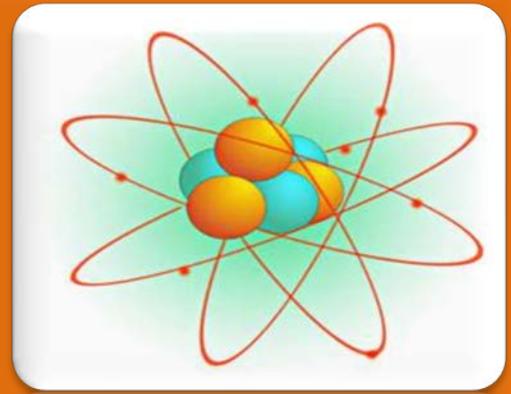


Science

- *Physics*
- *Chemistry*
- *Biology*

Physics



The Core concepts of Physics for Class VIII are as follows:

Class VIII

Matter

Physical Quantities and Measurement

Force and Pressure

Energy

Light Energy

Heat Transfer

Sound

Electricity

Theme 1: Matter

Building on previous learning in Classes VI and VII, in this class the theme aims at introducing children to the Kinetic theory that will help them in understanding the difference in the three states of Matter. The theory states that all matter is made of tiny particles that in an object are always in motion that may move slow or fast. In solids, the particles have less energy hence do not move around freely. In liquids, they have relatively more energy and move about freely within the container. The particles of gases have much more energy and move freely at high speeds. The increase or decrease in the movement of energy is the result of heating or cooling of an object. Heating an object increases the energy of particles whereas cooling decreases the energy of particles of an object.

Learning outcomes:

Children will be able to:

- ✔ distinguish the three states of matter in terms of movement of particles;
- ✔ relate the three states of matter with energy of movement of particles in them;
- ✔ describe the change of state using Kinetic theory:
 - ☛ Boiling
 - ☛ Vaporization
 - ☛ Melting
 - ☛ Fusion
 - ☛ Evaporation
 - ☛ Condensation
 - ☛ Sublimation
 - ☛ Deposition
 - ☛ Freezing

Matter		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
Kinetic Theory of Matter. ➤ Three states of matter in terms of movement of particles. ➤ Energy content in the three states of matter. ➤ Change of state in matter using the Kinetic theory: <ul style="list-style-type: none"> ☛ Boiling ☛ Vaporization ☛ Melting ☛ Fusion ☛ Evaporation ☛ Condensation ☛ Sublimation ☛ Deposition ☛ Freezing ➤ Change of State diagrams (using the terms mentioned above).	➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Demonstrating matter in three states. ➤ Explaining the different terms, like boiling, melting, freezing, condensation, sublimation, etc. with examples from daily life. ➤ Children observing solids and liquid (Compare and contrast the physical characteristics). ➤ Encouraging children to prepare a Comparison table of different states based on (shape, texture and volume).	➤ Samples of three states of matter ➤ A beaker ➤ Tripod stand with mesh ➤ Burner ➤ Thermometer ➤ Laboratory stand ➤ Naphthalene balls ➤ Videos on states of matter and change of State

Integration: Chemistry, Geography, Technology in daily life.

Life Skills: Cooperation and working together, Problem-solving.

Theme 2: Physical Quantities and Measurement

Previous learning demonstrated the measurement of the density of regular solids. In this class children will develop the ability to measure the, density of an irregular solid and also of a given liquid. They will also understand that due to the difference in the value of densities of a solid and liquid, a piece of solid can float or sink in a liquid.

Learning outcomes:

Children will be able to:

- measure density of regular solids;
- measure density of a liquid;
- discuss the concept of floatation based on relative densities of solid and liquid;
- express result of measurement in proper unit with proper symbol;
- solve simple numerical problems based on formula of density;
- compare densities of matter in three states, solid, liquid and gas.

Physical Quantities and Measurement		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
<ul style="list-style-type: none"> ➤ Density <ul style="list-style-type: none"> ☛ Units of density in various systems of units and relation between them. ☛ Finding density of regular solids. ➤ Relative Density <ul style="list-style-type: none"> ☛ Definition ☛ Relation with Density ➤ Measurement of Density of Fluids: <ul style="list-style-type: none"> ☛ Basic Concept ☛ Concept of Flotation and sinking of a substance (relate to density) ☛ Comparison of densities in the three states of matter. 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. 	<ul style="list-style-type: none"> ➤ Graduated cylinder ➤ Eureka can ➤ Graduated beaker ➤ water ➤ Objects of different densities ➤ Liquids of different densities ➤ Balance to measure mass ➤ Video on volume measuring devices ➤ Video on determination of density of solid and liquid

Life Skills: Cooperation and working together, Problem-solving.

Integration: Chemistry, Technology in daily life.

Theme 3: Force and Pressure

A force is a push or pull upon an object resulting from the object's interaction with another object. Turning effect of a force is more if the distance between the point of application of force and the hinge on a door is more. It is given a special name, Moment of force. Pressure is defined as force per unit area. Solids, liquids and gases, all exert pressure. Atmosphere also exerts pressure. activities are carried out to demonstrate that solid, liquid and gases exert pressure.

