

PHYSICS - CLASS 06

Theme 01: 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. Matter 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:

01. Define matter;
02. Describe what matter is made of;
03. List the distinguishing properties of solid, liquid and gas;
04. Classify different objects in terms of solid, liquid and gas.

Theme 02: 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:

01. Define length, mass and time;
02. Express length, mass, time, temperature and area in proper units with proper symbols;
03. Measure length of objects using a ruler and a measuring tape;
04. Measure mass of an object using a beam balance and an electronic balance;
05. Measure time using a clock, a watch and a stop-watch;
06. Relate temperature of an object with its hotness or coldness;
07. Measure temperature of a person using a clinical thermometer;
08. Measure temperature of an object using a laboratory thermometer;
09. Measure area of a regular object using a graph paper;
10. Convert a physical quantity from one unit into other related units.

Theme 03: 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:

01. Define force;
02. Explain that a force can change the state of motion;
03. Explain that a force can change the shape of an object;
04. Describe force of friction with examples from daily life;
05. Describe situations where static/ sliding / rolling frictions are in play;
06. Explain advantages and disadvantages of force of friction in daily life situations.

Theme 04: 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:

01. Define what a machine is;
02. Describe six simple machines with examples from daily life;
03. Describe different types of levers;
04. Define mechanical advantage of a lever;
05. Solve problems based on formula for mechanical advantage of a lever.

Theme 05: 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:

01. Give examples of evidence that light travels in straight lines;
02. Describe principle, construction and working of a pinhole camera;
03. Explain the factors on which the size of the image in a pinhole camera depends;
04. Explain the formation of shadows;
05. Explain the occurrence of lunar eclipse;
06. Explain the term umbra and penumbra.

Theme 06: 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:

01. State characteristics of a magnet;
02. Distinguish between magnetic and non-magnetic substances;
03. State the properties of magnets;
04. Recognise the magnetic field around a magnet;
05. Recognize the Earth's magnetic field;
06. Describe different ways to make a magnet;
07. Distinguish between permanent and temporary magnets;
08. Make a simple electromagnet;
09. List precautions for care and storage of magnets;
10. Discuss loss of magnetic property due to heating, hammering and electricity

Annual Plan for Class VI Physics

Month	Date	Name of lessons /Chapter No	No of class required
June	Chapter 1 (6/6/22-17/6/22)	Chapter-1	8
July	Chapter 1 (4-8)	Chapter-2	2
August	(1-23)	Chapter -2	3

		II Term	
September	12-30	Chapter-3	8
October	Chapter 5 (3-28)	Chapter-3	6
November	Chapter 9 (1-29)	Chapter-4	8
December	1-9	Chapter-4	2
		III Term	
January	3-25	Chapter-5	8
February	1-28	Chapter-5	8
March	1-7	Revision	4

Annual Marking Scheme

Marking Scheme- I Mid-Term

No	Class	Subject	Chapter No/ Chapter name	Marks
1	VI	Physics	Chapter -1	25
Total				25

Marking Scheme- I- Term

No	Class	Subject	Chapter No/ Chapter name	Marks
1	VI	Physics		
			Chapter -1	20
			Chapter -2	20
			Total	40

Marking Scheme- II Mid- Term

No	Class	Subject	Chapter No/ Chapter name	Marks
1	VI	Physics	Chapter -3	14
			Chapter -4	11

				Total	25
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Marking Scheme II Term

No	Class	Subject	Chapter No/ Chapter name		
1	VI	Physics			
			Chapter -3	30	
			Chapter -4	25	
			Chapter-5	25	
				Total	80

Annual Marking Scheme

No	Class	Subject	Chapter No/ Chapter name	Marks
I	VI	Physics	Chapter-1	5
			Chapter -2	5
			Chapter -3	5

			Chapter -4	5	
			Chapter-5	35	
				Total	80

PHYSICS - CLASS 07

Theme 01: Physical Quantities and Measurement

In the earlier classes, teaching-learning emphasised on the measurement of length, mass, time and temperature using devices made for such measurements and how a particular unit and symbol are used to express the result of measurement of each physical quantity. In continuity, this theme aims at enabling children to develop the ability to measure volume and determine the density of a regular solid. They will be introduced to the concept of speed, that contains simple problems to provide an idea of the speed of objects around us and also to know how fast or slow an object is moving.

