Theme 1: Matter

Objects that take shape and have mass are called matter. A block of wood, milk and air are all made of matter. Matter is made up of tiny particles called atoms and molecules that cannot be seen by the human eye as they are very small. Matters exists in form of solid, liquid or gas. A solid has a certain size and shape, like a block of wood. A liquid, like water, has a size but does not have a definite shape. It takes the shape of the container it is put in. A gas, like air, is a form of matter that has no definite shape or size.

Learning Outcomes:

Children will be able to:

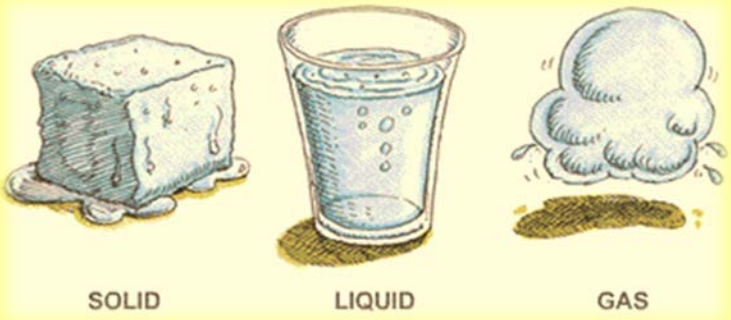
- define matter;
- describe what matter is made of;
- list the distinguishing properties of solid, liquid and gas;
- classify different objects in terms of solid, liquid and gas.

Matter

Key Concepts	Suggested Transactional Processes	Suggested Learning resources
Matter- its meaning and composition. **States of Matter** Solids, Liquids and Gases. Characteristics of Solids, Liquids and Gases (Shape, texture and Volume). Distinguishing properties of Solids, Liquids and Gases.	Revising previously learnt concepts. Building on children's previous learning. Demonstrating different types of matter. Children will be provided learning opportunities to: ☛ recognize different states of matter, using qualitative observation ☛ distinguish between objects in terms of solid, liquid and gas, using qualitative observation.	Objects in the immediate environment. Objects in the form of solid, liquid and gas. Video on matter and its forms. Charts and pictures.

Life Skills: Decision making, cooperation and working together

Integration: Chemistry, Technology in daily life



Theme 2: Physical Quantities and Measurement

Whenever we make a measurement, we require a number which answers the 'how' part of it and a unit which tells us that we are talking about. The unit that is used for a physical quantity is universally accepted and used so that science is communicated and understood all over the world, without any ambiguities. Length, mass, time and temperature are some of the physical quantities that are discussed in detail. They have their own units and symbols for representation. Different devices are required to make measurements of these quantities. How to use a device properly for measurement is an important aspect of learning physics. Area is an example of a physical quantity that can be expressed in terms of a product of two measurements in length. Children learn to develop skills of converting the magnitude of a physical quantity from one unit to its other related unit.

Learning outcomes:

Children will be able to:

- define length, mass and time;
- express length, mass, time, temperature and area in proper units with proper symbols;
- measure length of objects using a ruler and a measuring tape;
- measure mass of an object using a beam balance and an electronic balance;
- measure time using a clock, a watch and a stop-watch;
- relate temperature of an object with its hotness or coldness;
- measure temperature of a person using a clinical thermometer;
- measure temperature of an object using a laboratory thermometer;
- measure area of a regular object using a graph paper;
- convert a physical quantity from one unit into other related units.

Physical Quantities and Measurement

Key Concepts	Suggested Transactional Processes	Suggested Learning resources
▸ Measurement of Length: ☛ Concept of length as distance between two points. ☛ Measurement of length (ruler, measuring tape). ☛ Units (with symbol and full name). Name of unit / Symbol centimetre – cm meter – m Kilometre – km inch – inch foot – ft ▸ Measurement of Mass: ☛ Concept of Mass as matter contained in an object. ☛ Measurement of Mass (Beam Balance, Electronic Balance). ☛ Units (with symbol and full name).	▸ Explaining the concept of length as a distance between two points using objects in classroom like books, table, blackboard or length of classroom, etc. ▸ Demonstrating with the help of a ruler and a measuring tape and explaining the marking on each. ▸ Explaining the correct method of measurement using a ruler and a measuring tape ▸ Measuring the length of an object using a ruler / measuring tape. ▸ Explaining different units of length like cm, m, km, inch, ft and the relation between them. ▸ Practice converting one unit into others. ▸ Explaining the concept of mass as matter contained in an object using objects around us. ▸ Demonstrating a Beam balance and Electronic balance and explaining the marking on each.	▸ Objects around us. ▸ Ruler and measuring tape. ▸ Video on measurement of length using a ruler and a measuring tape. ▸ Objects in classroom. ▸ Beam balance and Electronic balance. ▸ Video on measurement of mass using beam balance and electronic balance. ▸ Clock, watch, stop watch. ▸ Video on measurement of time using a clock, watch and stopwatch.

