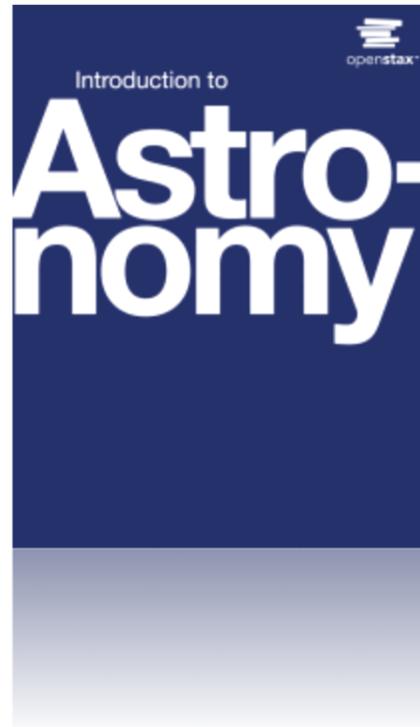


# ASTRONOMY

## Chapter 1 SCIENCE AND THE UNIVERSE: A BRIEF TOUR PowerPoint Image Slideshow

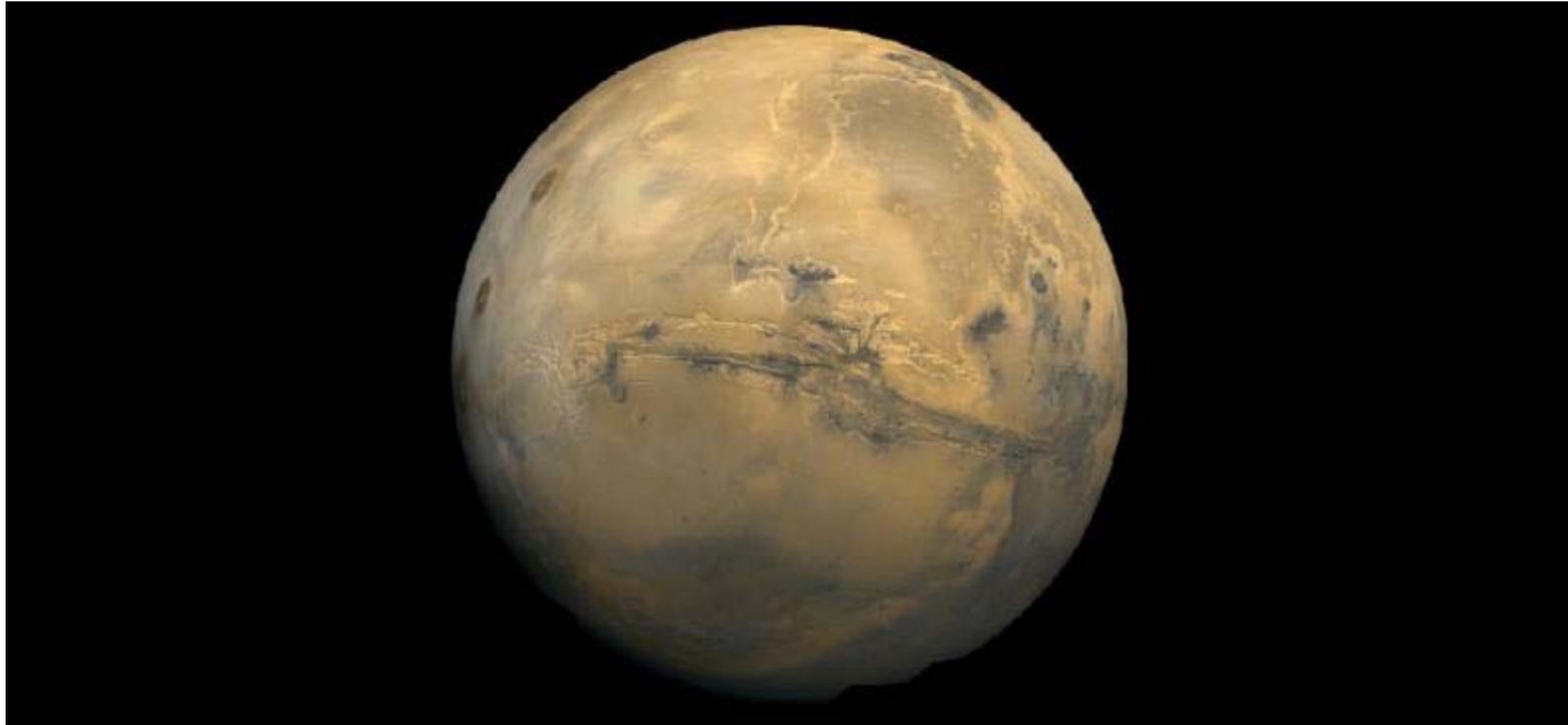


## FIGURE 1.1



**Distant Galaxies.** These two interacting islands of stars (galaxies) are so far away that their light takes hundreds of millions of years to reach us on Earth (photographed with the Hubble Space Telescope). (credit: modification of work by NASA, ESA, the Hubble Heritage (STScI/AURA)-ESA/Hubble Collaboration, and K. Noll (STScI))

