



## 31182 Slide Set Descriptions History of Astronomy

### Greek Concepts

1. Pythagorean system (Philolaus) about 450 B.C. showing the central fire, earth and counterearth, planets, sun and moon.
2. Eudoxus' system of Homocentric Spheres about 350 B.C., showing planetary motions resulting from composite motions of concentric spheres.
3. Diagram showing the concept of the epicycle and de Hipparchus (150 A.D.).
4. Ptolemy's addition of the eccentric and equant to the scheme Hipparchus (140 A.D.).
5. The Ptolemaic system combining uniform circular motion and the concepts of Hipparchus.
6. Aristarchus' method for measuring the earth - sun distance in terms of the earth - moon distance (250 B.C.).
7. Eratosthenes' method of measuring the circumference of the earth (250 B.C.)
8. A famous early 20th century engraving (1911) erroneously thought to be a 17th century woodcut of a Medieval astronomer passing through the sphere of the stars to see the mechanisms of the ptolemaic universe beyond.
9. Chart illustrating the chronology of the Greek philosophers from 600

B.C. to the fall of the Roman Empire (400 A.D.).

### Copernican Revolution

10. Heliocentric system of Copernicus including circular orbits and epicycles.
11. Tycho's scheme of the solar system including the orbit of a comet observed in 1603.
12. Galileo's wash drawing of the craters of the moon as seen through his telescope in 1610.
13. Geometry of the phases of Venus in heliocentric system (upper figure) compared to the Ptolemaic system in which the phases could not happen.
14. A progression of Galileo's observations of Jupiter's four satellites from 7 Jan. 1610 through 13 Jan. 1610.



## Ancient Astronomical Structures

15. Vertical view of Stonehenge.
16. Drawing of Stonehenge from a vertical view point showing stone placement.
17. Slide #16 with the major lunar and solar alignments superimposed according to Gerald Hawkins.
18. The sun was more a god than an astronomical object to the Egyptians. Here, this papyrus shows Akenaten and his wife and daughter giving offerings to the sun, Aten, whose beams end in human hands that offer the symbol of life to the royal family.
19. View of the north face of Cheops Pyramid showing the major passageways including the descending passage aligned to the north celestial pole. view looking west.
20. This diagram shows a cross section of the Cheops Pyramid and illustrates the positions of the king's and queen's chambers as well as the descending passage. This passage is inclined  $26^\circ$  and points to the position of Thuban, the north star in 2600 B.C. Thus, the pyramid faces appear to have been aligned with the cardinal points.
21. View of the exterior facade and entrance of the sun temple of Ramses II at Abu Simbal. This temple has a corridor aligned with the rising sun on Ramses' birthday.
22. This is a star map covering the ceiling of a room in Dendera, Egypt. It illustrates, with allegorical figures but without stars, the constellations of the zodiac. The Egyptians were among the first to describe the ecliptic or sun's path among the constellations of the zodiac.

## Early Astronomers and Their Observatories

23. Greek astronomer about the time of Hipparchus (150 B.C.) making



3300 CENCO Parkway • Franklin Park, IL 60131 • (708) 451-0150

observations of star altitudes using a crude quadrant.

24. Artist's rendering of the 10th century A.D. Arab astronomer Alhazen demonstrating the principles of refraction.
25. Portrait of Nicolas Copernicus.
26. Tycho Brahe at his Uraniborg observatory.
27. Vertical view of Uraniborg observatory.



28. Artist's rendering of Johann Kepler in his study working on the planetary laws of motion.
29. Artist's rendering showing Galileo making the first telescopic observations of the moon and sketching the craters from the "Telescopio Galileo" in Padua.
30. Famous rendering of John Hevelius' 150' refracting telescope in operation near Danzig.
31. Artist's rendering of Isaac Newton demonstrating his reflecting telescope to Christian Huygens, Edmund Halley and members of the Royal Society of England.
32. Artist's rendering showing William Herschel in the observer's cage observing through the great 40' reflecting telescope.

#### Early Astronomical Instruments

33. Armillary sphere (circa 1575) representing the Ptolemaic system.
34. Large equatorial armillary sphere 6' in diameter designed by Tycho Brahe to measure star positions.
35. Persian astrolabe (circa 1710).
36. Chinese horizontal sundial (circa 1800) with alternate Arabic and Chinese numerals.
37. A mechanical orrery (circa 1770) showing the heliocentric system out to Saturn. The moon, Galilean satellites and four moons of Saturn are also included.
38. Galileo's telescope (circa 1609) with which he made his first celestial observations. Larger telescope is 14x and 26mm diameter objective, smaller telescope is 20x and 16mm diameter objective.
39. Celestial globe (circa 1790) made from the observations of Bradley, the discoverer of the aberration of starlight.
40. Late 18th century Italian star map showing the southern hemisphere sky with fanciful mythological figures over the major stars.