Physical Quantities and Measurement

Key Concepts	Suggested Transactional Processes	Suggested Learning resources

Name of unit	Symbol
milligram	mg
gram	g
kilogram	kg

- Measurement of Time:
  - Concept of time and explanation in terms of hours, minutes and seconds.
  - Measurement of Time (Clock, watch, stop watch).
  - Units (with symbol and full name).

Name of unit	Symbol
Second	s
Minutes	min
Hour	h

(No distinction of SI, metric, MKS, CGS).

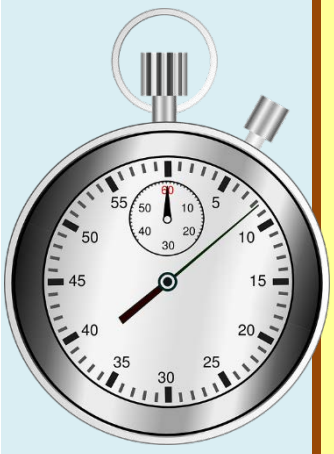
- Measurement of Temperature:
  - Temperature as a measure of degree of hotness or coldness of body.
  - Measurement of temperature (clinical thermometer, laboratory thermometer).
  - Normal temperature of a human body.
  - Units (with symbol and full name).

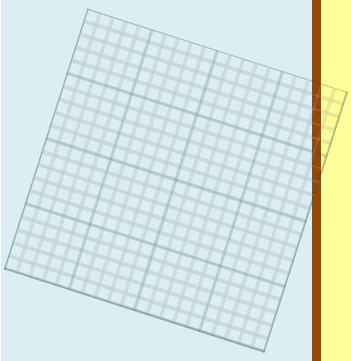
Name of unit	Symbol
Celsius	°C

- Measurement of Area:
  - Concept of area.
  - Area of Regular shapes (using graph paper).

- Explaining the correct method of measurement using a beam balance and an electronic balance.
- Measuring mass using a beam balance.
- Measuring mass using an electronic balance.
- Explaining different units of mass like mg, g, kg and the relation between them.
- Exercise for developing the skill of conversion of one unit into others.
- Explaining time in terms of hours, minutes and seconds.
- Demonstrating a clock, watch and stopwatch.
- Explaining the correct use of a clock, watch and stopwatch
- Measurement of time using a clock, watch and a stop watch by children in groups and individually.
- Explaining different units of time like seconds, minutes and hours and the relation between them.
- Exercise for developing the skill of conversion of one unit into others.
- Explanation of temperature as a measure of hotness of an object.
- Demonstrating the working of a clinical and a laboratory thermometer and explaining the correct use of a thermometer.
- Measurement of body temperature using a clinical thermometer on one another by children in pairs.
- Measurement of temperature of hot water using a laboratory thermometer and children recording the same.
- Explanation of unit and symbol of temperature.
- Explanation about scales on a graph paper.
- Measurement of area of objects of regular shapes using a graph paper.

- Use of mobile to measure time interval.
- Hot and cold objects.
- Clinical and Laboratory thermometers.
- Video showing measurement of temperature using a thermometer.
- A set of objects of regular shapes.
- Graph papers.
- Pencils.





Life Skills: Health, Communication skills, problem solving, Cooperation and working together.

Integration: Mathematics, Chemistry, Biology, Technology in daily life.

Theme 3: Force

This theme will enable children to understand the terms 'Force' and 'Friction'. The push or pull of an object is called Force. A force can cause a stationary object to move and can change the direction of a moving object. When an inflated football is pressed from all sides its shape changes. When a ball is rolled on a floor, it stops after some time. Children will understand why this happens because the force acting between the surface of the ball and the floor slows down the ball. This force is called Friction. Friction can be static, sliding or rolling. There are situations where friction is advantageous and situations where it is disadvantageous.

