literal meaning of its words, and under what conditions the day might be greatly lengthened by the Sun's obedience to Joshua's command that it stand still.

If the celestial motions are understood according to the Ptolemaic system, this could never happen at all. For the movement of the Sun through the ecliptic is from West to East, and hence it is opposite to the movement of the sphere of fixed stars, which in that system causes night and day. Therefore it is obvious that if the Sun should cease its own proper motion the day would become shorter not longer. The way to lengthen the day would be to speed up the Sun's proper motion; and to cause the Sun to remain above the horizon for some time in one place without declining towards the west, it would be necessary to hasten this motion until it was equal to that of the primum mobile [sphere of fixed stars]. This would require accelerating the usual speed of the Suns by a factor of about three hundred and sixty.

...

Galileo's view of the Bible

But I wish to consider next whether this very event may not be understood more consistently with what we have read in the Book of Joshua in terms of the Copernican system, adding a further observation that I have recently made about the body of the Sun.

...

Suppose, then, that in the miracle of Joshua the whole system of celestial rotations stood still, in accordance with the opinion of the authors named above. Now in order that all the arrangements should not be disturbed by stopping only a single celestial body, introducing great disorder throughout nature, I shall next assume that the Sun, though fixed in one place, rotates on its own axis making a complete revolution in about a month, as I believe is conclusively proved in my Letters on Sunspots. [...] And just as if the motion of the heart should cease in an animal, so all motions of its limbs would also cease, thus if the rotation of the Sun were to stop, the rotations of the planets would stop too.

Galileo's view of the Bible

The Sun, then, being the origin of light and the source of motion, when God willed that at Joshua's command the whole system of the world should rest and remain in the same state for many hours, it sufficed to make the Sun stand still. When it stopped, all other revolutions ceased; the Earth, Moon and Sun remained in the same pattern as before, as did all the planets; nor in all that time did day decline towards night, for day was miraculously prolonged. And in this manner, by the stopping of the Sun, without in the least disturbing the other features or configurations of the stars, the day could be lengthened on Earth -- and this agrees exactly with the literal sense of the sacred text.

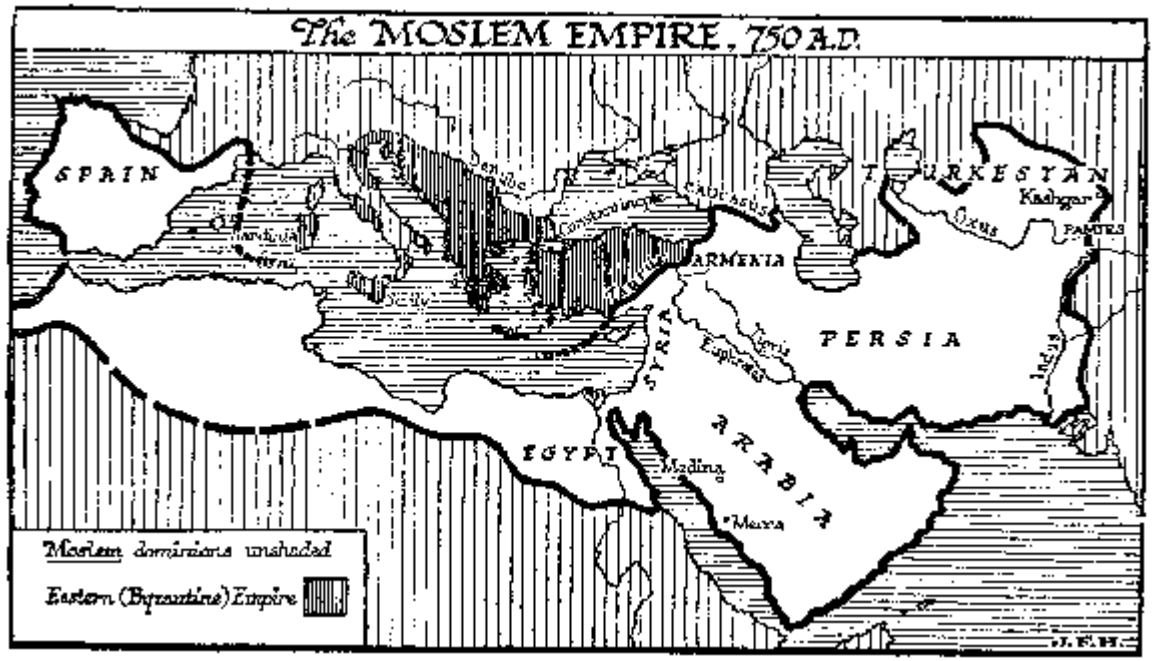
But if I am not mistaken, something of which we are to take no small acount is that by the aid of this Copernican system we have the literal, open, and easy sense of another statement that we read in this same miracle, that the Sun stood still in the midst of the heavens. ... we may avoid [all problems of interpretation] if, in agreement with the Copernican system, we place the Sun in the "midst" - that is, in the centre - of the celestial orbs and planetary rotations, as it is most necessary to do. Then take any hour of the day, either noon, or any hour as close to evening as you please, and the day would be lengthened and all the celestial revolutions stopped by the Sun's standing still in the midst of the heavens; that is, in the centre, where it resides.

