

# Syllabus 2020-21

## **CLASS – IX**

### **Physical Science**

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#### **Contents**

1. Matter around us.....	2
2. Motion.....	2
3. Laws of motion.....	3
4. Refraction of light at plane surface.....	3
5. Gravitation .....	4
6. Is matter pure?.....	4
7. Atoms Molecules and Chemical Reaction.....	5
8. Floating bodies.....	5
9. What is inside atom .....	6
10. Work and Energy.....	6
11. Heat.....	7
12. Sound .....	7

## 1. Matter around us

- 1.1 States of matter
- 1.2 Properties of solids, liquids and gases
  - 1.2.1 Shape and volume
  - 1.2.2 Identifying the shape and volume of liquids
  - 1.2.3 Do the gases have definite shape and fixed volume
  - 1.2.4 Compressibility
  - 1.2.5 Observing compressibility of different materials
- 1.3 Diffusion
  - 1.3.1 Observing diffusion of gases
  - 1.3.2 Observing the diffusion of liquids
  - 1.3.3 Observing diffusion of particles of solids into liquids
  - 1.3.4 Diffusion of two gases
- 1.4 Can matter change its state ?
- 1.5 What is matter made up of
  - 1.5.1 How small are the particles of matter
  - 1.5.2 Space between particles
- 1.6 Particles of matter attract each other
  - 1.6.1 Observing the force of attraction between the particles of matter.
- 1.7 How diffusion takes place
- 1.8 Effect of temperature on change of state
- 1.9 Effects of change of pressure on change of state
- 1.10 Evaporation
  - 1.10.1 Effects of surface area, humidity and wind speed on evaporation
  - 1.10.2 Experience with evaporation

## 2. Motion

- 2.1 What is relative
- 2.2 Motion is relative
  - 2.2.1 Distance and displacement O Drawing path and distinguishing between distance and displacement O Drawing displacement vectors
- 2.3 Average speed and average velocity
  - 2.3.1 Measuring average speed and average velocity
  - 2.3.2 Speed and velocity
  - 2.3.3 Observing direction of motion of a body
- 2.4 Uniform motion
- 2.5 Non uniform motion
  - 2.5.1 Observing the motion of a ball on an inclined plane
  - 2.5.2 Observing uniform circular motion
  - 2.5.3 Observing motion of an object thrown into air
- 2.6 Acceleration

2.6.1 Equations of uniform accelerated motion

2.6.2 Finding the acceleration and velocity of an object moving on an inclined plane

### **3. Laws of motion**

3.1 An introduction into laws of motion - thought of Galileo

3.2 First law of motion

3.2.1 Observing motion of coin kept on thick paper

3.2.2 Observing motion of the coins hit by a striker

3.3 Inertia and mass

3.3.1 Pushing two wooden blocks with same force

3.4 Second law of motion

3.4.1 Linear momentum  $\propto$  Net force - acceleration  $\propto$  Mass - acceleration  $\propto$  Atwood machine

3.5 Third law of motion

3.5.1 Pulling two spring balances

3.5.2 Balloon rocket

3.5.3 Action and reaction forces acting on two different objects

3.6 Conservation of momentum

3.6.1 Dropping eggs on different surfaces - net force on egg

### **4. Refraction of light at plane surface**

4.1 Refraction

4.2 Refractive index

4.3 Relative refractive index

4.3.1 Obtaining the relation between angle of incidence and angle of refraction - Snell's law

4.3.2 Derivation of Snell's Law

4.4 Total internal reflection

4.4.1 Mirages

4.5 Applications of total internal reflection

4.5.1 Brilliance of diamonds

4.5.2 Optical Fibres

4.6 Reflection through a glass slab

4.6.1 Lateral shift

4.6.2 Vertical shift

## 5. Gravitation

- 5.1 Uniform circular motion
  - 5.1.1 Observing the motion of an object moving in circular path
  - 5.1.2 Drawing velocity vectors in uniform circular motions
  - 5.1.3 Centripetal acceleration, Centripetal Force
- 5.2 Universal law of gravitation
  - 5.2.1 Acceleration is independent of masses
  - 5.2.2 What is the direction of 'g' ?
- 5.3 Weight
  - 5.3.1 Can we measure the weight of free fall body ?
  - 5.3.2 Observing changes during the free fall of a body
- 5.4 Centre of gravity
  - 5.4.1 Balancing objects
  - 5.4.2 Locating centre of gravity
- 5.5 Stability
- 5.6 Shift of the centre of gravity and its effects