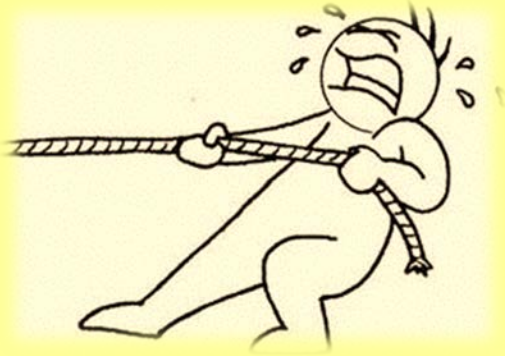
Learning outcomes:

Children will be able to:

- define force;
- explain that a force can change the state of motion;
- explain that a force can change the shape of an object;
- describe force of friction with examples from daily life;
- describe situations where static/ sliding / rolling frictions are in play;
- explain advantage and disadvantage of force of friction in daily life situations.

Force		
Key Concepts	**Suggested Transactional Processes**	**Suggested Learning resources**
▸ Force as a push or pull. ▸ Effects of force on ☛ Mass (No effect) ☛ Speed ☛ Direction (rest and motion) ☛ Change in shape and size ☛ Using real world examples only. ▸ Force of Friction: ☛ Types – Rolling, Sliding and Static. ☛ Advantages and Disadvantages.	▸ Demonstrating to and discussing with children: ☛ force as push or pull. ☛ that a force can change a state of motion. ☛ that a force can change shape of an object. ☛ the play of force of friction in an object in motion.	▸ A couple of tennis balls. ▸ An inflated football, ▸ A toy cart. ▸ Surface of a table. ▸ Video showing force, different types of frictional forces and effect of force.

Integration: Geography, Technology in daily life.
Life Skills: Communication, problem-solving.



Theme 4: Energy

The ability to do work is called Energy. Machines help us to do work. For example, a bottle opener is a machine. A needle, a doorknob are also machines. Some machines are more complex than others. A simple machine changes the direction or the magnitude of force applied. The six simple machines are the lever, the pulley, the wheel-and-axle, the inclined plane, the wedge and the screw. The factor by which a machine multiplies the force applied is called 'mechanical advantage'. On the basis of location of fulcrum (the pivot point), the load and the effort, levers may be classified into three types or orders. The aim of this theme is to enable children know and understand about different types of machines and levers.

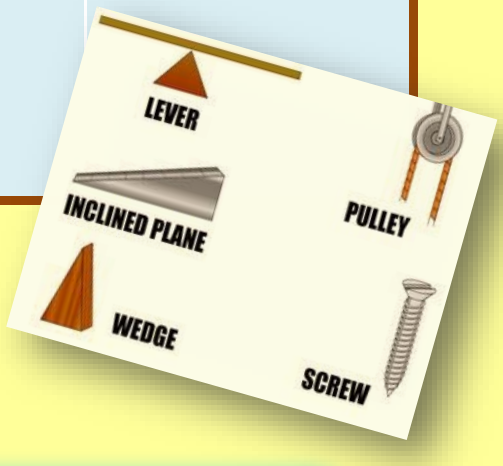
Learning outcomes:

Children will be able to:

- define what a machine is;
- describe six simple machines with examples from daily life;
- describe different types of levers;
- define mechanical advantage of a lever;
- solve problems based on formula for mechanical advantage of a lever.

Energy

Key Concepts	Suggested Transactional Processes	Suggested Learning resources
▸ Simple Machines: ☛ Basic Concept ☛ Mechanical Advantage ▸ Types of Simple Machines: ☛ Lever ☛ Wheel and axle ☛ Pulley ☛ Inclined plane ☛ Wedge ☛ Screw ▸ Different Orders of Levers ▸ Numericals based on mechanical advantage or leverage Load × Load arm = Effort × Effort arm.	▸ Demonstrating and explaining the use of simple machines. ▸ Identifying simple machines in devices used in daily life. ▸ Explaining the level and location of fulcrum, load and effort with help of diagram. ▸ Explaining the three types of levers. ▸ Explaining the term, 'mechanical advantage' of a machine. ▸ Helping children solve simple numerical problems based on MA.	▸ Charts of simple machine. ▸ Six simple machines. ▸ Models of three types of levers. ▸ Interactive videos on simple machines.



Integration: Mathematics, Technology in daily life.
Life Skills: Cooperation and working together, Problem-solving.

Theme 5: Light

Light is an important element that helps in making objects visible. It travels in a straight line. When light falls on an object it casts a shadow. The earth and the moon and, in fact, planets cast their shadows in space. Sometimes, on a full-moon day, the moon passes through the shadow of the earth. The Earth casts two shadows that fall on the moon during a lunar eclipse. The umbra is a full dark shadow. The penumbra is a partial outer shadow.

