List Of Selected Student Learning Outcomes (SLOs)	
General Science –VI	
Sr. No	**Student Learning Outcomes**
Unit 1: Cellular Organization	
1	• Arrange and rank different levels of cellular organization- cells to tissues, organs and organisms. • Relate the structures of some common cells (nerve, muscle, epithelium and blood cells) to their functions. • Describe the similarities and differences between the structures of plant and animal cells. Sketch the animal and plant cells and label key organelles in each.
Unit 2: Reproduction in Plants	
2	• Compare and contrast types of reproduction (sexual and asexual) in plants. • Distinguish between artificial and natural asexual reproduction in plants (Budding, Grafting, Bulbs, Tuber, Runners, Cutting and Layering).
Unit 3: Balanced Diet	
3	• Identify the essentials nutrients, their chemical composition and food sources.
Unit 4: Human Digestive System	
4	• Briefly describe the role of enzymes in digestion • Conclude that blood transports the product of digestion to other parts of the body and the undigested products get egested/ defecated.
Unit 5: Matter as Particles	
5	• Apply the particle theory of matter to explain diffusion. • Explain the changes in states: Melting, freezing, evaporation, condensation and sublimation using the particle model of matter.

Unit 6 : Elements and Compounds	
6	• Recognize the names and symbols of some common elements (first 10 elements of Periodic Table) and recognize their physical properties. • Differentiate that some elements are made of atoms and some elements exist as molecules and have different properties to a single atom of the element. • Illustrate the formation of a compound with the help of a word equation
Unit 7 : Mixtures	
7	• Differentiate between pure substances and mixtures on the basis of their formation and composition. • Describe alloys as mixture of metals and some other elements. • Demonstrate ways of separating different mixtures. • Describe the difference between elements, compounds and mixtures.
Unit 8 : Energy	
8	• Relate potential energy and kinetic energy. • Demonstrate an energy transfer such as a bouncing ball by energy transfer diagram e.g., potential energy (gravitational potential energy, elastic potential energy), kinetic energy (motion, thermal, light, sound, electricity, etc.). • State the law of Conservation of Energy and explain how the law applies to different situations • Assemble and demonstrate a solar panel to operate a small fan. (STEAM) • Design and make a solar water heater. (STEAM)
Unit 9 : Electricity	
9	• Recognize electric current as a flow of charges. • Identify the use of series and parallel electric circuits in daily life
Unit 10 : Magnetism	

10	• **Recognize Earth's magnetic field which attracts a freely pivoted magnet to line up with it.** • **Construct an electromagnet and identify its application in daily life.**
	Unit 11: Technology in Every Day Life
11	• Assemble a circuit to demonstrate the working of an electric bell.
	Unit 12: Solar System
12	• Differentiate between the characteristics of different planets. • Investigate how artificial satellites have improved our knowledge about space and are used for space research. • Describe the uses of various satellites in space i.e., geostationary, weather, communication and Global Positioning System (GPS).

TEACHER GUIDE GENERAL SCIENCE 6

CONTENT LIST

10		**Explain the changes in states: Melting, freezing, evaporation, condensation and sublimation using the particle model of matter.**	**61**
11	**Elements and Compounds**	Recognize the names and symbols of some common elements (first 10 elements of Periodic Table) and recognize their physical properties.	66
12		Differentiate that some elements are made of atoms and some elements exist as molecules and have different properties to a single atom of the element.	71
13		Illustrate the formation of a compound with the help of a word equation	77
14	**Mixtures**	Differentiate between pure substances and mixtures on the basis of their formation and composition.	83
15		Describe alloys as mixture of metals and some other elements.	88
16		Demonstrate ways of separating different mixtures.	94
17		Describe the difference between elements, compounds and mixtures.	100
18	**Energy**	Relate potential energy and kinetic energy.	105
19		Demonstrate an energy transfer such as a bouncing ball by energy transfer diagram e.g., potential energy (gravitational potential energy, elastic potential energy), kinetic energy (motion, thermal, light, sound, electricity, etc.).	110
20		State the law of Conservation of Energy and explain how the law applies to different situations	115
21		Assemble and demonstrate a solar panel to operate a small fan. (STEAM)	121

Grade 6 **Lesson Plan 1**

Cellular Organization


Duration: 40 Minutes

Student Learning Outcome:

- Arrange and rank different levels of cellular organization- cells to tissues, organs and organisms

Materials:

- writing board and board markers / cha
- pictures of cells, tissues and associated organs,
- chart of animal and plant cellular organization
- multimedia presentation tools (optional)

Information for Teacher

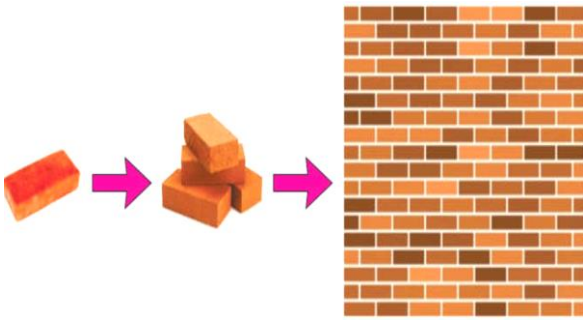
- Cells are the fundamental building blocks of life and are responsible for the structure and function of all living organisms i.e. plants, animals and microorganisms.
- Cell membrane, cytoplasm and nucleus is the basic part of cell.
- Cells work together to form tissues, which are groups of similar cells that perform specialized functions e.g. xylem and phloem tissues in plants, blood tissues and muscle tissues in animals
- Tissues further organize into organs, which are composed of different types of tissues working together to carry out specific tasks. e.g. root and shoot in plants, heart and stomach in animals
- Organs then come together to form organ systems, which are groups of organs that work in coordination to support the overall functioning of an organism e.g. root and shoot system in plants, digestive and excretory system in human.

- Different organ systems performing different functions combine together to constitute an organism. e.g. plants, animals and microorganisms
- To explore the related activities and concepts, visit the following website:
  https://www.cellsalive.com/

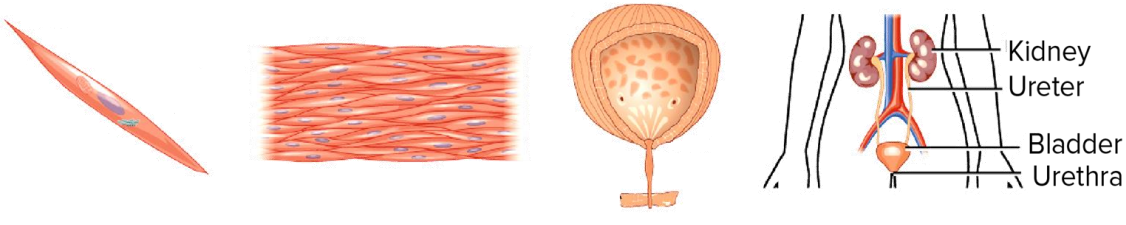
Introduction 05 minutes

- Make the following mind map on the whiteboard and take students' responses to check their previous knowledge about cell.

- Write down students' responses (Unit of life, electric cell, etc.). Give them feedback
- Ask them "What is a wall made of ?" (Brick, Cement, Clay, etc.). Give them feedback



- Now ask them "What is your body made up of?" (cells)



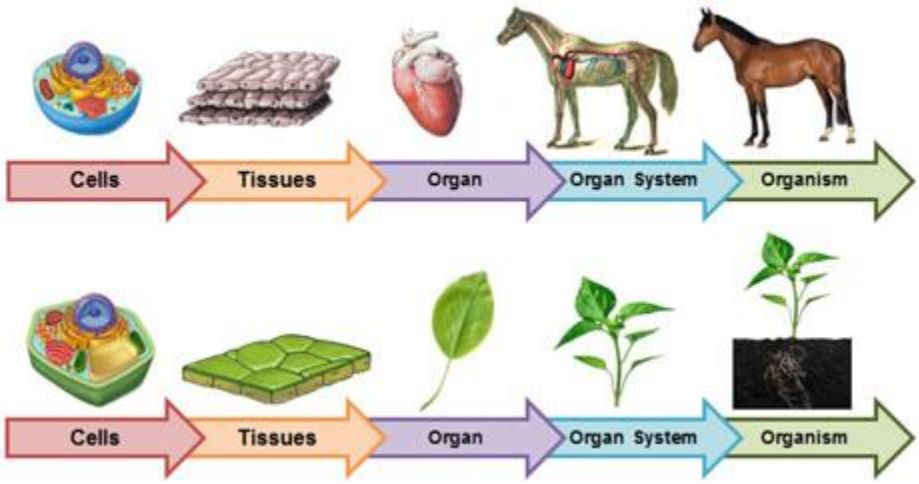
Muscle cell | Muscle tissue | Organ (bladder) | Organ system

- Facilitate a class discussion by asking questions like "What is the function of cells in the body?" (they organize themselves to perform different functions of the body)
- “What do cells make?” (tissues, organ and organ systems)
- Recap the concepts of **Cell →Tissues→ Organs**, and relate to the examples of **Brick → Wall → Building**.
- Encourage discussion and give feedback.

Development

Activity 1 — 09 minutes

- Use the following chart to explain of each level of cellular organization:



- Cell: The cell is the basic unit of life. It is the smallest unit of life that can function independently. Cells are made up of a variety of organelles, which are specialized structures that perform specific functions.
- Tissue: A tissue is a group of similar cells that work together to perform a specific function. e.g. xylem and phloem tissues in plants, muscle tissue, and nervous tissue in animals.
-

- Organ: An organ is a structure made up of tissues that work together to perform a specific function. Examples of organs include the heart, lungs, stomach, and brain.
- Organ system: An organ system is a group of organs that work together to perform a specific function. Examples of organ systems include respiratory system, digestive system, and nervous system.
- Organism: An organism is a living thing made up of organ systems. All living things are made up of cells, tissues, organs, and organ systems.
- The hierarchical organization of cells allows for specialization of function, which is essential for complex organisms. For example, the cells in the heart are specialized for pumping blood, while the cells in the brain are specialized for processing information. This specialization of function allows organisms to perform complex tasks, such as walking, talking, and thinking.
- Invite different students to explain the cellular organization chart.
- To facilitate learning, show students 3D animations of cells. The animation should explain the different types of cells and the functions of cells.
    - **https://www.cellsalive.com/**

Activity 2 **08 minutes**

- Tell the students that they will prepare a collage of a cellular organization.
- Provide students with pictures of cells, tissues, and organs (pictures from textbook, page 10, figure 1.10 can also be used) and a chart paper.
- Ask the students to arrange the given set of pictures in a sequential order that represents the organization of cells to organ systems.
- Have each group present their collage to the class, explaining the sequence and describing the organization of cells, tissues, organs, and organ systems.
- Move around the classroom to assist and monitor students' progress.
- Once completed, ask students to exchange their worksheets with a partner and peer-to assess their work.

Activity 3 — 07 minutes

- Play Board Race with the students
- Divide the class in two teams and give each team a colored marker. If you have a very large class, it may be better to divide the students in teams of 3 or 4.
- Draw a line down the middle of the board.
- Give students a fixed time in which students must write as many words as you require related to the topic in the form of a relay race (one student from each team will go to the board and write the information in the respective column).
- Each team wins one point for each correct word. Any words that are unreadable or misspelled are not counted.
- Make sure the area where the students will be playing is free from any obstacles, loose objects, or tripping hazards.
- Set clear boundaries for the playing area to prevent students from running into restricted or dangerous areas.
- Remind students the rules of the game from the previous class activities or visit the link:
    - **https://teachingrecipes.com/board-race/**

Team 1			Team 2		
Cells	**Tissues**	**Organs**	**Cells**	**Tissues**	**Organs**

- Monitor them. Support and guide.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main points of the lesson, emphasizing the role of cells as the basic unit of life and their organization into tissues, organs, systems, and organisms.

- Encourage students to reflect on the importance of cells in maintaining life and the significance of their organization into higher levels of complex structures.
- Answer any questions that students may have about level of organization.

Assessment 05 minutes

- Ask students to reflect on what they have learned about cells and their organization into tissues, organs, systems, and organisms.
- Write the following questions on the board and ask the students to write answers in their notebook.
    a) Describe the organization of cells into tissues and provide an example of a tissue in the human body.
    b) Explain how tissues come together to form organs and provide an example of an organ and its function.
- Move around in the class and check their work.
- Give your feedback.

Follow up 03 minutes

- Encourage students to explore online resources or library books to further deepen their understanding of cells and their role in the organization of living organisms. (https://www.cellsalive.com) (page 14 under **Scientific Investigation)**

Grade 6 **Lesson Plan 2**

Cellular Organization

 Duration: 40 Minutes

 **Student Learning Outcome:**

- Relate the structures of some common cells (nerve, muscle, epithelium and blood cells) to their functions.

 **Materials:**

- writing board and board markers
- textbook (General Science 6 PCTB)
- materials such as a spoon, diagrams, colored pencil, clay, food colors, beads, pipe cleaners, feathers of birds, multimedia presentation tools (optional)

Information for Teacher

- Understand the relationship between cell structure and function enhances our knowledge of how cells contribute to the overall role of organs and systems in the human body.
- Nerve cells, also known as neurons, have specialized structures such as dendrites and axons that enable them to transmit electrical signals and communicate with other cells in the nervous system.
- Muscle cells, including skeletal, smooth, and cardiac muscle cells, have unique contractile proteins that allow them to generate force and facilitate movement in the body.
- Epithelial cells form protective barriers and linings in various organs and tissues. Their structures, such as tight junctions and microvilli, support functions like absorption, secretion, and providing a physical barrier against pathogens.

- Blood cells, such as red blood cells, white blood cells, and platelets, have distinct structures that enable them to carry oxygen, defend against pathogens, and aid in blood clotting, respectively.
- To explore the related activities and concepts, visit the following links:
    - **www.ck12.org/biology/cells-and-their-functions**
    - **https://www.youtube.com/watch?v=nNv45-0ocaU**

Introduction 05 minutes

- Ask students for a few examples of real-life objects where the shape or structure is directly related to their function; for example:
- Spoon: The shape of a spoon with its concave bowl and long handle is specifically designed for scooping and conveying liquid or solid food to our mouths efficiently.

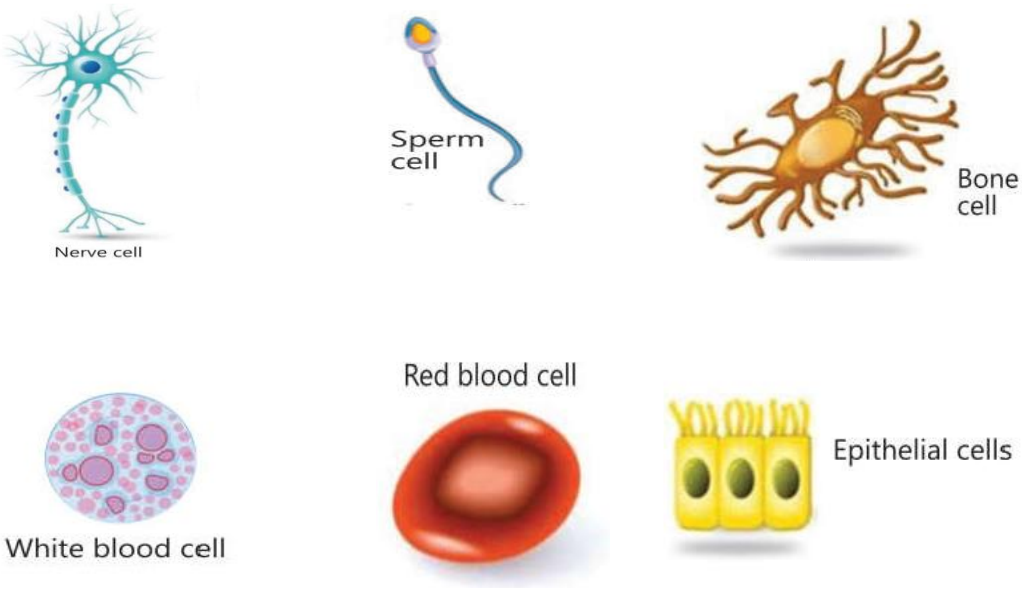
- Human ear: The structure of the human ear, including the shape of the outer ear and the intricate arrangement of the inner ear, plays a crucial role in capturing and transmitting sound waves, enabling us to hear.

- The shape or structure of the above is directly related to their function.
- Red blood cells carry Oxygen. What should be their shape? (Round, like a bowl, etc.)
- Nerve cells send messages to our body parts. What do you think their structure should be? (long and thin like a rope)
- To facilitate deeper understanding and thorough learning, show students the following video of cells. The video explains the different types of cells, their structures and the functions of cells.
    - (https://www.youtube.com/watch?v=nNv45-0ocaU**)**
- Encourage discussion and give feedback.

Development

Activity 1 — 10 minutes

- Explain in detail the nerve, muscle, epithelium, and blood cells, emphasizing their unique structures and functions by using pictures or flashcards to illustrate the characteristics of each cell type.
- Expedite a class discussion, encouraging students to share their prior knowledge and experiences related to cells.



- Make the following table with columns for each cell type (nerve, muscle, epithelium, blood) and their functions.
- Ask students to match the functions with the corresponding cell type for each cell type.
- Encourage students to think critically and provide explanations for their choices.
- Facilitate a class discussion to compare students' responses.

Type of Cells	Function
Nervous Cells:	Generate force and facilitate movement.
Muscle Cells:	Form protective barriers and facilitate the exchange of substances.

Epithelial Cells:	Transport oxygen, nutrients, and waste products throughout the body.
Blood Cells:	Transmit electrical signals throughout the body.

Activity 2 — 07 minutes

- Assign each student a specific cell type (nerve, muscle, epithelium, or blood).
- Ask students to discuss and prepare a short role play or skit that demonstrates the structure and function of their assigned cell.
- Provide time for students to practice their role plays and encourage creativity.
- Conduct a class presentation session where students showcase their role plays.
- Monitor them and provide support.
- Give feedback, if needed.

Activity 3 — 08 minutes

- Tell the students, this activity is about making models using no-cost low-cost materials.
- Divide the students into small groups or pairs.
- Provide each group with the materials like different colors of clay or play dough.
- Instruct the students to create models of nerve, muscle, epithelium, and blood cells using the clay or play dough. They can use different colors to represent the various cell structures.
- Encourage the students to be creative in their models by using additional craft materials to represent specific features of each cell type. For example, they can use pipe cleaners to depict nerve cell axons, feathers to represent epithelial cell cilia, or beads to symbolize blood cell hemoglobin.
- Once the models are complete, instruct the students to label the different cell structures and their functions using markers or paint.
- Provide time for the students to present their models to the class. Each group should explain the structures they created and describe how they relate to the functions of the respective cells.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Review the key concepts discussed throughout the lesson.
- Guide a class discussion, highlighting the relationships between cell structures and functions.
- Encourage students to reflect on their learning and share any new insights or connections made.

Assessment 05 minutes

- Make the following table on the board and ask the students to compare and contrast the structures and functions of nerve, muscle, epithelium, and blood cells using the chart below.

Cell Type	Structures	Functions
Nerve Cell		
Muscle Cell		
Epithelium Cell		
Blood Cell		

Follow up 02 minutes

- Assign homework tasks, such as researching additional cell types or investigating specific examples of cell structures and functions in real-life contexts.
- Encourage students to reflect on the impact of cell structures and functions on human health and well-being.

Answer Key:

Cell type	Structures	Functions
Nerve cell	Long and thin	Transmits electrical signals
Muscle cell	Long and thin, with many contractile proteins	Allows movement
Epithelial cell	Flat and arranged in sheets	Forms a protective barrier
Blood cell	Red blood cells: round, White blood cells: irregular, Platelets: small and disc-shaped	Transports oxygen, fights infection, helps blood clot

Grade 6 **Lesson Plan 3**

CELLULAR ORGANIZATION


Duration: 40 Minutes

Student Learning Outcome:

- Describe the similarities and differences between the structure of plant and animal cells. Sketch the animal and plant cells and label key organelles in each.

