

Chapter 8.2: Effects of Force

1. Introduction to Effects of Force

- **Force:** Cannot be seen but its effects can be felt.
- **Effects of Force:** Can change the shape, size, and motion of an object.

Example Sentence: When force acts on an object, it can change the object's speed, direction, or shape.

2. Different Scenarios and Effects of Force

Moving a Stationary Object

- **Situation 1 (Table Tennis Ball):** When a stationary object is pushed, it moves.
- **Situation 2 (Football):** Kicking a stationary football makes it move.

Example Sentence: Pushing a table tennis ball or kicking a football are examples of moving a stationary object with force.

Stopping a Moving Object

- **Situation 1 (Table Tennis Ball):** Applying force in the opposite direction stops the object.
- **Situation 2 (Football):** A goalkeeper catching a ball stops it.

Example Sentence: A table tennis ball can be stopped by applying force in the opposite direction of its motion.

Changing the Speed of an Object in Motion

- **Situation 1 (Table Tennis Ball):** Force from the same direction speeds up the object.
- **Situation 2 (Football):** A footballer kicking the ball harder to increase its speed.

Example Sentence: Kicking a moving football harder increases its speed.

Changing the Direction of Motion of an Object

- **Situation 1 (Table Tennis Ball):** Force from the side changes its direction.
- **Situation 2 (Football):** A player kicking the ball to change its direction.

Example Sentence: Applying a side force to a moving ball can change its direction.

Changing the Shape and Size of an Object

- **Situation 1 (Table Tennis Ball):** Force can change its shape and size.
- **Situation 2 (Football):** Squeezing a football changes its shape.

Example Sentence: Squeezing a soft ball changes its shape and size.

3. Buoyant Force

- **Definition:** An object will float if the buoyant force acting on it is equal to its weight.
- **Condition:**
 - Floating: Buoyant force equals weight.
 - Submerging: Buoyant force is less than weight.

Example Sentence: A rubber duck floats because the buoyant force acting on it equals its weight.

4. Density and Buoyant Effect

- **Principle:** The position of an object in a fluid depends on the density of the object compared to the fluid.
 - Less dense objects float.
 - More dense objects sink.

Example Sentence: Objects less dense than water will float, while more dense objects will sink.

5. Lever System

- **Components:** Effort, load, and fulcrum.

- **Purpose:** Makes work easier by allowing us to use minimal force.

Types of Levers

1. **First Class Lever:** Fulcrum between load and effort (e.g., scissors).
2. **Second Class Lever:** Load between fulcrum and effort (e.g., wheelbarrow).
3. **Third Class Lever:** Effort between fulcrum and load (e.g., fishing rod).

Example Sentence: Using a lever like a bottle opener makes it easier to open a bottle cap.

6. Moment of Force

- **Definition:** The turning effect produced by a force applied at a fixed point.
- **Calculation:** Moment of force = Force (N) × Perpendicular distance from pivot (m).
- **Unit:** Newton metre (N m).

Example Sentence: The moment of force can be increased by applying a greater force or increasing the distance from the pivot.

7. Pressure

- **Definition:** Force per unit area.
- **Formula:** Pressure = Force (N) / Surface area (m²).
- **Unit:** Pascal (Pa).

Example Sentence: Pressing a thumbtack into a plank is easier because it exerts more pressure on a smaller surface area.

Application in Daily Life

- **Examples:**
 - Thin blades of skating boots.
 - Wide wheels of tractors.
 - Studs on football boots.

8. Gas Pressure and Kinetic Theory

- **Air Pressure:** Caused by collisions of air molecules with container walls.
- **Factors Affecting Air Pressure:** Volume and temperature.

Relationship with Altitude

- **Principle:** Atmospheric pressure decreases with altitude due to gravitational attraction.

Example Sentence: At higher altitudes, air pressure is lower because air molecules are less densely packed.

9. Effects of Depth on Liquid Pressure

- **Principle:** Pressure increases with depth in a liquid.
- **Applications:**
 - Thicker walls at the base of dams.
 - Special suits for divers.
 - Strong submarine bodies.

Example Sentence: The walls of a dam are thicker at the base to withstand higher water pressure.