PHYSICAL SCIENCE

Formative Assessment - 3

Experiments / Lab activities / Activities and Projects

VIII, IX and X Classes

(2025 - 2026)

Visit: srini science mind

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8th Class

Lab Activities

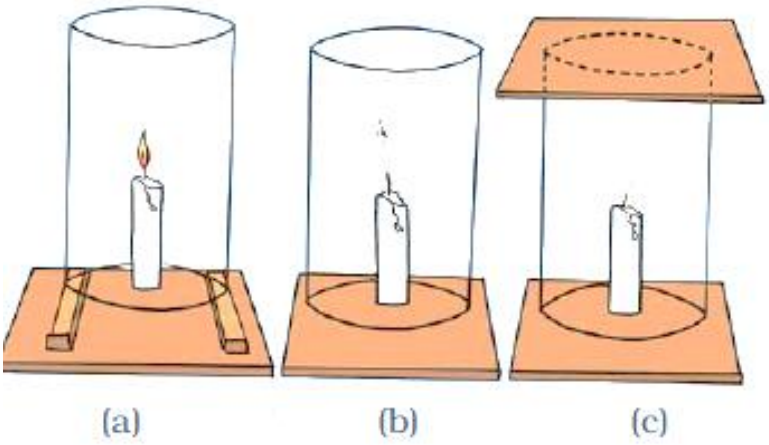
Lab Activity - 1

Aim: Investigate conditions under which combustion takes place.

Materials required: Candle, Glass chimney, Wooden blocks, Match box

Procedure:

1. Fix a lighted candle on a table.
2. Put a glass chimney over the candle.
3. Rest it on a few wooden blocks in such a way that air can enter the chimney.
4. Observe the flame.
5. Now remove the blocks and let the chimney rest on the table.
6. Again observe the flame.
7. Finally, put a glass plate over the chimney.



Conclusion: 1. We find that for combustion, air is necessary.

2. The candle burns freely in case (a) when air can enter the chimney from below.
3. In case (b) when air does not enter the chimney from below, the flame flickers and produces smoke.
4. In case (c) when air is not available, the flame finally goes off.

Lab Activity - 2

Aim: Medium is required for travel of sound.

Materials required: Glass tumbler, Cell phone.

Procedure:

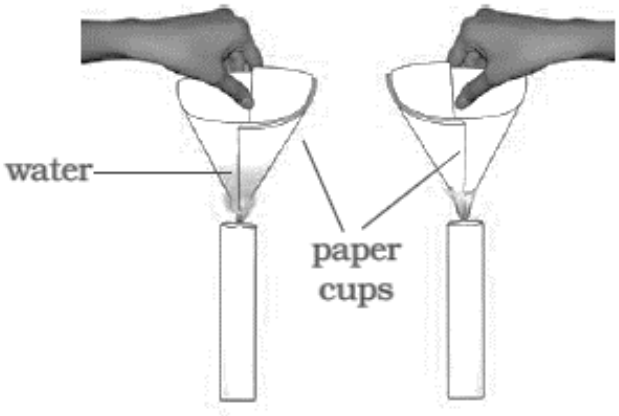
1. Take a metal or glass tumbler.
2. Make sure that it is dry.
3. Place a cell phone in it.
4. Ask your friend to give a ring on this cell phone from another cell phone.
5. Listen to the ring carefully.
6. Now, surround the rim of the tumbler with your hands.
7. Put your mouth on the opening between your hands.
8. Indicate to your friend to give a ring again.
9. Listen to the ring while sucking air from the tumbler.

Conclusion: 1. The sound become fainter as you suck air.
2. Remove the tumbler from your mouth, the sound become loud again.
3. Sound needs a medium to travel.

Lab Activity - 3

Aim: Shows that it is essential for a substance to reach ignition temperature to burn.
Materials required: Paper cups, Water, Candle, Matchbox.
Procedure:

1. Make two paper cups by folding a sheet of paper.
2. Pour about 50 ml of water in one of the cups.
3. Heat both the cups separately with a candle



Conclusion:

1. We continue heating the cup, even boil water in the paper cup.
2. The heat supplied to the paper cup is transferred to water by condition.
3. In the presence of water, the ignition temperature of paper is not reached, so it does not burn.
4. This shows that a substance must reach its **ignition temperature** for it to burn.
   Without reaching this temperature, even a burning flame cannot ignite the substance.

Lab Activity - 4

Aim: To show that sound can travel through liquids such as water.
Materials required: A bucket or bathtub, Clean water, A small bell
Procedure:

1. Take a bucket or bathtub and fill it with clean water.
2. Hold a small bell in one hand.
3. Dip the bell completely into the water without touching the sides or bottom of the bucket/tub.

4. Shake the bell inside the water to produce sound.
5. Gently place your ear close to the water surface without letting water enter your ear.
6. Listen carefully to check whether you hear the sound of the bell clearly through the water.
7. Observe how the sound reaches your ear even when the bell is inside the water.

Conclusion: Since the sound of the bell can be heard even when it is shaken inside the water, it shows that sound can travel through liquids. Water acts as a medium and carries sound vibrations to our ears.

Lab Activity - 5

Aim: To observe how the amplitude of vibration affects the loudness of sound.
Materials required: Metallic tumbler, Tablespoon, Small thermocol ball, Thread
Procedure:

1. Take a metallic tumbler and strike its brim gently with a tablespoon.
2. Listen to the sound produced.
3. Now strike the tumbler harder and observe the sound again.
4. Compare the loudness of the two sounds.
5. Next, suspend a small thermocol ball with a thread so that it just touches the rim of the tumbler.
6. Strike the tumbler gently and observe how much the thermocol ball is displaced.
7. Now strike the tumbler a little harder and observe the displacement of the ball again.
8. Compare the displacement of the ball in both cases.
9. Note that the displacement of the ball shows the amplitude of vibration of the tumbler.

Conclusion: The tumbler produces a louder sound when struck harder. The thermocol ball moves further away when the tumbler is struck harder, showing a larger amplitude of vibration. Thus, greater amplitude of vibration produces louder sound, while smaller amplitude produces softer sound.

Project – 1

Title of the Project: Understanding Fire Extinguishers and Their Working Principles.

Aim of the project: To study the concept, types, and working mechanisms of fire extinguishers, and to understand how they help in controlling and putting out different kinds of fires.

Hypothesis: If the supply of heat, fuel, or oxygen is cut off, then a fire can be controlled or extinguished effectively. A fire extinguisher works by removing one or more of these essential components.

Introduction: A fire extinguisher is a safety device designed to control or put out small fires in emergency situations. It is usually a handheld metal cylinder filled with chemicals that can cool the burning material, cover the fuel, or cut off oxygen supply.

Project: Types of Fire Extinguishers:

1. Water Fire Extinguishers: These work by cooling the burning material. They are suitable for wood, paper, or cloth fires (Class A fires).