Galileo's view of the Bible

- Of astronomy; for instance, so little is found that none of the planets except Venus are so much as mentioned, and this only once or twice under the name of "Lucifer."

- If the sacred scribes had had any intention of teaching people certain arrangements and motions of the heavenly bodies, or had they wished us to derive such knowledge from the Bible, then in my opinion they would not have spoken of these matters so sparingly in comparison with the infinite number of admirable conclusions which are demonstrated in that science.

Koran



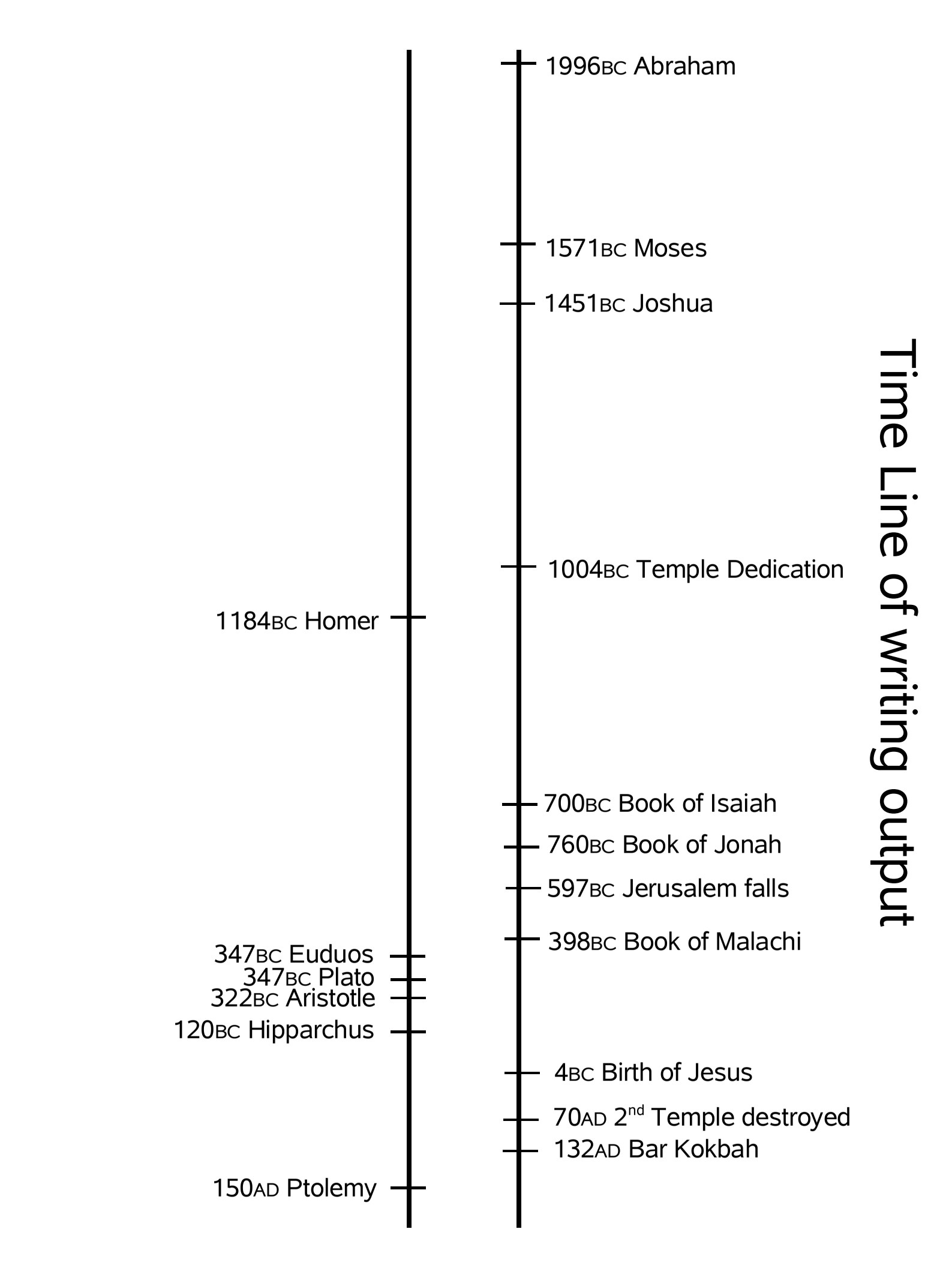
"When in 1966, for example, he (Sheikh Bin Baz) had condemned what he termed the Copernican 'heresy,' insisting, as the Koran said, that the sun moved, Egyptian journalists, much to President Nasser's delight, had mercilessly mocked the leading cleric as a reflection of Saudi primitiveness."