Materials:

- writing board, chalk /board marker (red, blue and black)
- textbook (General Science 6 PCTB)
- diagrams / pictures of the plant and animal cells
- chart paper

Information for Teacher

- In biology, the smallest unit that can live on its own and that makes up all living organisms and the tissues of the body is a cell.
- A cell has three main parts: the cell membrane, the nucleus, and the cytoplasm.
- Cell was first discovered by Robert Hooke in 1665. He discovered plant cells by viewing the cell walls in its cork tissue under a microscope. He described the cell as the basic unit of life.
- Robert Brown discovered the nucleus of the cell in 1804. The nucleus is a membrane-bound organelle present in eukaryotic cells.
- Prokaryotes are single-celled organisms belonging to the domains Bacteria and Achaea. Prokaryotic cells are much smaller than eukaryotic cells, have no nucleus, and lack organelles.

- *Eukaryotic cells* are cells which contains a nucleus enclosed within the nuclear membrane. Plant and animal cells are eukaryotic, meaning that they have nuclei. Eukaryotic cells are found in plants, animals, fungi, and protists.
    - https://www.youtube.com/watch?v=ApvxVtBJxd0

Introduction 07 minutes

- Start lesson by asking question to the students, what is cell. (The structural as well as functional unit of living organisms).
- Ask them that, can we see cells with naked eye?
- After taking their response tell them that these cells are so small and cannot be seen with naked eye. We can see/observe the cells by the use of Microscope.
- Ask students that wheather all the living organisms have same cells?
- After taking their response tell them that plant and animals have different types of cells.
- Ask students that is there any other parts of cell? If yes than what are these parts called?
- After taking response from students tell them that different parts or structures of cells are called cell organelles.
- Ask students have they know about any cell organelles?
- An organelle is a subcellular structure that has one or more specific jobs to perform in the cell, much like an organ does in the body.
- After taking response from students tell them that there are many cell organelles present in different cells but some common cell organelles are cell wall, cell membarane, nucleus, cytoplasm, chloroplast, mitochondria and vacule.

Development

Activity 1 10 minutes

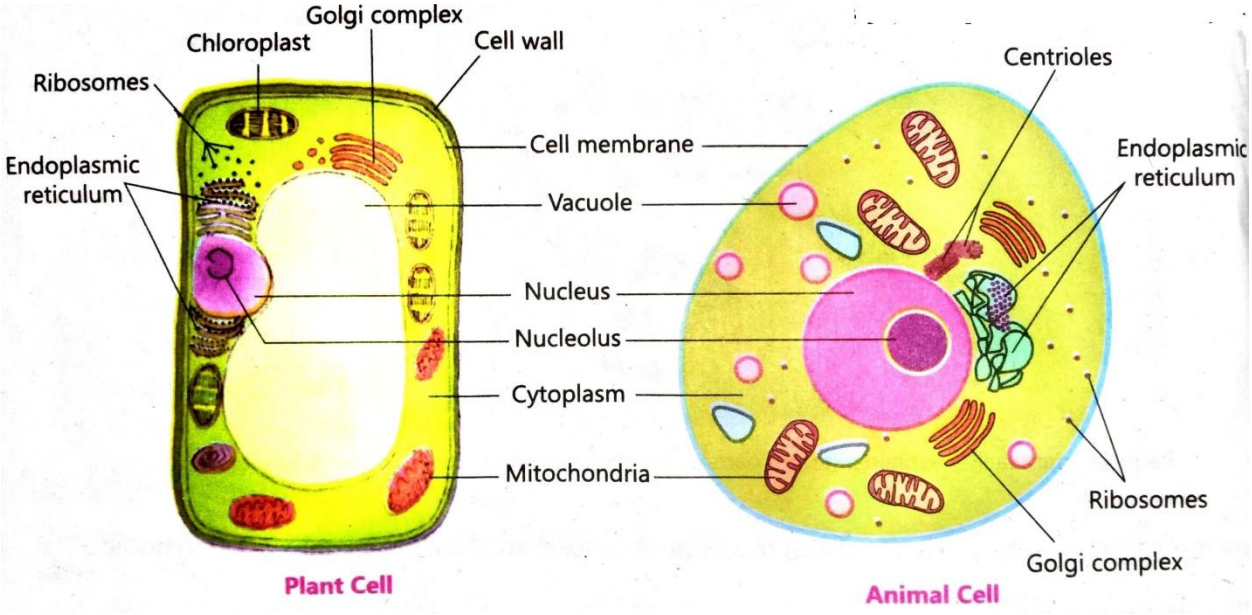
- Draw the following table on board and fill it with the help of students.
- Following procedure will be adopted to ensure students participation.
- Write down the below mentioned organelles in the table in spcified coulmn.
- Draw the following table on writing board and fill it with the help of students (can take help from text book page 4, 5 & 6).

- Following procedure will be adopted to ensure students participation.
- write down the below mentioned organelles in the table in spcified coulmn.
- Ask the students to tell about oragnelle's charateristics and their functions respectively.
- After discussion responses will be written in respective coloumn.
- In this way whole table will be filled.

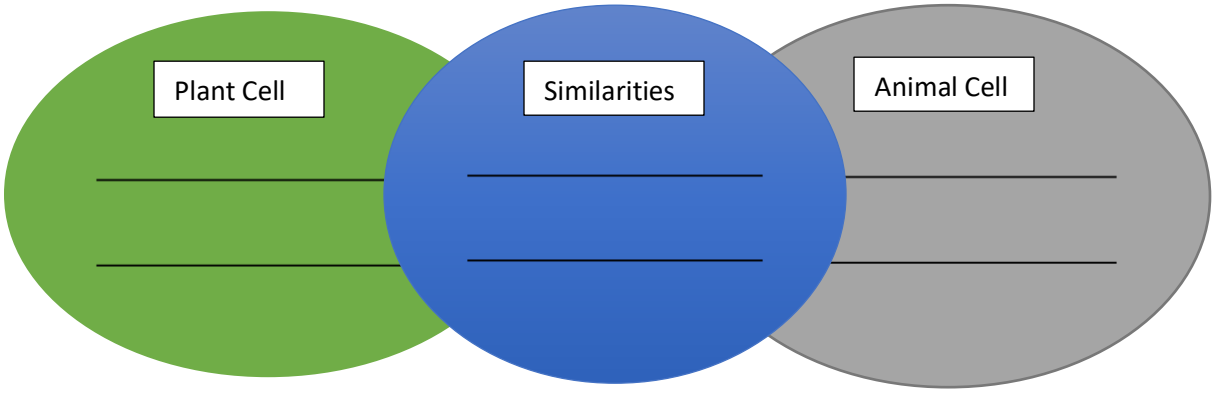
Sr. No.	Name of organelle	Characteristics/function
1	Cell wall	Present in plants,algae, fungae but not in animal cells and composed of cellolose. It supports and mainatin the shape of cell.
2	Cell membrane	Outermost covering of animal cells composed of lipid and protiens. It separates interior of cells from outer environment.
3	Nucleus	Nucleus act as brain of cell and controll all cell functions. Its inner material is called nucleoplasm.
4	Cytoplasm	Material consisted upon salts,water and protiens etc. covered by cell membrane is called cytoplasm.
5	Cholorplast	Present in plant cells having green pigment cholorophil and also called as food producer.
6	Mitochondria	These are called powerhouse of cell because energy producing reaction take place in it. These are double membranouse and red shape organelle.
7	Vacuole	A large oraganelle filled with water, food molecule and other substances. It helps in plant growth and mainatin shape of cell. It laso used to store waste material.

Activity 2 — 07 minutes

- Hang this picture chart before the class or draw these two diagrams on the board.



- Divide students into groups having 5-6 students in each group.
- Provide chart paper to them.
- Direct all groups to draw the following Venn diagram.



- Direct them to fill the diagram comparing animal and plant cell.
- After completion of task all groups will present their work.
- Paste the best chart in the classroom and demonstrate the similarities and differences of plant and animal cell with the help of students.

Activity 3 — 07 Minutes

- Divide the class into 04 groups.
- Write down name of organelles on whiteboard i.e., cell wall, cell membarane, nucleus, cytoplasm, chloroplast, mitochondria and vacule.
- Divide and assign organelles to all four groups.
- Ask them to draw picture of assigned organelle and label it.
- Also write down its function and structure.
- Students may take help from Science Grade 6th textbook page No. 4, 5 & 6.
- Ask groups to present their work before class and other classmates will have a critical view and make correction where needed.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Conclude the lesson by recapping the similarities and differences between the structure of plant and animal cells.
- Concisely describe the key organelles of plant and animal cells.
- Also briefly repeat the function of organelles.

Assessment — 05 minutes

- Write the following statements on the board and ask the students to fill in the blanks.
  1. Cell Wall is Outermost Part of _____
  2. Cell Membrane is Outmost Part of_____
  3. Chloroplast is Present in_____
  4. Big Vacuole is Present in_____
  5. _____is Called Powerhouse of Cell.

  OR
- Write the following MCQs in the board / ask the students to copy in their notebooks and chose the correct option.
  1. It is the outermost part of plant cell
     a. Cell membrane b. cell wall c. nucleus d. cytoplasm
  2. It is the outermost part of animal cell
     a. Cell membrane b. cell wall c. nucleus d. cytoplasm

3. It is present only in plant cell.
   a. Chloroplast b. cell membrane c. mitochondria d. cytoplasm
4. Big vacuole is present in:
   a. Plant cell b. bacteria c. animal cell d. virus

Follow up 01 minutes

- Draw animal and plant cells and also label the organelles.

Answer Key

Fill in the blanks

1. Cell wall is outermost part of plant cell.
2. Cell membrane is outmost part of animal cell.
3. Chloroplast is present in plant cell.
4. Big vacuole is present in plant cell.
5. Mitochondria is called powerhouse of cell.

MCQs

1. Cell wall
2. Cell membrane
3. Chloroplast
4. Plant cell

Grade 6 **Lesson Plan 4**

REPRODUCTION IN PLANTS

 Duration: 40 Minutes

Student Learning Outcome:

- Compare and contrast types of reproduction (sexual and asexual) in plants.

Materials:

- writing board and board marker (red, blue and black) /chalk
- pictures of the different types of reproduction
- chart paper and markers

Information for Teacher

- Reproduction is the process by which organisms give rise to offspring.
- In asexual reproduction, fusion of gametes does not occur. So, identical copies of parent plants are produced.
- Asexual reproduction is also termed as vegetative propagation.
- In sexual reproduction, Male gametes (sperm) and female gametes (eggs) fuse to form a zygote.
- Sexual reproduction involves pollination, fertilization, seed formation and seed germination.
- Transfer of pollen grains from anther to the stigma of a flower is called pollination.
- The fusion of male and female gametes is called fertilization.
- After fertilization, ovule is converted into seed and ovary is converted into fruits.
    - https://www.youtube.com/watch?v=3ZOx63hIsUw

Introduction 10 minutes

- Draw following diagram on the board

Now ask the following questions from whole class and write down student's responses on the board.

- How this plant emerges from the soil? (from seed).
- From where seeds come from ? (from some other plants having flowers).
- What type of reproduction they do? (sexual reproduction).
- Have we seen all the plants produces flowers, fruits and seeds? (No, only flowering plants produces them).
- What is the other type of reproduction? (asexual reproduction).
- Introduce the terms related to sexual and asexual reproduction (from chart or pictures or andoid source e.g mobile phone or LED).

Development

Activity 1 — 10 minutes

- Now ask them "which plants are grown by cutting, grafting and budding? Write down student's response in one column on the whiteboard.
- Ask students to tell the name of plants propagate by seed and write down their responses in other column.
- After that tell students that there are two types of reproduction in plants, Sexual reproduction and asexual reproduction.
- Now contrast and compare the types of reproduction on the board and discuss with students.
- Make following table and fill it with the help of students.

Sexual Reproduction	Asexual Reproduction
It requires two parents	It requires only one parent
It involves fusion of male and female gametes	It does not involve fusion of gametes
Offspring have characteristics of both parent plants	Offspring have characteristics of one parent.
It occurs through seeds	It occurs through stem, root and leaves of plants
It shows variation in off springs. Non identical off springs are produced	Off springs are identical to their parents
Less number of plants can be produced in a limited time	Large number of plants can be produced in short time
It involves pollination, fertilization, seed formation and germination processes	It involves tubers, bulb, runners, grafting, budding, cuttings and layering.
e.g. all flowering plants	e.g. potato, sugarcane, mint, rose, onion etc.

Activity 2 — 10 minutes

- Divide students into small groups.
- Ask students to arrange the following plants present in their locality into following categories as described at page number 28 of textbook of grade 6.

Sr.no	Name of plants	Mode of reproduction
1	Rose	
2	Citrus	
3	Lady finger	
4	Carrot	
5	Potato	
6	Wheat	
7	Grapes	

- Then randomly select one group and ask them to present their work on white board.
- Direct remaining groups to participate in discussion and give their input..

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main points of the lesson by defining the reproduction and its two major types, Sexual and Asexual reproduction.
- Briefly sum up the advantages and disadvantages of both types of reproduction.
- Invite questions from students if any?

Assessment — 05 minutes

Write the following questions on the board and ask the students to write answers in their notebooks.

1. Differentiate between Sexual and Asexual reproduction in plants.
2. What do you think is the most effective way of plants reproduction?

Follow up 02 minutes

- Ask students to fill up following table on their notebooks

Advantages of Sexual Reproduction	Advantages of A-Sexual Reproduction

Answer Key

- Write short questions

Q 1. Define types of reproduction in plants.

ANS. In asexual reproduction, fusion of gametes does not occur. So, identical copies of parent plants are produced. In sexual reproduction, Male gametes (sperm) and female gametes (eggs) fuse to form a zygote.

Q.2. What do you think is the most effective way of plants reproduction?

ANS. Asexual reproduction is the most effective way of plants reproduction.

- Ask students to fill up following table on their note books:

Advantages of Sexual Reproduction	Advantages of Asexual Reproduction
It shows variation in off springs. Non identical off springs are produced	Off springs are identical to their parents
Less number of plants can be produced in a limited time	Large number of plants can be produced in short time
It occurs through seeds	It occurs through stem, root and leaves of plants

.

Grade 6 **Lesson Plan 5**

REPRODUCTION IN PLANTS

Duration: 40 Minutes

Student Learning Outcome

- Distinguish between artificial and natural asexual reproduction in plants. (Buddig, grafting, bulbs, tubers, runners, cutting and layering)

Materials:

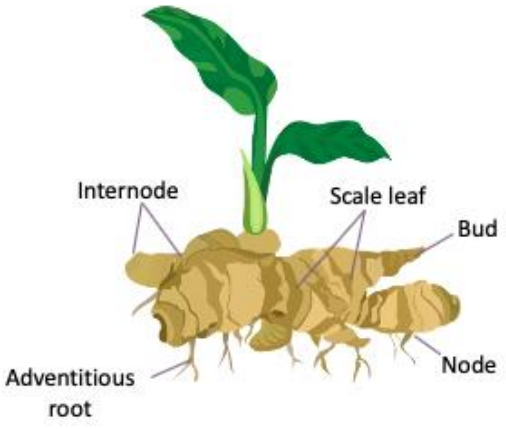
- writing board, chalk / board marker (red, blue and black)
- diagrams/ pictures of the different types of asexual reproduction
- worksheet and chart paper
- fresh plants (ginger, sweet potato, beet root, carrot) and water
- four disposable transparent cups and glasses
- cutter and tooth picks

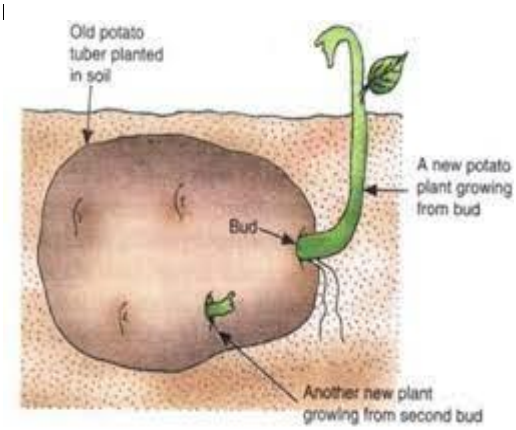
Information for Teacher

- Plant propagation is the process of increasing the number of plants of a particular species or cultivar.
- Asexual reproduction is also termed as vegetative propagation.
- Vegetative reproduction occurs by two methods i.e. natural and artificial vegetative propagation
- Natural vegetative propagation occurs when an axillary bud grows into a lateral shoot and develops its own roots (also known as adventitious roots). e.g. bulb, tuber, runners
- Artificial Vegetative Propagation: In this method, a part of a plant, specifically a stem or leaf is cut and planted in the soil for example cutting, budding, grafting and layering.
- Watch this video link:
    - https://www.youtube.com/watch?v=5algVrkxsCM

Introduction 05 minutes

- Show following pictures to the students.





- Now ask the following questions from whole class and write down student's responses on the board.
- What are names of these plants? (ginger and potato)
- Are they grow by seeds? (NO)
- Ask students how ginger grows. (by rhizome)
- Ask students how potato grows. (by tuber)
- Now tell students that in asexual propagation, plants propagated by two ways 1-natural vegetative propagation i.e.,through bubs, tubers and runners and by artificial vegetative propagation i.e., through cutting, grafting, budding and layering.
- Also tell the students about importance of vegetative propagation.

Development

Activity 1 10 minutes

- Tell the students abouit the difference between bulb, tuber and runner (from textbook page 24 & 25) and also explain the plants propagated by theses vegetative parts.
- Hang pictures of different propagations methods using poster / chart to show these pictures on the board.
- Tell students about these methods with the help of these pictures.

- Bulb is an underground stem with thick leaves e.g. onion, tulip etc.
- Tuber is an underground thick stem of plant developed by eyes or buds e.g. potato.
- Runners are stems which are spread horizontally above the ground having nodes or buds from which new plants start to grow e.g. Strawberry and grasses.
- Cutting is a short stem having two or more nodes or buds through which new stems and leaves will arise. e.g. rose, sugar cane etc.
- Layering is a process during which young branch is bent to the ground through which roots and leaves are eventually growing into a new plant. e.g. grass etc.
- Grafting is a technique in which a twig from one tree is joined to a stem from another tree of the same kind. e.g. citrus, mango etc.
- Budding is a technique in which a new plant develops from a bud of an existing organism. e.g. peach, plum etc.

Activity 2 **07 minutes**

- Divide the students in groups.
- Ask them to prepare a chart using the given material on page number 25 & 26 of the textbook.
- Assign one type to each group.
    1. Name of Propagation method
    2. Type of Propagation
    3. Brief description of Method
    4. Examples of plants propagated by this method
- Guide students to take help from textbook page no. 25 to complete this work.
- Move around in the class and visit each group and guide them.
- After completion of charts direct each group to present their work before class.
- Involve the remaining class to participate in discussion and also guide the students during discussion to develop their understanding on the topic.

Activity 3 **08 minutes**

- Divide the students in four groups.
- Take four plastic or disposable transparent glasses. Also bring carrot, beet root, potato, and ginger from home.

- Fill three quarters of glasses with water. Show a potato with eyes or nodes.
- Pass the tooth picks from each plant (ginger, carrot, beet root, potato) horizontally.
- Hang all these vegetables in the glass in such a way that upper half of part remain outside and lower half is inside the glass.
- Remain sure that change the water alternatively
- Then put the glasses near the window sill. So, that plant gets the maximum air and sunlight.
- Ask the students to observe the changes daily.
- After a few days you will see that root and leave start sprouting and growing out from a bud.
- Visit all groups and guide them where needed.
- Ask all groups one by one to present their work before class.
- Appreciate the good work.
- Visit the link for details.
    - https://www.youtube.com/watch?v=S8l7RzJAOYg

Conclusion/ Sum up/ Wrap up 03 minutes

- Summarize the main points of the lesson by distinguishing between artificial and natural asexual reproduction in plants.
- Briefly sum up the natural vegetative reproduction and artificial vegetative reproduction.
- Invite questions from students if any?

Assessment 05 minutes

- Write the following statements on the board and ask the students to fill in the blanks.
    3. The under underground stem with stored food is called _____
    4. Potato is propagated by _____ (plant part)
    5. The attached stem with the roots is called_____
    6. Cutting is example of _____propagation

OR

Make the following table on the board and ask the students to copy in their notebooks. Instruct them to complete it individually.