Learning outcomes:

Children will be able to:

- explain the turning effect of a force, with examples from daily life;
- define moment of force;
- express moment of force in proper units;
- define pressure;
- express pressure in proper units;
- describe pressure exerted by a liquid;
- describe pressure exerted by a gas;
- describe atmospheric pressure;
- express thoughts that reveal originality, speculation, imagination, a personal perspective, flexibility in thinking, invention or creativity;
- present ideas clearly and in logical order.

Force and Pressure		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
<ul style="list-style-type: none"> ➤ Turning effect of force (moment of force): concept, definition and daily life examples. ➤ Pressure <ul style="list-style-type: none"> ☛ Definition ☛ Unit ☛ Factors affecting pressure ☛ Pressure exerted by liquids (Qualitative only). ☛ Pressure exerted by gases- Atmospheric pressure (Qualitative only). 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Explanation of turning effect and factors on which it depends. ➤ Engaging children in task for calculation of turning effect. ➤ Explanation: pressure depend on the area of surface on which the force acts. ➤ Explanation of pressure exerted by atmosphere. ➤ Observation related to pressure. Children can perform simple experiments related to Pressure exerted by solid, liquid and gasses at home and note the observation. 	<ul style="list-style-type: none"> ➤ A nut fixed in an object ➤ Spanner ➤ Doors ➤ Nails ➤ Hammer ➤ Transparent glass tube or plastic pipe ➤ Rubber balloon ➤ Strong thread ➤ Water ➤ A plastic bottle with a hole near the bottom ➤ Rubber sucker

Integration: Geography, Technology in daily life.

Life Skills: Cooperation and working together, Problem-solving.

Theme 4: Energy

Building on previous learning on energy the emphasis in this class is on the introduction of gravitational potential energy to children. Look at a swinging bob of a pendulum. When it is at its extreme position (the highest point of its motion), it has gravitational potential energy. When it reaches its mean position (lowest point), it has maximum speed and it has high kinetic energy. In this case, one form of energy changes into other, according to the law of conservation of energy. Energy is the ability to do work. Work is said to be done when a force acting on an object changes the position of the object. For the special case when the object changes its position along the direction of the force, work is given by the product of the force and distance moved by the object. But different persons may take different time to do the same work. Rate of doing work is called power. So energy and power are two different physical quantities, having different units. In many situations, the focus is on the power and not energy. For e.g. the power of a motor which works is paid for the electricity consumed, is actually paid for the energy consumed.

Learning outcomes:

Children will be able to:

- define work;
- express work in proper unit;
- define kinetic energy;
- express kinetic energy in proper units;
- solve simple problems based on kinetic energy;
- define potential energy;
- define gravitational potential energy;
- solve simple problems based on gravitational potential energy;
- describe energy transformation in daily life situation;
- distinguish between energy and power.

Energy		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
<ul style="list-style-type: none"> ➤ Concept of Work ➤ Unit of Work (Joule) ➤ Kinetic Energy <ul style="list-style-type: none"> ➤ Basic Concept ➤ Potential Energy <ul style="list-style-type: none"> ➤ Basic Concept ➤ Gravitational Potential Energy ➤ Energy transformation in common daily life situations ➤ Difference between Energy and power 	<ul style="list-style-type: none"> ➤ Revising previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Explaining concept of work done with examples from daily life. ➤ Explaining of kinetic energy and potential energy ➤ Explaining of gravitational potential energy ➤ Explaining and discussing with children energy transformation in daily life situations / activities. ➤ Explaining the difference between energy and power. ➤ Citing examples of different applications of conservation of energy (Roller coaster, Production of hydroelectricity etc.) with children making energy conversion diagrams and deduce that energy is conserved. 	<ul style="list-style-type: none"> ➤ Video on work done in simple cases from daily life. ➤ A simple pendulum. ➤ Video on Kinetic and potential energy. ➤ Video on transformation of energy.

Integration: Technology in daily life

Life Skills: Cooperation and working together, Problem solving

Theme 5: Light Energy

An object lying at the bottom of a vessel filled with water usually appear to be at different depth than it actually is. This is due to bending of light rays when it travels from water to air. This phenomenon is called refraction. Light bends when it passes obliquely from one medium to the other. Due to refraction, a mirage is observed on a hot sandy desert. Atmosphere also refract the rays coming from the sun. This causes advanced sunrise and delayed sunset. Previous learning emphasized on reflection of light by a plane mirror. how images are formed by a curved (concave) mirror is now dwelt upon along with rules used to construct ray diagrams.