## 6. Is matter pure?

- 1.1 Is full cream pure?
- 1.2 What is mixture?
- 1.3 Types of mixtures (homogenous, heterogeneous)
- 1.4 Solutions
  - 6.4.1 Properties of Solutions
  - 6.4.2 Concentration of Solutions
  - 6.4.3 Preparation of saturated and unsaturated solutions
  - 6.4.4 Factors affecting on the rate of dissolving
- 1.5 Suspensions and colloids
  - 6.5.1 Finding of heterogeneous mixture - suspensions and colloids
- 1.6 Separations of components of a mixture
  - 6.6.1 Sublimation - Separation of mixtures by sublimation
  - 6.6.2 Evaporation - Process of Evaporation of Water
- 1.7 Chromatography - Paper Chromatography
- 1.8 Separation of immiscible and miscible liquids
  - 6.8.1 Separation of immiscible liquids
  - 6.8.2 Separation of mixture of two immiscible liquids
  - 6.8.3 Distillation - Separation of two miscible liquids by distillation
  - 6.8.4 Fractional distillation
- 1.9 Types of pure substances
  - 6.9.1 Can we separate Sulphur and Oxygen from Copper Sulphate
  - 6.9.2 Understanding the nature of elements, compounds and mixtures

## 7. Atoms Molecules and Chemical Reaction

- 6.10 An introduction about atoms
- 6.11 Change of mass in chemical reactions
- 6.12 Law of conservation of mass
- 6.13 Law of constant proportions
- 6.14 Dalton's atomic theory
  - 7.5.1 Atoms and molecules
- 6.15 Why do we name elements ?
- 6.16 Symbols of elements
- 6.17 Some unusual symbols
- 6.18 Elements with more than one atom in their molecules
- 6.19 Atomicity
- 6.20 Valency
- 6.21 What is ion?
- 6.22 Atomic mass
- 6.23 Molecules of compounds
  - 7.14.1 Chemical formulae of compounds (Criss-Cross method)
- 6.24 Molecular mass
- 6.25 Formula unit mass
- 6.26 Mole concept 7.17.1 Molar mass
- 6.27 Types of Chemical Reactions
  - 7.18.1 Combinations reaction : (Exothermic chemical reactions, Endothermic reactions)
  - 7.18.2 Decomposition reaction : (Thermal, Electrolytic, Photochemical reactions- examples only without mentioning names)
  - 7.18.3 Displacement reaction
  - 7.18.4 Double displacement reaction
- 6.28 Oxidation and Reduction
- 6.29 How you observe the effects of Oxidation reactions in dialy life
  - 7.20.1 Corrosion and prevention of corrosion
  - 7.20.2 Combustion
  - 7.20.3 Yeast reaction
  - 7.20.4 Bleaching
  - 7.20.5 Rancidity

## 8. Floating bodies

- 8.1 Can objects sink or float ? (fun activity)
- 8.2 Density - relative density
- 8.3 Relative density of liquids
  - 8.3.1 Making of lactometer
- 8.4 When do objects float on water ?
  - 8.4.1 Do objects denser than water float on it ?

