The Nature of Science

Poll everywhere

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Which is the most convenient unit when dealing with distance between galaxies?

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Unit conversions

- Multiplying by unit conversions is like multiplying by 1.
  - Not changing the value itself.

$$1 \text{ mile} = 5280 \text{ ft}$$

$$1 = 5280 \text{ ft} / 1 \text{ mile}$$

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- Think what units you want to end up with and what you need to get rid of.

Unit conversions — example

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$$186 \text{ pc} \times \frac{3.09 \times 10^{16} \text{ m}}{1 \text{ pc}} \times \frac{1 \text{ km}}{1000 \text{ m}} = 5.75 \times 10^{15} \text{ km}$$

Unit conversions

- worksheet

Unit conversions

1. 67.0 mph
2. 7.35×10^{-11} yr^{-1}

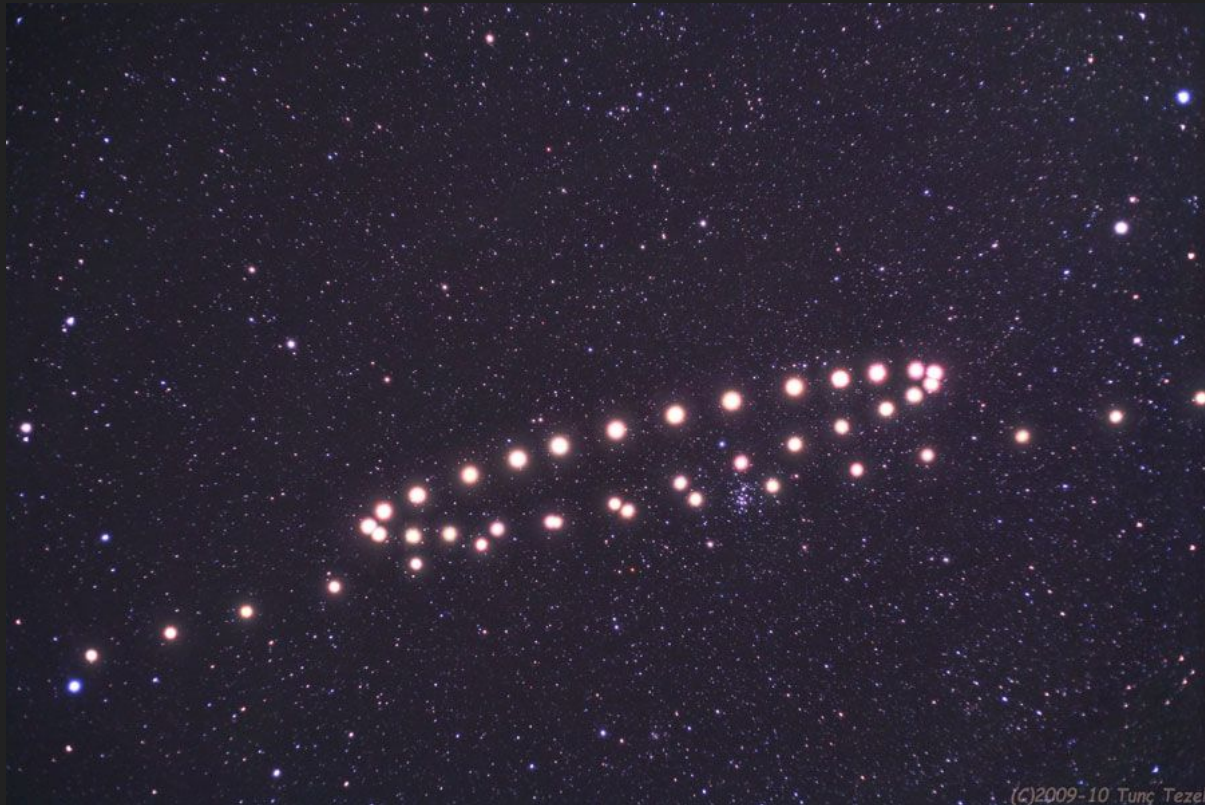   Worked out in lectures notes (notes.pdf on website and canvas)

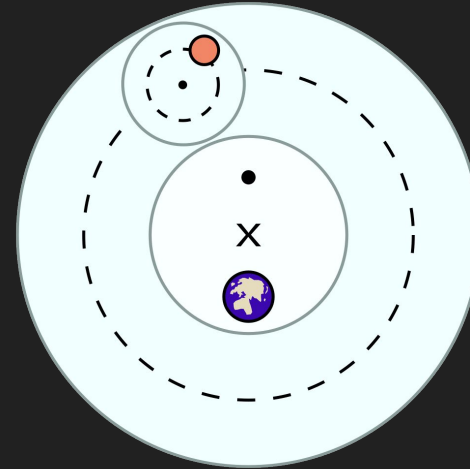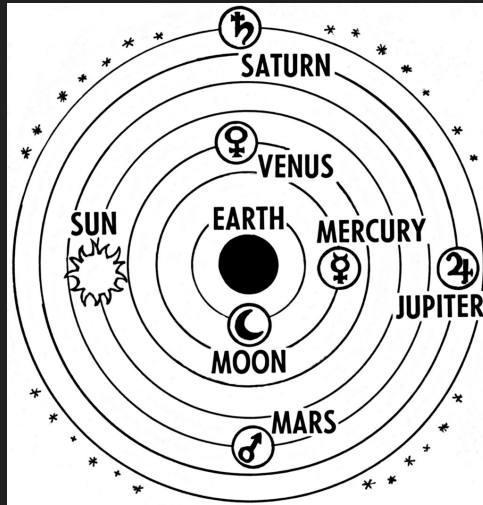# The nature of science

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The nature of science

- Geocentric model of the Solar System was the accepted cosmological model in early astronomy.
- Motion from the center of a circular orbit should be uniform.