2. Foam Fire Extinguishers: Foam covers the burning surface, preventing oxygen from reaching the fire. Used for petrol or oil fires (Class B fires).

3. Carbon Dioxide (CO_2) Fire Extinguishers: These release carbon dioxide gas, which removes oxygen from the area around the fire. They are mostly used for electrical and electronic fires. CO_2 does not damage equipment, which makes it ideal for offices and computer labs.

4. Dry Chemical Powder (DCP) Extinguishers: These extinguish fires by forming a protective layer on the burning substance. They are versatile and can be used for Class A, B, and C fires (wood, petrol, gases).

The principle behind fire extinguishers is directly linked with the fire triangle:

1. Removing heat (like water extinguishers)
2. Cutting off oxygen (like CO_2 extinguishers)
3. Interrupting chemical reaction (like dry powder extinguishers)

Fire extinguishers are used in homes, schools, laboratories, offices, shops, cars, and public buildings. They help in controlling fires at an early stage, preventing major accidents.

It is important that students and citizens know how to use a fire extinguisher. Most extinguishers follow the PASS method:

P – Pull the pin.
A – Aim the nozzle at the base of the fire.
S – Squeeze the handle.
S – Sweep the nozzle side to side.

Conclusion: Through this project, we understand that a fire extinguisher is a vital safety tool based on the scientific principle of breaking the fire triangle. By removing heat, blocking oxygen, or stopping the chemical reaction, extinguishers help control fires quickly.

PROJECT REPORT

Name of the project: Understanding Fire Extinguishers and Their Working Principles
Class : 8th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 8th class science book.

Project – 2

Title of the Project: Understanding Global Warming and Its Impact on Earth.

Aim of the project: To study the concept, causes, effects, and scientific background of global warming, and to understand how human activities contribute to rising temperatures on Earth.

Hypothesis: If the concentration of greenhouse gases in the atmosphere continues to increase, then the average temperature of the Earth will keep rising, leading to global warming and harmful environmental changes.

Introduction: Global warming is one of the most serious environmental issues faced by our planet today.

The Earth receives heat from the Sun, and some of it is reflected back into space. However, certain gases in the atmosphere—called greenhouse gases—trap part of the heat and keep the planet warm enough for life. This natural process is known as the greenhouse effect.

Project: The main greenhouse gases include: Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Water vapour, Ozone.

Human activities have increased the concentration of these gases, especially carbon dioxide. When we burn coal, petrol, diesel, or natural gas for vehicles, factories, and electricity, a large amount of CO_2 is released. Similarly, deforestation reduces the number of trees that absorb carbon dioxide. As a result, more heat remains trapped in the atmosphere, causing global temperatures to rise.

Global warming leads to many harmful effects. One major effect is climate change—changes in regular weather patterns. Many regions now experience hotter summers, irregular rainfall, more frequent droughts, and severe storms.

Global warming also affects plants, animals, and human health. Many species are unable to adapt to sudden temperature changes, leading to extinction. Coral reefs are dying because of ocean warming. Humans face problems like heat strokes, dehydration, and increase in diseases. Agriculture is also affected, as crops fail due to irregular rains and extreme temperatures.

To reduce global warming, we need to adopt eco-friendly practices. Planting more trees, using public transport, saving electricity, reducing waste, and shifting to renewable energy sources like solar and wind power can help decrease greenhouse gas emissions. Reducing the use of plastics and encouraging recycling also play an important role.

Conclusion: This project highlights that global warming is a major environmental threat caused mostly by human actions. The increasing concentration of greenhouse gases traps excess heat, raising Earth's temperature and causing climate changes, melting ice caps, rising sea levels, and loss of biodiversity.

PROJECT REPORT

Name of the project: Understanding Global Warming and Its Impact on Earth.
Class : 8th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 8th class science book.

Project – 3

Title of the Project: Harms of Noise Pollution and Measures to Reduce It.

Aim of the Project: To study what noise pollution is, understand its harmful effects on humans and the environment, and identify practical ways to control and reduce noise pollution in our daily lives.

Hypothesis: If noise levels in our surroundings increase beyond the permitted limits, they can cause harmful effects such as stress, hearing problems, lack of concentration, and environmental disturbance.

Introduction: In modern times, noise pollution has increased due to rapid urbanization, heavy traffic, industrial machines, bursting of crackers, loudspeakers, construction activities, and even loud music systems

Project: ***Harms of Noise Pollution:***

1. Hearing Loss: Continuous exposure to loud sounds can damage the eardrum and lead to temporary or permanent hearing impairment.
2. Lack of Concentration: Students find it difficult to study when there is loud noise nearby. It reduces learning ability and affects performance.
3. Stress and Irritation: Loud and unpleasant noise causes mental stress, fatigue, irritation, and sometimes aggressive behavior.
4. Sleep Disturbance: People living near busy roads, railway lines, or airports often face disturbed sleep, which affects their health.
5. Heart-Related Problems: Long-term exposure to high noise levels increases blood pressure and may contribute to heart diseases.
6. Impact on Animals: Animals get frightened or confused by loud noises. Birds may leave their natural habitats, and pets become anxious due to firecrackers or loudspeakers.

Measures to Limit Noise Pollution:

1. Use of Noise Barriers: Planting trees along roadsides and around buildings helps absorb sound.
2. Maintaining Vehicles: Proper servicing of vehicles reduces engine noise.
3. Soundproofing: Using sound-absorbing materials in homes, classrooms, and recording rooms reduces unwanted noise.
4. Strict Laws: Government rules should limit the use of loudspeakers, especially near schools, hospitals, and residential areas.
5. Avoiding Firecrackers: Celebrations can be made eco-friendly by reducing the use of loud crackers.
6. Awareness Programs: Educating people about the harmful effects of noise pollution encourages responsible behavior.

Conclusion: Noise pollution is a growing environmental problem that affects the physical and mental health of humans and animals. The harms—such as hearing loss, stress, lack of concentration, and disturbed sleep—show that noise is not just an unpleasant sound but a serious health hazard.

PROJECT REPORT

Name of the project: Harms of Noise Pollution and Measures to Reduce It.
Class : 8th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 8th class science book.

Project – 4

Title of the Project: Fuel Efficiency and Calorific Values: Understanding the Quality of Fuels

Aim of the project: To study the concept of fuel efficiency, understand calorific value, compare different fuels, and learn how calorific value helps identify the best fuel for practical use.

Hypothesis: If a fuel has a high calorific value and burns with less pollution, then it is more efficient and considered a better fuel for daily use.

Introduction: Fuels play a very important role in our life. We use fuels for cooking, transportation, heating, generating electricity, and many other activities.

Project: What is Calorific Value?

