Chapter 8.1: Force

1. Definition of Force

- **Force**: A pull or a push upon an object.

Example Sentence: Opening a can of food or pressing a switch involves applying a force.

2. Types of Forces

- **Gravitational Force**: Force that points towards the center of the Earth, causing objects to fall back to Earth.
- **Frictional Force**: Resists movement between two surfaces in contact.
- **Normal Force**: Produced when an object is in contact with a surface.
- **Buoyant Force**: Thrust force acting on an object floating on a fluid.
- **Elastic Force**: Exists when a material is stretched or compressed.
- **Weight**: The gravitational force acting on an object.

Example Sentence: When you push a box across the floor, frictional force resists its movement.

3. Characteristics of Force

- **Vector Quantity**: Has both magnitude and direction.
- **Magnitude**: The quantity or value of the measurement.
- **Point of Application**: The specific point where the force is applied.

Example Sentence: The force acting on the hammer has a magnitude of 15 N and is applied at the head of the hammer.

4. Measurement of Force

- **Tool**: Spring balance.
- **Principle**: Based on spring extension.

- **Unit**: Newton (N).

Example Sentence: Using a spring balance, we can measure the force by reading the scale on the balance.

5. Unit of Force

- **SI Unit**: Newton (N).
- **Weight Calculation**: An object with a mass of 1 kg has a weight of 10 N on Earth.

Example Sentence: A 100 g object has a weight of 1 N on Earth.

6. Action-Reaction Pair (Newton's Third Law)

- **Law**: For every action force, there is a reaction force of the same magnitude but in the opposite direction.

Situations:

1. **Object on a Table**:
   - **Action Force**: Weight (gravitational force).
   - **Reaction Force**: Normal force.

   Example Sentence: A book on a table remains still due to the balance of weight and normal force.

2. **Object Floating on Water**:
   - **Action Force**: Weight (gravitational force).
   - **Reaction Force**: Buoyant force.

   Example Sentence: A wooden block floats on water because its weight is balanced by the buoyant force.

3. **Trolleys in Contact**:
   - **Action Force**: Elastic force from the spring.
   - **Reaction Force**: Opposite elastic force.

Example Sentence: When two trolleys are pushed apart by a spring, each experiences an elastic force in opposite directions.