Sr.no	Name of Propagation Method	Name plant propagated by this method
1	Bulb	
2	Tuber	
3	Runner	
4	Layering	
5	Cutting	
6	Grafting	
7	Budding	

Follow up 02 minutes

- Ask students to research and visit some video link for understanding of concept.
- Define the cutting, grafting, layering and budding.

Answer Key

- Fill in the blanks
    1. The underground stem with stored food is called bulb.
    2. Potato is propagated by _tuber___ (plant part).
    3. The attached stem with the roots is called layering.
    4. Cutting is example of _artificial vegetative propagation.

Sr.No	Name of Propagation Method	Name plant propagated by this method
1	Bulb	Onion
2	Tuber	Potato
3	Runner	Strawberry
4	Layering	Pomegranate
5	Cutting	Rose
6	Grafting	Mangoes
7	Budding	Citrus

Grade 6 **Lesson Plan 6**

BALANCED DIET


Duration: 40 Minutes

Student Learning Outcome:

- Identify the essential nutrients, their chemical composition and food sources.

Materials:

- writing board and board markers / chalks
- textbook (General Science 6 PCTB)
- chart (Food Pyramid)
- pictures of the different food sources

Information for Teacher

- Diet is the sum of food consumed by a person or other organism.
- Balance diet is consisting of a variety of different types of food and providing adequate amounts of the nutrients necessary for good health.
- Adults typically require between 1,600–3,000 calories per day. However, this varies depending on a person's sex, age, height, and lifestyle.
- In a cold environment, we need more energy to maintain a constant body temperature, as our metabolism increases to produce more heat. In a warm environment, we need less energy.
- Carbohydrates provide the body with glucose, which is converted to energy used to support bodily functions and physical activity, due to which our body needs carbohydrates on daily basis.
- Carbohydrates provide 4 calories per gram, protein provides 4 calories per gram, and fat provides 9 calories per gram.
- Proteins provide material for growth, repair and reproduction.

- Fats are stored under skin and protect our body from effects of temperature changes.
- Vitamins do not produce energy but they are essential for growth and proper functioning of body.
- An essential nutrient is a nutrient required for normal body function that either cannot be made by the body or cannot be made in amounts adequate for good health and therefore must be provided by the diet.
- Watch these videos for understanding the concept of essential nutrients, their role in our body and their sources:
    - https://www.youtube.com/watch?v=Urr-MKKs8zc,

Introduction 08 minutes

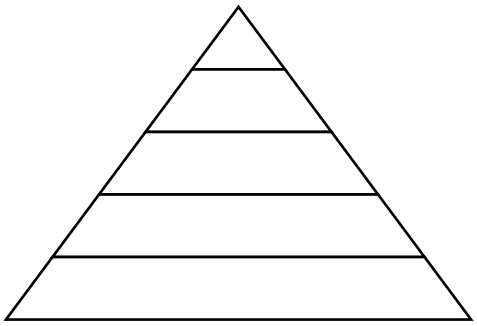
- Ask the studenst that what they have eaten yesterday and write down their responces on the board.
- Tell them that all the food they have consumed is called diet.
- Ask students does anyone of them only drink milk?if not then why?
- Ask them what will happen if someone only drinks milk and did not take any food?(he will face health issues)
- Now tell students that our body required balance food containing all types of necessary nutrients.
- There are six essenial nutrients carbohydrtaes, protiens, fats, vitamins, minerals and water.
- Tell students that glucose, sugar, starch etc. are the foods belonging to the group of called carbohydrates.
- Sugar is present in Honey, fruits, milk etc. while wheat, barley, potato tomato and other vegetables are rich source of starch.
- Proteins are food group which provides material for growth repair and reproductions.
- Rich sources of protein are meat, eggs, fish, pulses, chicken and nuts etc.
- Fats are richest source of energy and they obtained from milk, butter, cheese animal fat and fish oil etc.

- Vitamins donot produce energy but they are essential for growth and proper body function.
- Tell students that nutrients are substances required by the body to perform its basic functions.

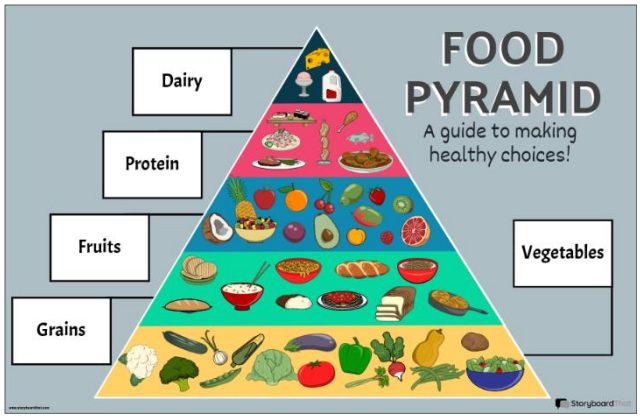
Development

Activity 1 — 10 minutes

- Draw the diagram of this pyramid on the board.



- Distribute chart and color marker to the groups.
- Ask them to think and discuss together within group which food did they eat in their daily life the most and put that group in bottom row of the pyramid.
- Like that think about all five group of essential nutrients and put in row of pyramid with a sequence that the most used food group is in the bottom and least used food group in the top most row.



- Then show this chart of healthy food pyramid to students.
- Ask them to compare their pyramid with this one.
- Ask them if the difference is positive or needs improvement.
- Share their observation infront of the class.
- Make them realize the importance of balanced diet.

Activity 2 — 05 minutes

- Tell the students about sources of essential nutrients.
- Instruct them to read about essential nutrients form the textbook page 32 – 36 in pairs.
- Make the following table on the board and ask the students to copy it on a chart paper.
- Now divide them in groups and ask them to fill the following table

Sr. No	Essential Nutrient	Common Sources of Essential Nutrient
1	Carbohydrates	
2	Protein	
3	Vitamin	
4	Fat	
5	Minerals	

- Move around in the class and visit all groups and guide them where needed.
- Guide students to take help from textbook page no. 32-36 to complete this work.
- Ask all groups to present their work before class.

Activity 3 — 05 minutes

- Draw the following table on the board.
- Direct students to copy this table on their notebooks.

Essential Nutrient	Breakfast	Lunch	Dinner
Carbohydrate	Y/N	Y/N	Y/N
Fat	Y/N	Y/N	Y/N
Protein	Y/N	Y/N	Y/N
Vitamin	Y/N	Y/N	Y/N

Mineral	Y/N	Y/N	Y/N
Water	Y/N	Y/N	Y/N

- Direct them to write down what they eat?
- Instruct the students to discuss in pairs.
- Ask them to asses which essential nutrients are present in their diet and record in table in form of yes, no.
- Randomly select three students to present their table on board and ask other students to make correction if needed.

Conclusion/ Sum up/ Wrap — 05 minutes

- Summarize the main points of the essential nutrients of diet.
- Briefly sum up the different food sources of essential nutrients.
- Invite questions from students if any?

Assessment — 05 minutes

- Draw this table for assessment for students.

Statement	C/I	Correct Statement
Balance diet contains only milk and meat		
Wheat, rice, potato are rich source of fat		
Meat, eggs, chicken are rich source of carbohydrates.		
Vegetable oil, cheese and ghee are rich source of Proteins		

- Ask students to complete this table on their notebooks.
- Move around in the class and check their work and see how many students have done their work correctly.

Follow up 02 minutes

- Ask students to make the chart of food they have eaten in during last 5 days and also point out which essential nutrients they have taken in bulk and which nutrient they have taken in very small amount.

Answer Key

Statement	C/I	Correct Statement
Balance diet contains only milk and meat	I	Balance diet comprises of food containing all essential nutrients.
Wheat, rice, potato are rich source of fat	I	Wheat, rice, potato are rich source of carbohydrates.
Meat, eggs, chicken are rich source of carbohydrates.	I	Meat, eggs, chicken are rich source of proteins
Vegetable oil, cheese and ghee are rich source of proteins	I	Vegetable oil, cheese and ghee are rich source of fats.

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Grade 6 **Lesson Plan 7**

HUMAN DIGESTIVE SYSTEM

Duration: 40 Minutes

Students Learning Outcome

- Briefly describe the role of enzymes in digestion.

Materials:

- writing board and board markers /chalk
- chart paper
- worksheet-assessment
- clear plastic cups or beakers
- digestive enzyme solution (e.g., amylase, pepsin), food samples (e.g., cracker, meat, fruit)
- water

Information for Teacher

- Enzymes are biological molecules that act as catalysts in digestion.
- Enzymes are the special types of proteins produced in the living bodies and speed up the chemical reactions occurring in our body.
- Digestive glands produce enzymes that break down different types of food molecules.
- Carbohydrates are broken down by amylase into simple sugars.
- Proteins are broken down by proteases into amino acids.
- Fats are broken down by lipases into fatty acids and glycerol.
- To explore the related activities and concepts, visit the following links:
  - https://www.youtube.com/watch?v=ZBZWgrfZFbU
  - enzymeshttps://www.youtube.com/watch?v=v2V4zMx33Mc
  - https://www.biologyonline.com/articles/digestive-enzymes

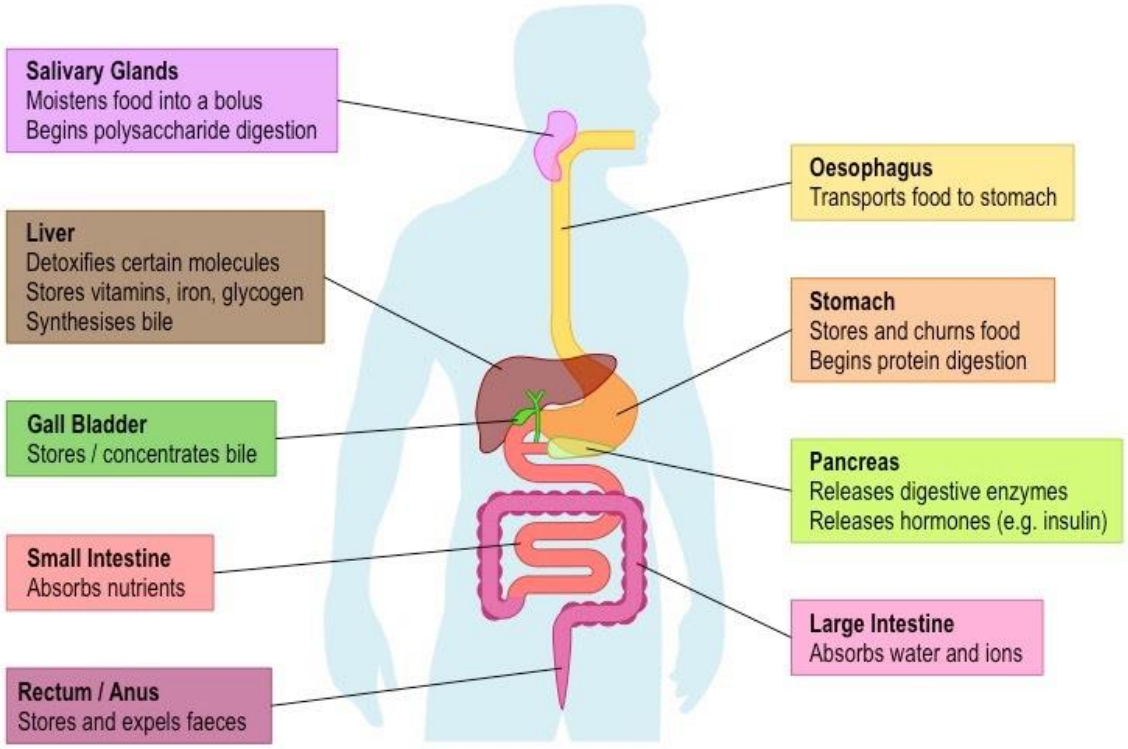
Introduction 05 minutes

- Start the lesson by asking questions such as:
    a. "What happens to the food we eat?"
    b. "How does our body break down the food?"
- Write Student' responses on the board.
- Highlight the importance of enzymes and their role in digestion.
- Encourage discussion and give feedback.

Development

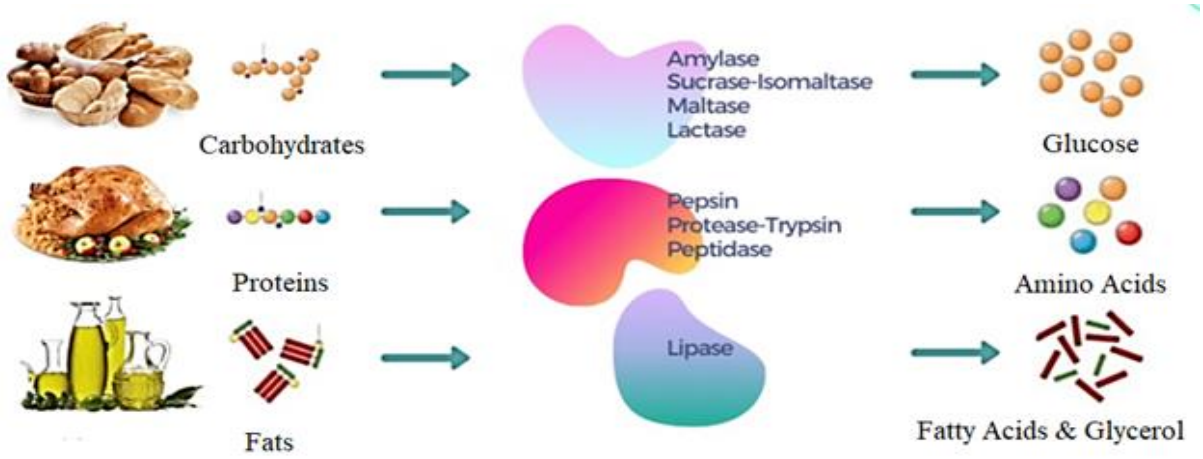
Activity 1 10 minutes

- Display the following chart in front of the whole class.
- Introduce the concept of digestive glands and their role in producing enzymes for digestion.



- Use diagram or model to help students visualize the different parts of the alimentary canal and the action of enzymes.

- Enzymes are the special types of proteins produced in the living bodies and speed up the chemical reactions occurring in our body.
- Discuss in detail the digestion of carbohydrates, proteins, and fats, highlighting the enzymes involved in each process.
- Show them Amylase enzyme as an example and tell them that it breaks down starch into smaller molecules called maltose.
- Maltase acts on maltose and converted into glucose, similarly sucrose acts on sucrose and converted into glucose and fructose.
- Pepsin is the enzyme which help in the breakdown of proteins into amino acids, much smaller units of proteins.
- Similarly, lipase is the enzyme to break lipids into fatty acids and glycerol.
- Make the following process flow on the board.



- Encourage and guide them where necessary.
- Make sure that they are doing correction explanation of assigned enzyme.

Activity 2 **15 minutes**

- Tell the students that they will do an activity to observe the action of enzyme in digestion.
- Divide the students into small groups or pairs and provide each group with a clear plastic cup or beaker.

- Instruct the students to add a small amount of water to their cups, representing the presence of saliva or gastric juice in the digestive system.
- Next, provide the students with different food samples, such as a cracker, a small piece of meat, and a piece of fruit. Explain that each food sample represents a different type of nutrient (carbohydrate, protein, or fat).
- Instruct the students to place a food sample in their cup with water and let it soak for a few minutes. This step simulates the initial phase of digestion, where the food is mixed with digestive juices in the mouth or stomach.
- After soaking, ask the students to observe and discuss any visible changes in the food samples.
- Introduce the specific digestive enzyme solution (e.g., amylase for carbohydrates, pepsin for proteins) to the students. Explain that these enzymes help break down specific types of nutrients.
- Instruct the students to add a few drops of the corresponding enzyme solution to their cups, depending on the food sample they have chosen. For example, if they have a cracker (carbohydrate), they should add amylase.
- Start the timer or stopwatch and allow the students to observe the reaction for a specific time period (e.g. 5 minutes). Encourage them to note any changes in the food samples during this time.
- After the designated time, have the students discuss their observations and explain the role of enzymes in breaking down the food samples. Emphasize how enzymes facilitate the digestion process by speeding up the chemical reactions involved.
- Facilitate a class discussion to summarize the activity and reinforce the concept of enzyme action in digestion. Encourage students to share their insights and ask questions.

Conclusion/ Sum up/ Wrap up 03 minutes

- Involve the students to review the main learning points about the role of enzymes in digestion.
- Discuss any question or misconceptions that arose during the activities.

- Emphasize the importance of enzymes in breaking down food and extracting nutrients for the body's needs.

Assessment 05 minutes

- Provide assessment worksheet to the students and instruct them to solve it individually.
- Give them 3 minutes for this.
- Share with them the correct answers and check how many students have done their job correctly.

Follow up 02 minutes

- Encourage students to observe their own eating habits and reflect on the role of enzymes in the digestion process.
- Refer to **Activity 4.2** and **Do you know?** on page 47 of the textbook for their interest. Ask them what they think about these?

Worksheet-Assessment

Tick mark (☑) the correct answer.

1. Which of the following statements best describes the role of enzymes in digestion?

   ☐ Enzymes provide energy to the body.
   ☐ Enzymes break down large food molecules into smaller ones.
   ☐ Enzymes absorb nutrients from digested food.
   ☐ Enzymes protect the stomach lining from acid.

2. Amylase is an enzyme that aids in the digestion of:

   ☐ Proteins ☐Fats
   ☐Carbohydrates ☐Vitamins

3. Which enzyme is responsible for the breakdown of fats in the small intestine?

   ☐ Amylase ☐ Lipase ☐ Pepsin ☐ Trypsin

4. Which enzyme is responsible for breaking down fats into fatty acid and glycerol?

   ☐ Lipase ☐ Amylase ☐T rypsin ☐ Maltase

5. Which enzyme is released by the stumach?

   ☐ Pepsin ☐ Amylase ☐ lipase ☐ Maltase

Answer Key

MCQs

b) enzymes break down large food molecules into smaller ones.

c) carbohydrates

b) lipase

c) lipase

d) pepsin

Grade 6 **Lesson Plan 8**

HUMAN DIGESTIVE SYSTEM

Duration: 40 Minutes

Student Learning Outcome:

- Conclude that blood transports the products of digestion to other parts of the body and the undigested products get egested/defecated.

Materials:

- writing board and chalk / board markers
- chart paper
- craft materials (colored paper, popsicle sticks, googly eyes, glue, etc.),
- scissors, stopwatch or timer, cones or markers to set up a relay race course,
- flashcards or small cards with nutrient names (e.g., carbohydrates, proteins, fats, vitamins)

Information for Teacher

- Blood plays a crucial role in the transportation of digested nutrients throughout the body.
- The digestive system breaks down food into smaller molecules, which are absorbed into the bloodstream.
- Blood vessels carry these nutrients to different organs and cells.
- The circulatory system transports nutrients from the small intestine to the rest of the body. These nutrients are used by the cells for energy, growth, and repair.
- The circulatory system removes waste products from the cells. These waste products are carried to the kidneys and liver, where they are filtered out of the blood.
- Undigested waste materials are eliminated from the body through the process of defecation through anus (the part of large intestine).

- To explore the related activities and concepts, visit the following links:
    - https://www.youtube.com/watch?v=VwrsL-lCZYo
    - https://www.dkfindout.com/us/human-body/digestion/intestines/

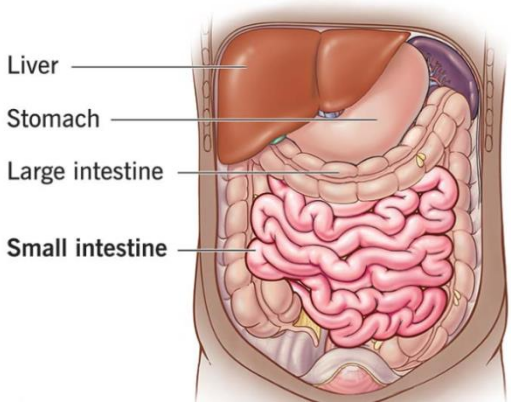
Introduction 03 minutes

- Ask students the following questions:
    - How is food absorbed in our body?
    - How does our body digest food and absorb nutrients?
    - What happens to the waste materials that our body cannot use?
    - What is Egestion/defecation.
    - How is Egestion/defecation important in removing waste materials from the body?
- Record students' responses. Give brief feedback.

