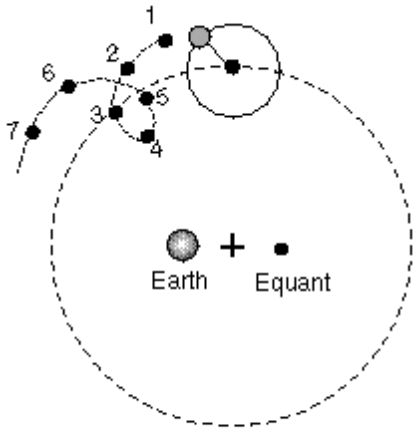
Universe: The big picture

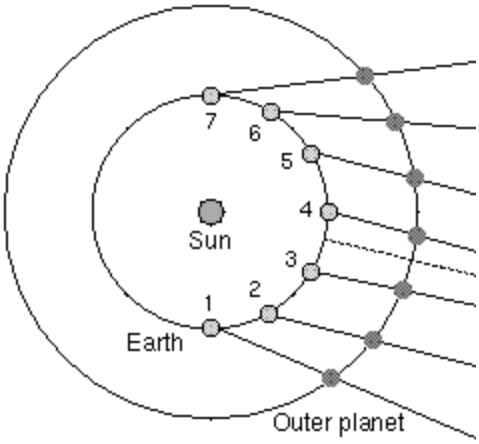
Panel One

Four Big Ideas guide the pursuit of scientific knowledge, and our understanding of the Universe.

1. Occam's Razor: If two competing models fit the observations, the simpler of the two is the better one



Deferent motion is in direction of point 1 to 7 but planet's epicycle carries it on cycloid path (points 1 through 7) so that from points 3 through 5 the planet moves backward (retrograde).



Earth overtakes slow outer planet so the outer planet appears to slow down, move backward, then move foward again with respect to the background stars.

Ptolemy vs Copernicus: Which model is simpler?

2. Modern science is based on the rules of evidence, not on any philospophy of life

Ancient World View-500BC – 1500 AD dominates model of the universe

- The planets, Sun, Moon and stars move in perfectly circular orbits abdout the Earth.
- The Earth is at the exact center of the motion of the celestial bodies.

Galileo with his telescope found evidence to the contrary. He saw Jupiter's moons orbiting that planet.

3. Scientific Theories **predict** new phenomenon, and so can be tested.

(Galileo and Venus, Big Bang, and Cosmic Background radiation)

4. The principal of mediocrity: The Universe as a whole is made of the same stuff as on Earth which obeys the same laws of physics.

Again Galileo, followed by Newton – Law of Gravity, followed by Einstien.

Panel 2: Four Big Ideas about the Universe

1. The Universe is vast

   Measuring Distance: Henrietta Levitt

2. The Universe is Expanding

   Hubble and Doppler Shift

3. The Universe began with a Big Bang

   Predicted radiation followed by P and W discovery

4. The Universe will expand forever?

   Cobe Data, Inflation Theory