Satellites

Definition and Importance

- A satellite is a small celestial body that orbits a planet.
- The word "satellite" comes from the Latin word satelles, meaning "companion" or "attendant."
- Satellites are essential in both natural celestial systems and human technological advancements.

Types of Satellites

1. Natural Satellites

- Naturally occurring celestial bodies that orbit planets.
- Formed through cosmic processes.
- Play a crucial role in planetary systems.

  Example: Earth's Moon

  - Affects tides.
  - Stabilizes Earth's axial tilt.
  - Influences natural phenomena.

Key Characteristics of Natural Satellites:

- Exist naturally in planetary orbits.
- Vary in size from small moonlets to large moons.
- Planets may have one or multiple moons.

  - **Earth:** 1 moon (The Moon).
  - **Jupiter:** 95 known moons (largest: Ganymede, bigger than Mercury).

2. Artificial Satellites

- Human-made machines launched into space.
- Orbit Earth or other celestial bodies for specific functions.
- Serve communication, navigation, weather forecasting, scientific research, and space exploration.

Key Characteristics of Artificial Satellites:

- Built and launched by humans.
- Categorized based on function:
  - **Communication Satellites:** Enable global connectivity.
  - **Weather Satellites:** Track climate and predict natural disasters.
  - **Scientific Satellites:** Study space and celestial bodies.

Notable Examples:

- **Sputnik 1 (1957):** First artificial satellite (Soviet Union).
- **Aryabhata (1975):** India's first artificial satellite.

Asteroids: Minor Planets of the Solar System

Definition and Location

- Asteroids are rocky remnants from the early solar system.
- Found mainly in the Asteroid Belt (between Mars and Jupiter).

Key Features of Asteroids

1. Composition and Size:

- Made of rock and metal.
- Size varies from 10 km to 500 km in diameter.
- Largest known asteroid: Ceres (975 km in diameter, classified as a dwarf planet).

Comets: The Icy Wanderers of Space

Definition and Characteristics

- Comets are icy celestial objects that orbit the Sun.
- Composed of ice, gas, and dust.
- Described as "dirty snowballs."

Formation of Comet Tails

- As a comet nears the Sun, its ice vaporizes due to heat.
- Releases gas and dust, forming:

1. **Coma:** A glowing halo around the comet's nucleus.

2. **Tail:** Always points away from the Sun due to solar wind.

- Comet tails make them visually striking in the night sky.

The Milky Way Galaxy

- Also called Ākāsha Gangā in Indian culture.
- **A spiral-shaped galaxy containing:**
  - The Sun and our solar system.
  - Hundreds of billions of stars.
  - Gas and dust concentrated in spiral arms.
- Estimated to be 13.6 billion years old.
- **Closest galaxy:** Andromeda Galaxy (4 light-years away).
  - Also a spiral galaxy.
  - Visible using telescopes.

Key Terms

Dwarf Planet: A small, round celestial object that orbits the Sun but is not large enough to clear other objects from its orbit.

Examples: Pluto, Ceres.