Learning outcomes:

Children will be able to:

01. Define volume;
02. Express volume of an object in a proper unit with proper symbols;
03. Measure volume of a liquid using a graduated cylinder and a graduated beaker;
04. Estimate the area of an object of irregular shape using a graph paper;

05. Measure the volume of an irregular solid using a graduated cylinder /a graduated beaker;
06. Define density and write its formula;
07. Express density in a proper unit and symbol;
08. Measure density of a regular/irregular solids;
09. Express result of measurement in a proper unit with proper symbol;
10. Define speed and write its formula;
11. Express speed in proper units with proper symbol;
12. Solve simple numerical problems based on formulas of density and speed.

Theme 02: Force and Pressure: Motion

An object is said to be in motion if its position changes with time. When walking, running or cycling or when a bird is flying, there is motion involved. Various objects have different types of motion. They can be classified into translatory motion, circular motion and oscillatory motion. Motion of an object can also be classified as periodic and non-periodic. If an object travels equal distance in equal time, its motion is said to be uniform, if not, the motion is said to be non-uniform. A physical quantity used to distinguish between uniform and non-uniform motion is average speed.

Learning outcomes:

Children will be able to:

01. Define motion;
02. Identify objects in motion and at rest;
03. Describe different types of motion, with examples from daily life;
04. Define uniform and non-uniform motion with examples from daily life;
05. Define the concept of speed (average speed);
06. Calculate average speed of objects based on data provided;
07. Define weight;
08. Relate weight of an object with its mass.

Theme 03: Energy

This theme aims at enabling children to know about energy and the different its forms namely, kinetic energy, potential energy, heat energy and electrical energy. They will also understand that one form of energy can be converted into another form and that this is known as transformation of energy. Energy is conserved during transformation. This is known as the law of Conservation of Energy.

Learning outcomes:

Children will be able to:

01. Define energy;
02. Express energy in proper units;
03. Discuss about different forms of energy;
04. Describe conversion of energy from one form to another in different situations;
05. State law of conservation of energy, with examples.

Theme 04: Light Energy

Light travels in a straight line. Light from an object can move through space and reach the human eye which enables one to see this page, or a face in a mirror. This process is known as reflection. It obeys a law known as law of reflection. Light travels in air at a constant speed of 3×10^8 m/s or 3 lakh kilometre per second. In other mediums, like glass or water, it slows down. Light from sun is composed of seven colours. The colours of objects fascinates everybody, Physicists have found that all colours can be explained as addition of three primary colours. The primary colours are red, green and blue. Colours that is seen on a TV or computer screen arise due to combination of these primary colours. Appearance of colour of an object is due to process of absorption and reflection of different colours by the object.

Learning outcomes:

Children will be able to:

01. Explain the phenomenon of reflection;
02. Define the terms, plane, normal to the plane, point of incidence, angle of incidence and angle of reflection;
03. State the law of reflection;
04. Describe reflection of light from a plane mirror;
05. Use law of reflection to show formation of image by a plane mirror;
06. Describe the characteristics of image formed by a plane mirror;
07. State the value of speed of light;
08. State primary colors;
09. Describe formation of secondary colors by addition of primary colors;
10. Explain the observed color of an object based on reflection and absorption of light of different colors from the object.

Theme 05: Heat

Heat is a form of energy. Sunlight carries heat that gives warmth when exposed to it. When water is heated, its energy in the form of heat increases and becomes hot. When

heat energy of an object increases, it can result in (i) change of temperature, (ii) change in size and/or (iii) change in state of an object. Some materials like aluminium are good conductors of heat and some, like wood are bad conductors of heat. Heat from a hot object is transferred to a cold object in three different ways- conduction, convection and radiation. Previous learning included topics on temperature and its measurement in degree Celsius. Further, two other frequently used temperature scales, Fahrenheit scale and Kelvin scale have been introduced in this theme for a better understanding of concepts related to temperature.

Learning outcomes:

Children will be able to:

01. Define heat as energy;
02. Define units of heat;
03. Describe temperature scales: degree Celsius, Fahrenheit and Kelvin;
04. Describe different effects of heat;
05. Explain different modes of heat transfer;
06. Decide about conductor and insulator of heat in different applications;
07. Describe construction and working of thermos flask.