## FIGURE 1.2



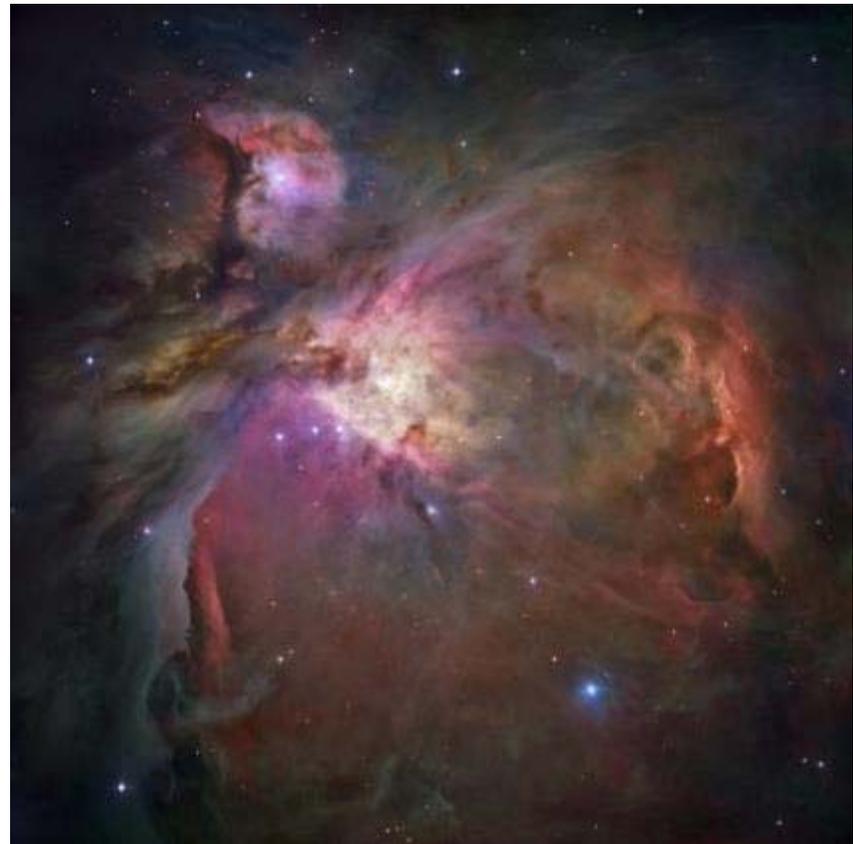
**Mars Mosaic.** This image of Mars is centered on the Valles Marineris (Mariner Valley) complex of canyons, which is as long as the United States is wide. (credit: modification of work by NASA)

## FIGURE 1.3



**Stellar Corpse.** We observe the remains of a star that was seen to explode in our skies in 1054 (and was, briefly, bright enough to be visible during the daytime). Today, the remnant is called the Crab Nebula and its central region is seen here. Such exploding stars are crucial to the development of life in the universe. (credit: NASA, ESA, J. Hester (Arizona State University))

**Orion Nebula.** This beautiful cloud of cosmic raw material (gas and dust from which new stars and planets are being made) called the Orion Nebula is about 1400 light-years away. That's a distance of roughly  $1.34 \times 10^{16}$  kilometers—a pretty big number. The gas and dust in this region are illuminated by the intense light from a few extremely energetic adolescent stars. (credit: NASA, ESA, M. Robberto (Space Telescope Science Institute/ESA) and the Hubble Space Telescope Orion Treasury Project Team)



## FIGURE 1.5



**Telescope in Orbit.** The Hubble Space Telescope, shown here in orbit around Earth, is one of many astronomical instruments in space. (credit: modification of work by European Space Agency)

