
SCIENCE SUCCESS GUIDE

How to Study Science the SMART Way

Science is not about mugging answers.

Science is about:

- Understanding concepts
- Connecting ideas
- Remembering keywords
- Writing correct points in exams

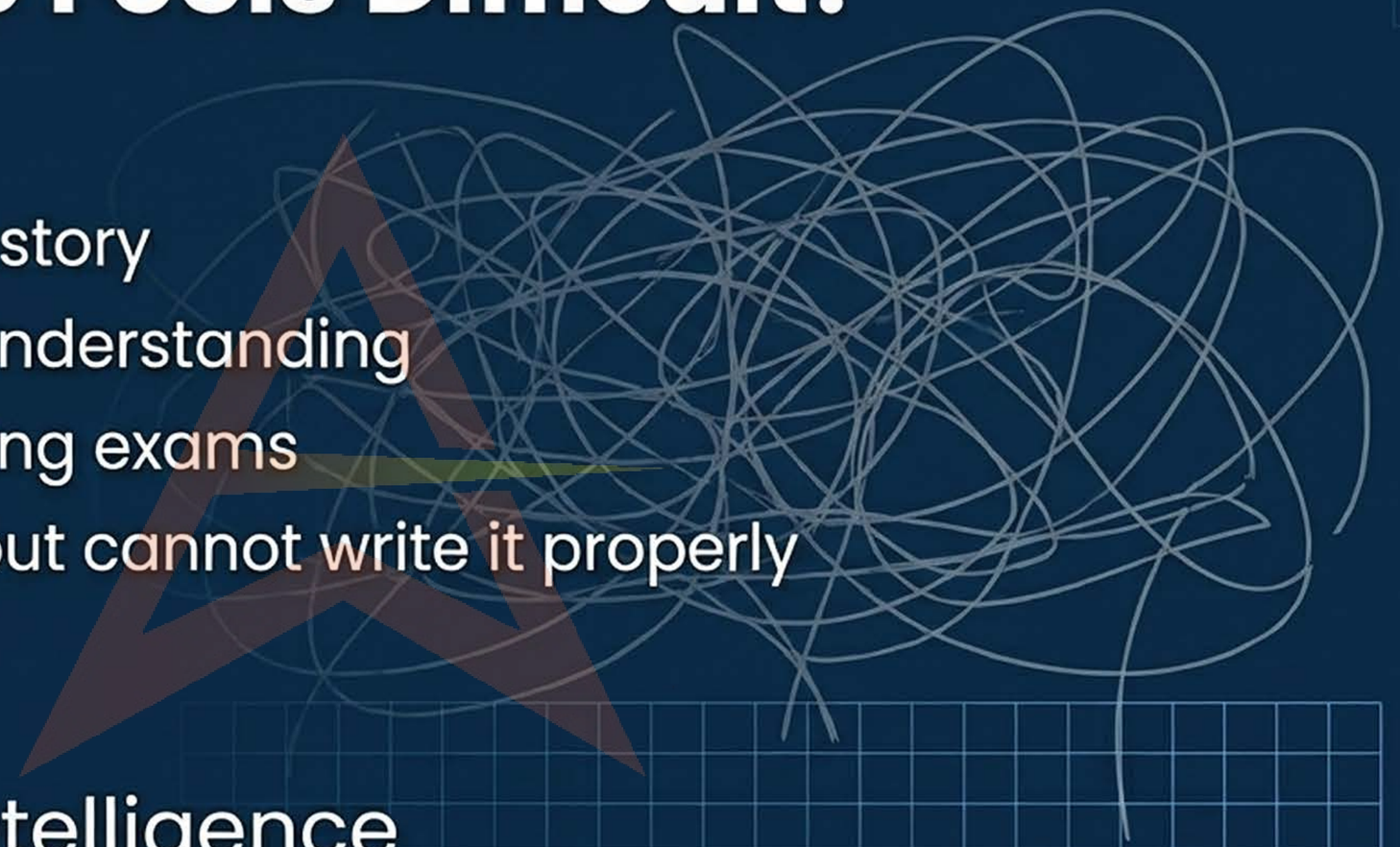
This guide will teach you:

- How to study science daily
- How to remember answers easily
- How to avoid silly mistakes
- How to score better marks with less stress

Why Science Feels Difficult?

Most students:

- Read science like a story
- Memorise without understanding
- Forget answers during exams
- Know the concept but cannot write it properly



Problem is NOT intelligence

Problem is **wrong study method**

THE GOLDEN RULE OF SCIENCE

If any one step is missing → marks are lost.

TECHNIQUE 1: TEXTBOOK FIRST RULE

Textbook is Your Main Weapon

Always study from textbook first.

- ✓ Read line by line
- ✓ Underline important words
- ✓ Focus on definitions, diagrams, processes
- ✓ Do NOT jump directly to guide answers

90% exam questions come from textbook language

TECHNIQUE 2: KEYWORD FOCUS METHOD

Marks Are Given for Keywords

In science, keywords = marks.

Example:

- Evaporation
- Photosynthesis
- Fertilisation
- Force, motion, energy

- ✓ Learn spelling of keywords
- ✓ Use them in every answer
- ✓ Underline keywords in exam