Learning outcomes:

Children will be able to:

- ☑ define refraction;
- ☑ discuss examples of refraction;
- ☑ describe a spherical mirror;
- ☑ describe a concave and a convex mirror;
- ☑ define the terms principal axis, centre and radius of curvature, focus and focal length for a spherical mirror;
- ☑ distinguish between real and virtual images;
- ☑ describe dispersion of white light by a prism into constituent colours;
- ☑ display a scientific attitude while making models;
- ☑ show a creative mind set while studying real world optical phenomena;
- ☑ communicate logical reasoning and explanations effectively using scientific terms.

Light Energy		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
<ul style="list-style-type: none"> ➤ Refraction: <ul style="list-style-type: none"> ☛ Definition ☛ Examples of Refraction. (examples such as, bending of pencil when placed in water, raising of coin when placed in water.) ➤ Curved Mirrors: <ul style="list-style-type: none"> ☛ Convex ☛ Concave ☛ Reflecting surface (Convex and Concave) ☛ Uses of Curved mirrors ☛ Terms related to Curved mirrors –Focus, Principal Axis, centre of curvature, radius of curvature ➤ Dispersion of white light into constituent colours. 	<ul style="list-style-type: none"> ➤ Revising and revisiting previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Representing of concave and convex mirrors through diagrams ➤ Explaining the terms <i>i.e.</i>, focus, principal axis, centre of curvature, radius of curvature with the help of diagrams to children. ➤ Explaining real and virtual images. ➤ Demonstrating the dispersion of white light into component colours. 	<ul style="list-style-type: none"> ➤ A glass slab ➤ A laser pencil ➤ White sheet of paper ➤ Drawing board ➤ Drawing pins ➤ Pencil ➤ Scale ➤ Eraser ➤ A glass tumbler with water ➤ Concave mirror ➤ Convex mirror ➤ Candle ➤ Mirror stand ➤ Candle stand ➤ Match box ➤ Screen with stand ➤ A sharp pin with stand ➤ A prism

Integration: Geography, Technology in daily life.

Life Skills: Cooperation and working together, Problem-solving.

Theme 6: Heat Transfer

In both boiling and evaporation, matter changes from liquid to gas. But the two processes are quite different. When temperature of a matter increases, the particles of the matter gain energy and move with greater speed. In evaporation, the particles at the surface escape and form gas. Other particles, inside the liquid, do not have enough energy. So the process of evaporation occurs at the surface. It happens at all temperature. In boiling, all particles of the liquid are at the same temperature and are involved in the process. It happens in the whole volume of the liquid. And it happens at a fixed temperature, particular to a liquid.

But before change of states takes place due to supply of heat, there is another effect which is commonly observed. That is the expansion of matter. Matters in all form, except some exceptions, expand on heating. In solids, the effect is less, in liquids more, and in gases maximum. Classification of expansion into three types- linear, superficial and volume are explained with examples from daily life.

Learning outcomes:

Children will be able to:

- ☑ compare and contrast Boiling and Evaporation;
- ☑ describe thermal expansion of matter;
- ☑ describe, linear, area(superficial) and volume expansion;
- ☑ compare expansivity in Solids, Liquids and Gases;
- ☑ observe and cite multiple physical phenomena from one experiment.

Heat Transfer		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
<ul style="list-style-type: none"> ➤ Difference between Boiling and Evaporation. ➤ Thermal Expansion: <ul style="list-style-type: none"> ☛ Linear Expansion ☛ Volume Expansion ☛ Superficial Expansion ☛ Compare expansivity in Solids, Liquids and Gases. ☛ Examples and real world applications. 	<ul style="list-style-type: none"> ➤ Revising and revisiting previous concepts learnt by children. ➤ Building on children's previous learning Demonstrating points of boiling and evaporation ➤ Explaining the difference in boiling and evaporation ➤ Explaining expansion with the help of examples from daily life activities. 	<ul style="list-style-type: none"> ➤ A flask ➤ Tripod stand with mesh ➤ Burner ➤ Water ➤ Videos on thermal expansion

Integration: Chemistry, Technology in daily life.

Life Skills: Problem-solving, Critical thinking.

Theme 7: Sound

In the previous classes, children were made aware about and enabled to understand that a sound wave is characterised by its frequency and amplitude. Parameters that focus on loudness and pitch and are commonly used to characterise sound produced by different sources were also highlighted. The loudness depends on the amplitude, hence when the amplitude of sound is large, sound is loud. Pitch is related to the frequency so when the frequency is high, the pitch is high or the sound is shrill. In this class the theme focusses on showing how sound produced by different musical instruments have different pitch and loudness.

Learning outcomes:

Children will be able to:

- ☑ describe sound as a longitudinal wave;
- ☑ define the terms- amplitude, time period and frequency;
- ☑ relate pitch and frequency;
- ☑ understand pitch and frequency in relation to working of musical instruments. (wind, membrane and string);
- ☑ relate loudness and amplitude;
- ☑ state the unit of loudness in decibels.