## FIGURE 1.6



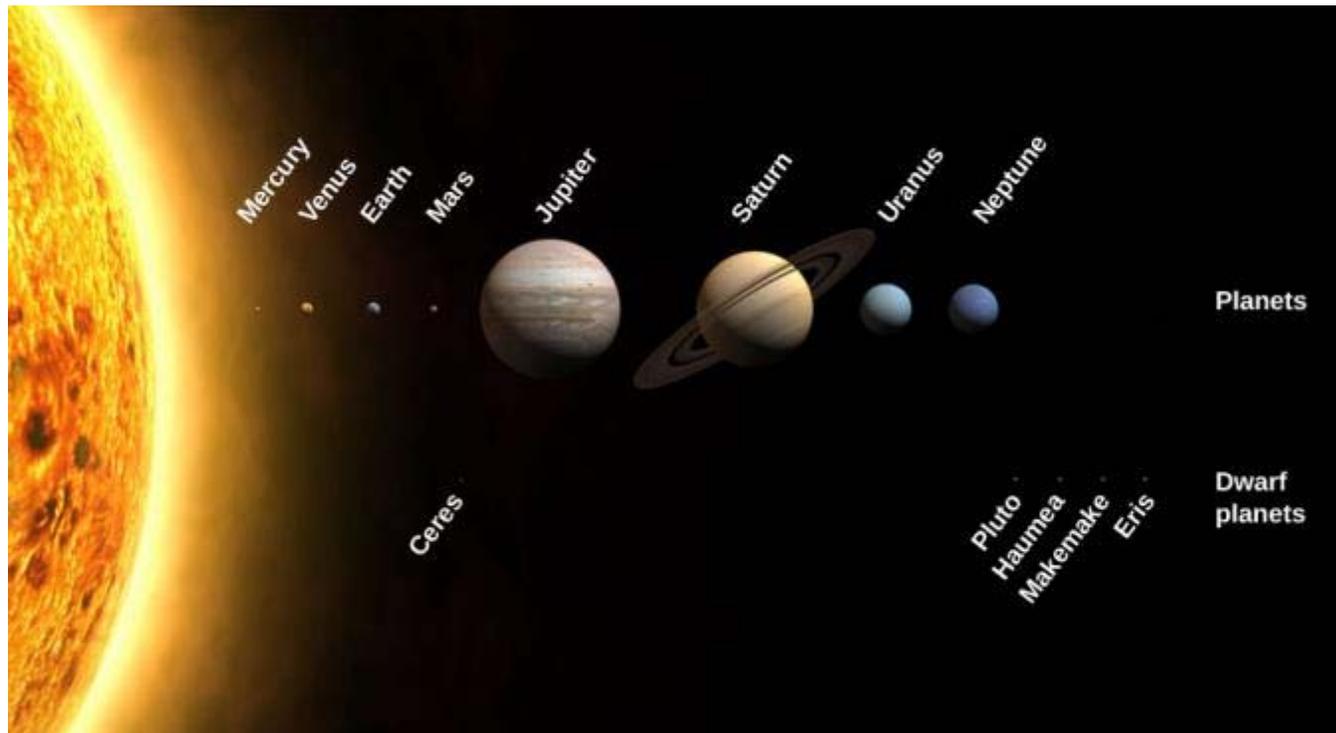
**Humanity's Home Base.** This image shows the Western hemisphere as viewed from space 35,400 kilometers (about 22,000 miles) above Earth. Data about the land surface from one satellite was combined with another satellite's data about the clouds to create the image. (credit: modification of work by R. Stockli, A. Nelson, F. Hasler, NASA/GSFC/NOAA/USGS)

## FIGURE 1.7



**Earth and Moon, Drawn to Scale.** This image shows Earth and the Moon shown to scale for both size and distance. (credit: modification of work by NASA)

## FIGURE 1.8



**Our Solar Family.** The Sun, the planets, and some dwarf planets are shown with their sizes drawn to scale. The orbits of the planets are much more widely separated than shown in this drawing. Notice the size of Earth compared to the giant planets. (credit: modification of work by NASA)

## FIGURE 1.9



**Spiral Galaxy.** This galaxy of billions of stars, called by its catalog number NGC 1073, is thought to be similar to our own Milky Way Galaxy. Here we see the giant wheel-shaped system with a bar of stars across its middle. (credit: NASA, ESA)

## FIGURE 1.10



**Milky Way Galaxy.** Because we are inside the Milky Way Galaxy, we see its disk in cross-section flung across the sky like a great milky white avenue of stars with dark “rifts” of dust. In this dramatic image, part of it is seen above Trona Pinnacles in the California desert. (credit: Ian Norman)

FIGURE 1.11

**Star Cluster.** This large star cluster is known by its catalog number, M9. It contains some 250,000 stars and is seen more clearly from space using the Hubble Space Telescope. It is located roughly 25,000 light-years away. (credit: NASA, ESA)