Learning outcomes:

Children will be able to:

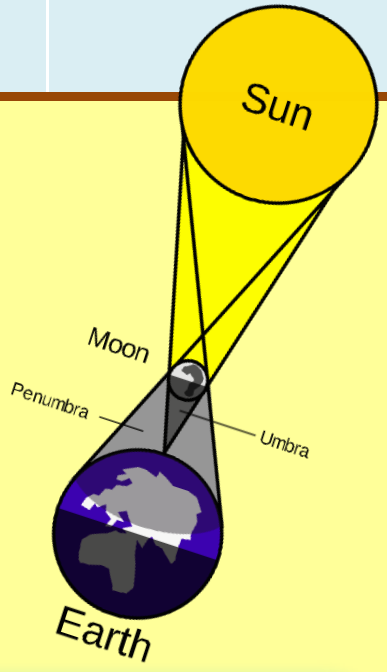
- give examples of evidence that light travels in straight lines;
- describe principle, construction and working of a pinhole camera;
- explain the factors on which the size of the image in a pinhole camera depends;
- explain the formation of shadows;
- explain the occurrence of lunar eclipse;
- explain the term umbra and penumbra.

Light

Key Concepts	Suggested Transactional Processes	Suggested Learning resources

▸ Rectilinear Propagation of Light.
▸ Applications of rectilinear propagation of light.
▸ Pinhole camera:
  ☛ Principle and Working
  ☛ Factors on which the size of the image produced depends
▸ Shadows:
  ☛ Umbra
  ☛ Penumbra
  ☛ Natural Shadows – Eclipses
	▸ Demonstration of activities to show that light travels in straight line.
	▸ Demonstration of construction of a pinhole camera.
	▸ Explanation of working of a pinhole camera.
	▸ Engaging children in construction of a pinhole camera.
	▸ Engaging children in use of a pinhole camera.
	▸ Demonstration of shadow and eclipse formation.
		▸ Candle, a rubber tube, three identical cardboards, moulding clay (Rectilinear propagation of Light).
		▸ Pinhole camera: Two boxes so that one can slide into another with no gap in between, Tracing paper (for screen).
		▸ Video on Pinhole camera.
		▸ Video on lunar eclipse.

Integration: Geography, Art
Life Skills: Cooperation and working together, problem solving.



Theme 6: Magnetism

Substances that have property of attracting iron are called magnets. The materials that get attracted towards a magnet are known as magnetic materials. For example, iron, nickel and cobalt. Materials that are not attracted towards a magnet are non-magnetic- for example, glass, plastic, wood. When a magnet is suspended freely, it always rests in the same direction. The end of the magnet that points toward North is called North pole. The end that points towards south is called South pole. This property of magnets helps us to find directions. Opposite poles of two magnets attract each other and similar poles repel one another. Each magnet is surrounded by a magnetic field. Permanent magnets retain their magnetism for a long time. Temporary magnets behave like a magnet only till they are under influence of a magnetic field. When an electric current flows through a coil of wire, the coil behaves like a magnet. This type of magnet is called electromagnet. Electromagnets are useful because their strength can be varied and they can be turned off and on, as desired.

Learning outcomes:

Children will be able to:

- state characteristics of a magnet;
- distinguish between magnetic and non-magnetic substances;
- state the properties of magnets;
- recognise the magnetic field around a magnet;
- recognize the Earth's magnetic field;
- describe different ways to make a magnet;
- distinguish between permanent and temporary magnets;
- make a simple electromagnet;
- list precautions for care and storage of magnets;
- discuss loss of magnetic property due to heating, hammering and electricity.

Magnetism		
Key Concepts	**Suggested Transactional Processes**	**Suggested Learning resources**
Magnetic and non-magnetic substances. Characteristics of a magnet. properties of magnets Magnetic field around a magnet. Earth's magnetic field. Making of Magnets Permanent & temporary magnets and their uses Electromagnets and choice of material for the core of an electromagnet Care & storage of magnets Demagnetization by heating, hammering and electricity.	Demonstrating magnetic and non-magnetic substances. Demonstrating properties of a magnet through activities. Engaging children in recognizing magnetic fields around a magnet. Demonstrating different ways of making a magnet. Explaining difference between permanent and temporary magnets and their uses. Demonstration of an electromagnet. Explaining demagnetization by heating, hammering and electricity.	Bar magnets. Iron nails and filings. Stand and thread to suspend a magnet. Compass. A coil of wire. A battery. A key. A long nail. Videos about magnets and electromagnets. Video about Earth as a magnet

Integration: Geography, Technology in daily life.
Life Skills: Cooperation and working together, critical thinking.