Calorific value is the amount of heat energy released when 1 kg of a fuel is completely burned.
It is expressed in kilojoules per kilogram (kJ/kg).
Fuels with higher calorific values release more energy and are considered better fuels.
Fuel Efficiency: How effectively a fuel burns and how much useful energy it produces without waste.
A fuel is efficient when:

1. It has a high calorific value, 2. It burns completely, 3. It produces less smoke,
4. It is easy to store and transport, 5. It does not harm the environment.

Fuel	Calorific Value (kJ/kg)	Clean Burning	Remarks
Wood	~17000–22000	No	Produces smoke, less efficient
Coal	~25000–30000	No	More pollution, moderate efficiency
Kerosene	~45000	Yes	Used in lamps/stoves
Petrol	~45000	Yes	Used in vehicles
Diesel	~45000	Yes	Used in engines
LPG	~55000	Yes	High efficiency, clean fuel
Biogas	~35000	Yes	Renewable and eco-friendly

Conclusion: Fuels with higher calorific values release more energy and are better for use. However, the best fuel is not only the one with the highest energy output but also the one that causes the least pollution.

PROJECT REPORT

Name of the project: Fuel Efficiency and Calorific Values: Understanding the Quality of Fuels
Class : 8th
Subject : Physical Science

Name of the School:
Time Duration :
Material used : Internet, Newspapers and 8th class science book.

Project – 5

Title of the Project: Understanding the Concept of an Ideal Fuel.

Aim of the Project: To study the characteristics of an ideal fuel and understand why certain fuels are preferred over others for domestic and industrial use.

Hypothesis: If a fuel has a high calorific value, burns efficiently, is easily available, produces less smoke, and is safe to handle, then it can be considered an ideal fuel.

Introduction: Fuels are substances that produce heat on burning. They are used for cooking, transportation, industrial production, electricity generation, and many daily activities.

Project: An ideal fuel is a fuel that satisfies most of the requirements for safe, efficient, and eco-friendly usage. Since no fuel is perfect, the term "ideal" is used to describe a fuel that comes closest to fulfilling the essential characteristics. A good understanding of an ideal fuel helps us choose the right fuel for various purposes.

A fuel is considered ideal if it has:

1. High calorific value – It should release a large amount of heat per unit mass.
2. Easy availability – It should be easily available in adequate quantity.
3. Low cost – It should not be expensive.
4. Eco-friendly burning – It should not produce harmful gases or smoke.
5. Easy transportation – It should be easy to store, handle, and transport.
6. Moderate ignition temperature – The fuel should ignite easily, but not so easily that it catches fire accidentally.
7. No residue – After burning, it should not leave ash or solid waste.

Examples: Commonly used fuels are wood, coal, kerosene, LPG, CNG, and biogas. Among these, LPG and CNG are considered better fuels because they burn efficiently, produce very little smoke, and have high calorific values. Wood and coal produce a lot of pollution; therefore, they are not ideal fuels even though they are widely used in rural areas.

In modern times, scientists and environmentalists promote the use of clean fuels like biogas, CNG, and hydrogen gas. Hydrogen has the highest calorific value, but because it is highly explosive and difficult to store, it cannot yet be used easily as a common household fuel.

Conclusion: it is clear that an ideal fuel should burn easily, produce large amounts of heat, be safe to use, and not harm the environment. No single fuel available today is completely ideal, but fuels like LPG, CNG, and biogas come close to meeting most of the requirements. Therefore, selecting a fuel depends on availability, convenience, cost, and environmental impact.

PROJECT REPORT

Name of the project : Understanding the Concept of an Ideal Fuel.
Class : 8th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 9th Science textbook

9th Class

Lab Activities

Lab Activity -1

Aim: To prove that law of conservation of mass in a chemical reaction.

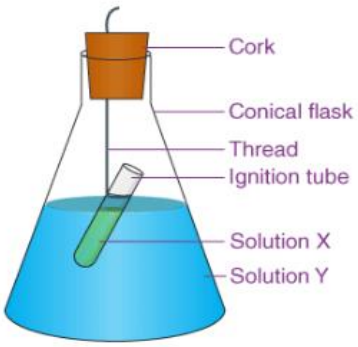
Materials required: Copper sulphate, Barium chloride, Lead nitrate, Sodium carbonate, Sodium sulphate, Sodium chloride, Water, Conical flask, Ignition tube.

Procedure:

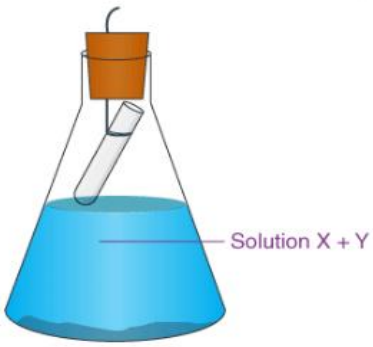
1. Take one of the following sets X and Y of chemicals.

	X	Y
i)	Copper sulphate 1.25g	Sodium carbonate 1.43g
ii)	Barium chloride 1.22g	Sodium sulphate 1.53g
iii)	Lead nitrate 2.07g	Sodium chloride 1.17g

2. Prepare separately 5% solution of any one pair of substances listed above X and Y each in 10 ml. in water.
3. Take a little amount of solution of Y in a conical flask and some solutions of X in an ignition tube.
4. Hang the ignition tube in the flask carefully, see that the solutions do not get mixed. Put a cork on the flask.
5. Weigh the flask with its contents carefully.
6. Now tilt and swirl the flask, so that the solutions X and Y get mixed.
7. Weigh again.
8. Cork is put on the mouth of the flask so that no material escapes out of splits out on swirling.
9. The mass of the flask and its contents are the same before the reaction and after the reaction.



Record the weight of reactants



Record the weight of product

Observations and Interpretation:

1. Some precipitate is formed in all the cases.
2. A chemical reaction takes place in all the cases.

Conclusion:

By comparing the initial and final masses of the reactants and products, you can demonstrate that the total mass is conserved during the chemical reaction. This is law of conservation of mass in chemical reaction.

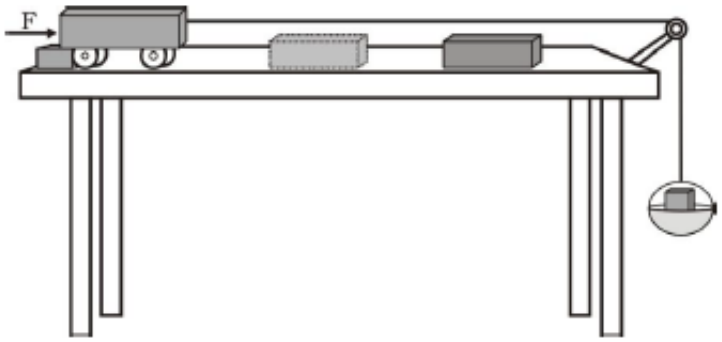
Lab Activity -2

Aim: How to prove that an object moving faster can do more work than an identical object moving relatively slow.