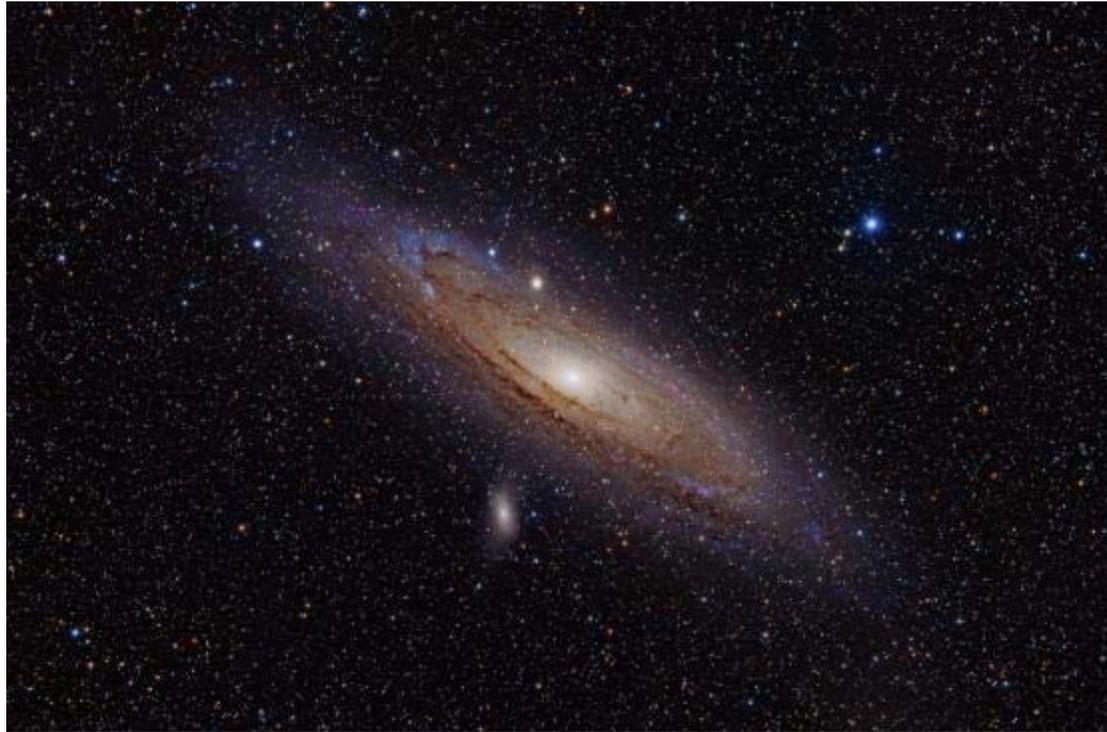


## FIGURE 1.12



**Neighbor Galaxies.** This image shows both the Large Magellanic Cloud and the Small Magellanic Cloud above the telescopes of the Atacama Large Millimeter/Submillimeter Array (ALMA) in the Atacama Desert of northern Chile. (credit: ESO, C. Malin)

## FIGURE 1.13



**Closest Spiral Galaxy.** The Andromeda galaxy (M31) is a spiral-shaped collection of stars similar to our own Milky Way. (credit: Adam Evans)

## FIGURE 1.14



**Fornax Cluster of Galaxies.** In this image, you can see part of a cluster of galaxies located about 60 million light-years away in the constellation of Fornax. All the objects that are not pinpoints of light in the picture are galaxies of billions of stars. (credit: ESO, J. Emerson, VISTA. Acknowledgment: Cambridge Astronomical Survey Unit)

# FIGURE 1.15



December						
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19 Vertebrates appear.	20 Land plants appear.	21
22	23	24	25 Dinosaurs appear.	26 Mammals appear.	27	28
29	30 Dinosaurs become extinct.	31 Humans appear.				

**Charting Cosmic Time.** On a cosmic calendar, where the time since the Big Bang is compressed into 1 year, creatures we would call human do not emerge on the scene until the evening of December 31. (credit: February: modification of work by NASA, JPL-Caltech, W. Reach (SSC/Caltech); March: modification of work by ESA, Hubble and NASA, Acknowledgement: Giles Chapdelaine; April: modification of work by NASA, ESA, CFHT, CXO, M.J. Jee (University of California, Davis), A. Mahdavi (San Francisco State University); May: modification of work by NASA, JPL-Caltech; June: modification of work by NASA/ESA; July: modification of work by NASA, JPL-Caltech, Harvard-Smithsonian; August: modification of work by NASA, JPL-Caltech, R. Hurt (SSC-Caltech); September: modification of work by NASA; October: modification of work by NASA; November: modification of work by Dénes Emöke)



PRINTED FOR STORAGE ON WIKIVERSITY

This OpenStax ancillary resource is © Rice University under a CC-BY 4.0 International license; it may be reproduced or modified but must be attributed to OpenStax, Rice University and any changes must be noted.