- 8.4.2 Is the weight of object and weight of water displaced by it equal ?
- 8.4.3 Making aluminum to float
- 8.5 Upward force in liquids
- 8.6 Pressure of Air
  - 8.6.1 Atmospheric pressure
  - 8.6.2 Measuring atmospheric pressure
- 8.7 Pressure at a depth 'h' in a liquid
  - 8.7.1 Pressure difference at different levels of depth in fluids
- 8.8 Measuring the force of buoyancy
  - 8.8.1 Measuring the weight of the water displaced by the immersed stone
- 8.9 Archimedes' principles 8.10 Pascal's principle - Bramah press

## 9. What is inside atom

- 9.1 Sub-atomic particles
  - 9.1.1 Electrons, protons, neutrons
- 9.2 Structure of atom
  - 9.2.1 Sketch the structure of atom as you imagine
- 9.3 Thomson's Model of atom
- 9.4 Rutherford's alpha particles scattering experiment - Rutherford's observations
  - 9.4.1 Nuclear model of an Atom - Limitations of Rutherford's atomic model
- 9.5 Bohr's model of the atom
- 9.6 Distribution of electrons in different orbits (shells)
- 9.7 Valency
  - 9.7.1 Importance of valency
- 9.8 Atomic number
- 9.9 Atomic mass number
- 9.10 Writing symbols of atoms
- 9.11 Isotopes
  - 9.11.1 Applications of isotopes

## 10. Work and Energy

- 10.1 Work
  - 10.1.1 Scientific meaning of the work
  - 10.1.2 Definition of work in science
- 10.2 Energy
  - 10.2.1 Energy transfer and work
  - 10.2.2 Understanding the increase and decrease in energy of an object
- 10.3 Kinetic energy
  - 10.3.1 Mathematical Expression for Kinetic energy
- 10.4 Potential energy

- 10.4.1 Observing energy in stretched rubber band
- 10.4.2 Observing the energy in an object at some height
- 10.5 Mechanical energy
- 10.6 Conversion of energy
  - 10.6.1 Conservation of mechanical energy
  - 10.6.2 Calculating total energy of free fall at different heights
- 10.7 Power
- 10.8 Sources of Energy
  - 10.8.1 Source of Energy
  - 10.8.2 Fuels
- 10.9 Renewable energy Resources
  - 10.9.1 Solar energy, Solar Cells
  - 10.9.2 Biomass
  - 10.9.3 Biogas
  - 10.9.4 Ocean energy O Tidal energy O Motion Thermal energy
  - 10.9.5 Geo Thermal energy
  - 10.9.6 Wind energy
  - 10.9.7 Atomic energy O Nuclear Fission O Nuclear Fusion

## 11. Heat

- 11.1 Thermal equilibrium - Heat and Temperature
  - 11.1.1 Heat
  - 11.1.2 Temperature and Kinetic Energy
- 11.2 Specific heat
  - 11.2.1 Applications of Specific Heat capacity
- 11.3 Methods of mixtures
  - 11.3.1 Principle of method of mixtures - Determination of specific heat of a solid
- 11.4 Evaporation, Condensation, Humidity, Dew and Fog, Boiling, Melting, Freezing

## 12. Sound

- 12.1 Sound is a form of energy
- 12.2 Production of sound
  - 12.2.1 Observing the vibration of tuning fork
- 12.3 How does sound travel
  - 12.3.1 Propagation of sound
- 12.4 Types of waves
  - 12.4.1 Transvers waves
  - 12.4.2 Sound waves are Longitudinal waves
- 12.5 Characteristics of sound wave
  - 12.5.1 Wave length

- 12.5.2 Amplitude
- 12.5.3 Time period, frequency
- 12.5.4 Speed of sound wave
- 12.6 Characteristics of musical waves
  - 12.6.1 Pitch
  - 12.6.2 Loudness
  - 12.6.3 Quality
- 12.7 Reflection of sound
  - 12.7.1 Listening reflected sound - Echo
  - 12.7.2 Reverberation
  - 12.7.3 Uses of multiple reflection of sound O Megaphone, Horn O Stethoscope O Designing of Concert halls and Cinema halls
- 12.8 Range of Hearing
- 12.9 Applications of ultrasounds
  - 12.9.1 Industrial applications
  - 12.9.2 Medical applications
- 12.10 Sonar