Observation: Wandering stars move strangely.

The nature of science

- Ptolemaic model of the universe.

Hypothesis: Planets orbit in epicycles in a larger orbit called the deferent.

The nature of science

- Ptolemy's model was not a sound hypothesis
  - Attempt to quantify observed phenomena.
  - Subsequent verification necessitated more and more epicycles.
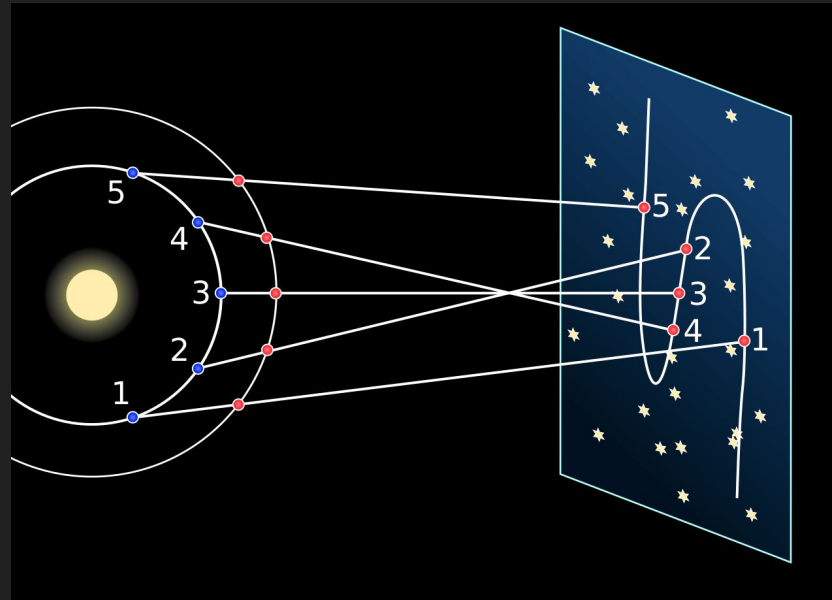
"If the Lord Almighty had consulted me before embarking on creation thus, I should have recommended something simpler."

-King Alfonso X of Castile, regarding epicycles (apocryphal).

The nature of science

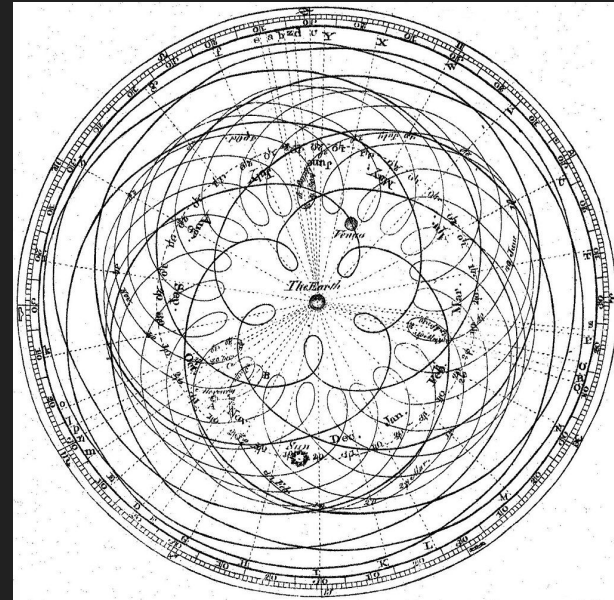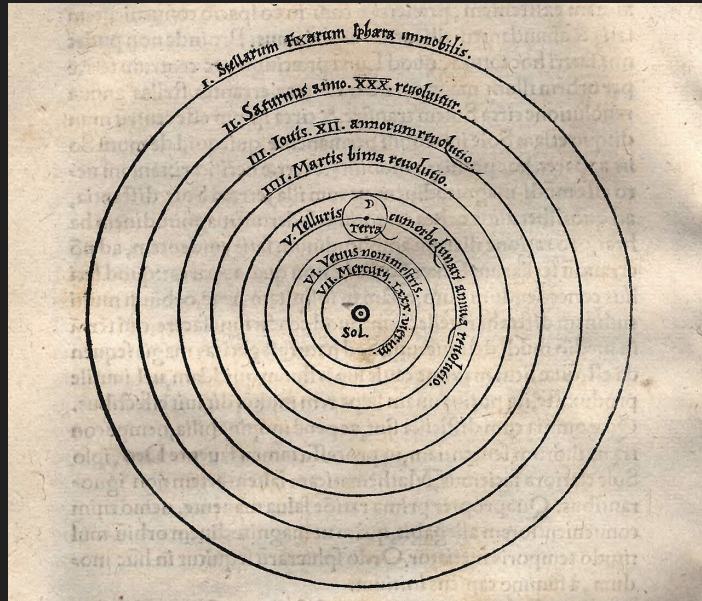- Retrograde motion easily explained in Heliocentric model of the universe

The nature of science

- Occam's Razor: When two equally verified models are in contention, the model requiring the fewest assumptions is preferred.

Astronomy as a science

- Astronomy is an *observational* science.
- Test models by observing different systems.

Announcements

- No class next Monday (Labor day). No lab.
- First homework will be assigned next week, due on Friday.

Next time

- Ancient astronomy