Materials required: Wooden block, Trolley, Pan, Table,

Procedure:

1. Set up the apparatus as shown in Fig.
2. Place a wooden block of known mass in front of the trolley at a convenient fixed distance.



3. Place a known mass on the pan so that the trolley starts moving. The trolley moves forward and hits the wooden block.
4. Fix a stop on the table in such a manner that the trolley stops after hitting the block. The block gets displaced.
5. Note down the displacement of the block. This means work is done on the block by the trolley as the block has gained energy.
6. The moving trolley does work and hence it possesses energy.
7. Repeat this activity by increasing the mass on the pan.
8. A moving object can do work.

Conclusion: An object moving faster can do more work than an identical object moving relatively slow.

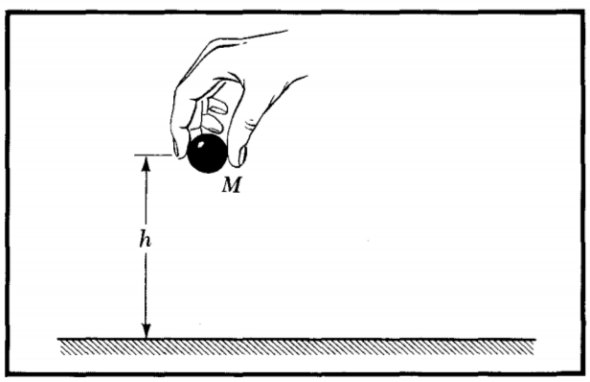
Lab Activity -3

Aim: To explore how potential energy varies with changes in mass and height.

Materials required: Stopwatch or timer, Measuring tape or ruler, Various objects with different masses (small balls, books, blocks), Platform or raised surface, Calculator

Procedure:

1. Set up a platform or raised surface at a convenient height (1meter) above the ground. Ensure the platform is stable and secure.
2. Measure the height (h) from the ground to the top of the platform using a measuring tape or ruler. Record this value.
3. Select one of the objects (a ball) to use in the experiment. Measure its mass using a scale and record the value.
4. Hold the object at the edge of the platform and release it. Use a stopwatch or timer to measure the time it takes for the object to fall from the platform to the ground. Record this time.
5. Repeat steps 3-4 for each object, ensuring you record the mass and fall time for each trial.
6. Calculate the gravitational potential energy for each trial using the formula: Potential Energy = mgh
7. Plot a graph with potential energy (PE) on the y-axis and mass (m) on the x-axis. Each point on the graph represents a different trial with a different object.
8. Analyze the relationship between potential energy and mass. Determine if there is a linear relationship or another pattern.
9. Repeat steps 3-8 for different heights of the platform (0.5 meters, 1.5 meters).
10. Compare the results for different heights and discuss how potential energy varies with changes in height.



Conclusion: The potential energy depends on both mass and height according to the results obtained.

Lab Activity - 4

Aim: To prove the law of conservation of energy, in the case of a freely falling object.

Materials required: An object of mass 20kg

Procedure:

An object of mass 20 kg is dropped from a height of 4 m. Take the value of g = 10 m s^{-2}

a) At h = 4 m
   Potential energy (E_p) = mgh = 20 x 10 x 4 = 800 J
   Kinetic energy (E_k) = ½ mv^2 = ½ x 20 x 0^2 = 0 J
b) At h = 3 m
   Potential energy (E_p) = mgh = 20 x 10 x 3 = 600 J
   Kinetic energy (E_k) = ½ mv^2 = ½ m(2gs) = ½ x 20 x (2x10x1) = 200 J
c) At h = 2 m
   Potential energy (E_p) = mgh = 20 x 10 x 2 = 400 J
   Kinetic energy (E_k) = ½ mv^2 = ½ x 20 x ^{2} = 400 J
d) At h = 1 m
   Potential energy (E_p) = mgh = 20 x 10 x 1 = 200 J
   Kinetic energy (E_k) = ½ mv^2 = mgs= 20 x 10 x 3 = 600 J
e) At h = 0 m
   Potential energy (E_p) = mgh = 20 x 10 x 0 = 0 J
   Kinetic energy (E_k) = ½ mv^2 = mgs= 20 x 10 x 4 = 800 J

Mass (kg)	Height (m)	E_p (J)	E_k (J)	Total Energy
20	4	800	0	800
20	3	600	200	800
20	2	400	400	800
20	1	200	600	800
20	0	0	800	800

f) From the above table, total mechanical energy is constant.

Conclusion: In the freely falling object, the total mechanical energy remains constant at each height.

Lab Activity - 5

Aim: To observe and record daily electricity consumption from the household electric meter at fixed times, compare day and night usage, and draw meaningful conclusions about energy consumption patterns.

Materials required: Household electric meter, Notebook and pen, Mobile phone/watch to note exact Time, Electricity bill of the current month (for comparison)

Procedure:

1. Visit the electric meter installed in your house and observe its features such as reading display, meter number, type of meter (digital/analog), and units recorded in kWh.
2. Record the meter reading every day at **6:30 am** and **6:30 pm** for one week (7 days).
3. Tabulate the readings in a table.
4. Calculate:
   Daytime consumption = Reading at 6:30 pm – Reading at 6:30 am
   Night consumption = Reading at next day 6:30 am – Reading at previous day 6:30 pm
5. At the end of the week, find:
   Total units consumed in daytime
   Total units consumed at night
6. Compare your total recorded consumption with the monthly electricity bill.

Day	Meter Reading at 6:30 am (units)	Meter Reading at 6:30 pm (units)	Day Consumption (units)	Night Consumption (units)
1	1127	1129	2	1
2	1130	1132	2	2
3	1134	1137	3	1
4	1138	1140	2	2
5	1142	1143	1	2
6	1145	1148	3	2

7	1150	1153	3	
Total	—	—	**16 Day units**	**10 Night units**

Conclusion: From the tabulated readings, it becomes easy to identify whether electricity consumption is higher during the day or night. By comparing with the monthly bill. This practical observation builds awareness about energy conservation and helps develop scientific data-recording skills.

Project – 1

Title of the Project: Are Various Energy Forms Interconvertible?
Aim of the Project: To study the different forms of energy and understand whether they can be converted from one form to another
Hypothesis: If energy exists in multiple forms, then it should be possible to convert one form of energy into another form during different activities and processes.