Theme 06: Sound

Sound is produced by the vibration of objects and different types of instruments are used to produce sound. In humans, sound is produced by the voice box or larynx. Sound needs a medium to propagate hence in vacuum it is not possible to hear one another. Sound wave is a longitudinal wave. A wave is characterised by an amplitude and a frequency. Like light, sound is also reflected from a surface. Sound is also absorbed by a medium. Therefore, walls of a theatre are lined with layers of materials that absorb sound. Sound travels with different speeds in different mediums and travels fastest in solids. This theme will enable children to know and understand 'Sound', different sources of sound and how it travels.

Learning outcomes:

Children will be able to:

01. Identify different sources of sound;
02. Describe sound as a longitudinal wave;
03. Define amplitude and frequency of sound;
04. Demonstrate that sound requires a medium to transmit;

05. List examples of reflection and absorption of sound;
06. Analyze the relative speed of Sound in different mediums;
07. Design a sound-proof box.

Theme 07: Electricity and Magnetism

The basic law of electromagnetism states that “Like poles of magnets repel one another and unlike poles attract”. When an electric current is passed through a coil, the coil behaves like a magnet. This magnet is called an electromagnet. The strength of this magnet is increased by inserting a core of suitable material. Many objects around us, like electric bell, electric motor, loudspeaker, etc. have electromagnets in them. A cell is a source of electricity and are used in torches, watches, calculators, etc. When connected to a device like bulb, it sends current through the bulb and the bulb lights up. Flow of charges constitute current. Materials that allow current to flow through them are called conductors whereas materials that do not allow passage of current through them are called insulators. Children will learn how electric components are arranged in simple series and simple parallel arrangements.

Learning outcomes:

Children will be able to:

01. State the Law of Magnetism;
02. Describe test for a magnet;
03. Explain the phenomenon of electromagnetism;
04. Describe an electromagnet and its uses;
05. Explain construction and working of an electric bell;
06. Relate current to flow of charge;
07. Recognize electric cell as a source of electricity;
08. Define resistors as the component that opposes the flow of current;
09. Represent different components like cell, battery, key, bulb, connecting wire, resistor by standard symbols;
10. Make simple series circuits and simple parallel circuits;
11. Recognize battery as series combination of cells;
12. Define conductors and insulators of electricity.

Month	Chapter	Name of the chapter
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June	1	Measurement
July	2	Motion
August	3	Energy
September	4	Reflection of light
October	5	Heat
November		General Properties of fluids
January	7	Magnetism & Electricity
February	6	Sound

Annual Marking Scheme

Exam	Mark	Topic	Mark Division
First mid-term	25	Measurement	25
First Term	40	Measurement Motion	20 20
Second mid term	25	Energy Reflection of light	10 15

Second term	80	Energy Reflection of light Heat General Properties of fluids	20 20 20 20
Annual Exam	80	Motion Reflection of light Magnetism & Electricity Sound	20 20 20 20

PHYSICS - CLASS 08

Theme 01: Matter

Building on previous learning in Classes VI and VII, in this class the theme aims at introducing children to the Kinetic Theory which will help them in understanding the difference in the three states of Matter. The theory states that all matter is made of tiny particles which 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:

01. Distinguish the three states of matter in terms of movement of particles;
02. Relate the three states of matter with energy of movement of particles in them;
03. Describe the change of state using Kinetic theory:
 - a. Boiling
 - b. Vaporization
 - c. Melting
 - d. Fusion

- e. Evaporation
 - f. Condensation
 - g. Sublimation
 - h. Deposition
 - i. Freezing
04. Identify appropriate observable parameters in experiments;
 05. Collect data and make careful observation;
 06. Present the results in the form of tables;
 07. Consider results using scientific knowledge and communicate these.

Theme 02: 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:

01. Measure density of an irregular solids;
02. Measure density of a liquid;
03. Discuss the concept of floatation based on relative densities of solid and liquid;
04. Express result of measurement in proper unit with proper symbol;
05. Solve simple numerical problems based on formula of density;
06. Compare densities of matter in three states, solid, liquid and gas;
07. Make careful observations including measurements;
08. Gather data using formal units;
09. Make conclusions from collected data;
10. Make predictions using scientific knowledge and effectively communicate the same.

Theme 03: 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 pivot 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.