TECHNIQUE 3: WHY–HOW–WHAT METHOD

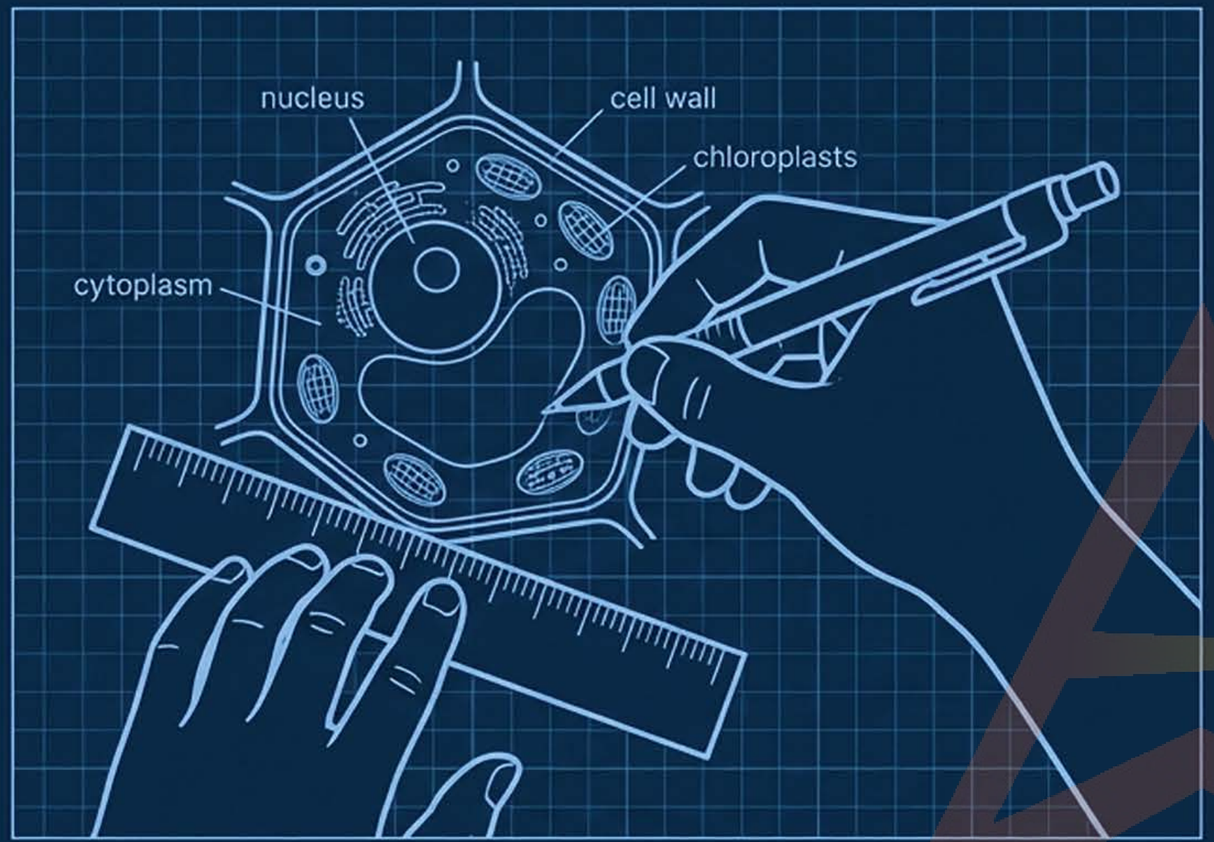
Ask These 3 Questions While Studying

For every topic ask:

* **What** is it? (Definition)
* **How** does it work? (Process)
* **Why** is it important? (Reason / use)

This makes answers:

- ✔ Clear
- ✔ Complete
- ✔ Easy to remember



- ✔ Practice diagrams regularly
- ✔ Label neatly
- ✔ Use pencil & ruler
- ✔ Even if answer is incomplete, diagram gives marks

TECHNIQUE 4: DIAGRAM POWER

Diagrams Can Save Your Marks

Science without diagram = marks lost

TECHNIQUE 5: SMALL DAILY REVISION

The 15 Minutes Rule

Daily:

- 10 minutes revise old chapter
- 5 minutes revise keywords

Weekly:

- Revise all important definitions
- Revise diagrams

Small revision = big confidence

TECHNIQUE 6: ANSWER WRITING FORMAT

How to Write Perfect Answers

- ✔ Start with definition
- ✔ Write points in bullets
- ✔ Use keywords
- ✔ Draw diagram if possible
- ✔ Keep handwriting neat

Good content + bad writing = low marks

TECHNIQUE 7: EXAM DAY STRATEGY

How to Avoid Silly Mistakes

- ✓ Read question twice
- ✓ Underline keywords in question
- ✓ Write to the point
- ✓ Do not rush
- ✓ Leave space for diagram

Calm mind = correct answers

How to Use This Guide Properly

This guide is NOT for:

- ✗ Reading like a story
- ✗ Mugging answers

This guide IS for:

- ✓ Understanding concepts
- ✓ Revising keywords
- ✓ Practicing exam writing

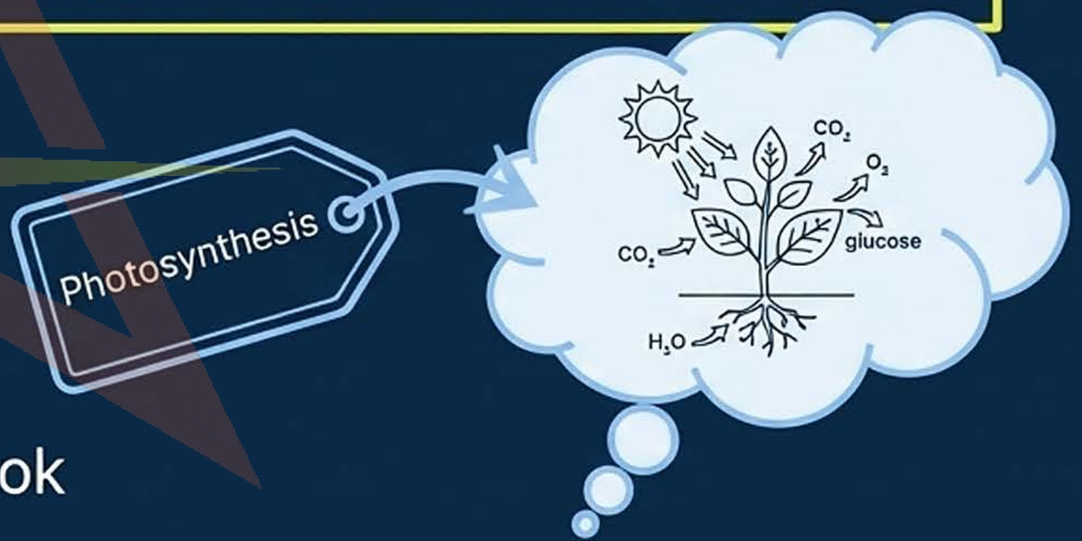
How to Use Chapterwise Keywords

Very Important Instruction

Keywords = Memory Trigger

Your task:

- 1. Read keywords carefully
- 2. Recall the topic in your mind
- 3. Open textbook
- 4. Read full explanation from textbook



Never skip textbook reading

The Final Revision Tool: One-Page Notes

After studying: ✓ **Textbook** → ✓ **Keywords** → ✓ **Diagrams**

In this guide you have one-page revision notes.

Use them:

- Before test
- Before exam
- For quick recall

One-page notes = last-day confidence booster

Science Can Be Easy If Studied Right

Remember:

- Science needs method, not fear
- Daily small effort beats last-minute study
- Understanding brings confidence
- Confidence brings marks

FOLLOW THE SYSTEM, MARKS WILL FOLLOW

Chapter 1: Matter in Our Surroundings

What is Matter?

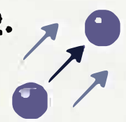
Anything that occupies space and has mass. Early philosophers called it "Panch Tatva" (Air, Earth, Fire, Sky, Water).