Sound		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
<ul style="list-style-type: none"> ➤ Sound as a longitudinal wave. ➤ Terms – amplitude, Time period and frequency. ➤ Pitch and Frequency ➤ Loudness and Amplitude ➤ Unit of loudness (decibels) 	<ul style="list-style-type: none"> ➤ Revising and revisiting previous concepts learnt by children. ➤ Building on children's previous learning ➤ Explaining terms related to Pitch and frequency, loudness and amplitude. ➤ Explaining units of loudness <i>i.e.</i>, decibel. ➤ Engaging children in tasks/ activities related to pitch, loudness, frequency and amplitude. 	<ul style="list-style-type: none"> ➤ A rubber band ➤ A metal tumbler filled with water ➤ A pencil ➤ Musical instruments ➤ Video on Pitch and loudness of sound

Integration: Music, Technology in daily life.

Life Skills: Cooperation and working together, Problem solving

Theme 8: Electricity

In this theme the aim is that children will appreciate and understand the need and importance of taking certain precautions and using of safety devices to protect themselves and others against electrical hazards. Previous learning stressed on electricity due to charges in motion, i.e. current electricity. However, objects can be charged, where charges are static not in motion. This is known as static electricity. This leads to many phenomena in nature, like lightning and thunder during rainy season. How an object that is charged may be detected using a simple device known as an electroscope.

Learning outcomes:

Children will be able to:

- identify live wire, neutral wire and earth wire in terms of their energy and path they travel and their colour code;
- describe safety components (fuses, circuit breakers);
- describe phenomenon of static electricity;
- explain conservation of charges;
- describe conduction and induction of charges;
- describe working of an electroscope;
- describe a lightning conductor;
- conduct scientific experiments keeping in mind all the parameters.

Electricity		
Key Concepts	Suggested Transactional Processes	Suggested Learning resources
<ul style="list-style-type: none"> ➤ Identify Live wire, neutral wire and earth wire in terms of their energy and path they travel and colour code ➤ Safety Components (fuses/circuit breakers) ➤ Static Electricity <ul style="list-style-type: none"> ☛ Conservation of charges ☛ Conduction ☛ Induction ☛ Electroscope (Gold Leaf Electroscope) ☛ Lightning Conductor ➤ Battery as a collection of cells connected in series. 	<ul style="list-style-type: none"> ➤ Revising and revisiting previous concepts learnt by children. ➤ Building on children's previous learning. ➤ Helping children identify live, neutral and earth wires. ➤ Engaging children in activities related to static electricity. ➤ Explaining a lightning conductor and its use. 	<ul style="list-style-type: none"> ➤ Household appliances with rated power ➤ Fuses and circuit breakers ➤ Balloons ➤ Threads, Laboratory stands ➤ Video on electricity and safety measures ➤ Interactive Video on static electricity ➤ Interactive video on lightning conductor

Integration: Geography, Technology in daily life.

Life Skills: Problem solving, Critical thinking.

Chemistry



The Core concepts of Chemistry for Class VIII are as follows:

Class VIII

Matter

Atomic Structure

Language of Chemistry

Chemical Reactions

Carbon and its Compounds

Theme 1: Matter

In earlier classes, Matter was introduced and discussed as composed of atoms/molecules and that it is found in the forms of solids, liquids and gases. In this class the aim of the theme is to enable children to understand that these states are changed on the basis of inter particle state and inter particle collision. The Kinetic theory of matter will be explained to explain the change of state. They will understand that in a physical and chemical change, the total mass before and after the change remains the same which is known as the law of conservation of mass. Explanation of these theory and law would help us in understanding other behaviour of the matter.

Learning Outcomes:

Children will be able to:

- ✔ describe the main postulates of the kinetic theory of matter;
- ✔ explain the reason of change of one state of the matter to another and vice-versa on the basis of inter particle space and inter particle attraction and collision;
- ✔ define and explain the law of conservation of mass using an example.

Matter		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Main postulates of kinetic molecular theory of matter. ➤ Explanation of change of state of the matter on the basis of inter particle space and inter particle attraction and collision. ➤ Law of conservation of mass. (statement and explanation with examples). 	<ul style="list-style-type: none"> ➤ Describing and discussing the main postulates of kinetic theory of matter. ➤ Discussing inter particle space and inter particle attraction and collision. (Inter particle space and inter particle attraction varies from one matter to another. Hence the conditions of change of state of a matter are different from the other.) ➤ Stating the law of conservation of mass. Using videos to show that there is no change in total mass when a physical and chemical change takes place. (If the reaction involves combustion in presence of air, the mass of O₂/N₂ is also to be considered) Total mass of reactants including the mass of atmospheric gases if any, will be equal to the mass of the products formed. <ul style="list-style-type: none"> ☛ Taking the example of reaction of barium chloride with sodium sulphate. 	<ul style="list-style-type: none"> ➤ Pictures of collision of particles and exchange of energy. ➤ Chemicals and glass wares, barium chloride, sodium sulphate, weighing balance, test tubes, distilled water, filter paper, funnel and beaker.

