Name: _____ Per: _____

Chapter 27 – The Planets and the Solar System

27.1 The Inner Planets

Advances in technology have provided us with more information about the solar system.

Two Planetary Neighborhoods

- Inner Planets – Mercury, Venus, Earth, Mars
- Characteristics – rocky crusts, dense mantle layers
- Called – Terrestrial (earthlike) planets

Asteroid belt separates Inner from Outer

- Outer Planets – Jupiter, Saturn, Uranus, Neptune
- (Jovian Planets)
- Much larger than Earth
- Gaseous
- Outer layers – hydrogen gas
- Less dense than Earth
- ALL have ring systems

Pluto is an oddity

Mercury

- Nearest the sun
- (Revolution) Orbits the sun in SHORTEST period of time – 88 days
- Surface is heavily cratered – Impact craters are MOST abundant landform
- (Rotation) Mercury turns on its axis once every 59 days
- Temp range 400° C to -200 °C
- Weak gravity – prevents retaining an atmosphere

Venus

- Earth's sister planet – similar in diameter, mass and gravity
- Weak/non-existent magnetic field
- *Rotates EAST to WEST
- Rotates on axis once every 243 days
- Revolves around sun 225 days (day is LONGER than year)
- Landscape dominated by volcanic features, faulting, and impact craters
- Dense atmosphere mostly CO_2 and 3% Nitrogen – clouds of concentrated sulfuric acid
- GREENHOUSE EFFECT traps heat in atmosphere – keeps the temperature HIGH – about 473°C

Mars

- Rotates about 24 hours
- Revolution (orbit around Sun) is 687 days (double Earth)
- Four seasons – similar tilt as Earth
- Atmosphere is 95% CO_2, 3% Nitrogen and Argon
- Northern Hemisphere – smooth lowland; Southern Hemisphere – large craters, small channels
- LARGEST VOLCANO IN SOLAR SYSTEM – OLYMPUS MONS
- Long Canyon System – VALLES MARINERIS - Indication that there was once liquid water on surface
- At Present – liquid water CANNOT survive on surface – freeze, boil, evaporate

27.2 The Outer Planets

Jovian Planets

- Jupiter, Saturn, Uranus, Neptune
- Characteristics – Much larger, do NOT have solid surfaces (gaseous) ; composed of light elements, three-layered structure (temperature increases with depth), ALL have ring systems

Jupiter

- Revolves (orbits the Sun) – 11.9 earth years
- Rotates FASTER than any other planet – under 10 hours
- LARGEST planet in solar system
- STRONGEST magnetic field - brilliant auroras
- Great Red Spot – storm over 350 years old

Saturn

- Rotation – about every 10 hours
- Revolution (orbits the sun) – 30 years
- LOWEST DENSITY OF ANY PLANET
- Saturn's magnetic field is WEAKER than Jupiter, but STRONGER than Earth

Uranus

- Rotation – 17.2 hours
- Revolution (orbit around the Sun) – 84 earth years
- Orbits on its SIDE – possibly tipped over by a collision with an object; but the magnetic field is NOT tipped (results in spiral pattern in solar wind)
- Surface temperature is -200°C

Neptune

- Atmosphere – 74% Hydrogen, 25% Helium, 1% Methane
- Rotation – 16.1 earth hours
- Revolution (orbit around sun) – 165 years
- Neptune and Pluto become interchanged every 248 years
- Neptune was predicted mathematically BEFORE being discovered.

27.3 Planetary Satellites

Satellites – bodies or objects that revolve around planets (often called moons)

Satellites of Earth and Mars

- Earth – has one moon
- Mars – has two moons (Deimos and Phobos)

Jupiter's Moons

- Jupiter has 67 moons – 4 largest (Io, Europa, Ganymede, and Callisto – Galilean satellites))
    - IO – geologically active – at least 9 volcanoes; Distinctive color caused by sulfur and sulfur dioxide; has a high altitude ionosphere
    - EUROPA – Has an atmosphere; has a smooth and white shiny surface of water; criss-cross pattern across the surface
    - GANYMEDE – LARGEST MOON IN SOLAR SYSTEM; ONLY MOON of Jupiter to have a magnetic field
    - CALLISTO – MOST HEAVILY CRATERED in the solar system; Oxygen has been detected; internal structure does NOT consist of separate layers
- Saturn's Moons – 62 moons
    - Titan – largest (second largest in solar system); Only moon to have a SUBSTANTIAL ATMOSPHERE; principal gas is Nitrogen, remaining gas is methane
- Moons of Uranus and Neptune
    - ***Uranus*** has at least 27 moons - 5 major moons are Titania, Oberon, Umbriel, Ariel, and Miranda – ALL lack atmospheres and impact craters
    - Differences
        - Titania – has huge, faulted valleys;
        - Oberon – impact craters partially flooded by dark material;
        - Umbriel – has unusual dark surface;
        - Ariel – cratered surface is criss-crossed by valleys and faults;
        - Miranda – deeply scarred; been shattered as many as 5 times
    - ***Neptune***
        - Has at least 13 moons (actually 14)
        - Triton is the largest.

27.4 Solar-System Debris