Particulate Nature

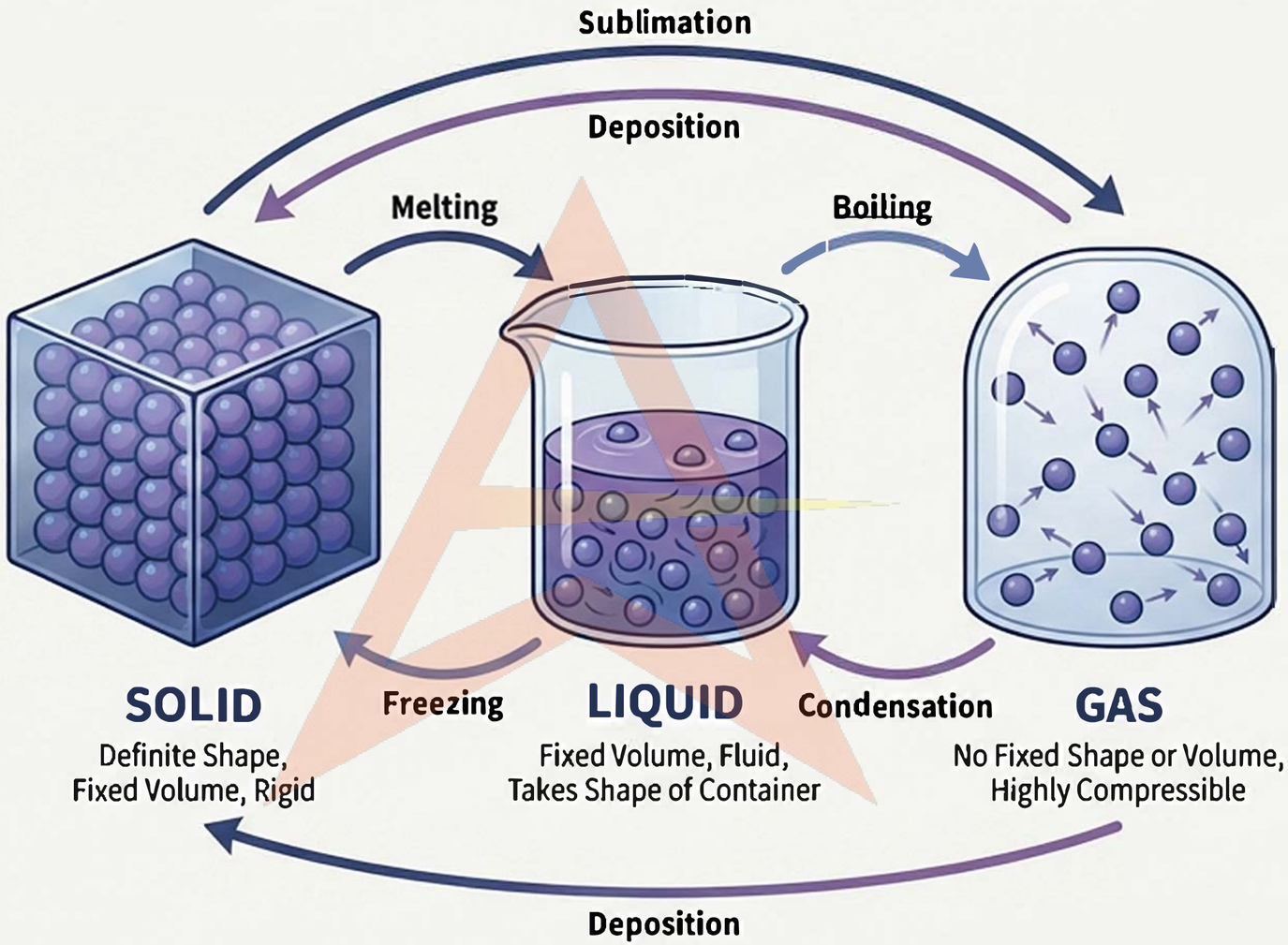
Matter is made of incredibly tiny particles, not a continuous block.

Particle Characteristics

1. 
Space Between Them
Sugar particles dissolving water motassis gurartesdes.

2. 
Continuously Moving
Possess kinetic energy; faster with heat.

3. 
Attract Each Other
Force varies (strong in solids, weak in gases).



Evaporation

The cooling phenomenon of liquid turning to vapor below its boiling point.
Factors affecting it: Surface Area, Temperature, Wind Speed (increases), Humidity (decreases).

Key Terms & Formulas

Melting Point: Solid to liquid (Ice: 273.15 K / 0°C).

Boiling Point: Liquid to gas (Water: 373 K / 100°C).

Latent Heat of Fusion: "Hidden" energy used to change state without raising temperature.

Sublimation: Solid directly to gas (e.g., Camphor).

Dry Ice: Solid CO_2, which sublimates.

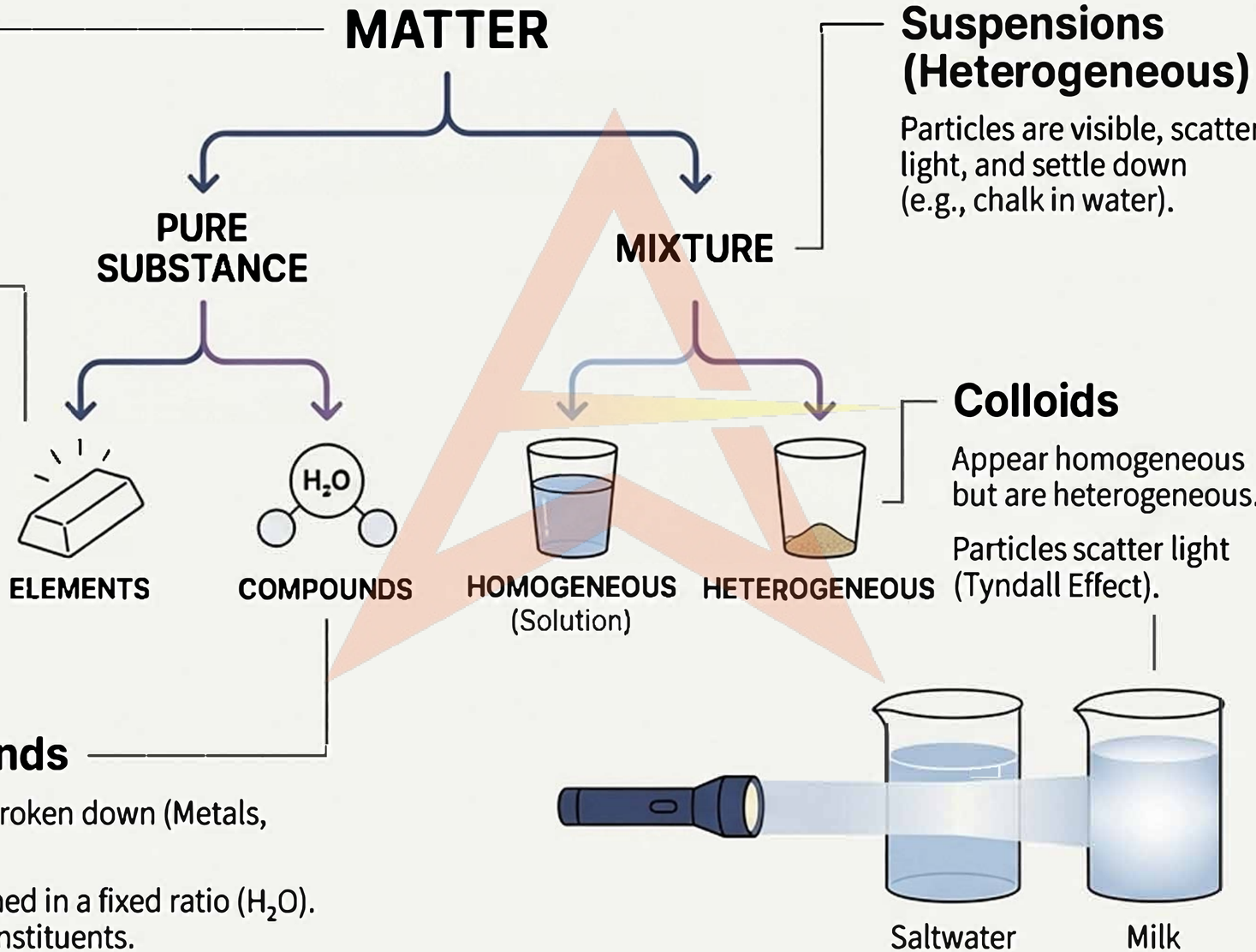
$$K = °C + 273$$

Temperature Conversion Formula

Chapter 2: Is Matter Around Us Pure?

Pure vs. Mixture

A pure substance has one type of particle (water). A mixture has more than one (milk).



Suspensions (Heterogeneous)

Particles are visible, scatter light, and settle down (e.g., chalk in water).