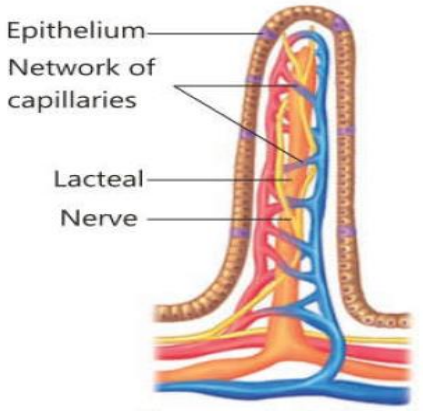
Development

Activity 1 12 Minutes

- Involve the students to recall the role of Small Intestine in digestion.
- Encourage them to share their answers.
- After getting their responses, tell them that small intestine is responsible for the absorption of nutrients from the digested food. Its inner lining is covered with tiny, finger-like projections called villi, which increase the surface area for nutrient absorption. Nutrients such as carbohydrates, proteins, fats, vitamins, and minerals are absorbed into the bloodstream through the walls of the small intestine.



- Villi are small, finger-like projections (show picture) that line the inside of the small intestine. They are covered in tiny projections called microvilli, which further increase the surface area of the small intestine. This increased surface area is important for the absorption of nutrients from food.



- The small intestine completes the digestion process by breaking down nutrients into their smallest forms. Any remaining undigested material move from the small intestine to the large intestine.
- The large intestine primarily functions in the absorption of water and electrolytes from undigested food material, while also playing a role in the formation and storage of feces until elimination from the body during defecation.
- Have a class discussion and answer questions?
- Divide the students into groups of 4-6 members in each.
- Set up a relay race course in the classroom or outdoor area using cones or markers.
- Place the large poster boards with labels for different parts of the digestive system at different points along the race course, including one labeled "Small Intestine."
- Distribute the flashcards or small cards with nutrient names to each team.
- Explain that each team member represents a nutrient, and their task is to "travel" through the relay race course and reach the small intestine (marked poster board) to be absorbed.
- Start the race, with each group member taking turns running to the next poster board and placing their flashcard on the small intestine board.
- The group that successfully "absorbs" all the nutrients (places all flashcards on the small intestine board) in the shortest time wins the race.
- After the race, gather the students and discuss the importance of the small intestine in nutrient absorption.
- Ask questions to reinforce their understanding of the topic.

Activity 2	5 minutes

- Divide the students into groups of 4-6 members in each.
- Set up a relay race course in the classroom or outdoor area using cones or markers.
- Place the large poster boards with labels for different parts of the digestive system at different points along the race course, including one labeled "Small Intestine."
- Distribute the flashcards or small cards with nutrient names to each team.
- Explain that each group member represents a nutrient, and their task is to "travel" through the relay race course and reach the small intestine (marked poster board) to be absorbed.
- Start the race, with each group member taking turns running to the next poster board and placing their flashcard on the small intestine board.
- The group that successfully "absorbs" all the nutrients (places all flashcards on the small intestine board) in the shortest time wins the race.
- After the race, gather the students and discuss the importance of the small intestine in nutrient absorption.
- Ask questions to reinforce their understanding of the topic.

Activity 3	07 minutes

- Divide the students into small groups.
- Explain that each group will create their own puppet show to showcase the role of the small and large intestine in the digestion and elimination of waste.
- Provide craft materials and encourage students to design and create puppets representing different parts of the digestive system, including the small and large intestine.
- Once the puppets are ready, have the groups brainstorm a short script or dialogue that highlights the functions of the small and large intestine.
- Allocate time for the groups to practice and rehearse their puppet shows.
- Set up a designate a performance area in the classroom.
- Each group performs their puppet show, focusing on the actions and functions of the small and large intestine. Give students feedback if needed.

- After each performance, engage the audience in a discussion about the key points and understanding of the digestive process.
- Use the large chart paper or whiteboard to create a visual representation of the small and large intestine, highlighting their functions and key features as discussed during the puppet shows.
- Conclude the activity by summarizing the importance of the small and large intestine in the digestive system and their role in nutrient absorption and waste elimination.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Recap the main learning points from the lesson, emphasizing the role of blood in transporting digested nutrients and eliminating waste.
- Allow students to ask questions and give your answers accordingly.

Assessment — 05 minutes

Write the following statements on the board and ask the students to fill in the blanks with the appropriate words to complete the sentences.

1. The process of moving digested nutrients from the digestive system to other parts of the body is called _____.
2. The waste material that is not digested and needs to be eliminated from the body is called _____.
3. The undigested waste material is eliminated from the body through the process of _____.
4. The waste material that is formed in the liver and stored in the gallbladder is called _____.
5. The organ that produces bile to aid in the digestion and absorption of fats is the _____.

Follow up — 05 minutes

- Refer to **Activity 4.6** on page 51 of the textbook for their interest. “Can digestion occur outside the living bodies?”

Answer Key

Answer Key - Fill in the blanks

1. circulation
2. waste
3. defecation
4. bile
5. liver

Grade 6 **Lesson Plan 9**

MATTER AS PARTICLES

Duration: 40 Minutes

Student Learning Outcome:

- Apply the particle theory of matter to explain diffusion.

Materials:

- writing board and chalk / board marker
- perfume spray / scent and pieces of cotton
- transparent / clear cups
- food colors /ink
- salt of different particle size

Information for Teacher

- All matter is composed of small particles.
- Matter is made up of tiny particles that are too small to be seen with the naked eye.
- The particles in matter are always moving. The speed and direction of their motion depend on the temperature of the substance.
- There are spaces between the particles of matter.
- The amount of space between particles determines the density of the substance.
- There are attractive forces between the particles. These forces hold the particles together and determine the physical properties of the substance.
- Diffusion is the movement of particles from an area of high concentration to an area of low concentration. It happens because the particles are constantly in motion and collide with each other, causing them to spread out.
- To explore the related activities and concepts, visit the following links:

- https://www.youtube.com/watch?v=OTksau0_VoI
- https://www.thoughtco.com/what-is-diffusion-3967439
- https://study.com/learn/lesson/diffusion-overview-chemistry.html

Introduction 08 minutes

- Ask students the following engaging questions:
    a. How does ink spread in water?
    b. How does a smell of a flower move and spread in a room?
    c. Can you think of other examples where particles move in everyday life?
    d. What happens to the scent of perfume when it's sprayed in one corner of a room?
- Invite the students to share their answers.
- Spray perfume in one corner of a room and ask students how it reaches the other corner. Record students' responses. Give brief feedback.
- Recap the main points of the particle theory of matter, emphasizing that all matter is made up of tiny particles (atoms or molecules) that are constantly in motion.
- Introduce the concept of diffusion and explain that as a result of particle motion, they spread out and move from areas where they have high amount to areas of low amount.
- Place a small piece of cotton or a cotton ball soaked in liquid perfume inside the container.
- Close the container tightly with the lid and let it sit for a while.
- Open the container and observe the spread of the scent in the surrounding air.
- Illustrate the diffusion of particles in gases. The scent molecules from the perfume will diffuse and spread through the air inside the container, making the smell stronger when the container is opened.
- Ask them to observe and understand diffusion in different states of matter.
- Discuss the factors that affect the rate of diffusion, such as spaces between particles, temperature, and the size of particles.
- Lead a class discussion and answer questions, if any.

Development

Activity 1 — 07 minutes

- Fill a clear glass or plastic cup with water, leaving some space at the top.
- Add a few drops of food coloring in different colors to the water.
- Observe the cup over time and note any changes in the distribution of the colored water.
- Demonstrate the diffusion of particles in liquids. The food coloring will gradually spread throughout the water as the particles mix.

Activity 2 — 07 minutes

- Tell the students that let do an activity to observe the effect of temperature on diffusion.
- Invite volunteer students in front of the class and instruct them to fill one container with hot water and the other with cold water.
- Now instruct them to add a few drops of food coloring to each container, preferably using different colors.
- Now involve all the students to observe and record the time it takes for the food coloring to completely diffuse in both containers.
- Instruct them to discuss the observations in pairs and relate with particle theory of matter.
- Now discuss the observations with the students and relate them to the particle theory of matter, highlighting how increased temperature increases the kinetic energy of particles, leading to faster diffusion.

Activity 3 — 08 minutes

- Tell the students that lets do an activity to observe the effect of particle size infusion.
- Fill two glasses with the same amount of water.
- Add a spoonful of finely ground salt (small particles) to one glass and coarse salt (big particles) to the other glass. Stir until it dissolves completely in both glasses.

- Observe and record the time it takes for the salt to diffuse and mix evenly with the freshwater in both the glasses.
- Discuss the observations with the students, emphasizing how smaller particles (salt) diffuse more quickly than larger particles.
- Connect the findings to the particle theory of matter, explaining that smaller particles have a higher surface area, allowing for faster diffusion.

Conclusion/ Sum up/ Wrap up 03 minutes

- Recap the main learning points, emphasizing the particle theory of matter, diffusion, and the factors influencing diffusion.
- Engage the class in discussion, allowing the students to share their insights, ask questions and make connections to real-life examples of diffusion.
- Summarize the key concepts and ensure that students have a clear understanding of the relationship between the particle theory of matter and diffusion.

Assessment 05 minutes

- Write the following statements on the board and instruct the students to copy in their notebooks. Instruct them to Label the following statements as true or false working individually.

  Or

- Write the following statements on the board one by one and ask the students to tell about it true or false.

  a) All matter is composed of tiny particles.

  b) Particles in a solid are closely packed and have little freedom of movement.

  c) Particles in a gas are spread out and move randomly.

  d) Particles in a liquid are arranged in a regular pattern.

  e) Higher temperature increases the rate of diffusion.

  f) Higher concentration decreases the rate of diffusion.

  g) Larger surface area slows down diffusion.

Follow up 02 Minutes

- Refer to **activity 5.6** on page **58 and activities 5.7** and **5.8**on page 59 of the textbook for their interest.

Answer Key

True or False

a) True

b) True

c) True

d) False

e) True

f) False

g) False

Grade 6 **Lesson Plan 10**

MATTER AS PARTICLES

 Duration: 40 Minutes

Students Learning Outcome:

- Explain the changes in states; melting, freezing, evaporation, condensation and sublimation using the particle model of matter.

Materials:

- writing board and chalk / board marker
- perfume spray / scent and pieces of cotton
- transparent / clear cups
- food colors /ink
- salt of different particle size
- pictures and multimedia presentation tools (optional).

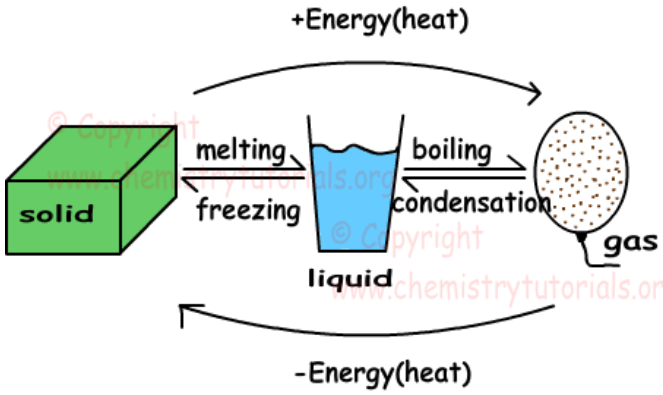
Information for Teacher

- In melting solid changes into a liquid when heat is applied. Understand that the particles gain energy and start moving more freely, resulting in a change in their arrangement.
- Freezing is the opposite of melting. When a liquid loses heat, its particles slow down and come closer together, forming a solid.
- Evaporation occurs when a liquid changes into a gas at a temperature below its boiling point. Particles at the surface gain enough energy to escape into the air, causing the liquid to gradually decrease in volume.
- Condensation is the reverse of evaporation. When a gas loses heat, its particles slow down and come closer together, forming a liquid.

- In sublimation a solid directly changes into a gas without going through the liquid state. Particles gain enough energy to break free from the solid structure and become gas particles.
- To explore the related activities and concepts, visit the following links:
  - https://www.youtube.com/watch?v=oIYyeFhZ7eE
  - https://www.dkfindout.com/us/science/solids-liquids-and-gases/changing-states/

Introduction 4 minutes

- Start the lesson with the students by asking questions related to the changes they observe when substances are heated or cooled.
  - What happens to ice when you leave them outside on a hot summer day?
  - How does water in a kettle change when you heat it on a stove?
  - What happens to a chocolate bar when you hold it in your hand for a while?
  - How does the smell of food spread when you heat it on the stove?
  - How do washed clothes become dry?
- Encourage students to think about the basic changes that occur during heating or cooling processes and facilitate them to relate these changes to the behavior of particles in different states of matter.
- Show the process flow of changes in states with the help of a chart or make process flow diagram on the board.



- Introduce and explain to them the changes in states of matter: melting, freezing, evaporation, condensation, and sublimation and how it is related to particle motion.
- Discuss each change in detail, including the conditions required for the change to occur and the corresponding energy exchange.

- Emphasize how the particle arrangement and motion change during each state change.Involve the students to recall about the particle theory of Matter.
- Facilitate class discussion and answer questions

Development

Activity 1 — 12 minutes

- Tell the students that lets do some demonstrations to illustrate and explain the changes in states of matter.
- Instruct them to observe and describe the changes happening at the particle level during each demonstration.
- Melting Ice Cubes: Provide each student with an ice cube and ask them to observe what happens as the ice cube is exposed to room temperature. Have they describe the changes and explain that the ice is melting into liquid water?

- Freezing Water: Give students small cups of water and instruct them to place the cups in the freezer. After a designated time, have them check on the cups and describe the changes they observe, noting that the liquid water has turned into solid ice.

- Boiling Water: Set up a demonstration where you heat a pot of water on a hot plate or stove. As the water begins to boil and produce steam, explain to students that boiling is the process in which a liquid turns into a gas, and the steam they see is water vapor.

- Condensation on a Cold Surface: Fill a clear glass with ice-cold water or place an ice pack in a transparent bag. Ask students to observe the outside of the glass or bag and describe what they see. Help them understand that the moisture collecting on the surface is condensation, where water vapor in the air turns back into liquid form.

- Evaporation: Provide students with small dishes of water and ask them to place them in different locations around the classroom, such as near a window, on a heater, or under a fan. Have them periodically check the dishes and record their observations of any changes in the water level, explaining that evaporation occurs as the water slowly turns into vapor and disappears?
- Sublimation of Dry Ice: If available, demonstrate the sublimation of dry ice (solid carbon dioxide) in a well-ventilated area. Show students how the solid dry ice transforms directly into carbon dioxide gas, creating the appearance of "smoke" or fog.
- Encourage students to think critically about the changes they observe during heating or cooling processes and to relate them to the behavior of particles in different states of matter.

Activity 2 **05 minutes**

- Put sand at the bottom of the china dish.
- Sprinkle ammonium chloride powder on top of the sand.
- Set up the heat source and ensure a safe working area.
- Insert the funnel tightly into the container's mouth and seal with wet cotton.
- Carefully heat the container from the bottom.
- Observe the sublimation process as ammonium chloride turns to gas.

- Notice the gas cooling and becoming solid on the cool funnel surface.
- Take note of the changes during sublimation and condensation.

Activity 3 **08 minutes**

- Divide students into groups.
- Assign each group a scenario written on the handout.
- Ask them to analyze the changes in states of matter in groups and discuss the role of particles in these changes.
- Instruct students to prepare a presentation, summarizing their findings in groups.
- Each group will present their explanations to the class.

Sample Scenario:

Scenario 1:

- A glass of ice water is left on a table, and after some time, the ice cubes have completely melted, and the water has reached room temperature. Explain this change using the particle theory of matter.

Scenario 2:

- A wet shirt is hung outside on a sunny day. Over time, the shirt dries up, and the water on it disappears. How does this change relate to the particle theory of matter?

Scenario 3:

- A pot of boiling water is left uncovered on a stove. As time passes, the water level decreases. Explain the process of evaporation and its connection to the particle theory of matter.

Scenario 4:

- A glass of cold lemonade is left outside on a hot summer day. After some time, water droplets form on the outer surface of the glass. How can you explain this occurrence using the particle theory of matter?

Scenario 5:

- Dry ice (solid carbon dioxide) is placed in a container. As it warms up, it transforms directly from a solid to a gas without going through the liquid state. Explain this process of sublimation and its relationship to the particle theory of matter.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the key concepts learned in the lesson, highlighting the changes in states of matter and their connection to the particle theory of matter.
- Encourage students to reflect on the real-life applications of these concepts, such as cooking and weather conditions.

Assessment — 05 minutes

- Instruct the students to open page # 63 and solve MCQs (Question 5.1) individually.
- Give them 3 minutes for this.
- Move around in the class and check their work.

OR

- Write the following statements on the board and instruct the students to fill in the blanks with the appropriate words to complete the sentences.
  1. When a liquid changes into gas, it is called _____.
  2. The process in which a solid changes directly to a gas is known as _____.
  3. The state change from a gas to a solid is called _____.
  4. During _____, a liquid changes to a solid.
  5. The conversion of a gas to a liquid is called _____.

Follow up — 03 minutes

- Assign homework that reinforces the concepts learned, such as researching and writing about real-life examples of changes in states of matter.
- Refer to **Activity 5.9** on page 60 and **Activity 5.10** on page 61 of the textbook for their interest.

Answer Key

Answer Key - Fill in the blanks

1. Evaporation
2. Sublimation
3. Deposition
4. Freezing
5. Condensation

. **Grade 6** **Lesson Plan 11**

ELEMENTS AND COMPOUNDS

Duration: 40 Minutes

Student Learning Outcome:

- Recognize the names and symbols of some common elements (first 10 elements of the periodic table) and recognize their physical properties.

Materials

- writing board and boar markers / chalk
- textbook (General Science 6 PCTB)
- periodic table posters or handouts
- flashcards (physical properties such as color, state at room temperature, density etc.)
- worksheets-assessments

Information for Teacher

- Elements are substances that cannot be broken down into simpler substances.
- The periodic table is a chart that organizes elements based on their properties.
- Elements have unique names and symbols.
- Elements can be classified as metals, non-metals, and metalloids based on their properties.
- Elements have different physical properties, such as color, state at room temperature, density, etc.
- Atomic number Z represents the number of protons in the nucleus of an atom.
- Atomic mass A represents the average mass of an atom of an element, including protons, neutrons, and electrons.

Introduction 05 minutes

- Start the lesson by asking following questions to the students?
  - What are elements? Can you give an example of an element?
  - Can you name any elements and their symbols?
  - Can you think of any everyday objects that are made up of specific element? What is Lead Pencil made of? (Graphite, Carbon)
- Encourage discussion in the class and give feedback.

Development

Activity 1 12 minutes

Atomic Number	Name of element	Symbol
1	Hydrogen	H
2	Helium	He
3	Lithium	Li
4	Beryllium	Be
5	Boron	B
6	Carbon	C
7	Nitrogen	N
8	Oxygen	O
9	Fluorine	F
10	Neon	Ne

- Display or show the periodic table chart to the students.
- Present a brief overview of the periodic table and the first 10 elements.
- Explain that atomic number represents the number of protons in the nucleus of an atom and is unique to each element.
- Explain that atomic mass represents the average mass of an atom of an element, including protons, neutrons, and electrons.
- Discuss the names and symbols of the first 10 elements and their physical properties.
- Emphasize their significance and common uses such as:
  - Hydrogen (H): Used as a fuel for rockets and to make water.
  - Helium (He): Used to fill balloons.
  - Lithium (Li): Used in rechargeable batteries for phones and laptops.
  - Beryllium (Be): Used in making sports equipment.
  - Boron (B): Used in laundry detergents.
  - Carbon (C): Used in pencils and charcoal for drawing.
  - Nitrogen (N): Used to make plants grow and as a component of fertilizer.

- Oxygen (O): Used by humans and animals for breathing and to make fire burn.
- Fluorine (F): Used in toothpaste to keep teeth healthy.
- Neon (Ne): Used in colorful signs and lights.

