

ICSE Class 7 Physics Syllabus 2020-21

Physics

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

Class VII

Physical Quantities and Measurement

Force and Pressure: Motion

Energy

Light Energy

Heat

Sound

Electricity and Magnetism

Theme 1: Physical Quantities and Measurement

In the earlier classes teaching- learning emphasised on the measurement of length, mass, and time 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 and understand the concept of speed, that contains simple problems to get an idea of the speed of objects around them and also to know how fast or slow an object is moving. The concept of speed has been introduced that contains simple problems to get an idea of speed of objects around us.

Learning outcomes:

Children will be able to:

- define volume;
- express volume of an object in a proper unit with proper symbols;
- measure volume of a liquid using a graduated cylinder and a graduated beaker;
- estimate the area of an object of a regular shape using formula;
- define density and write its formula;
- express density in a proper unit and symbol;
- measure density of a regular;
- express result of measurement in a proper unit with proper symbol;
- define speed and write its formula;
- express speed in proper units with proper symbol.

| Physical Quantities and Measurement | | |
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| Key Concepts | Suggested Transactional Processes | Suggested Learning resources |
| <ul style="list-style-type: none"> ➤ Measurement of Volume (3D concept): <ul style="list-style-type: none"> ☛ Concept of unit volume ➤ Measurement of area of a regular shaped body using formula ➤ Measurement of Density of Regular Solids: <ul style="list-style-type: none"> ☛ Basic concept ☛ Formula ➤ Calculation of Speed: <ul style="list-style-type: none"> ☛ Basic Concept ☛ Formula | <ul style="list-style-type: none"> ➤ Explanation of process of measurement of volume ➤ Explanation of concept of speed with examples from daily life | <ul style="list-style-type: none"> ➤ Graduated cylinder ➤ Graduated beaker in activities ➤ A regular object ➤ Objects of irregular shape ➤ Video on volume measuring devices |

Integration: Chemistry, Technology in daily life

Life Skills: Creative thinking, Problem-solving

Theme 2: 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:

- ☑ define motion;
- ☑ identify objects in motion and at rest;
- ☑ describe different types of motion, with examples from daily life;
- ☑ define uniform and non-uniform motion with examples from daily life;
- ☑ define weight;
- ☑ relate weight of an object with its mass.

| Force and Pressure: Motion | | |
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| Key Concepts | Suggested Transactional Processes | Suggested Learning resources |
| <ul style="list-style-type: none"> ➤ Motion as a change in position of an object with respect to time. ➤ Types of motion: <ul style="list-style-type: none"> ☛ Translatory ☛ Circulatory ☛ Oscillatory ☛ Repetitive (Periodic and Non Periodic) ☛ Random ➤ Uniform and Non Uniform Motion ➤ Weight: <ul style="list-style-type: none"> ☛ Concept ☛ Differences between Mass and Weight. | <ul style="list-style-type: none"> ➤ Demonstrating objects at rest and in motion. ➤ Explaining uniform and non-uniform motion by citing examples from daily life ➤ Explaining the concept of weight. ➤ Explaining the difference between mass and weight. | <ul style="list-style-type: none"> ➤ A ball. ➤ A stopwatch. ➤ A bob with hook. ➤ Thread. ➤ Laboratory stand. ➤ Video on motion and types of motion. ➤ Video on uniform and non-uniform motion. |

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

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

Theme 3: Energy

This theme aims at enabling children to know about energy and the different forms namely, kinetic energy, potential energy, heat energy, 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:

- ☑ define energy;
- ☑ express energy in proper units;
- ☑ discuss about different forms of energy;
- ☑ describe conversion of energy from one form to another in different situations;
- ☑ state the Law of Conservation of Energy, with examples.

| Energy | | |
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| Key Concepts | Suggested Transactional Processes | Suggested Learning resources |
| <ul style="list-style-type: none"> ➤ Energy: <ul style="list-style-type: none"> ☛ Energy as capacity to do work. ☛ Units of energy (joule and calorie). ☛ Different forms of energy. ☛ Inter-conversion of energy ➤ Law of Conservation of Energy: <ul style="list-style-type: none"> ☛ Real world examples. | <ul style="list-style-type: none"> ➤ Explanation of the term energy. ➤ Explanation of relation between work and energy. ➤ Discussion with children about the different forms of energy, with examples. ➤ Providing examples of different applications of conservation of energy (Roller coaster, Production of hydroelectricity etc.) and encouraging children to carefully make energy conversion diagrams and deduce that energy is conserved. | <ul style="list-style-type: none"> ➤ A simple pendulum. ➤ Charts showing different forms of energy. ➤ Video/s showing interconversion of different forms of energy. |

Integration: Chemistry, Biology, Technology in daily life.

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

Theme 4: Light Energy

Light travels in a straight line. Light from an object can move through space and reach the human eye that 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 fascinate everybody.

Learning outcomes:

Children will be able to:

- ☑ explain the phenomenon of reflection;
- ☑ define the terms plane, normal to the plane, point of incidence, angle of incidence and angle of reflection;
- ☑ state the laws of reflection;
- ☑ describe reflection of light from a plane mirror;
- ☑ define the terms virtual image, real image and lateral inversion;
- ☑ state the value of speed of light.

| Light Energy | | |
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| Key Concepts | Suggested Transactional Processes | Suggested Learning resources |
| <ul style="list-style-type: none"> ➤ Reflection: <ul style="list-style-type: none"> ☛ Definition and Examples. ☛ Terms related to reflection - Normal, plane, point of incidence, angle of incidence, angle of reflection. ➤ Laws of Reflection. ➤ Plane mirror: <ul style="list-style-type: none"> ☛ Virtual and real image ☛ Lateral inversion ☛ Uses. ➤ Speed of light (3×10^8 m/s). | <ul style="list-style-type: none"> ➤ Demonstrating reflection of light on a plane mirror. Explaining the point of incidence, normal, angle of incidence and angle of reflection. | <ul style="list-style-type: none"> ➤ A plane mirror. ➤ Reflecting surfaces. ➤ A laser pencil pointer. ➤ Pencil, scale, eraser, marker. ➤ White paper sheet. |

Integration: Art, Mathematics, Technology in daily life.