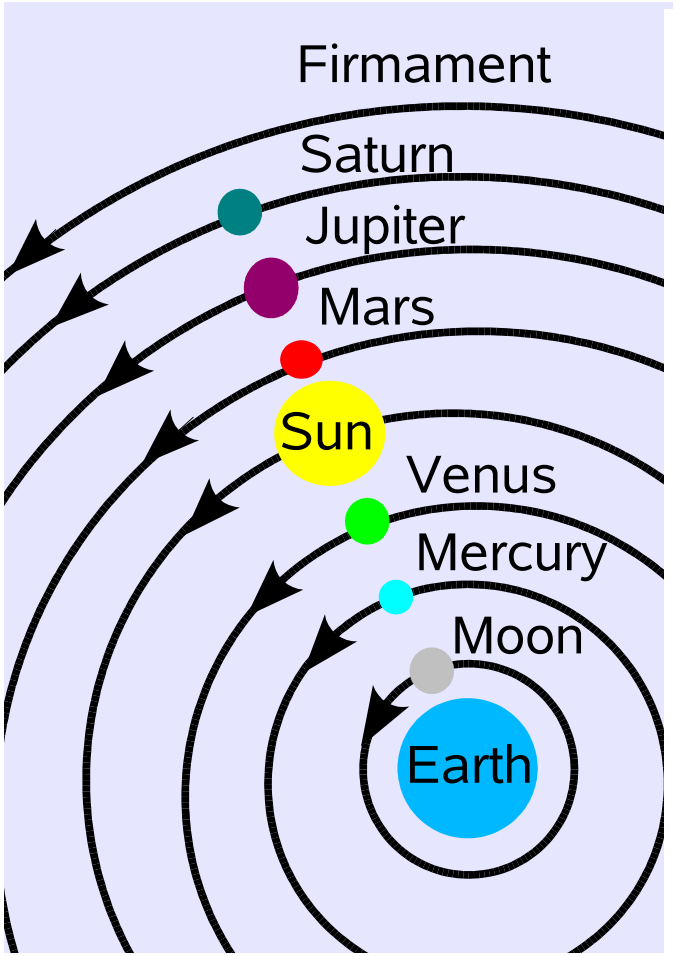
[Sura 21:33] And He is the One who created the night and the day, and the sun and the moon; each floating in its own orbit.

[36:40] The sun is never to catch up with the moon - the night and the day never deviate - each of them is floating in its own orbit.

[79:30] He made the earth egg-shaped.

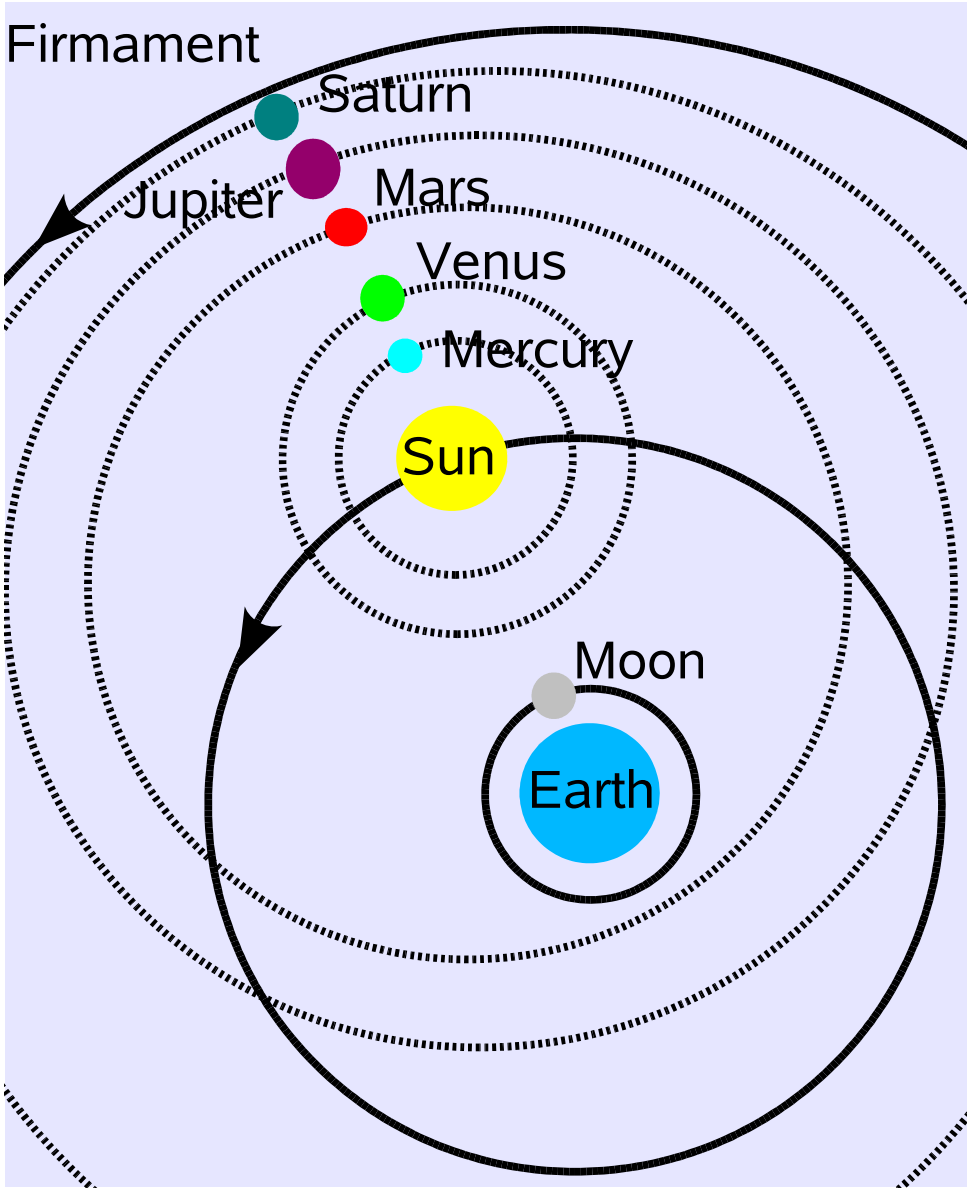
[25:59] He is the One who created the heavens and the earth, and everything between them, in six days, then assumed all authority.