- Use the following mnemonic device to help students memorize the first 10 elements of the periodic table:
  - H, H, Li, Be, B, C, N, O, F, Ne
  - "Huma Helps Little Bilal Bake Cake Noodles On Friday Night"

Activity 2 — 06 minutes

- Write one by one on the board the correct name or symbol of the element based on the given information.
- Ask the students to think and fill the blanks on their notebooks.

1. **Atomic number: 6** **Symbol: ___** **Name: ___**	2. **Symbol: He** **Atomic number: ___** **Name: ___**
3. **Name: Oxygen** **Symbol: ___** **Atomic number: ___**	4. Atomic number: 1 Name: ___ Symbol: ___
5. **Symbol: N** **Name: ___** **Atomic number: ___**	

Activity 3 — 06 minutes

- Divide the class into pairs or small groups, ensuring each group has a worksheet.
- Distribute the worksheets of matching elements with their uses to each group.
- Instruct the students that read the element name and its uses from the worksheet.

- Math the element with its uses.

Conclusion/ Sum up/ Wrap up 03 minutes

- Summarize the main learning points discussed throughout the lesson.
- Highlight the importance of recognizing element names, symbols, and physical properties in understanding the world around us.
- Allow the students to ask questions if they have and answer accordingly.

Assessment 05 minutes

- Write the following elements on the board;

  Jumbled Elements: Carbon, Nitrogen, Hydrogen, Beryllium, Oxygen, Helium, Lithium, Fluorine, Boron, Neon
- Instruct the studetns to write the same on their notebooks.
- Now insturct them to rearrange the given elements to form their correct order based on increasing atomic number and write the names of the elements.

Follow up 03 minutes

- Assign homework that reinforces the learning outcome, such as researching and creating a poster on one of the first 10 elements, including its name, symbol, and physical properties.
- Encourage students to write down the definitions of Atomic Number (Z) and Mass Number (A)on their notebooks.

Worksheet- Assessment

Day_____ **Date_____**

Match the Element with Its Uses

Element	**uses**
Hydrogen (H)	Used in rechargeable batteries for phones and laptops.
Helium (He)	Used in making sports equipment.
Lithium (Li)	Used as a fuel for rockets and to make water.
Beryllium (Be)	Used to fill balloons
Boron (B)	Used to make plants grow and as a component of fertilizer.
Carbon (C)	Used in laundry detergents.
Nitrogen (N)	Used in toothpaste to keep teeth healthy.
Oxygen (O)	Used in pencils and charcoal for drawing.
Fluorine (F)	Used in colorful signs and lights
Neon (Ne)	Used by humans and animals for breathing and to make fire burn.

Answer Key:

Answer key Jumbled Elements:

H, H, Li, Be, B, C, N, O, F, Ne

Grade 6 **Lesson Plan 12**

ELEMENTS AND COMPOUNDS

Duration: 40 Minutes

Student Learning Outcome:

- Differentiate that some elements are made of atoms and some elements exist as molecules and have different properties to a single atom of the element.

Materials:

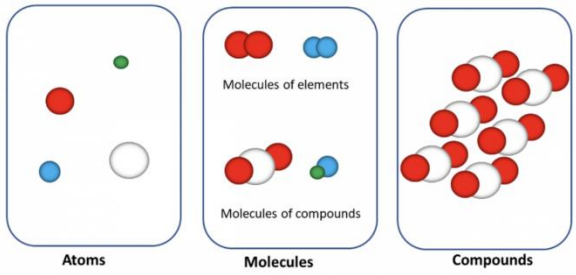
- writing board and board markers / chalk
- textbook (General Science 6 PCTB)
- modeling clay or playdough, scissors and glue
- bingo card and sticky notes
- art supplies (such as colored pencils, markers, or crayons)

Information for Teacher

- Elements are pure substances made of only one kind of atoms and cannot be broken down into simpler substances.
- Some elements exist as individual atoms, while others exist as molecules made up of two or more atoms bonded together.
- Elements in molecular form may have different properties compared to their individual atom form.

Introduction 05 minutes

- Draw the following on the board;

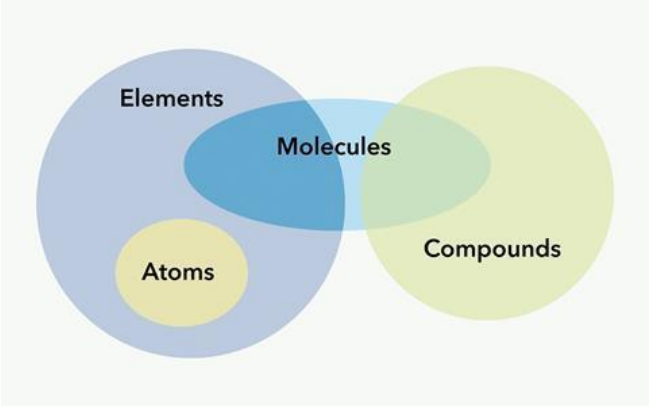


- Engage students in a brainstorming activity.
- Ask them to recall what they already know about elements.
- Write their responses on the board or use sticky notes to create a visual representation of their ideas.
- Introduce the concept of elements being made up of atoms and some elements existing as molecules.
- Give examples of H atom, He as atom and molecule and O_2 as molecules.
- Encourage discussion and give feedback.

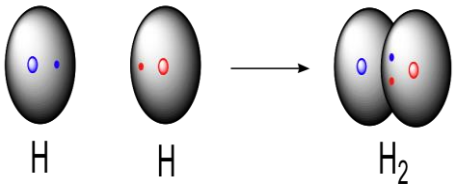
Development

Activity 1 12 minutes

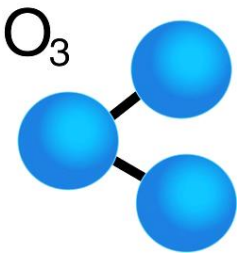
- Draw the following diagram on the board.
- Discuss the concept that elements can exist as individual atoms or as molecules composed of two or more atoms.



- Use visual aids such as diagrams or models to enhance understanding.
- Explain the difference between individual atoms and molecules of elements using simple examples such as H atom, H_2 molecule, and O_2 molecule.



- Use modeling clay or play dough to represent atoms, and construction paper cut into small pieces to represent molecules.
- Guide students in creating models of atoms and molecules of different elements.
- Discuss the differences between individual atoms and molecules.



Activity 2 **08 minutes**

- Provide each student with a bingo card containing a grid of element names (first 10 elements only).
- Ask the students to differentiate between elements made of atoms and elements existing as molecules.
- Explain that some of the elements on the bingo card are made of single atoms, while others are made of molecules.
- Call out the names of various elements, one at a time.
- As students hear an element name, they should check their bingo card to see if it matches.
- If the element is made of atoms, students can mark it with a different color marker or cover it with a token. (e.g. C as in Graphite)
- If the element is made of molecules, students can mark it with another color or use a different token. (e.g. H_2)
- The first student to get a row (horizontal, vertical, or diagonal) of marked elements and correctly differentiated between atoms and molecules should call out "Bingo!"
- Verify the win by checking the marked elements and ensuring the correct differentiation.
- Engage in a class discussion to review the elements and their classification as atoms or molecules.

Activity 3 — 05 minutes

- Provide each student with a blank sheet of paper and art supplies (such as colored pencils, markers, or crayons).
- Encourage students to demonstrate their understanding of elements made of atoms and elements existing as molecules by creating visual models.
- Instruct students to choose one element from the periodic table that is made of atoms and one element that exists as a molecule.
- Ask students to draw and label two separate models on their paper:
  - Model 1: Representing the element made of atoms (e.g., single atoms arranged in a pattern)
  - Model 2: Representing the element existing as a molecule (e.g., multiple atoms bonded together)
- Encourage students to be creative and use symbols or icons to represent the atoms and molecules in their models.
- Once students have completed their models, allow them to share and explain their representations to their peers.
- Have a class discussion to compare and contrast the different models, emphasizing the differences between elements made of atoms and elements existing as molecules.
- Give feedback.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main learning points discussed throughout the lesson, emphasizing the differences between elements, atoms, and molecules.
- Engage students in a brief discussion to reinforce their understanding of the concept.

Assessment — 05 minutes

Write the following on the board and instruct the students to copy in their notebooks and mark as true / false for each statement.

1. Elements can be made of both atoms and molecules. (True/False)
2. Atoms are the smallest units of elements. (True/False)
3. All elements exist as molecules. (True/False)

4. Elements made of atoms and elements made of molecules have the same properties. (True/False)
5. All elements have the same number of atoms. (True/False)

- Move around in the class and check their work.
- Provide your feedback and note how many students have done their work correctly.

OR

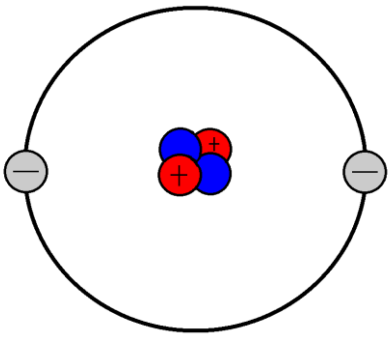
- Write the following on the board;

1. Elements made of atoms are composed of _____.
2. Elements existing as molecules are composed of _____.
3. An example of an element made of atoms is _____.
4. An example of an element existing as a molecule is _____.
5. In elements made of molecules, the molecules are held together by _____.

- Instruct the students to copy in their notebooks and fill the blanks.
- Move around in the class and check their work.

Follow up 2 minutes

- Assign homework that encourage students to further explore elements, atoms, and molecules.
- Remind students of He as a Noble Gas.
- Encourage them to think about the following statement:
  "The atoms whose electronic configuration is stable can exist independently."
- Ask students to make a list of other elements that can exist independently.



Answer Key:

True/False:

1. True
2. True
3. False
4. False
5. False

Fill in the blanks:

1. Elements made of atoms are composed of atoms.
2. Elements existing as molecules are composed of molecules.
3. An example of an element made of atoms is helium.
4. An example of an element existing as a molecule is oxygen.
5. In elements made of molecules, the molecules are held together by chemical bonds.

Grade 6 **Lesson Plan 13**

ELEMENTS AND COMPOUNDS


Duration: 40 Minutes

Students Learning Outcome:

- Illustrate the formation of a compound with the help of a word equation.

Materials:

- writing board and board markers / chalk
- color markers, periodic table, internet access (optional)
- worksheet-assessment
- chart paper

Information for Teacher

- Compounds are formed when elements combine chemically.
- Compounds have different properties than the elements they are made of.
- Word equations can be used to represent the formation of compounds.

Introduction 05 minutes

- Start your lesson by asking following questions:
  - How is water formed? (by combining Hydrogen and Oxygen)
  - What are the elements that make up Table Salt? (Sodium and Chlorine)
  - How do these elements combine to form a new compound? (A chemical reaction)
  - Have you heard of a word equations?

hydrogen + oxygen $\xrightarrow{\text{spark}}$ water

- Encourage discussion and give feedback.

Development

Activity 1 — 08 minutes

- Explain to students that a compound is a substance that is made up of two or more elements that are chemically bonded together.
- The elements in a compound are always present in the same proportions, and they cannot be separated.
- Conduct a guided practice and illustrate the formation of a compound with a word equation.
- Choose simple compounds to start with such as Ammonia (NH_3)

  Hydrogen + Nitrogen → Ammonia

  Carbon + Hydrogen → Methane
- Write the elements of the compound on the board, and then explain how they combine to form a new compound.
- Answer any question that may arise.

Activity 2 — 10 minutes

- Divide students into small groups of 3-4 members.
- Provide each group with a set of materials, including large chart papers or posters, markers, and colored pencils.
- Assign each group a specific compound to work on (e.g., Ammonia, Methane, Sodium Chloride, Sugar, etc.).
- Instruct each group to brainstorm and design their placards, ensuring that they include the following elements:
  - The names of the elements or molecules involved in the compound formation.
  - The chemical formula of the compound.
  - A word equation that describes the reaction or combination of elements/molecules.
  - Visual representations of the elements or molecules coming together to form the compound.

- Encourage students to use colors, symbols, and illustrations to make their posters visually appealing and informative.
- Give time for groups to work collaboratively and create their posters.
- Once all groups have completed their play cards, ask them present their work to the class.
- During the presentations, ask each group to explain their word equation and the process of compound formation depicted on their chart papers/posters.
- Conclude the activity by summarizing the main points.

Activity 3 **07 minutes**

- Give students a list of compounds (Methane, Sugar, Carbon Dioxide, Calcium Carbonate, Polythene, etc.) and them work in pairs or small groups to illustrate the formation of each compound with a word equation.
- Provide students access to Periodic table if they need help.
- Once students have completed their word equations, ask them share their work with the class.
- Give feedback.

Conclusion/ Sum up/ Wrap up **03 minutes**

- Recap the main learning points about compound formation and word equations.
- Discuss the significance of compounds in everyday life and their importance in various fields (e.g., medicine, industry, agriculture).
- Assign homework where students research and write about one compound of their choice, including its formation and uses.

Assessment **05 minutes**

- Write the following statements on the board.
- Instruct the students to think and fill in the blanks with the appropriate elements and compounds involved in the word equations.

1. Carbon + Oxygen = _____
2. Hydrogen + Chlorine = _____
3. Sodium + Chlorine = _____
4. Nitrogen + Hydrogen = _____
5. Iron + Oxygen = _____
6. Methane = Carbon + _____
7. Water = Hydrogen + _____
8. Ammonia = Nitrogen + _____
9. Sugar = Carbon + Hydrogen + _____
10. Sodium Chloride = Sodium + _____

Or

- Provide assessment-worksheet to the students and instruct them to solve it individually.
- After alloted time, share the correct answers and check how many students have correct anwers.

Follow up 02 minutes

- Assign homework tasks that encourage students to further explore word equations.
- Review the assessment sheets to track student progress.
- Provide support to students who are struggling to understand the concepts.

Answer Key:

Answer key "Fill in the blanks":

1. Carbon dioxide
2. Hydrogen chloride
3. Sodium chloride
4. Ammonia
5. Iron oxide
6. Hydrogen
7. Oxygen
8. Hydrogen
9. Oxygen
10. Chlorine

Answer Key MCQs / Assessment - Worksheet

1. **(A)**
2. **(B)**
3. **(A)**
4. **(A)**
5. **(A)**

Worksheet – Assessment

Choose and encircle the best answer for each question.There is only one correct answer for each question.

1. What is the word equation for the formation of water?
   (A) Hydrogen + oxygen → water
   (B) Hydrogen + oxygen → hydroxide
   (C) Hydrogen + oxygen → hydrogen oxide
   (D) Hydrogen + oxygen → dihydrogen monoxide
2. What is the word equation for the formation of sodium chloride?
   (A) Sodium + chlorine → salt
   (B) Sodium + chlorine → sodium chloride
   (C) Sodium + chloride → sodium chlorate
   (D) Sodium + chlorine → sodium hypochlorite
3. What is the word equation for the formation of sugar?
   (A) Carbon + hydrogen + oxygen → sugar
   (B) Carbon + hydrogen + oxygen → sucrose
   (C) Carbon + hydrogen + oxygen → glucose
   (D) Carbon + hydrogen + oxygen → fructose
4. What is the word equation for the formation of ammonia?
   (A) Nitrogen + hydrogen → ammonia
   (B) Nitrogen + hydrogen → ammonium
   (C) Nitrogen + hydrogen → nitride
   (D) Nitrogen + hydrogen → nitrous oxide
5. What is the word equation for the formation of methane?
   (A) Carbon + hydrogen → methane
   (B) Carbon + hydrogen → methanol
   (C) Carbon + hydrogen → ethane
   (D) Carbon + hydrogen → propane

Grade 6 **Lesson Plan 14**

MIXTURES

Duration: 40 Minutes

Student Learning Outcome:

- Differentiate between pure substances and mixtures on the basis of their formation and composition.

Materials:

- writing board and board markers / posters
- worksheet-assessment
- iron fillings
- sand, magnet, sieve, internet access (optional)
- chart paper

Information for Teacher

- Pure substances are made up of only one type of particle, either atoms or molecules, and have a fixed composition. (e.g. water)
- Mixtures are combinations of two or more substances that can be separated physically and do not have a fixed composition. (e.g. air)

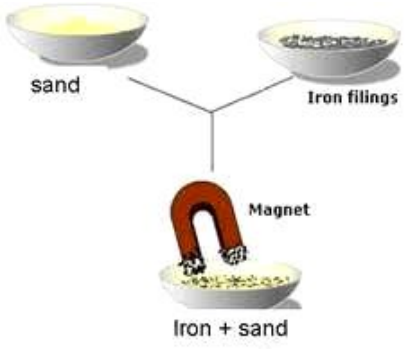
Introduction 05 minutes

- Review with the students, the concept of mixtures and their types (homogeneous and heterogeneous) covered in their previous lesson.
- Ask the students to recall examples of mixtures (e.g. air) they have already learned.
- Ask them to think about different substances (e.g. water) and mixtures they encounter in their daily lives. Write their responses on the board.
- Give feedback.

Development

Activity 1 — 12 minutes

- Review some examples of common mixtures and their components.
- Show a sample of a mixture (Iron fillings and sand). Use the samples to explain the composition and separation of mixtures.
- Conduct a demonstration to separate a mixture using physical methods.



- Use a magnet to separate iron filings from sand. Use a sieve to separate small particles from larger particles.
- Discuss each step of the demonstration, emphasizing the physical methods used and how they help separate the components of the mixture.
- Ask them if they can use physical methods to separate compounds into their components.
- Ask them to summarize what they learnt from the activity
- Answer any question that may arise.

Activity 2 — 06 minutes

- Remind students that pure substance consists of only one type of particles and cannot be separated into other substances by physical means and a mixture consists of two or more substances that are physically combined and can be separated by physical means.
- Provide them a list of following items as cut-ups and ask them to work in pairs or small group to determine whether the item in the list is a pure substance or a mixture and then stick it to the relevant column on a chart paper.

  saltwater, gold, air, sugar, vinegar, iron filings, orange juice, carbon dioxide gas, milk, oxygen gas

- Make the following table on the board and instruct the students to copy in their notebooks.

Pure Substance	Mixture

Activity 3 — 05 minutes

- Write the following list of different items on the board;
  - Salt: _____
  - Tap water: _____
  - Aluminum foil: _____
  - Oxygen gas: _____
  - Sand: _____
  - Lemonade: _____
  - Silver: _____
  - Brass: _____
  - Air: _____
  - Sugar: _____
- Instruct the students to copy in their notebooks.
- Divide the participants in groups and ask them to discuss and separate the items into Pure Substance or Mixture. Write "P" for Pure Substance or "M" for Mixture next to each item.
- Give feedback.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main learning points of the lesson, emphasizing the differences between pure substances and mixtures based on their formation and composition.
- Allow students to ask any questions or share their reflections on the topic.
- Give your feedback.

Assessment 07 minutes

- Provide Assessment-Worksheet to the students.
- Instruct them to read each statement carefully and indicate whether each statement is true or false by circling the correct answer.

Or

- Make the following table on the board and ask the students to match each substance on the left with the correct description on the right by drawing a line connecting them.

Substances	Descriptions
Iron	A mixture with a uniform composition
Salt	A pure substance made up of one type of atom
Water	A pure substance made up of two or more different types of atoms
Oxygen	A mixture with a non-uniform composition
Air	A compound made up of sodium and chlorine atoms

Follow up 02 minutes

- Assign homework to reinforce the learning. It should include identifying and classifying substances at home as pure substances or mixtures, and explaining their reasons.
- Encourage students to continue exploring the concept of pure substances and mixtures in their daily lives. They can look for examples and observe how substances are classified around them.
- Discuss any questions or observations students may have in the next class.

Worksheet-Assessment

1. A pure substance is made up of two or more different types of particles. True / False
2. Mixtures can be separated into their individual components through physical methods. True / False
3. Elements are examples of pure substances. True / False
4. Compounds are examples of mixtures. True / False
5. Mixtures have a fixed composition. True / False
6. A homogeneous mixture has the same composition throughout. True / False
7. Heterogeneous mixtures can be easily separated into their components. True / False
8. Sugar dissolved in water is an example of a compound. True / False
9. Sand and water form a homogeneous mixture. True / False

Grade 6 **Lesson Plan 15**

ELEMENTS AND COMPOUNDS

Duration: 40 Minutes

Students Learning Outcome:

- Describe alloys as mixtures of metals and some other elements.

