Satellites, Shuttles, and Space Stations

Rockets

A **rocket** is propelled into shape by particles flying out of one end at high speed

- Fuel is ignited in a chamber → explosion of gases → pressure that forces gases out of rocket → rocket moves in opposite direction
- Thrust: reaction force of gases which push the rocket forward

Study Tip

Remember Newton's Third Law of Motion ("for every action, there is an equal and opposite reaction") in order to better understand how a rocket is thrust upward into space.

Satellites

- **Satellite:** object that orbits a larger object
- **Orbit:** circular or elliptical path around an object
- The moon was Earth's first satellite, but now many human-made "artificial satellites" orbit the planet
- 4 main types of satellites:
  - Imaging satellites take pictures of Earth's surface for military or scientific purposes
  - Communications satellites receive and send signals for telephone, television, and other methods of communication
  - Navigational satellites are used for navigation systems (e.g. Global Positioning System)
  - The International Space Station (largest artificial satellite) is designed for humans to live in space while conducting scientific research

The space shuttle Atlantis being launched into orbit by a rocket on Cape Canaveral, Florida.

Space Stations

- Modern space stations are constructed piece by piece to create a modular system
- International Space System (ISS) : primary purpose is scientific research

Space Shuttles

- **Space shuttles** can carry large pieces of equipment, such as satellites, space telescopes, or sections of a space station
- 3 main parts:

- **Orbiter:** has wings similar to an airplane

- Fuel tank which contains liquid fuel (attached to orbiter)
- 2 large "booster rockets"

- Once in space, orbiter can be used to release equipment, repair existing equipment, or do experiments directly on board
- When the mission is complete, the orbiter re-enters Earth's atmosphere and flies back to Earth more like a glider than an airplane

The space shuttle orbiter Atlantis touches down at the Kennedy Space Center in Florida.

Concept Check

- How does a rocket work?
- Why are there so many satellites orbiting Earth at this time?
- Would you like to spend months in the International Space Station? If so, what would you be interested in studying? If not, why not?