Introduction: Energy is the ability to do work. Everything we do—walking, studying, cooking, playing, or even breathing—depends on energy. Energy exists in many forms such as heat energy, electrical energy, light energy, sound energy, mechanical energy (potential and kinetic), chemical energy, and muscular energy.
Project: A very important concept in physics is that energy can neither be created nor destroyed; it can only be transformed from one form to another. This is known as the Law of Conservation of Energy.
Forms of Energy and Their Interconversion
1. Mechanical Energy (Potential and Kinetic Energy):
Ex: A stone placed at a height has potential energy. When it falls, potential energy converts into kinetic energy.
2. Electrical Energy to Other Forms:
Ex: Electric fan: Electrical → Mechanical energy
3. Chemical Energy to Other Forms:
Ex: Burning of fuel: Chemical → Heat + Light energy
4. Heat Energy to Other Forms
Ex: Steam can run a turbine to generate electrical energy.
Thus, Heat → Mechanical → Electrical energy.
5. Light Energy to Other Forms
Ex: Plants convert sunlight into chemical energy through photosynthesis.
Conclusion: From the study of different forms of energy, it is clear that energy is always changing from one form to another. Whether it is mechanical, electrical, heat, sound, light, or chemical energy, each form can be converted into another depending on the process.

PROJECT REPORT

Name of the project : Are Various Energy Forms Interconvertible?
Class : 9th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 9th Science textbook

Project – 2

Title of the Project: Understanding and Writing Formulae of Simple Compounds.
Aim of the Project: To study how chemical formulae of simple compounds are written using the symbols and valencies of elements, and to understand the importance of chemical formulae in representing compounds.

Hypothesis: If the valencies and symbols of elements are known, then the chemical formulae of different compounds can be written correctly and easily.

Introduction: A chemical formula shows the types of atoms present in a compound and the number of each type of atom.

Project: Every element has a unique chemical symbol, and each symbol carries a valency, which represents the combining capacity of that element.

For example:

Hydrogen (H) has valency 1 — Oxygen (O) has valency 2

Sodium (Na) has valency 1 — Chlorine (Cl) has valency 1

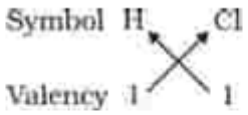
Magnesium (Mg) has valency 2 — Aluminium (Al) has valency 3

Rules for Writing Formulae of Compounds:

1. Write the symbols of the elements or radicals involved.
2. Write their valencies below the symbols.
3. Interchange the valencies (criss-cross method).
4. Reduce to simplest whole numbers, if possible.
5. Write the final formula without showing the valencies.

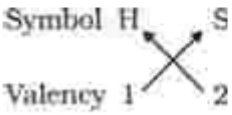
Examples of Simple Compounds and Their Formulae:

1. Formula of hydrogen chloride



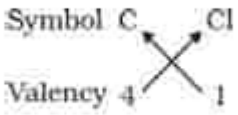
Formula of the compound would be HCl.

2. Formula of hydrogen sulphide



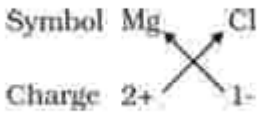
Formula : H_2S

3. Formula of carbon tetrachloride



Formula : CCl_4

4. Formula of magnesium chloride



Formula : $MgCl_2$

Conclusion: By knowing the valencies of elements and applying the criss-cross rule, easily write formulae of simple compounds. This understanding forms the foundation for writing chemical equations, studying reactions, and learning more complex concepts in higher classes.

PROJECT REPORT

Name of the project : Understanding and Writing Formulae of Simple Compounds.

Class : 9th class

Subject : Physical Science

Name of the School :

Time Duration :

Material Used : Internet, Newspapers and 9th Science textbook

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Project – 3

Title of the Project: Dalton's Atomic Theory – Foundation of Modern Chemistry.

Aim of the Project: To understand Dalton's Atomic Theory, its postulates, and its role in explaining the nature of matter and chemical reactions.

Hypothesis: If Dalton's postulates about atoms are scientifically studied, then the composition of matter and the laws of chemical combination can be clearly understood.

Introduction: In 1808, the English scientist John Dalton proposed the first scientific theory about the nature of matter known as Dalton's Atomic Theory. His theory explained the basic structure of matter and helped chemists understand how elements and compounds form.

Project: Dalton's theory also helped explain the laws of chemical combination, such as the Law of Conservation of Mass and the Law of Constant Proportion.

Main Postulates of Dalton's Atomic Theory:

1. All matter is made of very tiny particles called atoms, which participate in chemical reactions.
2. Atoms are indivisible particles, which cannot be created or destroyed in a chemical reaction.
3. Atoms of a given element are identical in mass and chemical properties.
4. Atoms of different elements have different masses and chemical properties.
5. Atoms combine in the ratio of small whole numbers to form compounds.
6. The relative number and kinds of atoms are constant in a given compound.

Significance of Dalton's Atomic Theory:

- A clearer distinction between elements and compounds.
- Development of modern chemical formulas.
- A scientific basis for understanding the periodic table.
- Advancement in studying atomic structure.

Limitations of Dalton's Theory:

1. Atoms are not indivisible; they contain subatomic particles.
2. Atoms of the same element are not always identical; isotopes exist.
3. Atoms of different elements can sometimes have the same mass number.

Conclusion: Dalton's Atomic Theory provided the first modern explanation of the composition and behaviour of matter. It helped scientists understand how substances form, combine, and react.

PROJECT REPORT

Name of the project : Dalton's Atomic Theory – Foundation of Modern Chemistry.
Class : 9th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 9th Science textbook

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Project – 4

Title of the Project: Understanding Kinetic and Potential Energies and Their Real-Life Examples**.**

Aim of the Project: To understand the concepts of kinetic and potential energies, identify real-life situations where these energies are present, and explain how they transform from one form to another.

Hypothesis: If an object is in motion, it possesses kinetic energy; if an object is at a certain height or has a specific position, it possesses potential energy. These energies can convert into each other during various physical activities.

Introduction: Energy is an essential concept in physics and daily life. Energy is defined as the capacity to do work**.**

Project:

Kinetic Energy: Kinetic energy is the energy possessed by an object due to its motion. The amount of kinetic energy depends on the **mass** of the object and the **square of its velocity**, given by the formula:

$$K.E. = \frac{1}{2} mv^2$$

This shows that if an object doubles its speed, its kinetic energy becomes four times greater.

Examples of Kinetic Energy:

1. A moving car on the road
2. A rolling basketball
3. A flowing river running a hydroelectric plant
4. A child swinging on a swing
5. Wind turning the blades of a windmill
6. A flying kite or airplane

Potential Energy: The energy possessed by a body due to its change in position or shape is called the potential energy. The gravitational potential energy of an object of mass, m raised through a height, h from the earth's surface. The formula of gravitational potential energy P.E = mgh

Objects also store **elastic potential energy** when stretched or compressed, such as springs, bows, or rubber bands.

Examples of Potential Energy:

1. Water stored behind a dam at a height
2. A book kept on a shelf
3. A stretched bow or slingshot
4. A child at the top of a slide
5. A compressed spring in a toy car
6. A rock placed on a hilltop

Conclusion: Kinetic and potential energies are the two most important forms of mechanical energy. Kinetic energy is related to the motion of objects, while potential energy is related to their position or shape.

PROJECT REPORT

Name of the project : Understanding Kinetic and Potential Energies and Their Real-Life Examples**.**
Class : 9th class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 9th Science textbook

Project – 5

Title of the Project: Understanding Atomic Symbols and Their Significance.