Learning outcomes:

Children will be able to:

01. Explain the turning effect of a force, with examples from daily life;
02. Define moment of force;
03. Express moment of force in proper units;
04. Solve simple numerical problems based on moment of force;
05. Define pressure;
06. Express pressure in proper units;
07. Solve simple numerical problems based on formula for pressure;
08. Describe pressure exerted by a liquid;
09. Demonstrate that liquids exert pressure;
10. Describe pressure exerted by a gas;
11. Describe atmospheric pressure;
12. Express thoughts that reveal originality, speculation, imagination, a personal perspective, flexibility in thinking, invention or creativity;
13. Present ideas clearly and in logical order

Theme 04: 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:

01. Define work;
02. Express work in proper unit;
03. Calculate work done in simple cases;
04. Define kinetic energy;
05. Express kinetic energy in proper units;
06. Solve simple problems based on kinetic energy;

07. Define potential energy;
08. Define gravitational potential energy;
09. Solve simple problems based on gravitational potential energy;
10. Describe energy transformation in daily life situation;
11. Distinguish between energy and power;
12. Can plan an experimental investigation or demonstration using Scientific processes;
13. Can identify /select on the basis of attributes.

Theme 05: 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:

01. Define refraction;
02. Discuss examples of refraction;
03. Describe a spherical mirror;
04. Describe a concave and a convex mirror;
05. Define the terms, principal axis, center and radius of curvature, focus and focal length for a spherical mirror;
06. Describe rules for making ray diagrams for spherical mirror;
07. Distinguish between real and virtual images;
08. Use a ray diagram to show formation of a real image by a spherical mirror;
09. Describe the characteristics of a real image formed by a spherical mirror;
10. Describe dispersion of white light by a prism into constituent colors;
11. Display a scientific attitude while making models;
12. Show a creative mind set while studying real world optical phenomena;
13. Communicate logical reasoning and explanations effectively using scientific terms.

Theme 06: 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 temperatures. 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:

01. Compare and contrast Boiling and Evaporation;
02. Describe thermal expansion of matter;
03. Describe, linear, area(superficial) and volume expansion;
04. Compare expansivity in Solids, Liquids and Gasses;
05. Construct models based on scientific process;
06. Observe and cite multiple physical phenomena from one experiment

Theme 07: Sound

In the previous classes children were made aware of 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:

01. Relate pitch and frequency;
02. Understand pitch and frequency in relation to working of musical instruments. (wind, membrane and string);
03. Explain mono tone;
04. Relate loudness and amplitude;
05. State the unit of loudness in decibels.

Theme 08: Electricity

In this theme the aim is to develop the ability to estimate consumption of electricity by knowing the power rating of appliances used. Children will also be able to appreciate and understand the need and importance of taking certain precautions and use 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:

01. Describe household consumption of electricity;
02. Identify live wire, neutral wire and earth wire in terms of their energy and path they travel;
03. Describe safety components (fuses, circuit breakers);
04. Describe phenomenon of static electricity;
05. Explain conservation of charges;
06. Describe conduction and induction of charges;
07. Describe construction and working of an electroscope;
08. Describe a lightning conductor;
09. Identify dangers of electricity;
10. Conduct scientific experiments keeping in mind all the parameters;
11. Study the impact of energy consumption and draw conclusions from the same and suggest alternate approaches;
12. Learn the use of safety precautions while dealing with electrical appliances.

Month	Date	Chapter	Name of the chapter
June	10 --30	1	1. Matter
July	1----29	2	2. Physical quantities & Measurement
August	1----- 16	3	3 Force & pressure

September	12---- 30	4	4.Work&Energy
October	1----- 30	5	5.Light Energy
November	1----- 30	7	7.Sound
January	1----- 30	8	8.Electricity
February	1----- 30	6	6.Heat transfer

Annual Marking Scheme

Exam	Mark	Topic	Mark Division
First mid-term	25	1. Matter	25
First Term	40	1. Matter 2. Physical quantities &Measurement 3Force & pressure	10 15 15
Second mid term	25	4.Work&Energy 5.Light Energy	15 10
Second term	80	4.Work&Energy 5.Light Energy 7.Sound	25 30 25
Annual Exam	80	8.Electricity 6.Heat transfer 3Force & pressure 7.Sound	30 30 10 10