Integration: Physics

Theme 2: Atomic Structure

This theme focuses on developing children's understanding about the atom as the building block of all types of matter. Therefore, in science, it becomes important to know about the atom and its structure.

In fact, everything on this earth is made up of atoms. It is the atom of an element that takes part in chemical reactions.

Learning Outcomes:

Children will be able to:

- ✔ describe that an atom consists of electrons, protons and neutrons;
- ✔ define atomic number and mass number;
- ✔ discuss valency of elements and radicals with respect to the number of hydrogen atoms combining with one atom of the element.

Atomic Structure		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none">➤ Fundamental subatomic particles present in an atom: electrons, protons, neutrons.➤ Nucleus and extra nuclear parts.➤ Atomic number and mass number.	<ul style="list-style-type: none">➤ Discussing historical perspective of discovery of electrons, protons and neutrons.➤ Identifying that a nucleus consists of protons and neutrons. Electrons are present in its extra nuclear part.➤ Describing that atomic number (Z) is the number of protons in an atom. It is also equal to the number of electrons in an atom.➤ Mass number: it is the sum of the number of protons and neutrons in an atom.	<ul style="list-style-type: none">➤ Books of science /Chemistry➤ Videos showing the structure of atom

Integration: Physics.

Theme 3: Language of Chemistry

In previous classes, discussions about the symbols of elements and the formulae of compounds help in expressing their long names as short-hand notations which forms the language of Chemistry. In this class children will develop the ability to derive the Formulae of compounds if symbols of elements/radicals forming the compound and their valencies are known. They will also be able to write chemical equations if the reactants and products and their symbols/ formulae are known to them.

Learning Outcomes:

Children will be able to:

- recall the symbols of different elements;
- derive the formulae of compounds on the basis of valencies of elements and radicals;
- write chemical equation of a reaction;
- balance chemical equations by applying the law of conservation of mass.

Language of Chemistry		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Symbols of elements. ➤ Formulae of compounds. ➤ Chemical equations (from word equations). ➤ Law of conservation of mass. ➤ Balancing simple equations ➤ Relate the law to the balancing of simple equations. ➤ Information gathered from a chemical equation. ➤ Limitations of a chemical equation: Catalyst, conditions for the reaction, state of the reactants and products, nature of the chemical reaction are not gathered from the equation. 	<ul style="list-style-type: none"> ➤ Revisiting earlier concepts. ➤ Building on children's previous learning. ➤ Conducting quiz to recapitulate the symbols of elements in the class by using valency cards. (symbols and valency of first twenty elements). ➤ Encouraging children to derive Formulae of compounds from valency and symbols/ formulae of elements/ radicals under the guidance of teacher. ➤ Writing word equations followed by writing the chemical equation. ➤ Explaining the law of conservation of mass and its importance in balancing a chemical equation. ➤ Giving practice in balancing simple equations. ➤ Specifying the state of the reactants and products as (s), (l) and (g) for solid, liquid and gas respectively by writing them after their symbols/ formulae. ➤ Using an equation to discuss with children the information provided and the limitations by/of a chemical equation. 	<ul style="list-style-type: none"> ➤ Valency cards PPT. ➤ Video depicting the important and simple chemical equations in which the state of reactants and products is also shown. ➤ Quiz.

Integration: Mathematics, Physics

Theme 4: Chemical Reactions

This theme will enable children to understand that several oxides, carbonates and hydrates on heating are converted to other compounds. Oxides of metals and non-metals have basic and acidic character respectively. They will also realize and appreciate that there are different types of reactions such as combinations, decomposition, displacement, double displacement, exothermic and endothermic reactions.

Learning Outcomes:

Children will be able to:

- describe different types of chemical reactions with examples;
- identify the type of chemical reaction;
- identify different oxides as basic, acidic, amphoteric and neutral;
- explain the effect of heat on oxides of some metals.

Chemical Reactions		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ▷ Types of reactions: <ul style="list-style-type: none"> ☛ Combination ☛ Decomposition ☛ Displacement ☛ Double displacement. ▷ Reactivity series: <ul style="list-style-type: none"> ☛ In reactivity series metals are arranged in order of their reactivity. ☛ The metal that displaces the metal ion from the solution is more reactive. ▷ Predict the reactivity of metals. 	<ul style="list-style-type: none"> ▷ Explaining that chemical reactions involve breaking of existing bonds and formation of new bonds with absorption or release of energy normally in the form of heat or light. Explaining with examples using chemical equations. ▷ Giving examples of reactions from daily life - burning of fuel. ▷ Sharing videos of burning of a magnesium ribbon. ▷ Explaining the different types of reactions with examples. <ul style="list-style-type: none"> ☛ Synthesis $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2$ $\text{Ca(OH)}_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$ $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$ ☛ Decomposition Decomposition of CaCO_3, PbO. ☛ Displacement Displacement of Cu from CuSO_4 by Zn. ☛ Double displacement Both the ions are displaced - $\text{NaCl} + \text{AgNO}_3$ ▷ Asking children to arrange metals - Cu, Ag, Al, Mg, Fe in decreasing order of their reactivity by consulting the table of reactivity series. ▷ Sharing experiments (videos) for different metals with metal salt solution. 	<ul style="list-style-type: none"> ▷ Magnesium wire, match box. ▷ Limestone, tongs, test tube, burner. ▷ CuO, ZnO, Al_2O_3, litmus paper. ▷ Virtual laboratory and Videos/ PPTs. <p style="margin-top: 20px;">All activities and experiments can be shared through virtual laboratory.</p>