Solutions (Homogeneous)

Uniform composition.

Has a Solvent (dissolving part) and a Solute (dissolved part).

Particles are tiny, stable, and don't scatter light.

Can be dilute, concentrated, or saturated.

Colloids

Appear homogeneous but are heterogeneous.

Particles scatter light (Tyndall Effect).

Elements & Compounds

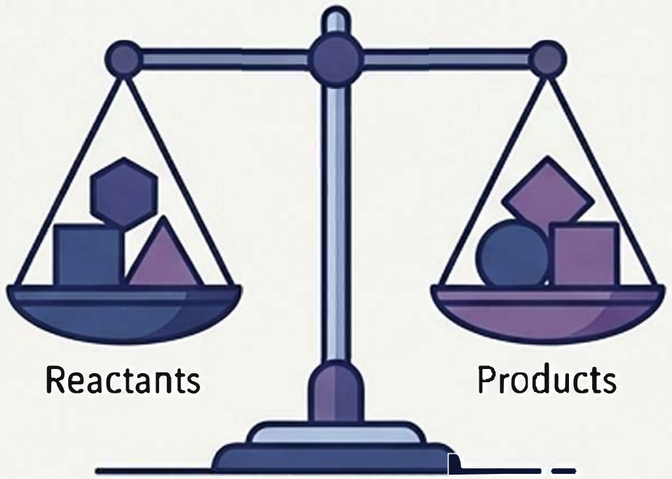
Element: Basic form, can't be broken down (Metals, Non-metals, Metalloids).

Compound: Chemically combined in a fixed ratio (H_2O). Properties are different from constituents.

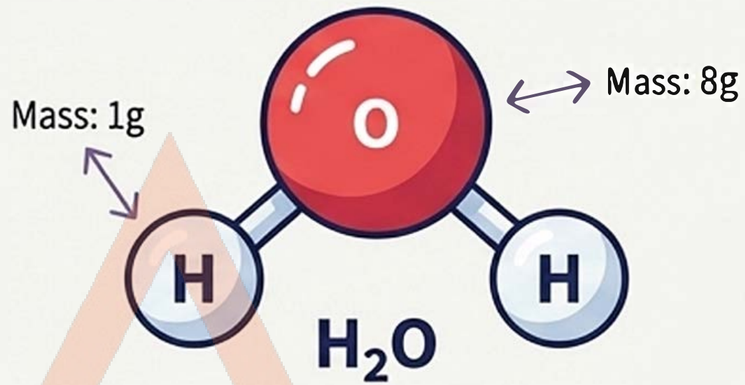
Key Terms & Exam Alerts

- **Tyndall Effect:** The scattering of a beam of light by colloidal particles.
- **Alloys:** Mixtures of metals (e.g., Brass = Copper + Zinc), but considered mixtures as they retain constituent properties.
- **Centrifugation:** Technique to separate colloids (like cream from milk).
- **Metalloids:** Elements with intermediate properties (Boron, Silicon).
- **Liquids at Room Temp:** Mercury (metal) and Bromine (non-metal).

Chapter 3: Atoms and Molecules



Law of Conservation of Mass: Mass is neither created nor destroyed.



Law of Constant Proportions: H:O is always 1:8 by mass.

What is an Atom?

The fundamental building block of all matter. Measured in nanometers (10^{-9} m).

Atomic Mass

A relative scale with Carbon-12 as the standard.
1 atomic mass unit (u) = 1/12th the mass of a C-12 atom.

Molecules

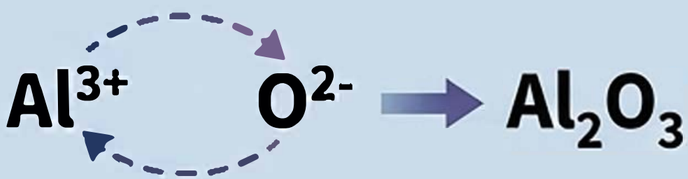
A group of atoms bonded together. Can be of the same element (O_2) or different (H_2O).

Ions

Charged particles formed by gaining or losing electrons.
Cations are positive (Na^+), **Anions** are negative (Cl^-).

Writing Chemical Formulae Section

Valency: The combining capacity of an element.



"Crossover" Rule

Visual Analogy

Analogy for balancing "hands" or valency.

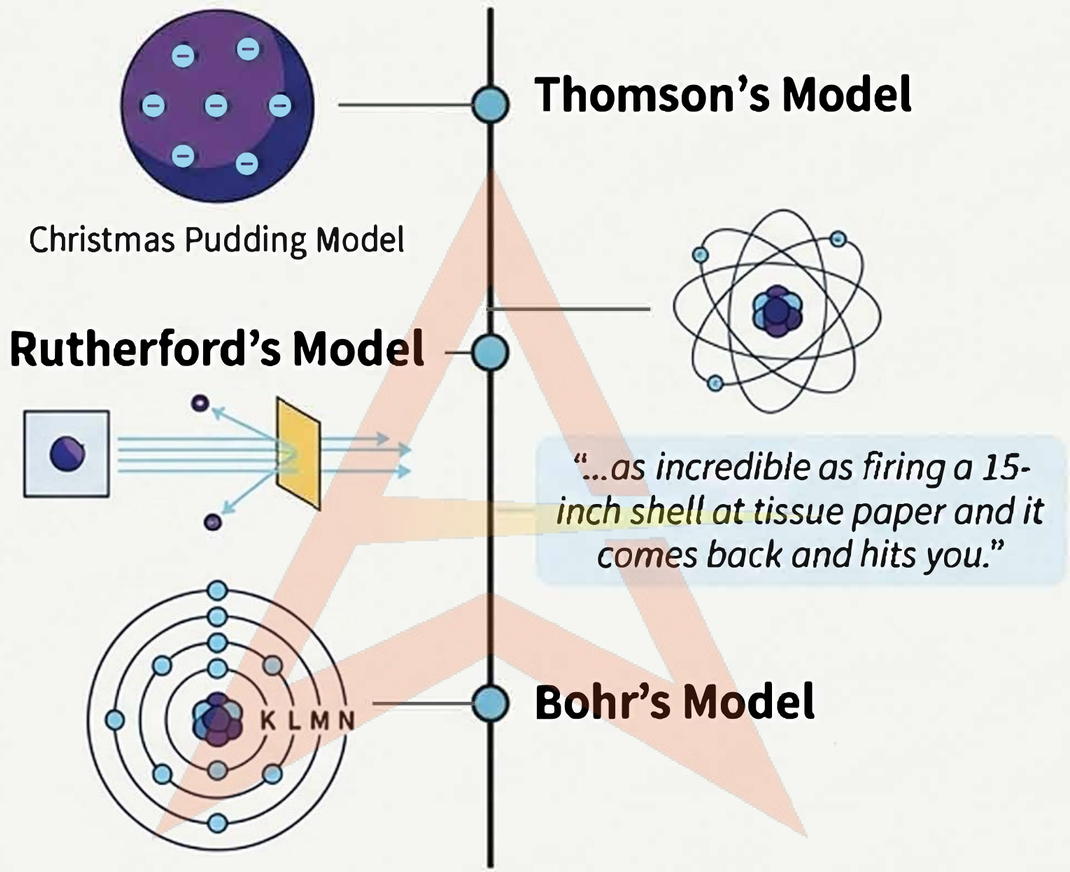
Key Terms & Definitions

- **Atomicity:** Number of atoms in a molecule.
  Examples:
  - Monoatomic: Argon (Ar)
  - Diatomic: Oxygen (O_2)
  - Tetra-atomic: Phosphorus (P_4)
- **Molecule:** Smallest particle of a substance that can exist independently.
- **Molecule:** Smallest particle of a substance that can exist independently.
- **Ion:** A charged atom or group of atoms.
- **Formula Unit Mass:** Used for ionic compounds (like NaCl) instead of molecular mass.