Aim of the Project: To study the symbols of atoms of different elements as introduced by modern chemistry and to understand why atomic symbols are essential for writing chemical formulae, equations, and expressing quantitative relationships

Hypothesis: If students identify and learn the standard symbols of elements, then understanding chemical formulae, equations, reactions, and quantitative relationships in chemistry becomes easier and more meaningful.

Introduction: The concept of atoms and their symbols forms the foundation of modern chemistry. According to **Dalton's Atomic Theory**, matter is made up of tiny, indivisible particles called atoms.

Project:

A) Common Elements and Their Symbols:

Students listed elements frequently discussed in Class 9:

Hydrogen – H
Oxygen – O
Carbon – C
Nitrogen – N
Chlorine – Cl
Sodium – Na (Latin name: Natrium)
Potassium – K (Latin name: Kalium)
Iron – Fe (Latin name: Ferrum)
Copper – Cu (Latin name: Cuprum)
Silver – Ag (Latin name: Argentum)
Gold – Au (Latin name: Aurum)
Calcium – Ca
Magnesium – Mg
Sulphur – S
Phosphorus – P

Students observed that **symbols are not randomly chosen**; they follow specific rules:

The **first letter** is always capital.
The **second letter**, if used, is always small.
Example: Fe, Na, Cl.
No two elements can have the same symbol.

The class also discussed how **atomic symbols make chemical representation universal**, so a scientist from India or Japan will write hydrogen as "H" and iron as "Fe" in the same way.

B. Importance of Atomic Symbols:
1. Universal Chemical Language
2. Simplifies Writing Chemical Reactions
3. Helps in Forming Chemical Formulae
4. Used in Chemical Calculations
5. Represents Atoms in Molecules
6. Essential for Scientific Communication

Conclusion: Through this classroom-based project, learned that **atomic symbols are essential tools in chemistry**, helping in easy representation, communication, and understanding of chemical reactions and formulas.

PROJECT REPORT

Name of the project : Understanding Atomic Symbols and Their Significance.
Class : 9^{th} class
Subject : Physical Science
Name of the School :
Time Duration :
Material Used : Internet, Newspapers and 9^{th} Science textbook

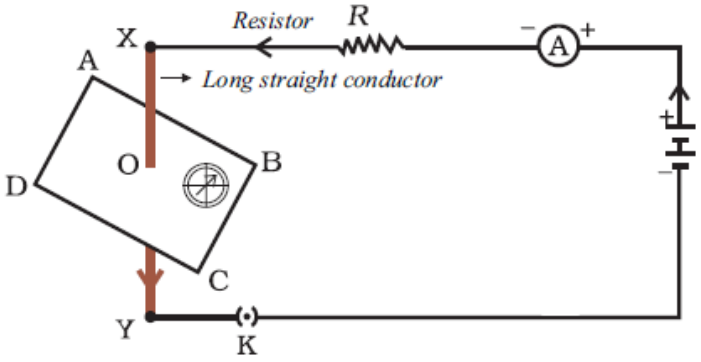
10th Class

Lab Activities

Lab Activity - 1

Aim: To show that compass needle is deflected on passing an electric current through a metallic conductor.

Materials required: Thick copper wire, Magnetic compass, Card board, Resistor, Ammeter, Key.



Procedure: 1. Take a straight thick copper wire and place it between the points X and Y in electric circuit as shown in the figure.
2. The wire XY is kept perpendicular to the plane of paper.
3. Horizontally place a small compass near to this copper wire.
4. See the position of its needle.
5. Pass the current through the circuit by inserting the key into the plug.

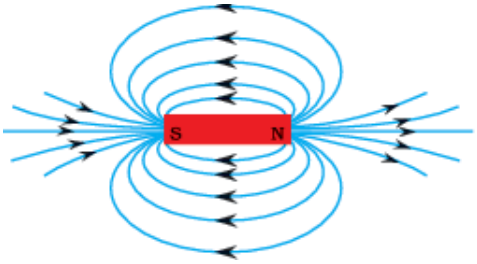
Observations: 1. We observe that the needle is deflected.
2. The electric current through the copper wire has produced a magnetic field around it.

Lab Activity – 2

Aim: To draw the magnetic field lines around a bar magnet.

Materials required: Small compass, Bar magnet, White sheet, Drawing board.

Procedure:

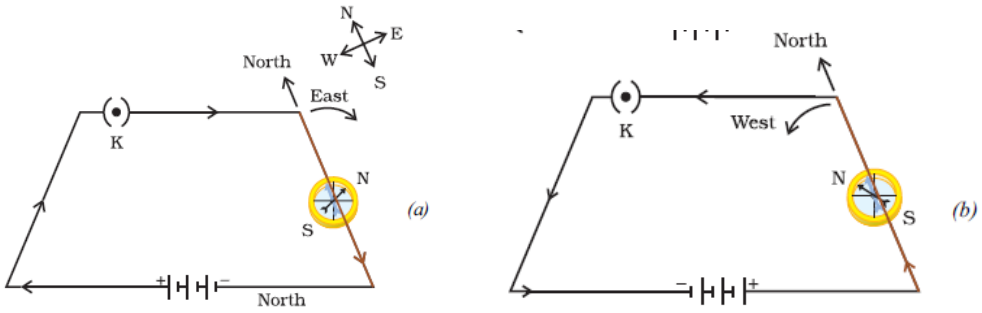


1) Take a small compass and a bar magnet.
2) Place the magnet on a sheet of white paper fixed on a drawing board, using some adhesive material.
3) Mark the boundary of the magnet. Place the compass near the north pole of the magnet.
4) The south pole of the needle points towards the north pole of the magnet.
5) The north pole of the compass is directed away from the north pole of the magnet.
6) Mark the position of two ends of the needle.
7) Now move the needle to a new position such that its south pole occupies the position previously occupied by its north pole.
8) In this way, proceed step by step till you reach the south pole of the magnet as shown in Figure.
9) Join the points marked on the paper by a smooth curve. This curve represents a field line.
10) Repeat the above procedure and draw as many lines and will get a pattern shown in Figure.
11) These lines represent the magnetic field around the magnet. These are known as magnetic field lines.

Observation: The magnetic field lines around a bar magnet.