Chemical Reactions

Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<p>➤ Endothermic and exothermic processes/ reactions.</p> <p>➤ Neutralization reaction.</p> <p>➤ Decomposition reactions to form Oxides.</p> <p>➤ Classification of oxides:</p> <ul style="list-style-type: none"> ☛ Acidic ☛ Basic ☛ Amphoteric ☛ Neutral. <p>Metal oxides are basic; non-metal oxides are acidic in nature.</p> <p>Acidic oxides react with base and basic oxides react with acids. some oxides such as ZnO, PbO react both with acids and bases. These are amphoteric oxides.</p>	<p>➤ Sharing videos of</p> <ul style="list-style-type: none"> ☛ neutralization of an acid with a base as an exothermic reaction. ☛ dissolution of NH_4Cl in water is an endothermic process. <p>➤ Heating metal carbonates, nitrates, sulphates yield oxides and carbon dioxides.</p> <p>Oxides are also formed by heating element in presence of air.</p> <ul style="list-style-type: none"> ☛ Activity-1 Heating limestone strongly over the flame - CaO is formed ☛ Activity-2: Heating Lead carbonate strongly - PbO is formed. <p>➤ Dissolving the oxide in water and testing the acidic, basic and neutral oxide with litmus paper.</p>	

Life skills: Critical thinking, observation, interpretation, analysis

Theme 5 : Carbon and its Compounds

In this theme children will learn the importance of carbon and some of its compounds. It is a constituent of all plants and animals. In fact, a large number of compounds are made up of carbon. It is a very versatile element.

Products such as paper, wooden furniture, soaps, food items are made up of carbon as one of their elements and used extensively in daily life activities. The fuel that is used in cars and trucks is also made of carbon.

Learning Outcomes:

Children will be able to:

- explain the term allotropy;
- describe different Allotropes of Carbon;
- state the properties of Graphite and Diamond.

Carbon and its Compounds		
Key Concepts / Concerns	Pedagogy/ Transactional Strategies*	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Allotropes of Carbon - definition and explanation. ➤ Crystalline and amorphous nature of allotropes of carbon. ➤ Uses of diamond, graphite, coke, coal, soot. ➤ Physical properties of Carbon dioxide. ➤ Chemical properties of Carbon Dioxide. ➤ Acidic nature. ➤ Reaction with lime water. ➤ Properties and uses of Carbon monoxide. ➤ Emphasis on use as reducing agent in the extraction of iron. ➤ Emphasize the harmful properties of Carbon monoxide when inhaled - -- Asphyxia. 	<ul style="list-style-type: none"> ➤ Defining allotropes and explaining it with different examples, -diamond, graphite, coal, etc. ➤ Emphasising on different physical properties but same chemical properties of allotropes. ➤ Explaining that the properties such as electric and thermal conductivity of the two allotropes are different. ➤ Emphasising that the difference in physical properties is due to their different structures. Showing the models of structures and discussing the differences. ➤ Making models using dough / other molecular models. ➤ Discussing the classification of crystalline and amorphous nature of carbon. ➤ Defining Allotropes on the basis of their Crystalline and amorphous nature. ➤ Making a list of the uses of diamond, graphite, coke, coal, soot from the literature and internet. 	<ul style="list-style-type: none"> ➤ Models of structures of Diamond and Graphite. ➤ Sample of Graphite as an electrode. PPT ➤ Videos or Virtual laboratory.

Integration: Geography, Biology

Biology



The core concepts of Biology for Class VIII are as follows:

Class VIII

Transport of Food and Minerals in Plants

Reproduction in Plant and Animals

Ecosystems

**Human Body-Endocrine, Circulatory and Nervous
System**

Theme 1: Transport of Food and Minerals in Plants

This theme deals with the movement of water containing minerals and food in plants. The exchange of water, gases, minerals and other substances into and out of the cells and also between neighboring cells, takes place through a system called transportation system. In unicellular organisms (*Chlamydomonas*) and simple multicellular organisms like *Spirogyra*, diffusion is a major method of transportation. Diffusion of water across a semipermeable membrane is called osmosis. In complex higher plants because of enormity of size and complex organization, there is an elaborate transportation system and transport occurs through a vascular system of independent channels or conducting tubes (xylem and phloem). In addition to transport, xylem tissue also provides mechanical strength to the plant body.

