Planetary Geology
- Solar system includes
  - Sun, Nine planets, Moons, Asteroids, Comets, and Meteoroids
The planets drawn to scale

- Two groups of planets occur in the solar system
  - **Terrestrial** (Earth-like) planets
    - Mercury through Mars
    - Small, dense planets
    - Rocky surface
  - **Jovian** (Jupiter-like) planets
    - Jupiter through Neptune
    - Large, low density, gaseous
    - Massive
    - Thick atmospheres composed of hydrogen, helium, methane, and ammonia
    - Several Moons
  - Pluto not included in either group

Sun (5’)…Earth = grape (500’)…Pluto = 4 miles
Evolution of the planets

- **Nebular hypothesis**
  - Planets formed a long time ago
  - Condensing from a gaseous nebula

- As the planets formed, the materials that compose them separated
  - Dense metallic elements (iron and nickel) sank toward their centers
Planets: A brief tour

- **Mercury**
  - Innermost planet
  - Second smallest planet
  - No atmosphere
  - Cratered highlands
  - Vast, smooth terrains
  - Very dense
  - Similar to our moon
Venus

- Similar to Earth in:
  - Size
  - Density
- Shrouded in thick clouds:
  - Atmosphere is 97% carbon dioxide
  - Surface atmospheric pressure is 90 times that of Earth's
- Covered with Volcanoes and some craters
Our Earth and Moon

General characteristics of our moon
• Diameter of 2150 miles: unusually large compared to its parent planet
• No atmosphere
• Bombarded by meteorites
• Rocks similar to Earth
The Moon’s Surface

Lunar surface

- Three types of terrain
  - **Maria**—Latin for "sea"-lava
  - **Craters**—Impact features from meteorites
  - **Ejecta**—light colored spray
A 20-km-wide crater on the Moon

Figure 22.6
Origin of our Moon

Lunar history--2 Theories

• Capture Theory--Too Large
• Collision Theory--Very Similar Rocks
Importance of Moon

- Exploration Base
  - Lunar Ice

- Moon controls
  - Ocean Tides
  - Rotation Speed of Earth
  - Tilt of Earth, 23 degrees
Mars

- Called the rocky "Red Planet"
- Thin CO₂ Atmosphere (1% Earth’s)
- Large Volcanoes and Canyons
- Drainage Patterns--Water?

Mt Olympus
- **Jupiter**
  - Largest planet
  - Rapid rotation
  - Banded Appearance
  - Giant Red Spot
  - Atm Storms
  - Gaseous-Liquid Hydrogen
- Saturn
  - Similar to Jupiter—Gaseous
  - Rings of rock debris
  - 30 moons
  - Would Float in Giant Lake
Planets: A brief tour

- **Uranus**
  - Icy Planet
  - Rotates "on its side"
  - Small Rings
  - Several large moons
Planets: A brief tour

- **Neptune**
  - Icy Gases
  - Dynamic atmosphere
    - One of the windiest places in the solar system
    - Great Dark Spot
  - Eight moons
- Pluto
  - Not visible with the unaided eye
  - Discovered in 1930
  - Average temperature is -210ºC
  - Sun looks like bright star
Comets

- **Origin**
  - Not well known
  - Form at great distance from the Sun
  - Dirty Snowballs—rock debris and ice
- **Most famous short-period comet is Halley's**
  - 76-year orbital period
Comet Hale-Bopp

Figure 22.27
Other members of the solar system

- Asteroids--Asteroid Belt
  - Most lie between Mars and Jupiter
  - Irregular sizes
  - Origins are uncertain
Other members of the solar system

Meteorites

- Meteoroids are referred to as meteorites when they are found on Earth
  - Types of meteorites classified by their composition
    - Irons--6%
      - Mostly iron
      - 5-20% nickel
    - Stony meteorites--93%
      - Silicate minerals with Inclusions of other minerals
    - Stony-irons -1%– mix of irons and stony meteorites
Crater Locations

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