Chapter 4: Structure of the Atom

Subatomic Particles

Particle	Charge	Mass	Discovered By
Electron (e^-)	Negative	Negligible	J.J. Thomson
Proton (p^+)	Positive	~1 u	E. Goldstein
Neutron (n)	No Charge	~1 u	J. Chadwick

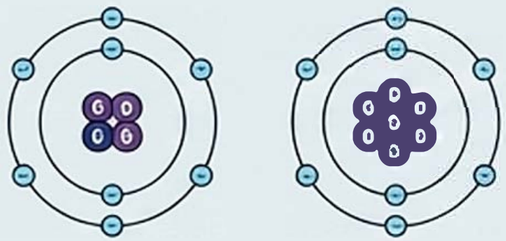


Key Concepts & Rules

- **Electron Distribution:** Shells fill according to the formula $2n^2$. (K=2, L=8, M=18).
- **Octet Rule:** Outermost shell holds a maximum of 8 electrons.
- **Atomic Number (Z):** Number of protons. Defines the element.
- **Mass Number (A):** Protons + Neutrons.

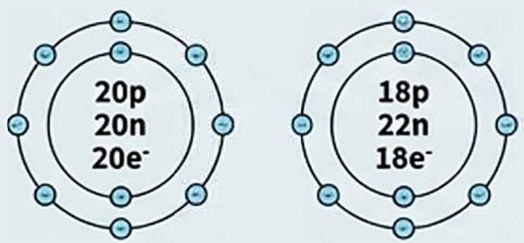
Isotopes & Isobars

Isotopes: Same Z, Different A.



C-12 C-14

Isobars: Different Z, Same A.



Ca-40 Ar-40

Uses of Isotopes:

- **Uranium:** Nuclear fuel.
- **Cobalt:** Cancer treatment.
- **Iodine:** Goitre treatment.

Chapter 5: The Fundamental Unit of Life

Key Concepts

- **Discovery**
  - Robert Hooke (1665, cork cells), Leeuwenhoek (1674, free-living cells).
- **Cell Theory**
  1. All living things are made of cells.
  2. All cells come from pre-existing cells (Virchow, 1855).
- **Transport Across Membrane**
  - **Diffusion**
    Movement of gases (O_2, CO_2).
  - **Osmosis**
    Movement of water.

Hypotonic | **Hypertonic** (Plasmolysis) | **Isotonic**

Plant Cell Exclusives

Cell Wall (made of cellulose)

Plasma Membrane
City Wall with Gates
(Selectively Permeable)

Mitochondria
Power Plants
(Produces ATP)

Nucleus
City Hall / Control Center
(Contains DNA)

Endoplasmic Reticulum
Highway System
(Transport)

Golgi Apparatus
Post Office / Packaging Plant

Lysosomes
Recycling Center / Suicide Bags

Cytoplasm
The City Grounds/Atmosphere

Key Terms & Processes Sidebar

Prokaryote vs. Eukaryote
Eukaryotes have a true nucleus; Prokaryotes have a "nucleoid".

ATP
Adenosine Triphosphate, the "energy currency" of the cell.

Membrane Biogenesis
ER building the cell membrane.

Cell Division

- **Mitosis**
  For growth/repair (1 cell → 2 identical cells).
- **Meiosis**
  For reproduction (1 cell → 4 cells with half chromosomes).

Chapter 6: Tissues

Focus on Support & Growth

Plant Tissues

- **Meristematic (Growing)**
  - Apical
  - Lateral
  - Intercalary
- **Permanent (Differentiated)**
  - **Simple**
    - Parenchyma (storage)
    - Collenchyma (flexibility)
    - Sclerenchyma (hardness)
  - **Complex**
    - Xylem (transports water)
    - Phloem (transports food)

Focus on Movement & Function

Animal Tissues

- **Epithelial (Covering)**
  - Squamous (flat)
  - Cuboidal (cube)
  - Columnar (pillar)
- **Connective (Connecting)**
  - Blood (droplet)
  - Bone (cross-section)
  - Ligament (connecting two bones)
  - Tendon (connecting muscle to bone)
- **Muscular (Movement)**
- **Muscular (Movement)**
  - Striated (voluntary)
  - Smooth (involuntary)
  - Cardiac (heart)
- **Nervous (Communication)**
  - Neuron

Protective Chemicals & Key Terms Sidebar

Differentiation: Process of cells taking a permanent role.

Plant Chemicals:
Lignin: Hardens Sclerenchyma.

Cutin: Waterproofing on desert plants.

Suberin: Makes cork impervious.

Matrix: The non-living material in which connective tissue cells are embedded.

Neuron: The cell of nervous tissue.

Chapter 7: Motion

Key Concepts & Formulas

Speed: v = s/t (Distance/Time).

Velocity: Speed in a given direction.
Average Velocity = (u+v)/2.

Acceleration: Rate of change of velocity.
a = (v - u)/t.
SI Unit: m/s².

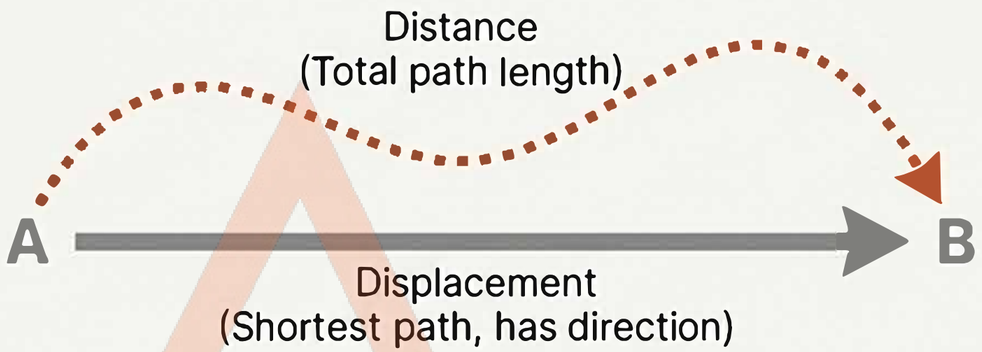
Uniform Circular Motion: Constant speed but changing direction means it's accelerated motion.

Equations for Uniformly Accelerated Motion

1. $v = u + at$
2. $s = ut + \frac{1}{2}at^2$
3. $2as = v^2 - u^2$

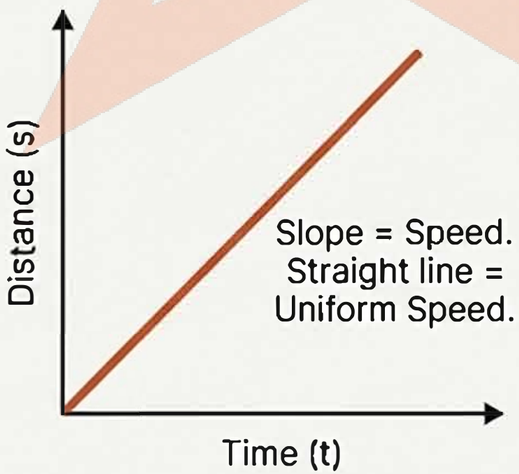
s=displacement, u=initial velocity, v=final velocity, a=acceleration, t=time.