Learning Outcomes:

Children will be able to:

- ☑ learn about the existence of a transport system inside the plant body of complex multicellular higher plants;
- ☑ explain that transport in unicellular and simple multicellular plants takes place by diffusion;
- ☑ define and discuss diffusion, osmosis, transpiration, root pressure;
- ☑ perform experiments and demonstrate the process of osmosis;
- ☑ define transpiration, interpret its role in xylem transport and know about the factors affecting rate of transpiration.

Transport of Food and Minerals in Plants

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>Transport in Plants</p> <ul style="list-style-type: none"> ➤ Diffusion – definition; ➤ Osmosis – definition, example, semipermeable membrane, root pressure; active transport. ➤ Transpiration - definition, importance and factors affecting transpiration. ➤ Structure and function of Xylem and Phloem. 	<p>➤ Experiments</p> <ul style="list-style-type: none"> ☛ Putting a twig of any available white flower in coloured water and noting the flower and portion of stem that becomes coloured. ☛ Demonstrating experiments on osmosis (potato osmoscope), (online/video) and asking the children to do same at home. ☛ Showing experiments on diffusion, root pressure and transpiration (covering the aerial part with a transparent colourless bag). ☛ Performing simple experiments to study the process of diffusion, osmosis, active transport and transpiration. <p>➤ Drawing and labelling diagrams of experiments on osmosis, diffusion.</p>	<ul style="list-style-type: none"> ➤ PPTs, Videos ➤ Discussion ➤ Drawings

Theme 2: Reproduction in Plants and Animals

Reproduction is one of the most important functions of living organisms. It is essential for perpetuation of species. There are two ways by which living organisms give rise to new organisms - Asexual (vegetative propagation) and sexual reproduction. While asexual reproduction involves a single individual parent, sexual reproduction involves two different individuals of different sexes, one male and another female. In this theme children will learn more about sexual reproduction in plants and animals.

Learning Outcomes:

Children will be able to:

- ✔ observe and correlate butterflies and honeybees moving around flowers to the process of pollination;
- ✔ recognize that sexual reproduction involves the fertilization of an egg cell by a sperm cell to produce offspring that may closely resemble the parents.

Reproduction in Plants and Animals

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p style="text-align: center;">PLANTS</p> <p>➤ Sexual reproduction in Plants:</p> <ul style="list-style-type: none"> ☛ Review of parts of a typical flower (4 whorls and their structure and function) ☛ Pollination: self and cross; ☛ Agents of pollination: three characteristics of plants pollinated by insects, water and wind (with examples). ☛ Fertilization 	<ul style="list-style-type: none"> ➤ Asking children their experiences about multiplication and reproduction in plants and animals seen by them in their surroundings. ➤ Analysing the advantages and disadvantages of vegetative propagation in group work. ➤ Learning the economic importance of artificial propagation. ➤ Learning through PPTs, videos, the process of fertilization in plants ➤ Explaining the main organs of human reproductive system (male and female) through images, diagrams, videos 	<ul style="list-style-type: none"> ➤ Actual specimens of flowers ➤ Dissection of typical bisexual flower to study the different whorls. (to be explained so children can do the dissection at home) ➤ PPTs and Videos. ➤ Tissue culture photographs ➤ PPTs/videos of human reproductive system (male and female)
<p style="text-align: center;">ANIMALS</p> <ul style="list-style-type: none"> ➤ Sexual reproduction in humans ➤ Main organs of male and female reproductive system. 		

Theme 3: Ecosystems

A community of organisms (plants and animals) in a given area, live in harmony with the environment. There is a close interaction between the living (called biotic) and non-living (called abiotic) components of the environment. The study of interaction between biotic and abiotic components is known as ecology and the ecosystem is the basic unit of study. There are many types of ecosystems, namely aquatic (fresh water/ marine), terrestrial (forest/ grassland/ desert), etc. The composition of biotic community and the abiotic components (environment) varies in different ecosystems. Organisms develop adaptations suited to live in a particular environment. Living organisms, which may be producers (plants), consumers (animals) or decomposers (micro-organisms), are linked to each other through food chains. Ecosystems exhibit two important functional attributes (a) A unidirectional flow of energy from sun to producers to consumers and finally to decomposers, and (b) Cyclic flow of nutrients.

Learning Outcomes:

Children will be able to:

- ☑ define the terms ecosystem, producer, consumer, decomposer, food chain, food web and pyramid of numbers, with examples (technical terms);
- ☑ explain and analyze the biotic and abiotic components of an ecosystem;
- ☑ interpret the relationship between different biotic components in terms of food chain, food web and pyramid of numbers;
- ☑ evaluate the abiotic factors and their influence on biotic factors;
- ☑ describe and provide examples for inter dependence relationships between organisms (symbiosis, parasitism and predation).