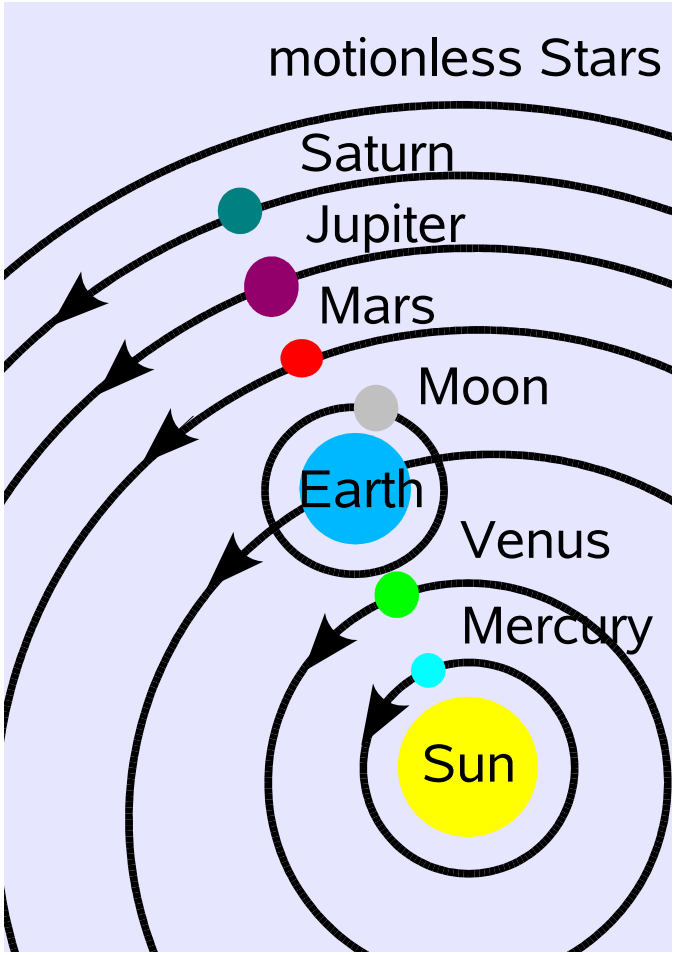

Time Line of writing output
1996BC Abraham
1571BC Moses
1451BC Joshua
1004BC Temple Dedication
1184BC Homer
700BC Book of Isaiah
760BC Book of Jonah
597BC Jerusalem falls
398BC Book of Malachi
347BC Euduos
347BC Plato
322BC Aristotle
120BC Hipparchus
4BC Birth of Jesus
70AD 2nd Temple destroyed
132AD Bar Kokbah
150AD Ptolemy



Geocentric: Earth Center

1551BC Moses, 322BC Aristotle,
150 Ptolemy, 1601 Tyco Brahe


Firmament
Saturn
Jupiter
Mars
Venus
Mercury
Sun
Moon
Earth



Heliocentric: Sun Center

230BC Aristarchus,
1543 Copernicus,

Aristotle's Proof of Geocentric Earth.