Distance vs. Displacement

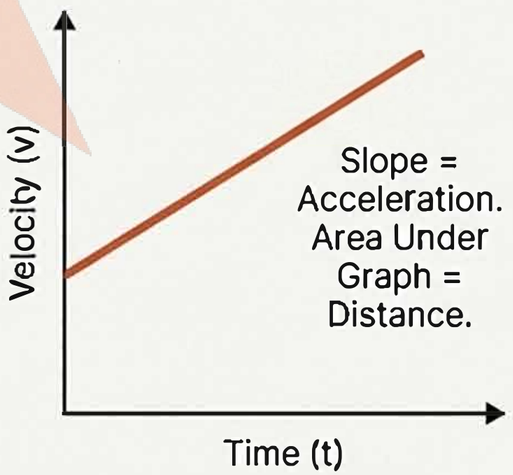


Run a full circle on a track: Distance is 400m, Displacement is 0m.

Distance-Time Graph



Velocity-Time Graph



Vocabulary Sidebar

Reference Point: The origin from which motion is measured.

Odometer: Measures distance traveled in a vehicle.

Speedometer: Measures instantaneous speed.

Chapter 8: Force and Laws of Motion

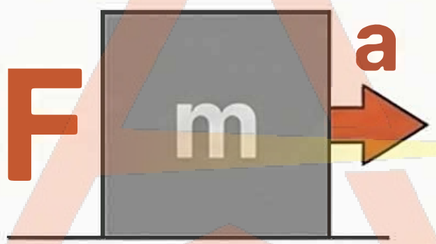
Key Concepts

- **Force**: A push or pull. **Balanced forces** cause no change in motion. **Unbalanced forces** cause acceleration.
- **Inertia**: The natural tendency of an object to resist a change in its state of motion. More mass = more inertia.
- **Momentum (p)**: "Mass in motion." Formula: $p = mv$. The second law is technically about the rate of change of momentum.

First Law (Inertia)

An object in motion stays in motion. Mass is the measure of inertia.

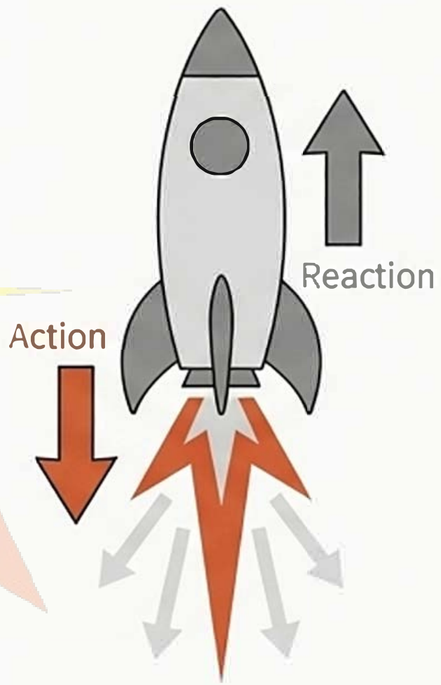
Second Law (F=ma)



$$F = ma$$

Force equals mass times acceleration.

Third Law (Action-Reaction)



For every action, there is an equal and opposite reaction.

Real-World Applications Sidebar

- **Cricketer Catching a Ball:** Pulling hands back increases time (t), reducing the force of impact.

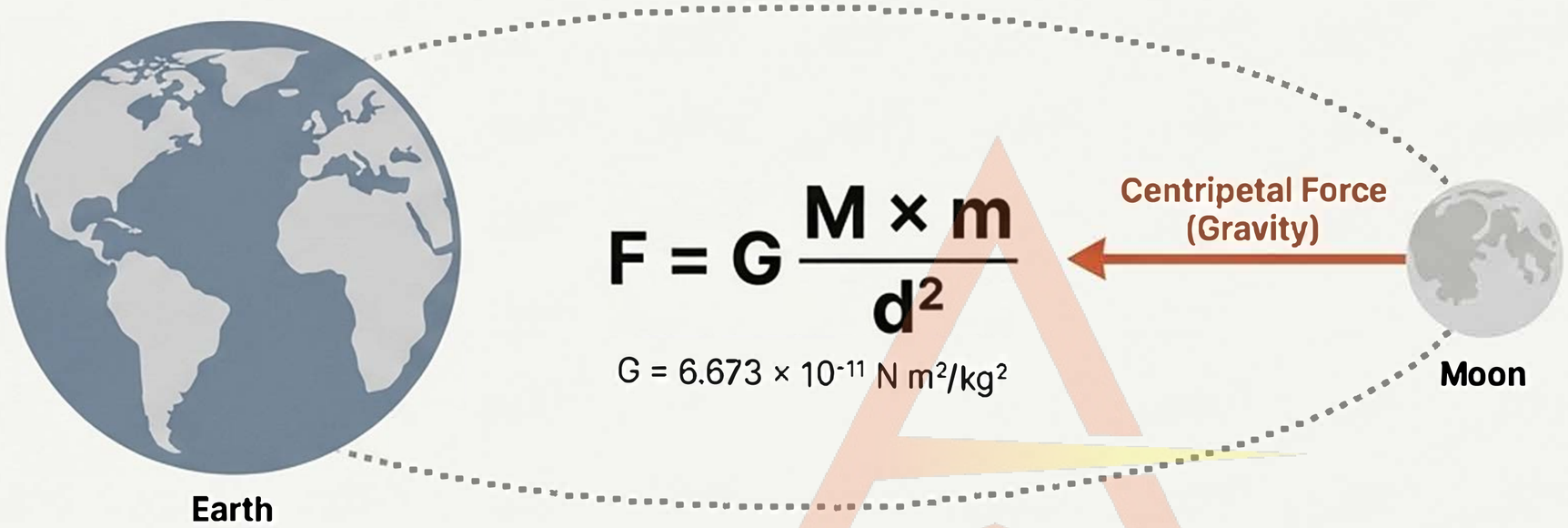
- **Karate Chop:** A fast strike reduces time (t), massively Increasing the force to break a slab.

- **Gun Recoil:** The forward action of the bullet creates a backward reaction on the gun.

- **Galileo's Contribution:** Used marbles on inclined planes to deduce that objects maintain constant speed without a force.

- **Definition of 1 Newton:** The force required to accelerate a 1 kg mass at 1 m/s².

Chapter 9: Gravitation



Free Fall

Falling under the influence of gravity alone.

All objects fall at the same rate without air resistance.

Acceleration due to gravity is $g \approx 9.8\ m/s^2$ on Earth.

Mass vs. Weight

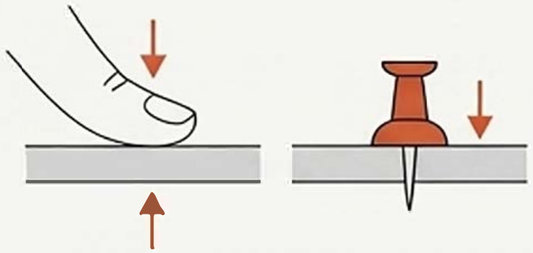
Mass: Amount of matter. Constant everywhere.