Lab Activity - 3

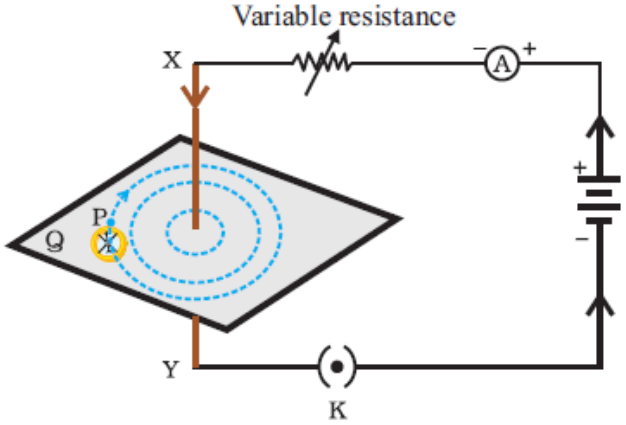
Aim: To show the direction of magnetic lines produced by a current-carrying conductor.
Materials required: Long straight copper wire, Battery, Plug key, Magnetic compass.



Procedure: 1. Take a long straight copper wire, two or three cells of 1.5 V each, and a plug key.
2. Connect all of them in series as shown in (a).
3. Place the straight wire parallel to and over a compass needle.
4. Plug the key in the circuit.
5. Observe the direction of deflection of the north pole of the needle. If the current flows from north to south, as shown in Fig. (a), the north pole of the compass needle would move towards the east.
6. Replace the cell connections in the circuit as shown in Fig. (b). This would result in the change of the direction of current through the copper wire, that is, from south to north.
7. Observe the direction of deflection of the south pole of the needle. If the current flows from south to north, as shown in Fig. (b), the south pole of the compass needle would move towards the west.

Lab Activity - 4

Aim: To study the magnetic field lines around a straight current carrying straight conductor.
Materials required: Battery, Variable resistance, Ammeter, Plug key, Thick copper wire, Cardboard, Iron filings.



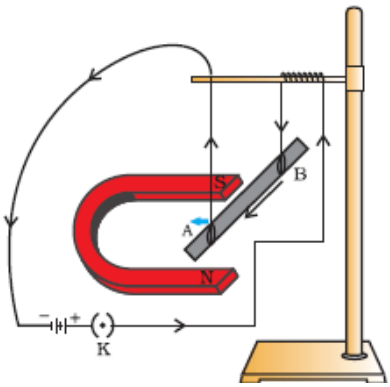
Procedure: 1. As shown in the figure, connecting the circuit.
2. Insert the thick wire through the centre, normal to the plane of a rectangular cardboard. Take care that the cardboard is fixed and does not slide up or down.
3. Connect the copper wire vertically between the points X and Y, as shown in Fig. (a), in series with battery, a plug and key.
4. Sprinkle some iron filings uniformly on the cardboard.
5. Keep the rheostat at a fixed position and note the current through the ammeter. Close the key so that a current flows through the wire. Ensure that the copper wire placed between the points X and Y remains vertically straight.
6. Gently tap the cardboard a few times.
7. We Observe that the iron filings align themselves showing a pattern of concentric circles around the copper wire.
8. Place a compass at a point (say P) over a circle. The direction of the north pole of the compass needle

would give the direction of the field lines produced by the electric current through the straight wire at point P.

Lab Activity - 5

Aim: To show that the force experienced by a current-carrying conductor placed in a magnetic field.

Materials required: Small aluminium rod, Strong horse-shoe magnet, Battery, Plug key, Vertical stand, Connecting wires.



Procedure: 1. Take a small aluminium rod AB (of about 5 cm). Using two connecting wires suspend it horizontally from a stand, as shown in Fig.

2. Place a strong horse-shoe magnet in such a way that the rod lies between the two poles with the magnetic field directed upwards. For this put the north pole of the magnet vertically below and south pole vertically above the aluminium rod.
3. Connect the aluminium rod in series with a battery, a key and a rheostat.
4. Now pass a current through the aluminium rod from end B to end A.
5. We observed that the rod is displaced towards the left and rod gets displaced.
6. Reverse the direction of current flowing through the rod and observe the direction of its displacement. It is now towards the right.

Observations: The aluminium rod gets displaced because a force is exerted on the current-carrying rod when it is placed in a magnetic field.

Class room based Projects

Project – 1

Title of the Project: Understanding Overloading of Circuits and Its Effects

Aim of the Project: To study what electrical overload is, understand its causes and effects, and learn how overloading of household circuits can be prevented

Hypothesis: If too many electrical appliances are connected to a single circuit or if the current drawn is more than the circuit's safe limit, then the circuit will become overloaded, leading to overheating and potential hazards such as fire, short circuit, or damage to appliances.

Introduction: Electricity plays an essential role in our daily lives. We use it for lighting, cooking, heating, cooling, communication, and running almost every appliance at home.

Project: When the total current flowing through it exceeds this safe limit, the circuit becomes overloaded. Overloading can cause serious hazards such as short circuits, fire outbreaks, damage to electrical devices, and failure of wiring systems.

***Causes Overloading*:**

1. Connecting too many devices in a single socket
2. Using high-power appliances together
3. Faulty wiring
4. Using extensions or multi-plugs
5. Short Circuit

Effects of Overloading:

1. Electrical Fires: Excessive current causes wires to heat up, melt insulation, and start fires.
2. Damage to Appliances: Motors and components can burn due to overheating.

3. Power Failures: Overloading in one house can affect the entire area's power supply.
4. Electric Shocks: Damaged wires may expose live conductors.
5. Short Circuits: Overheated wires can cause accidental touching of live and neutral wires.

Preventive Measures Against Overload:

- Avoid plugging many appliances into a single socket.
- Use separate circuits for heavy appliances.
- Ensure household wiring is done by a trained electrician.
- Regularly check wiring for wear and tear.
- Use appliances within their rated capacity.
- Install MCBs and proper fuse ratings.
- Avoid loose connections, which increase resistance and heat.

Conclusion: overloading is a serious electrical hazard, caused when the current flowing through a circuit exceeds its safe limit. It results from connecting too many devices, using faulty wiring, or operating high-power appliances together.

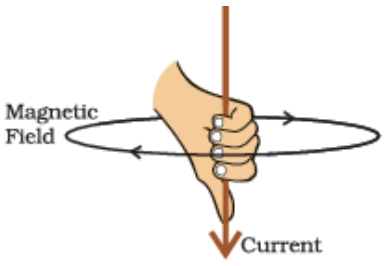
PROJECT REPORT

Name of the project: Understanding Overloading of Circuits and Its Effects
Class : 10th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 10^{th} class physical science book.

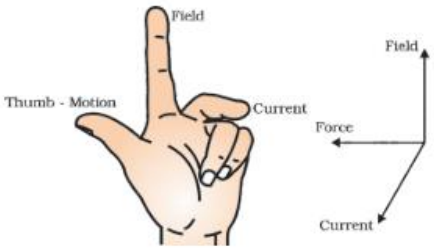
Project – 2

Title of the Project: Understanding the Rules Related to the Magnetic Effects of Electric Current.
Aim of the Project: To study and understand the rules used to determine the direction of magnetic fields and forces in current-carrying conductors.
Hypothesis: If the direction of electric current in a conductor is known, then the direction of the magnetic field and force can be predicted using established rules such as the Right-Hand Thumb Rule, Fleming's Left-Hand Rule, and Maxwell's Corkscrew Rule.
Introduction: When electric current passes through a conductor, it produces a magnetic field around it. Scientists have developed certain rules that help us determine the direction of this magnetic field, the direction of the force on a current-carrying conductor, and the motion produced in electrical devices like motors.