Materials:

- writing board and board markers / chalk
- color pencils, printed images or samples of alloys
- internet access (optional)
- worksheet-assessment

Information for Teacher

- Alloys are mixtures of metals with one or more other elements. They are formed by combining different metals to create new materials with enhanced properties.
- Alloys can have enhanced strength, durability, and resistance to corrosion compared to pure metals.
- Alloys play a crucial role in various industries, including construction, transportation, and electronics.

Introduction 05 minutes

- Encourage students to share their ideas and previous knowledge related to mixtures and metals.
- Ask students the following questions:
  - Do you use Steel utensils at home? (yes or no)
  - What is Steel made of? (Iron, Iron and other metals, etc.)
  - How is Steel different from Iron? (Made by mixing Iron with other elements)

- Write the term "alloys" on the board.
- Introduce the term "alloys" and ask students if they have heard of alloys or have any prior knowledge about them.
- Encourage discussion and give feedback.

Development

Activity 1 — 12 minutes

- Explain that alloys are special types of mixtures that are composed of metals and other elements.
- Discuss the reasons for making alloys, such as enhancing the strength, durability, and specific properties of metals.
- Present examples of different alloys, such as Steel, Stainless Steel, Silicon Steel, Brass, German Silver, Sterling Silver, Red Gold, and White Gold and give examples of daily life objects using these alloys.
- Show images or samples of alloys, if available, to help students visualize their appearance.
- Show short videos that illustrate the concept and process of making alloys, such as Steel.
  - **https://www.youtube.com/watch?v=7c80l-VmNSU**
  - **https://www.youtube.com/watch?v=jaSiStNOMkA**
- Explain the steps involved in alloy formation, including melting the metals and adding the other elements.
- Discuss the role of heat, temperature, and cooling in the alloy formation process.
- Engage students in observing and analyzing the changes that occur during the formation of alloys.
- Answer any question that may arise.

Activity 2 — 06 minutes

- Divide students into small groups.
- Provide each group with a different alloy (Steel, Stainless Steel, Brass, etc.) and its corresponding properties and uses.
- Instruct students to gather information about their assigned alloy, focusing on its composition (made of which elements), properties (such as hard, rust-free, etc.), and uses (cooking pots, surgical tools, automobiles, etc.).
- Tell them that the group that finds all the information first will be the winner.
- Conclude the activity by asking students to summarize the main points.

Alloy	Composition	Properties	Uses

Activity 3 — 06 minutes

- Encourage students to create visual presentations that summarize their findings in activity 2.
- Allow time for groups to prepare their presentations.
- Have each group present their findings and share their visual presentations with the class.
- Facilitate a class discussion to compare and contrast the different alloys, their properties, and uses.
- Encourage students to ask questions and engage in critical thinking about the role and significance of alloys in various contexts.
- Give feedback.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main points discussed during the lesson, emphasizing the definition and importance of alloys as mixtures of metals and other elements.
- Encourage students to reflect on the significance of alloys in everyday life.

Assessment 06 minutes

- Match the alloys (Column A) with their corresponding properties or uses (Column B).

Column A	Column B
Alloys	**Properties/Uses**
Steel	High electrical conductivity
Brass	Resistance to corrosion
Stainless Steel	High strength and toughness
Silicon Steel	Construction of bridges and buildings
German Silver	Cutlery and kitchen appliances

OR

- Provide assessment-worksheet to the students and ask them to solve individually.
- After allotted time share correct answers and check how many students have done their work correctly.

Follow up 02 minutes

- Assign homework tasks that encourage students to further explore word equations.
- Review the assessment sheets to track student progress.
- Provide support to students who are struggling to understand the concepts.

Worksheet-Assessment

Encicle the correct answer.

1. What are alloys?
   a) Pure substances made of only one type of element.
   b) Mixtures of metals and other elements.
   c) Compounds formed by chemical reactions.
   d) Heterogeneous mixtures with varying compositions.
2. Which of the following is an example of an alloy?
   a) Oxygen gas
   b) Sodium chloride
   c) Brass
   d) Carbon dioxide
3. What is the primary purpose of creating alloys?
   a) To create pure substances with unique properties.
   b) To separate metals from other elements.
   c) To enhance the properties of metals.
   d) To convert metals into compounds.
4. Stainless steel is commonly used for:
   a) Making jewelry
   b) Building bridges and structures
   c) Electrical wiring
   d) Baking cakes
5. Which alloy is known for its high strength and resistance to corrosion?
   a) Sterling silver
   b) Red gold
   c) Steel
   d) Silicon steel

Answer Key

Answer Key MCQs

1. b) Mixtures of metals and other elements.
2. c) Brass
3. c) To enhance the properties of metals.
4. b) Building bridges and structures
5. c) Steel

Answer Key Matching Activity

1. Steel - c) High strength and toughness
2. Brass - e) Cutlery and kitchen appliances
3. Stainless Steel - b) Resistance to corrosion
4. Silicon Steel - d) Construction of bridges and buildings
5. German Silver - a) High electrical conductive

Grade 6 **Lesson Plan 16**

ELEMENTS AND COMPOUNDS

Duration: 80 Minutes

Student Learning Outcome:

- Demonstrate ways of separating different mixtures.

Materials:

- writing board and board markers / chalks
- mixtures for demonstrations and student activities (e.g., sand and water mixture, salt and water mixture, ink and water mixture, mud and soil mixture), glass beakers or containers
- textbook (General Science 6 PCTB)
- worksheet-assessment

Information for Teacher

- The constituents of mixtures can be separated by simple physical methods.
- Pouring off the top layer of liquid in a mixture to separate it from the solid or denser components is called decantation.
- Filtration is passing a mixture through a filter paper to separate the solid particles from the liquid.
- Distillation is heating a mixture to separate its components based on their different boiling points.
- Sublimation is changing a solid directly into a vapor without turning it into a liquid first.
- Allowing a solvent to evaporate from a solution to obtain solid crystals is called crystallization.
- Chromatography is separating the components of a mixture by their differential movement through a stationary phase and a mobile phase.

Introduction 05 minutes

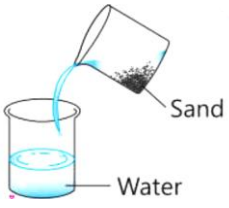
- Show your students a glass full of muddy water.

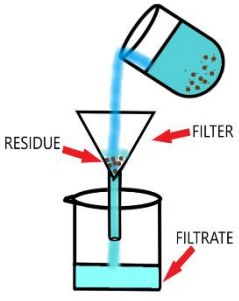
- Ask them the following question:
  - Can you clean this water? (yes or no)
  - How did people in the past clean water from the ponds or wells? (filtering, decantation, boiling, etc.)
  - Can you think of any real-life examples where you have observed the separation of mixtures? Describe what happened and how it was done?
  - Why do you think it is important to know different techniques for separating mixtures? How can these techniques be useful in various fields, such as science or medicine?
  - Have you ever tried to separate a mixture on your own? Share your experience and explain the method you used.
- Remind them that separation of mixtures is possible through physical methods.
- Encourage questions and give feedback.

Development

Activity 1 10 minutes

- Conduct demonstration of separation techniques such as decantation and filtration.
- Explain the steps and observations to the students as you perform the separation processes.
- Remind them the concept of Sublimation from previous unit and how it can be used to separate mixtures.





- Present and explain the remaining separation techniques such as distillation, crystallization, and chromatography using whiteboard, pictures and videos.
- Show short videos that explain these methods.
- Explain the steps involved in each method and discuss the role of heat, temperature, and cooling in each process.
- Answer any question that may arise.

Activity 2 **07 minutes**

- Provide students with different mixtures such as sand, mud, and salt in water.
- Ask them to carry out an experiment to separate these mixtures in small groups.
- Students should use one of the methods of separating mixtures that they have experienced in the class such as decantation and filtration.
- After the experiment, ask students to share about their findings.

Activity 3 **07 minutes**

- Assign each group a different separation technique and instruct them to create a visual representation or model of the technique.
- Allow students to use markers, chart papers and whiteboard to show their understanding of assigned separation technique (decantation, filtration, distillation, sublimation, crystallization, and Chromatography).
- Have groups give their presentations to the class and explain the process involved in their assigned technique.
- Encourage students to ask questions and engage in critical thinking about the processes.
- Give feedback.

Conclusion/ Sum up/ Wrap up **03 minutes**

- Conduct a whole-class discussion to summarize the different separation techniques and their applications.
- Emphasize the importance of separation techniques in various fields and everyday life.

Assessment **06 minutes**

- Provide assessment-sheet to the studensts and instruct them to solve individually.

- Move around in the class and observe their work.
- Share correct answers and check how many students have done their job correctly.

OR

- Write the following statements on the board and ask the students to copy in their notebooks.
- Tell them that **fill in the blanks** with the appropriate separation technique for the given scenarios.

1. Separating salt from seawater: _____
2. Separating a mixture of sand and gravel: _____
3. Separating a mixture of oil and water: _____
4. Separating a mixture of ink colors: _____
5. Separating a mixture of ammonium chloride and sodium chloride: _____

Follow up 02 minutes

- Assign homework that encourages students to research and identify examples of separation techniques used in their daily lives.
- Provide online resources to students to explore further on separation techniques.
- Review the assessment sheets to track student progress.
- Provide support to students who are struggling to understand the concepts.

Worksheet-Assessment

Encircle the correct option for each statement.

1. Which separation technique is best suited for separating a mixture of sand and water?
    a) Decantation
    b) Filtration
    c) Distillation
    d) Chromatography
2. What separation technique is commonly used to separate alcohol from a mixture of alcohol and water?
    a) Decantation
    b) Filtration
    c) Distillation
    d) Sublimation
3. Which technique involves heating a mixture to separate the components based on their different boiling points?
    a) Decantation
    b) Filtration
    c) Distillation
    d) Crystallization
4. _____ is a separation technique that involves the direct conversion of a solid into a vapor without going through the liquid state.
    a) Decantation
    b) Filtration
    c) Distillation
    d) Sublimation
5. What separation technique is used to separate different pigments in ink?
    a) Decantation
    b) Filtration
    c) Distillation
    d) Chromatography

Answer Key

Answer Key MCQs

b) Filtration

c) Distillation

c) Distillation

d) Sublimation

d) Chromatography

Answer Key "Fill in the blanks"

1. Distillation
2. Filtration
3. Separation by Decantation
4. Chromatography
5. Sublimation

Grade 6 **Lesson Plan 17**

ELEMENTS AND COMPOUNDS

Duration: 40 Minutes

Student Learning Outcome:

- Describe the difference between elements, compounds and mixtures.

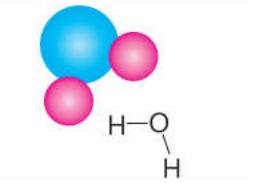
Materials:

- writing board and board markers / chalks
- color pencils, visual aids (pictures or models of elements, compounds, and mixtures)
- samples of salt, sand, water, samples of Sulphur and iron, bar magnet
- safety goggles, test tubes and a test tube rack, burner or heating source
- safety glove, internet access (optional)

Information for Teacher

- Compounds are substances formed by the chemical combination of two or more elements in fixed ratios.
- Mixtures are combinations of two or more substances that are physically mixed but not chemically combined.
- Physical changes do not change the composition of a substance, while chemical changes result in the formation of new substances.
- The formation of a mixture involves the physical mixing of substances, while the formation of a compound involves a chemical reaction.
- Research and explore further on the topic.
    - https://www.twinkl.com.pk/teaching-wiki/elements-compounds-and-mixtures

Introduction 05 minutes



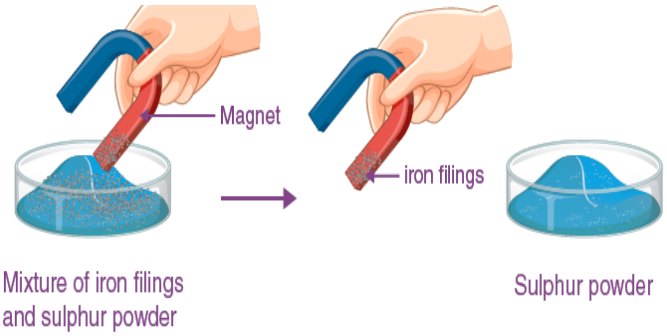
- Ask students to recall what they have learned about elements, compounds, and mixtures in previous lessons.
- Ask the following questions to check their understanding of the differences between these concepts:
  - Is water a compound or a mixture? (compound)
  - Can you separate water into its components using a physical method? (No)
  - What happens when you boil water? (It evaporates, stays a compound)
  - Can you separate sand from sandy water? (Yes)

- Write their responses on the board to create a visual representation of their ideas.
- Encourage questions and give feedback.

Development

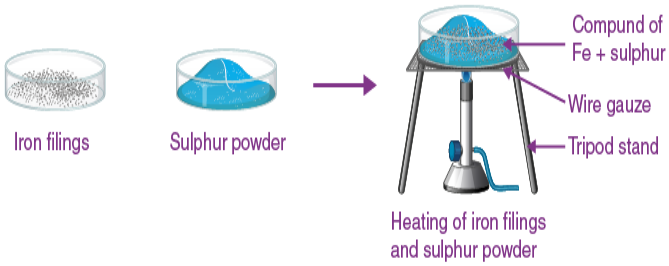
Activity 1 10 minutes

- Explain the difference between elements, compounds, and mixtures.
- Show students the samples of sulfur and iron and explain their properties.
- Discuss the properties of the resulting mixture and emphasize that it can be separated through physical means.



- Demonstrate and explain the formation and composition of a mixture (e.g., sulfur and iron mixture) and a compound (e.g., iron sulfide).
- Use a magnet to separate iron fillings from sulfur powder.
- Discuss physical changes and their role in the formation of mixtures.

- Use the inquiry method to engage students and encourage them to think critically about the concepts.
- Demonstrate and explain the formation and composition of compound i.e. iron sulfide.
- Discuss the chemical change and its role in the formation of this compounds.
- Explain that now the components cannot be separated using physical methods.
- Answer any question that may arise.



Activity 2 **06 minutes**

- Divide students into small groups and provide them with different substances (e.g., salt, sand, sugar, water).
- Instruct the groups to classify each substance as an element, compound, or mixture.
- Encourage students to discuss and justify their classifications based on their understanding of the properties and composition of the substances.
- Allow time for groups to present their classifications and reasoning to the class.

Activity 3 **07 minutes**

- Ask students to work in pairs or small groups to create posters that illustrate the differences between elements, compounds, and mixtures.
- Each group should present their visual representation to the class and explain the key differences.
- Allow students to use markers, chart papers and board to show their understanding.
- Have groups give their presentations to the class and explain the differences between elements, compounds, and mixtures.
- Encourage students to ask questions and engage in critical thinking about the processes.
- Give feedback.

Conclusion/ Sum up/ Wrap up 03 minutes

- Recap the main concepts and learning points discussed in the lesson.
- Emphasize the differences between elements, compounds, and mixtures.

Assessment 07 minutes

- Write the following statements on the board.
- Ask the students to fill in the Blanks with the appropriate terms (elements, compounds, mixtures)
  1. A substance that cannot be broken down into simpler substances by chemical means is called an _____.
  2. _____ are substances formed by the chemical combination of two or more elements.
  3. _____ are combinations of two or more substances that are physically mixed but not chemically combined.
  4. Water is an example of a _____.
  5. Saltwater is an example of a _____.

OR

Write the following statements on the board and ask the students to tell True or False for each statement.

1. Elements are pure substances that cannot be broken down into simpler substances by chemical means.
2. Compounds are combinations of two or more substances that are physically mixed but not chemically combined.
3. Mixtures can be separated into their individual components by physical means.
4. Physical changes result in the formation of new substances.
5. The formation of a mixture involves a chemical reaction.

Follow up 02 minutes

- Assign homework that requires students to identify examples of elements, compounds, and mixtures in their daily lives.
- Provide feedback on their performance during assessments.

Answer Key

Answer Key Fill in the blanks

1. element
2. Compounds
3. Mixtures
4. compound
5. mixture

Answer Key "True or False"

1. True
2. False
3. True
4. False
5. False

Grade 6 **Lesson Plan 18**

ENERGY

Duration: 40 Minutes

Student Learning Outcome:

- Relate potential energy and kinetic energy.

Materials:

- writing board and board markers
- color pencils, duster and chart paper
- various objects that can demonstrate potential and kinetic energy (e.g., ball, table, spring, rubber band, pendulum, etc.)

Information for Teacher

- Potential energy is the stored energy an object possesses due to its position.
- Kinetic energy is the energy of an object in motion.
- Potential energy can be converted into kinetic energy and vice versa.

Introduction 05 minutes

- Asking students to name things that have energy. (Sun, battery, etc.)
- Write their responses on the board or chart paper.
- Now ask them to consider the different forms of energy that their examples represent. (Sun has heat energy, battery has chemical energy, etc.)
- Once students have finished brainstorming, review their list and identify the different forms of energy that they have mentioned.
- Explain that there are two main types of energy: potential energy and kinetic energy.
- Encourage questions and give feedback.

Development

Activity 1 — 10 minutes

- Write the term **Potential Energy** on the board.
- Explain that potential energy is the energy of position. Give students some examples of potential energy, such as a ball held in your hand, a stretched rubber band, and a book sitting on a table.
- Explain that kinetic energy is the energy of motion. Give students some examples of kinetic energy, such as a ball rolling down a hill, a stretched rubber band that is released, and a book falling off a table.
- Explain the different forms of potential energy, such as gravitational potential energy, elastic potential energy, and chemical energy. Use real-life examples (Roller coaster, rubber band, batteries, etc.) to help students understand each form.
- Present various examples of Kinetic Energy such as heat energy, light energy, sound energy, electrical energy, and mechanical energy. Explain how kinetic energy is the energy of an object in motion.
- Show pictures from textbook (grade 6, topic energy, page 97) to further illustrate the concepts of potential and kinetic energy.
- Facilitate a discussion to help students make connections between potential and kinetic energy, highlighting how potential energy can be converted into kinetic energy and vice versa.
- Conduct a demonstration with objects that can demonstrate potential and kinetic energy. For example, show how potential energy is converted into kinetic energy by releasing a spring or letting a pendulum swing.
- Answer any question that may arise.

Activity 2 — 05 minutes

- Divide students into groups of 3 or 4.
- Give each group a rubber band, a ball, and a table.

- Have students experiment with the rubber band and the ball to see how potential energy and kinetic energy are related.
- For example, students could stretch the rubber band and then release it, or they could roll the ball down the table.
- Have students discuss their observations and come up with the relationship between potential energy and kinetic energy.
- After the experiment, ask students to share about their findings.

Activity 3 **10 minutes**

- Divide the students into small groups.
- Provide each group with a set of index cards or small pieces of paper.
- Instruct the students to write down examples of either kinetic energy or potential energy on each card, based on the examples discussed in the lesson.
- Each group should have an equal number of cards representing kinetic energy and potential energy.
- After the cards are prepared, have the groups shuffle them and mix them up.
- Instruct each group to sort the cards into two separate piles: one for kinetic energy and one for potential energy.
- Encourage the groups to discuss and justify their choices as they sort the cards.
- Once the sorting is complete, ask each group to share their sorted piles with the rest of the class.
- Have a class discussion to clarify any misconceptions and reinforce the understanding of the examples of kinetic and potential energy.
- Summarize the activity by emphasizing the key characteristics and differences between kinetic and potential energy.
- Conclude by asking students to reflect on the activity and discuss real-life examples they encounter daily that involve either kinetic or potential energy.
- Give feedback.

Conclusion/ Sum up/ Wrap up 03 minutes

- Summarize the main concepts of potential and kinetic energy, emphasizing their relationship and the various examples discussed.
- Ask students to reflect on their learning by discussing how potential and kinetic energy are interconnected and how they can be observed in everyday life.

Assessment 05 minutes

- Write the following statements on the board.
- Ask them to determine whether each statement is true or false. Write "T" for True and "F" for False.
    1. Kinetic energy refers to the energy possessed by an object in motion. (True/False)
    2. Potential energy is the energy stored in an object due to its position or condition. (True/False)
    3. Sound energy is an example of potential energy. (True/False)
    4. Gravitational potential energy is dependent on an object's height and mass. (True/False)
    5. Electrical energy is a form of kinetic energy. (True/False)

OR

- Make the following table on the board.
- Ask the students to match the examples of energy on the left with their correct forms on the right.