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

Theme 5: 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 for a better understanding of concepts related to temperature.

Learning outcomes:

Children will be able to:

- ☑ define heat as energy;
- ☑ define units of heat;
- ☑ describe temperature scales: degree Celsius, Fahrenheit and Kelvin;
- ☑ describe different effects of heat;
- ☑ explain different modes of heat transfer;
- ☑ decide about conductor and insulator of heat in different applications;

| Heat | | |
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| Key Concepts | Suggested Transactional Processes | Suggested Learning resources |
| <ul style="list-style-type: none"> ➤ Heat as a form of energy and its units, joule(J) and calorie (cal). ➤ Different units of Temperature (°C, °F, K). (No numerical to be done) ➤ Effects of Heat: <ul style="list-style-type: none"> ☛ Change in Temperature. ☛ Change in Size (Expansion and contraction). ☛ Change in State. ☛ Good Conductors and Bad Conductors of Heat and their examples. ☛ Choice of conductors and insulators in day to day life (Pan handles, metal cooking utensils etc.) ➤ Methods of Heat Transfer: <ul style="list-style-type: none"> ☛ Conduction ☛ Convection ☛ Radiation | <ul style="list-style-type: none"> ➤ Explanation of use of thermometer marked in (°C and °F). ➤ Explanation of different effects of heat. ➤ Children have to deduce where conduction, convection and radiation is taking place in some real-world applications. | <ul style="list-style-type: none"> ➤ Thermometer graduated in °C and °F. ➤ Water in beaker. ➤ A tripod with mesh screen. ➤ A burner for heating. ➤ A set up to show heat transfer by conduction. ➤ A round flask. ➤ Potassium Permanganate Crystals. ➤ Test tube. ➤ Test tube holder. |

Integration: Geography, Biology, Technology in daily life.

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

Theme 6: 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 space 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 medium 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:

- ✔ identify different sources of sound;
- ✔ describe sound as a longitudinal wave;
- ✔ define amplitude and frequency of sound;
- ✔ demonstrate that sound requires a medium to transmit;
- ✔ list examples of Reflection and Absorption of sound;
- ✔ analyse the Relative speed of Sound in different mediums.

| Sound | | |
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| Key Concepts | Suggested Transactional Processes | Suggested Learning resources |
| <ul style="list-style-type: none"> ➤ Sources of sound. ➤ Sound as a longitudinal wave. ➤ Characteristics of a sound wave: Amplitude (Relate amplitude with loudness) and Frequency. ➤ Sound needs a medium to propagate. ➤ Reflection and Absorption of sound. ➤ Relative speed of sound in different mediums. | <ul style="list-style-type: none"> ➤ Demonstration of production of sound using simple objects within the classroom followed by discussion ➤ Children place their hand on their throats and when they speak they feel vibration. ➤ Explanation of the characteristics of sound. ➤ Explanation of relative speed of sound in solid, liquid and gas. | <ul style="list-style-type: none"> ➤ Different sources of sound. ➤ A set up to show that sound need a medium to propagate. ➤ Materials for reflecting sound. ➤ Materials for absorbing sound. ➤ Videos on sound, sources, need of a medium, characteristic, reflection, absorption. |

Life Skills: Cooperation and working together, Problem solving, Critical thinking.

Integration: Music, Mathematics, Technology in daily life.

Theme 7: Electricity and Magnetism

The basic law of magnetism states that "Like poles of magnets repel one another and unlike poles attract". 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:

- state law of magnetism;
- describe test for a magnet;
- relate current to flow of charge;
- recognize electric cell as a source of electricity;
- define resistors as the component that opposes the flow of current;
- represent different components like cell, battery, key, bulb, connecting wire, resistor by standard symbols;
- recognize battery as series combination of cells;
- define conductors and insulators of electricity.

| Electricity and Magnetism | | |
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| Key Concepts | Suggested Transactional Processes | Suggested Learning resources |
| <ul style="list-style-type: none"> ➤ Laws of magnetism ➤ Test for a magnet (by repulsion) ➤ Electric current as a flow of charges ➤ Resistors as components that oppose the flow of current. ➤ Symbolic representation of electrical components (key, battery, bulb, conducting wire, resistor) ➤ Battery as a collection of cells connected in series. ➤ Good and Bad conductors of electricity | <ul style="list-style-type: none"> ➤ Revisiting previous concepts. ➤ Building on children's previous learning. ➤ Familiarizing children with symbols for electric components. ➤ Explaining the role of key in electric circuits. ➤ Explaining the precautions to be taken before an electric circuit is switched-on. | <ul style="list-style-type: none"> ➤ Two bar magnets ➤ Laboratory stand ➤ Thread and hook for magnet ➤ An iron nail ➤ A cell ➤ A coil of wires ➤ A compass ➤ Dry cell ➤ Key ➤ Connecting wires ➤ Three bulbs ➤ Banana clips |

Integration: Chemistry, Geography, Technology in daily life.

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