Ecosystems		
Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<ul style="list-style-type: none"> ➤ Understanding ecosystems: definition, interaction between biotic and abiotic factors; ➤ Biotic components consisting of producers, consumers, decomposers. Meaning of food chain. Food web, and pyramid of numbers. ➤ Interdependence between organisms: symbiosis, parasitism and predation. ➤ Only, forest ecosystem with its flora and fauna to be taught. 	<ul style="list-style-type: none"> ➤ Asking children to collect information on the flora and fauna of a forest ecosystem, and noting down: <ul style="list-style-type: none"> ☛ <i>The different producers and consumers;</i> ☛ <i>the decomposers acting on the leaves fallen on the forest floor, and</i> ☛ <i>the abiotic factors.</i> 	<ul style="list-style-type: none"> ➤ Photographs, PPTs. ➤ Specimens/pictures /charts of examples for predation, symbiosis, parasitism

Integration: Geography, Languages

Life Skill: Concern for environment

Theme 4: Human Body – Endocrine, Circulatory and Nervous Systems

This theme aims at enabling children to know and understand that in human beings, there are two kinds of control and coordination (nervous and chemical). The nervous coordination is brought about by the nervous system, and the chemical coordination by the chemicals called hormones. Children will also learn about the hormonal system called endocrine system. In addition, this theme will build and expand on the circulatory system, which was introduced in earlier classes.

Learning Outcomes:

Children will be able to:

- ☑ explain that in addition to nervous control, another control/coordination mechanism called hormonal control also exists in humans;
- ☑ define the terms – endocrine system, hormones, endocrine and exocrine glands;
- ☑ draw a diagram showing the location of endocrine glands in the body and describe the functions of hormonal glands namely the thyroid, adrenal, pituitary and pancreas;
- ☑ relate the knowledge gained and explain the changes in their own bodies;
- ☑ become aware about the changes that occur during adolescence and how to manage the emotional and physical changes;
- ☑ explain the techniques used in the management of stress;
- ☑ draw diagrams of the neuron and reflex action;
- ☑ list out the functions of the heart, nervous system, RBC and WBC.

Human Body – Endocrine, Circulatory and Nervous Systems

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p style="text-align: center;">Endocrine System</p> <ul style="list-style-type: none"> ➤ Two types of glands- exocrine, endocrine (basic concept and difference); ➤ Hormone (definition). ➤ Hormonal glands - (thyroid, adrenal, pancreas, pituitary); location and function of each. ➤ Following points to be studied in tabular form: name of gland, location in body, secretion, function. <p style="text-align: center;">Adolescence and accompanying changes</p> <ul style="list-style-type: none"> ➤ Physical and emotional changes in the body during adolescence. ➤ Importance of personal hygiene. ➤ Stress management (meaning of stress; ways to tackle stress: yoga, meditation, time 	<ul style="list-style-type: none"> ➤ Revisiting previous concepts learnt by children. ➤ Discussing and explaining to children, the concept of hormones and endocrine glands. ➤ Describing the endocrine system in human beings through PPTs and videos. ➤ Asking children to show the location of endocrine glands in the human body by means of a labelled diagram. <ul style="list-style-type: none"> ➤ Discussing how hormones bring about changes in the body. ➤ Explaining the changes taking place (physical and emotional) in the body during adolescence; ➤ Encouraging children to maintain a personal journal/ diary ➤ Discussing the importance of personal hygiene; 	<ul style="list-style-type: none"> ➤ PPTs and videos. ➤ Photographs of the structure of heart, neuron, circulatory system, nervous system. ➤ B.P measuring instrument, ECG; ➤ Videos on reflex action.

Human Body – Endocrine, Circulatory and Nervous Systems

Key Concepts	Suggested Transactional Processes	Suggested Learning Resources
<p>management, sports, hobbies, rational thinking etc.)</p> <p style="text-align: center;">Circulatory System</p> <p>Revisit learning of earlier class</p> <ul style="list-style-type: none"> ➤ External structure of heart ➤ Schematic diagram of the heart; ➤ Blood vessels - aorta, pulmonary trunk, coronary artery & vein, vena cava. ➤ Circulation of blood as double circulation. ➤ Blood Groups (A, B, AB and O): universal donor and universal acceptor. <p style="text-align: center;">Nervous System</p> <p>Revisit learning of earlier class</p> <ul style="list-style-type: none"> ➤ Central nervous system (CNS) in detail with its parts and their functions. ➤ Reflex action: definition and basic terms used to describe reflex action stimulus, response, impulse, receptor, effector); common examples of reflex action. 	<ul style="list-style-type: none"> ➤ Discussing various ways to tackle stress. ➤ Encouraging children to label diagram of the heart. ➤ Discussing about the different types of blood vessels and double circulation. ➤ Asking children to check the pulse at home after a vigorous exercise (with the help of an adult) ➤ Learning about the structure of a neuron. ➤ Explaining the central nervous system in detail through diagrams. ➤ Discussing with children about Reflex action and its impact in their daily lives. Citing the example of Pavlov’s experiment on the dog, and its relation to our body. ➤ Providing experiences to children by making them experience common reflex actions – when a hand is moved in front of the face – eyes close; when a knee is tapped while sitting, the foot moves forward etc. 	