Examples of Energy	Form of Energy
Heat energy	Kinetic energy
Light energy	Potential energy
Sound energy	Kinetic energy
Gravitational potential energy	Potential energy
Electrical energy	Kinetic energy

Follow up 02 minutes

- Assign homework that requires students to find and explain examples of potential and kinetic energy in their surroundings.
- Encourage students to research and explore additional examples of potential and kinetic energy such as flowing water energy and wind energy producing electricity.
- Ask them to think why speed of sound is different in different media such as water, air and solids.
- Provide feedback on their performance during assessments

Answer Key

Answer Key Matching Activity

1. Heat energy (a) Kinetic energy
2. Light energy (c) Kinetic energy
3. Sound energy (c) Kinetic energy
4. Gravitational potential energy (b) Potential energy
5. Electrical energy (a) Kinetic energy

Answer Key "True or False"

1. Kinetic energy refers to the energy possessed by an object in motion. (True)
2. Potential energy is the energy stored in an object due to its position or condition. (True)
3. Sound energy is an example of potential energy. (False)
4. Gravitational potential energy is dependent on an object's height and mass. (True)
5. Electrical energy is a form of kinetic energy. (True)

Grade 6 **Lesson Plan 19**

ENERGY

Duration: 40 Minutes

Student Learning Outcome:

- Demonstrate an energy transfer such as a bouncing ball by energy transfer diagram, e.g. potential energy (gravitational potential energy, elastic potential energy), kinetic energy (motion, thermal, light, sound, electricity, etc.).

Materials:

- writing board and board markers
- color pencils and bouncing ball
- objects or pictures representing energy converters (e.g., model car, drill, plant, washing machine)
- pictures of energy transfer diagrams
- worksheet-assessment

Information for Teacher

- Energy can be transferred from one form to another.
- Energy transfer diagrams show the flow of energy from one form to another.
- Energy converters are devices or systems that convert one form of energy into another.
- Energy dissipation refers to the loss of energy as heat or other non-useful forms during energy transfers.

Introduction 05 minutes

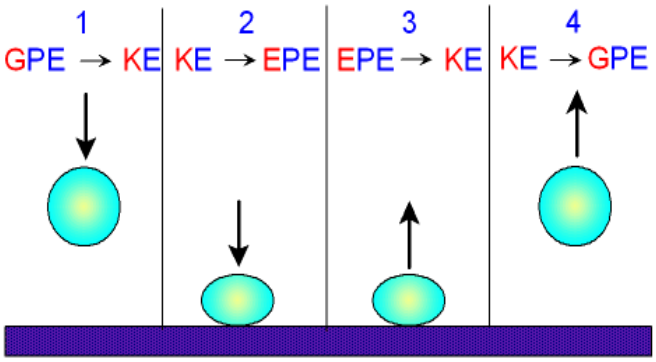
- Engage students in a brief discussion about different types of energy they are familiar with (e.g., light, heat, sound, electricity).

- Recap their understanding of potential energy and kinetic energy, using examples such as a ball on a hill and a moving car.
- Introduce the concept of energy transfer and the idea that energy can be transformed from one form to another by asking simple question such as:
    - What happens when you rub your both hands? (Kinetic energy changes to heat energy)
- Encourage questions and give feedback.

Development

Activity 1 — 10 minutes

- Demonstrate the concept of energy transfer using a bouncing ball activity.
- Lift the ball to a certain height and release it, allowing it to bounce.
- Show students the bouncing ball and explain that when the ball is lifted, it gains potential energy, and when it is released, the potential energy is converted to kinetic energy as the ball bounces.
- Use a whiteboard or chart paper to draw an energy transfer diagram, depicting the flow of energy from potential energy to kinetic energy.



- Explain the different forms of energy that are involved in the activity, such as gravitational potential energy, elastic potential energy, and kinetic energy.
- Use the whiteboard or chart paper to draw an energy transfer diagram, showing the conversion of potential energy to kinetic energy during the bouncing motion.
- Explain each step of the diagram and engage students in a discussion about the energy transformations that occur.
- Discuss other examples of energy transfers, such as a moving car (chemical energy to kinetic energy) or a light bulb (electrical energy to light energy).

- Introduce the concept of energy converters and provide examples, such as a plant (solar energy to chemical energy) or a washing machine (electrical energy to mechanical energy).
- Answer any question that may arise.

Activity 2 **05 minutes**

- Divide students into groups of 2 or 3.
- Give each group a bouncing ball and a piece of chalk.
- Have students experiment with the bouncing ball and draw an energy transfer diagram to show how the energy changes as the ball bounces.
- After the experiment, ask students to share about their findings.

Activity 3 **05 minutes**

- Divide students into pairs.
- Provide each pair with pictures of objects representing energy converters (e.g., model car, drill, plant, washing machine, etc.).
- Instruct students to identify the energy transfers involved in the operation of each energy converter and create their own energy transfer diagrams for their assigned object.
- Encourage students to discuss and collaborate with their partners to complete the task.
- Have each pair present their energy transfer diagrams and explain the energy conversions that occur.
- Give feedback.

Conclusion/ Sum up/ Wrap up **03 minutes**

- Recap the main concepts learned during the lesson, including potential energy, kinetic energy, energy transfer diagrams, energy converters, and energy dissipation.
- Discuss real-life examples where energy transfer and conversion occur, emphasizing the importance of understanding these concepts in various contexts.

Assessment 10 minutes

- Make the following table on the board.
- Ask the students to match the terms related to energy with their corresponding definitions by drawing a line connecting them.

Energy Terms	Definitions
Potential energy	The energy of position or stored energy.
Kinetic energy	The energy of motion or energy in use.
Energy transfer	The process of energy changing from one form to another.
Energy conversion	The transfer of energy from one object or system to another.
Energy dissipation	The loss of energy over time.

OR

- Provide assessment-worksheet to the students and ask them to solve individually.
- Move around in the class and check their work.

Follow up 02 minutes

- Assign homework that requires students to find and explain examples of potential and kinetic energy in their surroundings.
- Encourage students to research and explore additional examples of potential and kinetic energy such as flowing water energy and wind energy producing electricity.
- Ask them to think why speed of sound is different in different media such as water, air and solids.
- Provide feedback on their performance during assessments.

Worksheet-Assessment

Encircle the correct option.

1. Which of the following has the most potential energy?
   a) A ball at the top of a hill
   b) A ball rolling down a hill
   c) A ball at the bottom of a hill
   d) A ball at rest on a table
2. Which of the following has the most kinetic energy?
   a) A ball at the top of a hill
   b) A ball rolling down a hill
   c) A ball at the bottom of a hill
   d) A ball at rest on a table
3. What is the difference between potential energy and kinetic energy?
   a) Potential energy is the energy of motion, while kinetic energy is the energy of position.
   b) Potential energy is the energy of position, while kinetic energy is the energy of motion.
   c) Potential energy is the energy of an object that is not moving, while kinetic energy is the energy of an object that is moving.
   d) Potential energy is the energy of an object that is moving, while kinetic energy is the energy of an object that is not moving.
4. Which of the following is an example of energy transfer?
   a) A ball rolling down a hill
   b) A plant growing
   c) A car engine running
   d) All of the above
5. What is energy dissipation?
   a) Energy dissipation is the loss of energy over time.
   b) Energy dissipation is the conversion of one form of energy into another.
   c) Energy dissipation is the process of energy changing from one form to another.
   d) Energy dissipation is the process of energy being converted into heat.

Grade 6 **Lesson Plan 20**

ENERGY


Duration: 40 Minutes

Student Learning Outcome:

- State law of conservation of energy and explain how the law applies to different situations.

Materials:

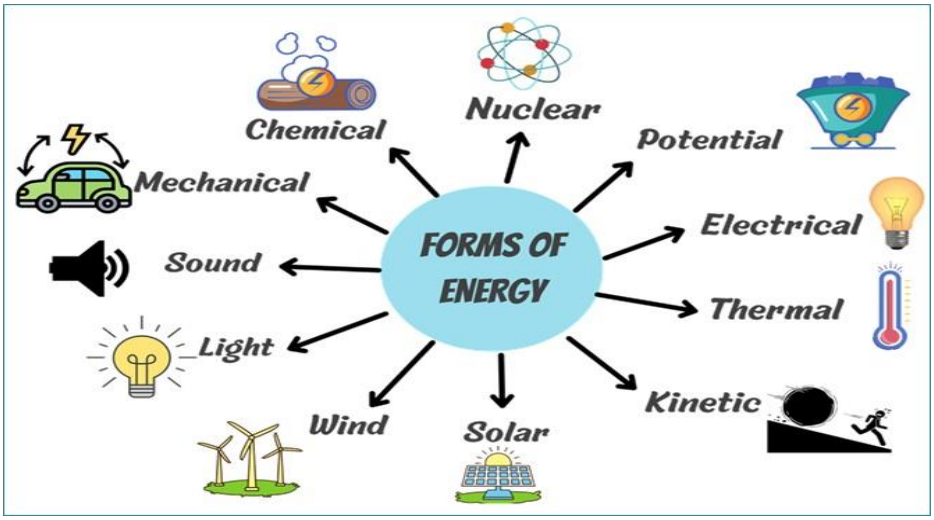
- writing board and board marker / chalks
- textbook (General Science 6 PCTB)
- charts (different forms of energy and law of conservation of energy)
- pendulum and rubber ball
- chart paper

Information for Teacher

- Energy is ability to do some work.
- The SI unit of work or energy is the joule.
- In 1842, Julius Robert Mayer discovered the Law of Conservation of Energy. In its most compact form, it is now called the First Law of Thermodynamics.
- Once a theory has been tested thoroughly and is accepted, it becomes a scientific law.
- Conservation is the total value of a physical quantity or parameter (such as energy, mass, linear or angular momentum) remains constant in a system which is not subject to external influence.
- A pendulum is a body suspended from a fixed point so that it can swing back and forth under the influence of gravity.
    - https://www.youtube.com/watch?v=51RCyBr_nGk

Introduction 08 minutes

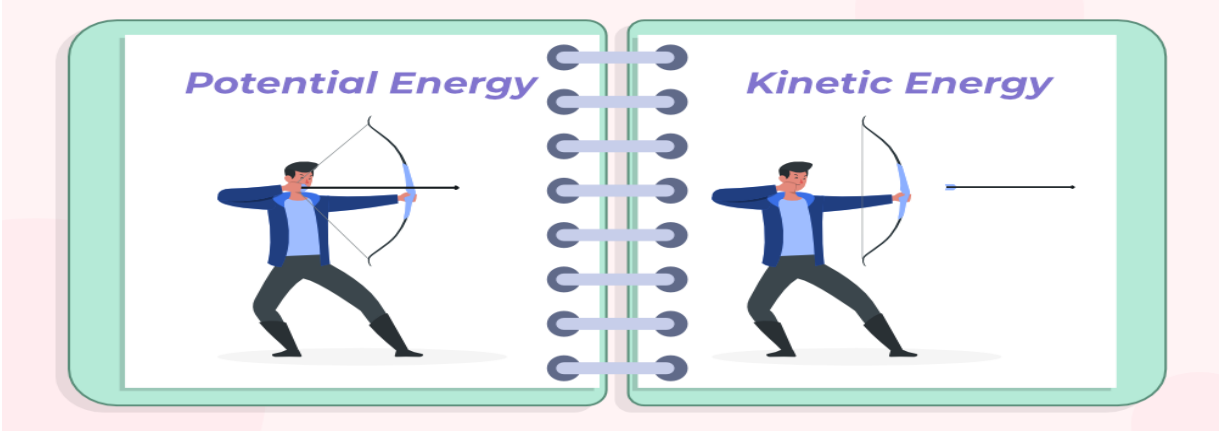
- Start the lesson by asking question to the students that how many types of energy did they know?(take response)
- Show following diagram to students or make this diagram on the board when students



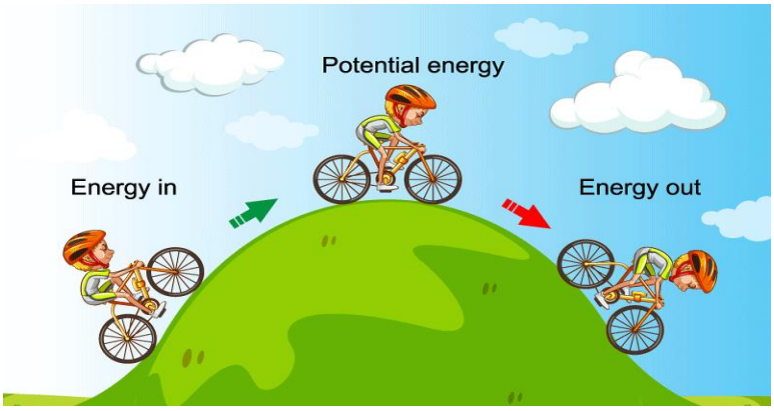
give feedback draw it in form of a mind map.

- Elicit diiferent types of energy from the students.
- Tell them that all forms of energy can be put into two types of energy.
    - Potential Energy P.E, which is enery stored in an object due to its position or some chemical or mechanical process
    - Kinetic nergy K.E, is the energy possessed by an object due its position. Any moving object has Kinetic energy.

- Ask the students that when they pull an arrow and leave it, moving arrow possess what kind of energy?(Kinetic energy)



- Then ask them how this kinetic energy produce?(Man pull the arrow backward)
- Its means that man transfer potential energy to arrow which converts into Kinetic energy.
- Now tell the students that energy cannot be created or destroyed but it can be changed from one form to other form.
- Show the following on a chart paper to the students.

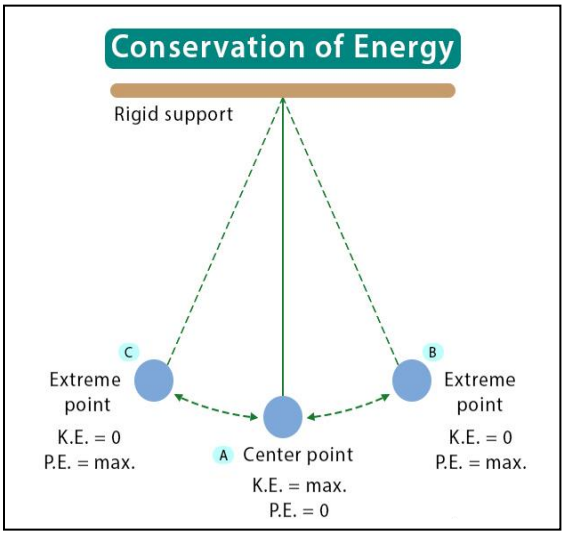


- Tell them that this is called law of conservation of energy.

Development

Activity 1 — 10 minutes

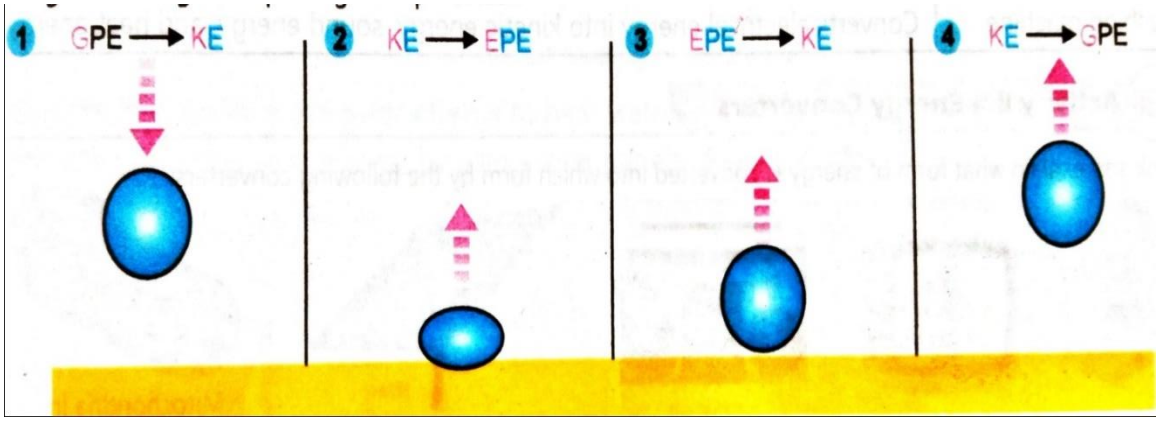
- Arrange a demonstration in the class.
- Place a suspended pendulum on the table before the students.
- Also draw the following diagram of this pendulum on the board and label three positions of suspended pendulum, i.e. Position A is the mean position,
- Now displace pendulum to left side and let it free.
- Now it will move from B to C passing through A.
- Tell the students that during motion, its energy will be conserved as under.
    - At position B and C it has maximum potential energy and no kinetic energy.
    - At position A it will have maximum Kinetic energy but no potential energy.
    - During this whole motion from A to B and then back from B to A and C, its kinetic energy keeps converting.
    - In this way during this process energy keeps changing but not ceased.



Activity 2 — 12 minutes

- Divide the students into four groups.
- Provide one rubber ball to each group and tell them that they will do a bouncing ball activity.
- Ask them to lift up ball above the ground at certain level.
- Then leave it and let it fall towards the ground.

- Draw the following diagram on the board and ask students to compare their observation with it.



- Stage 1.
  - The form of energy stored in the ball when you lift it up.
  - During falling what form of energy is converting into what form.
- Stage 2.
  - When ball hits the ground and gets its shape changed: what form of energy is converted into what.
- Stage 3.
  - When ball retains its shape: what form of energy is converted into what.
- Stage 4.
  - When the ball bounces back and is moving up into the air: what form of energy is converting into what form.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main points of law of conservation of energy.
- Conclude the lesson by summarizing the example of pendulum.
- Encourage questions from the students.

Assessment — 05 minutes

- Write the following statements on the board and ask the students to copy in their notebooks.
- Instruct them to fill in blanks.

- Energy due to movement of an object is called_____
- Energy due to position of an object is called _____
- According to law of conservation within a system energy_____

Follow up 02 minutes

- Explain the law of conservation with at least one example.

Answer Key

- Energy due to movement of an object is called kinetic energy
- Energy due to position of an object is called potential energy
- According to law of conservation within a system energy cannot created or destroyed

Grade 6 **Lesson Plan 21**

ENERGY

Duration: 40 Minutes

Student Learning Outcome:

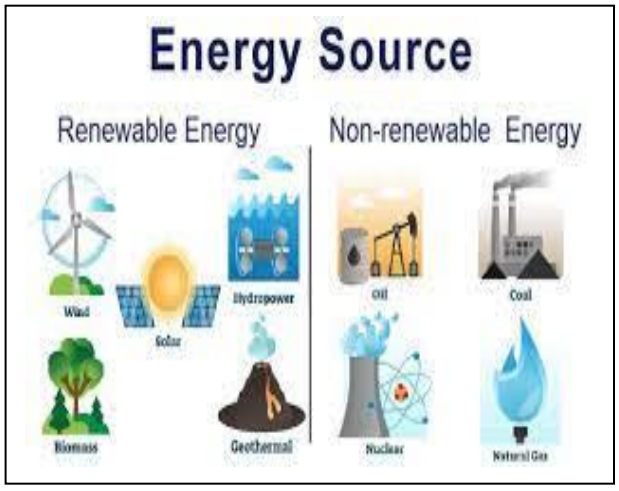
- Assemble and demonstrate a solar panel to operate a small fan. (STEAM)

Materials:

- writing board and board markers / chalks
- textbook (General Science 6th PCTB)
- pictures of renewable and non-renewable energy sources
- chart (solar panel working)
- solar panel, electric wire, a small DC fan and electric switch

Information for Teacher

- There are two types of energy sources, Renewable and Non-Renewable.
- Show the following pictures of renewable and non-renewable energy sources to the students.
- A renewable source of energy is one which cannot be readily replaced by natural means on a level equal to its consumption.
- Most fossil fuels, such as oil, natural gas and coal are considered as non-renewable resource.
- The sources of energy that not go to end or that can be recovered are called renewable sources of energy.