Weight: Force of gravity on an object. $W = mg$. Changes with location.

Thrust and Pressure

Thrust: Perpendicular force.

Pressure: $P = \frac{\text{Thrust}}{\text{Area}}$.



Buoyancy & Archimedes Sidebar

Buoyancy: Upward force exerted by a fluid.

Archimedes' Principle: Buoyant force = weight of the fluid displaced.

Floating Rule: An object floats if its density is less than the liquid's density.

Applications:

- Designing ships
- Submarines
- Lactometers (milk purity)
- Hydrometers (liquid density)

Equations for Free Fall

$v = u + gt$

$s = ut + \frac{1}{2}gt^2$

$v^2 - u^2 = 2gs$

Chapter 10: Work and Energy

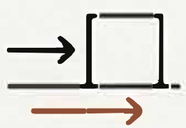
Defining Work

Scientific Conditions:
1. A force must act.
2. The object must be displaced.

$$W = F \times s$$

Unit: Joule (J)

Types of Work:

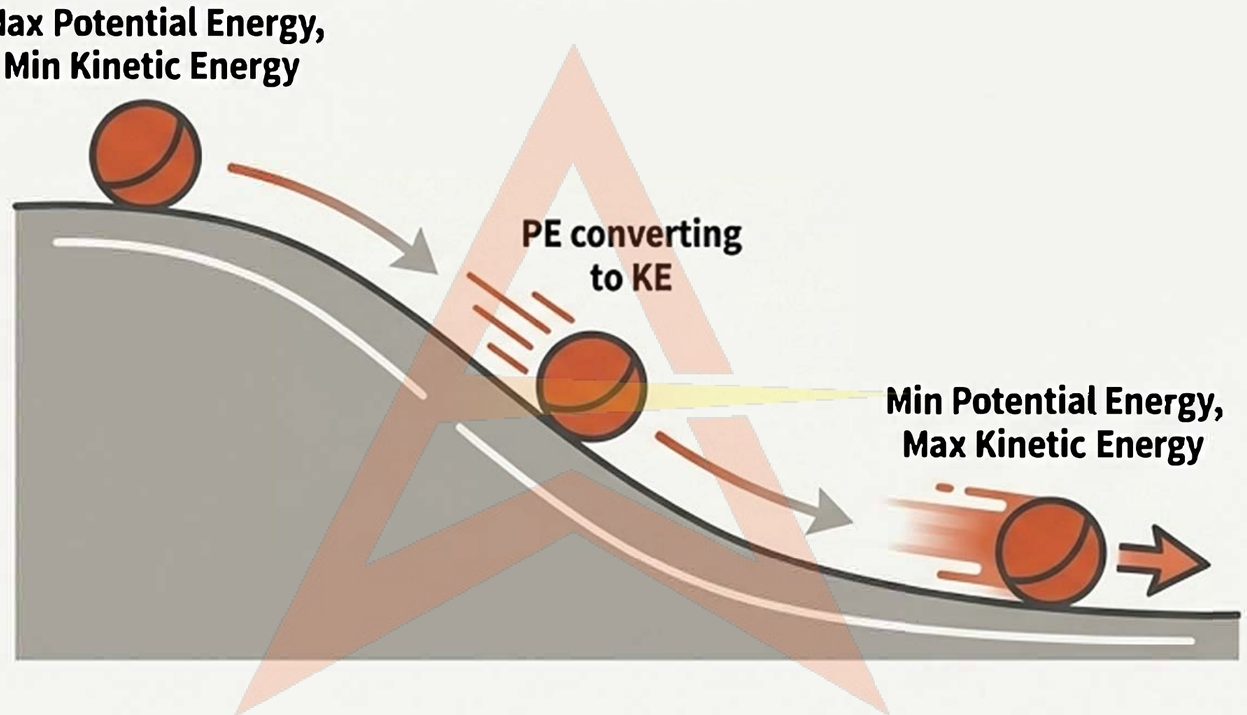


Positive: Force and displacement in the same direction.

Negative: Force opposite to displacement (e.g., friction).

Zero: No displacement (pushing a wall) or force is perpendicular to displacement.

Law of Conservation of Energy: PE + KE = Constant



Forms of Energy

Kinetic Energy (KE):
Energy of motion.

$$E_k = \frac{1}{2}mv^2$$

Potential Energy (PE):
Stored energy due to position or shape.

$$E_p = mgh$$

Power & Commercial Energy

Power: The rate of doing work.

$$P = \frac{W}{t}$$

Unit: Watt (W)

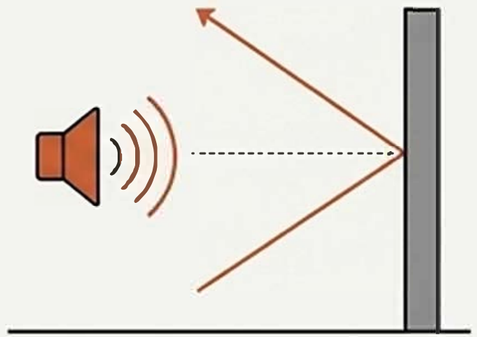
Law of Conservation of Energy: Energy is only transformed, never created or destroyed.

Commercial Unit: Kilowatt-hour (kWh). 1 "Unit" on an electric bill.

Exam Value: 1 kWh = 3.6×10^6 J.

Chapter 11: Sound

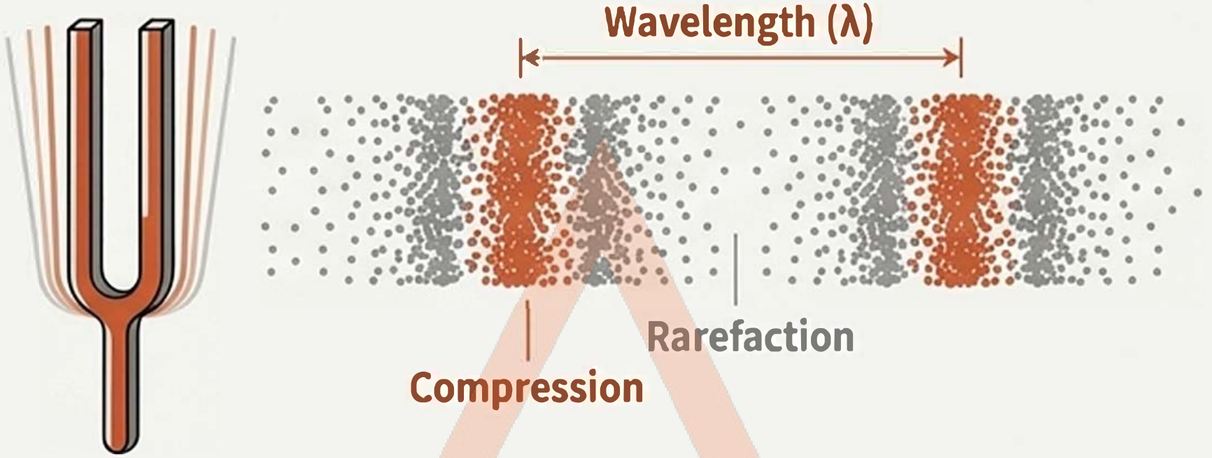
Reflection of Sound



Echo: Reflected sound. Requires a minimum time gap of 0.1s.