Project:



Right – Hand Thumb Rule



Fleming's Left – Hand Rule

1. Right-Hand Thumb Rule: Also known as Ampere's Right-Hand Thumb Rule, this rule helps determine the direction of the magnetic field produced by a current-carrying straight conductor.
Rule: If you are holding a current carrying straight conductor in your right hand such that the thumb points towards the direction of current. Then your fingers will wrap around the conductor in the direction of the field lines of the magnetic field.
Classroom Understanding: Students observe that when current flows upward, the magnetic field circulates anticlockwise; when the direction of current is downward, the field becomes clockwise.
2. Fleming's Left-Hand Rule: This rule helps determine the direction of force on a current-carrying conductor placed in a magnetic field, an important concept in understanding electric motors.

Rule: Stretch the thumb, forefinger, and middle finger of your left hand so that they are perpendicular to each other. If the forefinger shows the direction of magnetic field, and the middle finger shows the direction of current, then the thumb gives the direction of the force (motion) on the conductor.
Classroom Application: Students apply this rule to understand motor movement and observe how changing the direction of current changes the direction of rotation.
Conclusion: The Right-Hand Thumb Rule, Fleming's Left-Hand Rule, and Maxwell's Corkscrew Rule are essential tools in the study of electromagnetism.

PROJECT REPORT

Name of the project: Understanding the Rules Related to the Magnetic Effects of Electric Current.
Class : 10th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 10thclass physical science book.

Project – 3

Title of the Project: Hans Christian Oersted – Establishing the Relationship Between Electricity and Magnetism
Aim of the Project: To understand how Hans Christian Oersted discovered the fundamental relationship between **electric current and magnetic fields**, and to explain how this discovery laid the foundation for modern electromagnetism and technological advancements.
Hypothesis: If an electric current flows through a conductor, then it should produce a magnetic field around it; hence electricity and magnetism are interrelated phenomena.
Introduction: Hans Christian Oersted, a Danish physicist and chemist, made one of the most important discoveries in the history of science. In the year 1820, he found that electricity and magnetism are not two separate forces**,** as previously believed, but are deeply connected. His discovery came during a classroom demonstration where he observed that a magnetic compass needle deflected whenever an electric current was passed through a nearby conducting wire.
Project: Before Oersted, scientists understood electricity and magnetism as independent fields of study. Magnetism was associated with natural magnets (lodestones) and compasses, while electricity was considered a different phenomenon involving charges. Oersted's accidental observation revolutionized scientific thinking by proving that an electric current creates a magnetic field around it. This phenomenon is now known as Oersted's Experiment**.**

This discovery laid the foundation for the development of electromagnetism, one of the major branches of physics. Oersted's work directly inspired scientists like André-Marie Ampère, who formulated mathematical laws of electromagnetism. It also paved the way for inventions such as electromagnets**,** electric motors, transformers, loudspeakers, generators, magnetic compasses, and communication systems**.**

Oersted demonstrated that the magnetic field produced by a current-carrying conductor forms concentric circles around the wire. He also showed that reversing the direction of the current reverses the direction of the magnetic field. His experiment proved that energy produced by electric current can influence magnetic materials, which became the cornerstone for modern electrical engineering and physics.

Today, almost every device that uses electricity depends on Oersted's discovery. From household appliances to industrial machines, from mobile phones to MRI scanners, the concept of electromagnetism governs their working. Understanding Oersted's contribution helps students appreciate the scientific principles behind these technologies and motivates them to explore physics with curiosity.

Conclusion: Hans Christian Oersted's discovery established the fundamental link between electricity and magnetism**,** forming the basis of modern electromagnetic theory. His experiment proved that an electric current generates a magnetic field, which transformed scientific understanding and led to revolutionary technological inventions.

PROJECT REPORT

Name of the project: Hans Christian Oersted – Establishing the Relationship Between Electricity and Magnetism
Class : 10th

Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 10th class physical science book.

Project – 4

Title of the Project: Magnetism in Medicine – Diagnostic and Therapeutic Applications of Magnetic Fields

Aim of the Project: To explore how magnetic fields are used in medical science for diagnosing and treating diseases, and to understand their importance in modern healthcare.

Hypothesis: If magnetic fields can safely penetrate the human body and interact with atoms, then they can be used to produce internal images and aid in medical treatment.

Introduction: Magnetism plays a vital role in the field of modern medicine. With the advancement of science, magnetic fields are now used to look inside the human body without surgery and to diagnose various medical conditions.

Project: The most widely used magnetic technology in hospitals is the **Magnetic Resonance Imaging (MRI)** scanner. MRI works by using a powerful magnetic field to align the water molecules inside the body. When these molecules return to their original positions, they release signals that are transformed into highly detailed images. MRI helps doctors to clearly see the **brain, spinal cord, heart, joints, and internal organs** without using harmful radiation.

Another important application is **Magnetoencephalography (MEG)**, where magnetic fields from brain activity are measured to detect disorders like epilepsy or to study brain functions. Magnetic fields are also used in **Magnetic Resonance Angiography (MRA)** to observe blood vessels and identify blockages.

In the field of treatment, **Transcranial Magnetic Stimulation (TMS)** uses magnetic pulses to stimulate brain cells. It is used to treat depression, anxiety, and some neurological conditions. Additionally, **magnetotherapy** uses low-intensity magnets to help reduce pain, swelling, and muscle stiffness, although its effectiveness is still being researched.

Scientists are also developing **magnetic nanoparticles** for advanced treatments like targeted drug delivery and cancer therapy. These particles can be directed to specific areas of the body using magnetic fields, making treatment safer and more effective.

Thus, magnetism has become an essential tool in modern medical technology, offering non-invasive, safe, and accurate methods for diagnosing and treating patients.

Conclusion: Magnetism in medicine has revolutionized healthcare by providing powerful tools such as MRI, MEG, MRA, TMS, and magnetotherapy. These technologies help doctors diagnose diseases more accurately and treat patients without surgery or harmful radiation. Magnetic techniques are safe, reliable, and continue to improve with scientific research. The use of magnetism clearly shows how physics contributes to better medical care and enhances human health.

PROJECT REPORT

Name of the project: Magnetism in Medicine – Diagnostic and Therapeutic Applications of Magnetic Fields
Class : 10th
Subject : Physical Science
Name of the School:
Time Duration :
Material used : Internet, Newspapers and 10th class physical science book.

PHYSICAL SCIENCE

Formative Assessment - 3

Experiments / Lab activities / Activities and Projects

VIII, IX and X Classes

(2025 - 2026)

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