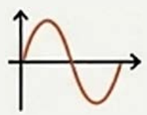
Note: At 22°C, this means a minimum distance of 17.2m to the obstacle.

Reverberation: Persistence of sound from multiple reflections in a large hall. Reduced by sound-absorbent materials.

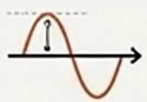


Sound is a **Longitudinal Wave**. It needs a medium to travel.

Wave Characteristics



Frequency (ν): Oscillations per second. Unit: Hertz (Hz). Determines **Pitch** (High ν = High Pitch).

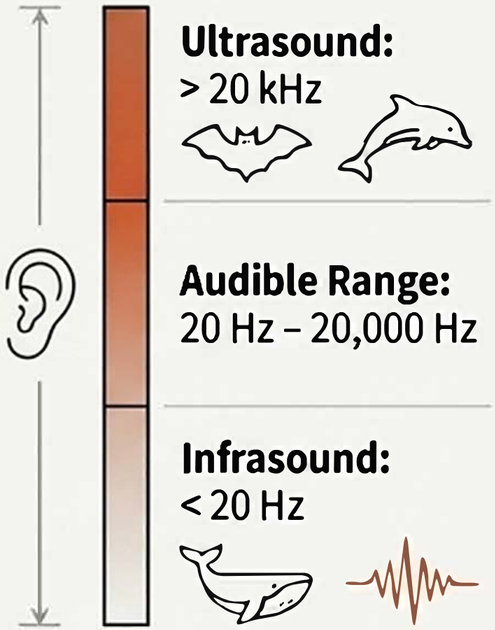


Amplitude: Maximum displacement. Determines **Loudness** (High Amplitude = Loud Sound).

Timbre (Quality): Distinguishes sounds of same pitch and loudness (e.g., flute vs. guitar).

Speed Formula: $v = \lambda\nu$ (Speed = Wavelength × Frequency).

Range of Hearing



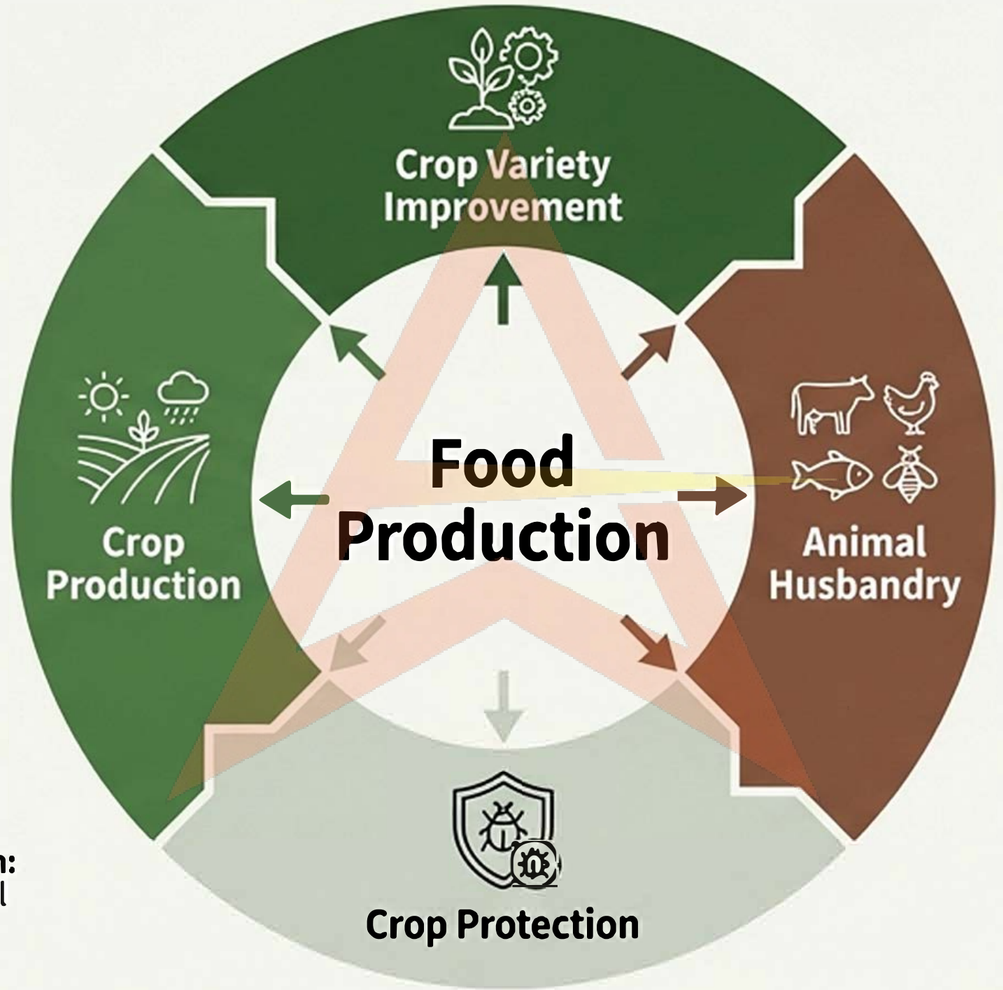
Uses of Ultrasound: SONAR, Echocardiography (heart imaging), Medical scanning.

Pro-Tip:
Speed of Sound: `Solids > Liquids > Gases`.

Chapter 12: Improvement in Food Resources

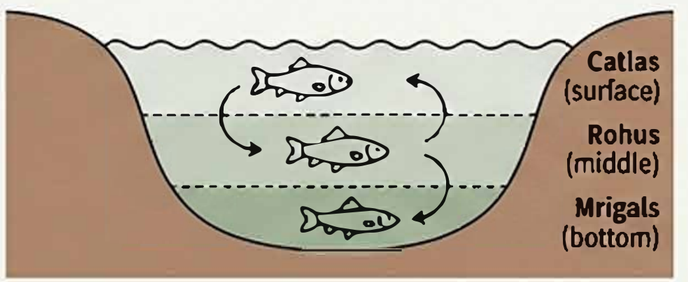
Crop Management

- **Seasons**
  - **Kharif** (Rainy: Paddy, Maize)
  - **Rabi** (Winter: Wheat, Gram)
- **Variety Improvement**
  - Achieved through **Hybridisation.**
  - Goals: higher yield, disease resistance, shorter maturity.
- **Production Management**
  - **Nutrients**: Macro (N, P, K) & Micro (Iron, Zinc).
  - **Manure** (organic) vs. **Fertilizers** (chemical).
- **Cropping Patterns**
  - **Mixed Cropping:** Reduces risk (Wheat + Gram).
  - **Inter-cropping:** Row patterns prevent disease spread (Maize + Soyabean).
  - **Crop Rotation:** Maintains soil fertility.
- **Protection**
  - Managing **Weeds** and preventing storage losses from moisture and pests.



Animal Husbandry

- **Cattle Farming**
  - **Milch** (milk) & **Draught** (labor).
  - Cross-breeding exotic (Jersey) and local (Red Sindhi) breeds.
- **Poultry**
  - **Broilers** (for meat) and **Layers** (for eggs).
- **Fish Production (Blue Revolution)**
  - **Composite Fish Culture**
  - Growing 5-6 non-competing species in one pond.



- **Beekeeping (Apiculture)**
  - Italian bees (***Apis mellifera***) are preferred for high honey collection and stinging less.
  - **Pasturage:** The available flowers for nectar, which determines honey quality.