- Solar energy flowing water, wind, plants etc., are the examples of renewable sources of energy.
- Energy converters are the devices which converts one form of energy into another.
- Electric fans, television, car engine and solar panels are some examples of energy converters.
- Sun is the main source of energy. It releases energy at a mass level. The rate of conversion pf energy is 4.26 million metrics per second, which produce 3.846 x 10^{26}W.
- Shortage of energy is the main problem.
- Solar Panels are one of the cheapest sources of energy production.
- Solar Photovoltaic was discovered back in 1839 by French scientist Edmond Becquerel.
- Daryl Chapin, Gerald Pearson and Calvin Fuller were the first to design the first silicon photovoltaic cell which was the precursor of all silicon cells today.
    - https://www.youtube.com/watch?v=NgXqD_JDn6s

Introduction 05 minutes

- Ask students to define energy. (as the capacity or ability to do some work)
- Energy has many forms: such as kinetic energy, potential energy, heat energy, thermal energy, nuclear energy, electrical energy and solar energy etc.
    - Ask students to name commonly used sources of energy, (oil, gas and charcoal)
    - Ask students that have commonly used energy sources are fulfilling our needs?
- After getting their responses, tell them that human being needs more sources of energy to run industries, factories, operate vehicles, planes, ships, etc.
- Ask students that green plants uses what type of energy? (Plants need solar energy to prepare their food in the process of photosynthesis)
- However, with the development in science, technology, mathematics and engineering more sources were invented to fulfill the requirement of the energy source of the world.
- Tell students that Sun is the main source of energy. The core of sun fuses about 600 million tons of hydrogen into helium every second, converting 4 million tons of matter

into energy every second as a result. This energy escaped from the core of the sun in the form of heat and light energy.

- This solar energy can be utilized to produce electrical energy and can be a great renewable alternative to the limited nonrenewable sources of energy such as Coal, Oil and gas.
- Ask students that what are solar panels? (These panels convert solar energy to electrical energy.)
- Ask students that do you think that solar energy can be an alternative to hydroelectricity? (yes it can be cheapest and environment friendly source of electricity)

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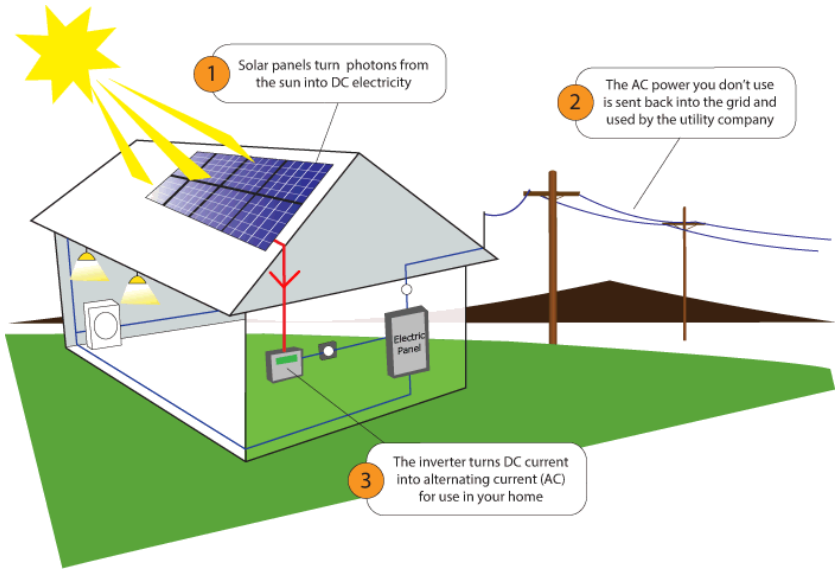
Development

Activity 1 — 10 minutes

- Ask students that what will be the first step of solar panel working?
- Display the following chart in the class.



- Elicit from the students, the sequence wise steps of solar panel working.
- After that explain working of solar panel with the help of the chart.
    - First of all sunlight will fall on solar panel.
    - After that silicon atoms present in solar panel will trap light photon shifting on them.
    - In third step free electrons will move through the layers of solar panel that will produce electricity as electricity is the mainly movement of free electrons.
    - The electric current flows to the edges of panel will move to the inverter through wire.
    - The inverter will convert direct current (DC) into alternate current (AC).
    - In the last step this electricity is supplied to the consumer.
- At end of activity ask some student to repeat working of solar panel before class.

Activity 2 **10 minutes**

- Arrange solar panel, electric wire, a small DC fan, electric switch on table.

- Select a volunteer group of students.
- Arrange student behind table facing towards class so that class can see whole practice.
- Tell the students that now we will run a fan with the help of solar panel.

- First of all ask them to take a piece of wire and connect its one end with negative terminal of the solar panel and other with fan.
- Then ask them to take two other pieces of wire and connect one end of each of these wires with switch.
- Now connect free one end one wire with the fan and free end other wire with the solar panel.
- Then direct students to place solar panel into direct sunlight.
  - Switch on and observe what happened.

    The fan will start working using the electricity produced by solar panel.

    Ask all groups to present their work before class.

Conclusion/ Sum up/ Wrap up 03 minutes

- Summarize the working of solar panel.
- Briefly conclude the assembling steps of solar panel and fan.
- Invite questions from students if any?

Assessment 04 minutes

- Draw this table for assessment for students.
- Write C for correct and I for incorrect.
- If the statement is incorrect, write it in correct form in the next column.

Statement	C/I	Correct Statement
Oil is the main source of energy in solar panel.		
Solar energy is non-renewable source of energy.		
Solar panel produces AC alternate current.		

Follow up 03 minutes

Answer the following questions and write in your notebook.

- What is energy?
- What are the most common sources of energy?
- Do you think that solar energy can be an alternative to hydroelectricity?

Answer Key

Statement	C/I	Correct Statement
Oil is the main source of energy in solar panel.	I	Sun is the main source of energy in solar panel.
Solar energy is non-renewable source of energy.	I	Solar energy is renewable source of energy.
Solar panel produces AC alternate current.	I	Solar panel produces DC Direct Current.

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Grade 6 **Lesson Plan 22**

ENERGY

Duration: 40 Minutes

Student Learning Outcome:

- Design and make a solar water heater (STEAM).

Materials:

- writing board and board markers / chalks
- textbook (General Science 6 PCTB)
- chart (installation diagram of solar water heater)
- small clipboard pieces, disposable glass, straw and glue
- chart paper

Information for Teacher

- The water heater is a device which is used for heating domestic water.
- Solar water heating system is a device that helps in heating water by using the energy from the SUN.
- The Swiss natural scientist Horace Bénédict de Saussure builds a “simple solar water heater”, which is made of a wooden box with a black bottom and covered with glass. The solar collector reaches temperatures of almost 90 °C.
- The solar panels used in hot water systems take up a lot less space on a roof than photo-voltaic systems.
- These panels contain a water-based fluid that carries the sun's heat down to your hot water tank.
- The first commercial solar water heater dates back to the 1896 when Clarence Kemp of Baltimore, Maryland created what he referred to as the “Climax” solar water heater.

Introduction 05 minutes

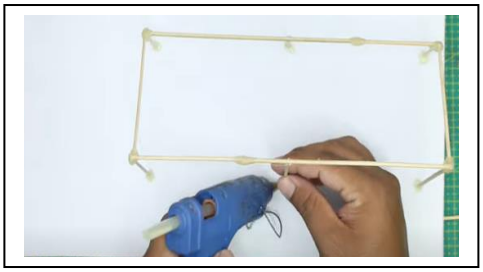
- Start the lesson by asking question to the studenst that what type of water heater they used in their homes? (take resonse)
- Then ask students that have they use solar water heater system?
- Tell students different types of water heater system i.e., electric heater system, gas water heater system and solar water heater system.
- Tell them that there are two types of solar heater system.
    - Flat Plate solar water heater – Solar radiation is absorbed by flat plate collectors which consist of an insulated outer metallic box covered on the top with glass sheet.
    - Evacuated Tube Collector – The Collector is made of double layer borosilicate glass tubes evacuated for providing insulation.
    - Show the following chart to the students to show the installation diagram of solar heater.

Development

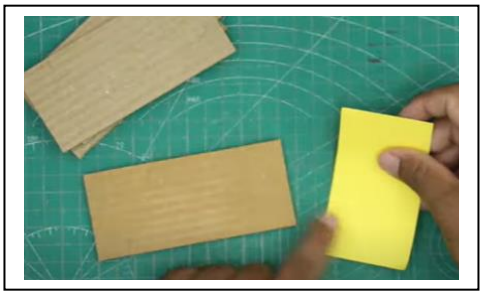
Activity 1 15 minutes

- Arrange the following demonstration with the help of students in the class.
- Select group of our volunteer students.

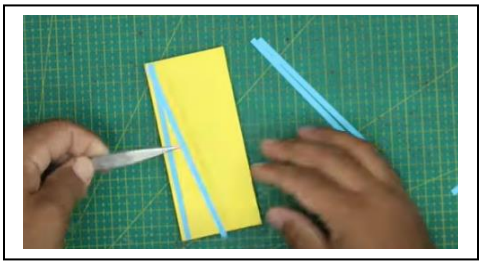
- Arrange following material on table.
    - Small clipboard pieces.
    - Water straw
    - chart
    - disposable glass
    - Glue.



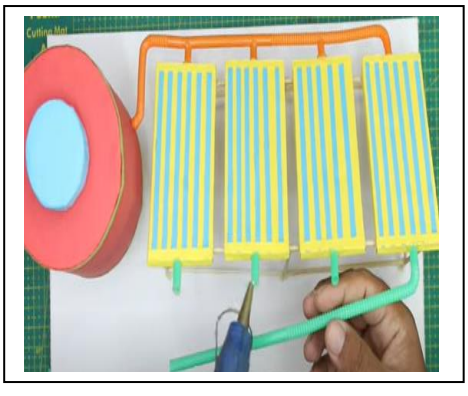
- Ask students to make stand by using small sticks and glue.
- After that direct them to make solar plate by covering the clip board pieces with charts, and place water straw over these plates.

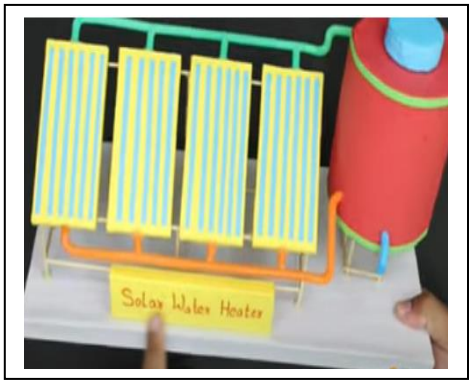


- Then ask them to fix these plates on stand.
- Use one round piece of clipboard and disposable glass to make water tank.
- By using water straws make pipeline one entered from water tank to plates and other leaving plates towards water tank.



- Tell students that cold water is entering from water tank to plates and after heating it is going back to water tank.





Activity 2 — 06 minutes

- Divide the students into groups.
- Draw the following table on the board.
- Fill it with the help of students.
- Ask students about the advantages of solar water heater and write down in table.
- Then ask disadvantages of solar water heater system and write down in table.

Advantages	Disadvantages
○ It is environment friendly	○ Compared to photovoltaic panels, solar thermal panels only heat water.
○ Solar water heaters save money on your energy bill	○ Solar heaters require sufficient roof space to accommodate them.
○ No use of fossil fuels.	○ Solar water heaters require direct sunlight to function.
○ Safe to operate	○ The system does not function on cloudy, rainy, or foggy days
○ Solar water heaters don't produce any harmful gases or fumes	

Activity 3 — 06 minutes

- Divide students into four groups.
- Provide charts to each group.
- Ask them to make diagram of working solar heater system and also label its parts.
- After the groups have completed their work ask one of them to come forward and present their work before class.
- Direct remaining groups to make correction in model diagram where needed.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main points working model of solar water heater system.
- Also tell them the advantages of solar water heater system.

Assessment — 03 minutes

- Ask the students to write at least three advantages and disadvantages of solar water heater in their notebooks.
- Move around in the class and check their work.

Follow up — 02 minutes

Draw and label the solar water heater system.

Grade 6 **Lesson Plan 23**

ELECTRICITY

Duration: 40 Minutes

Students Learning Outcome:

- Recognize electric current as a flow of charges.

Materials:

- writing board and board marker / chalks
- textbook (General Science 6 PCTB)
- blue and red ribbon and some pieces of ropes.

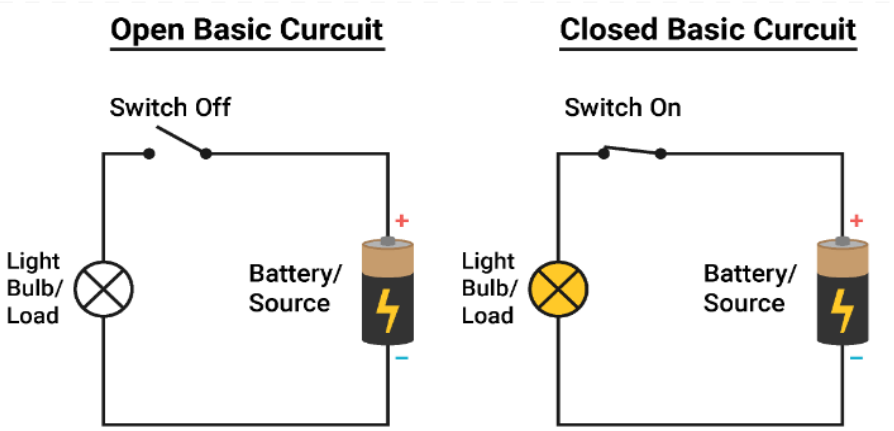
Information for Teacher

- An electric current is a flow of charged particles, such as electrons or ions, moving through an electrical conductor or space.
- There are mainly two types of current.
- Direct Current (DC): consists of the displacement of electrical charges that do not change their direction of travel over time.
- Alternating Current (AC) is a type of electrical current, in which the direction of the flow of electrons switches back and forth at regular intervals or cycles.
- The S.I unit of charge is coulomb and measurement of electric current happens in units of coulomb per second which is 'ampere'.
- Conductors are the materials or substances which allow electricity to flow through them. Metals, humans, earth, and animals are all conductors
- Conductors have free electrons on its surface which allow current to pass through easily
- Insulators are the materials or substances which resist or don't allow the current to flow through them.
- Wood, cloth, glass, mica, and quartz are some good examples of insulators.

- Insulators don't have any free electrons. It is the main reason why they don't conduct electricity.

Introduction 08 minutes

- Ask the studenst that how they turn off the fans in their homes?(switch off the button)
- What happened if they do not turn off the fan?(fan will continue in on position)
- Ask students when the fan is switched off why fan stops working tell the reason?
- After taking students response tell them that when we switch off the button of fan then supply of current to the fan is cutoff due to which fan turned off.
- Make the following diagram on the board.



- Tell the students that there is two types of electric circuit open circuit and close circuit.
- When we switch off the button then the circuit becomes open and continuity of current supply is disconnected due to which fan sops working
- When we switched on the button, the circuit closed and supply of electricity to the fan is restored and current starts flowing through the circuit and fans starts working.
- When the positive terminal of battery connected to its negative terminal through a metallic wire, charge begins to flow through the wire.
- The electricity produced by flow of charge is called current electricity.

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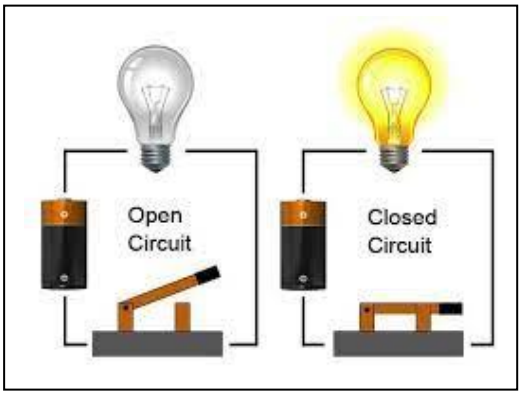
Development

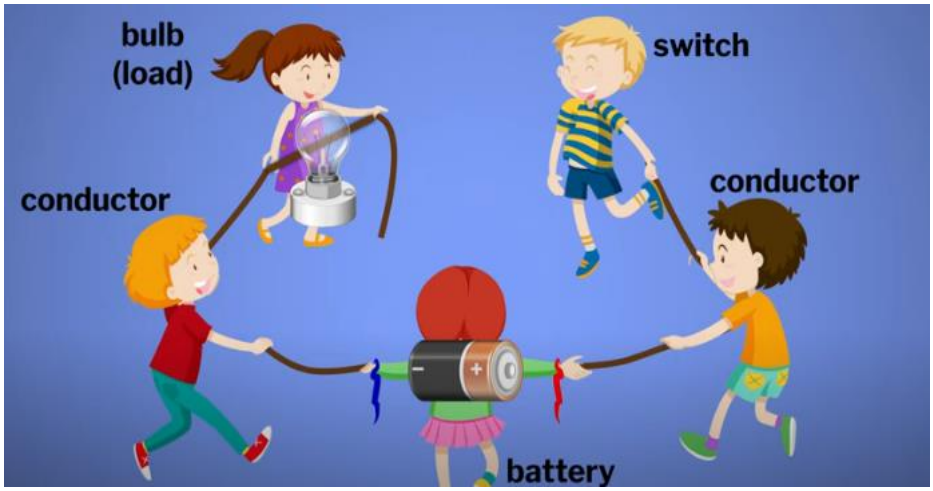
Activity 1 — 12 minutes

- Arrange a practical demonstration for students.
- Divide the class into groups according to strength.
- Arrange one battery; bulb, switch and metallic wire to make a circuit.
- Give following guidelines to students and direct them to act according to given directions.
  1. Insert bulb in the holder
  2. Connect the bulb to a cell or battery through metal wires.
  3. Turn the switch on and observe the bulb. Does it start glowing?
  4. Now turn the switch off and observe the bulb. Why did it stop glowing?
  5. Discuss that when the switch is off then why bulb stops glowing and when switch is on why bulb starts glowing.
  6. Bulb starts glowing because an electric current flows through it.
  7. It means that electric current means flow of charges throughout the circuit.



Activity 2 — 10 minutes

- Select five or six volunteers from the class, take blue and red ribbon and some pieces of ropes.
- Draw the sketch of the following diagram on the board.



- Ask the students to make a circle and hold the ropes between them.
- Assign the role battery to one student and tie blue and red ribbon to his opposite hands.
- One student will hold the rope tightly between his hand and he will represent the bulb.
- On left hand of bulb there will be switch and he only have the facility to leave the rope to break the circle.
- When the switch will break the circuit the bulb will loosen his rope which will indicate that the bulb is not glowing.
- Repeat this activity so that the class understands the concept that the flow of charges is electric current.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main points of the open and close circuit.
- Briefly sum up by defining the electric current.
- Invite questions from students if any?

Assessment — 05minutes

- Draw the following table on the board for assessment.
- Ask the students to write C for correct and I for incorrect against each statement.
- Tell them that if the statement is incorrect, then write it in correct form in the second column.

Statement	C/I	Correct Statement
Two positive charges will attract each other.		
A common battery have three terminals, positive, negative and neutral.		
When we switch off it close the circuit.		
When circuit is open it continues the flow of charges throughout the circuit.		

- Move around in the class and check their work.
- Give your feedback and check how many students have done their correct job.

Follow up 02 minutes

- Watch this video for developing understanding, https://youtu.be/ZmJTc1yi5g0.
- Differentiate between open and close circuit.

Answer Key

Statement	C/I	Correct Statement
Two positive charges will attract each other.	I	Two opposite charges will attract each other.
A common battery has three terminals, positive, negative and neutral.	I	A common battery have two terminals, positive and negative.
When we switch off it close the circuit.	I	When we switch off it open the circuit.
When circuit is open it continues the flow of charges throughout the circuit.	I	When circuit is open it breaks the flow of charges through the circuit.

Grade 6 **Lesson Plan 24**

ELECTRICITY

Duration: 40 Minutes

Students Learning Outcome:

- Identify the use of series and parallel electric circuits in daily life.

Materials:

- writing board and board markers / chalks
- textbook (General Science 6 PCTB)
- material for practical activity (Bulb receptacles, small bulbs, switch, small battery, wires, screw drivers)
- chart paper

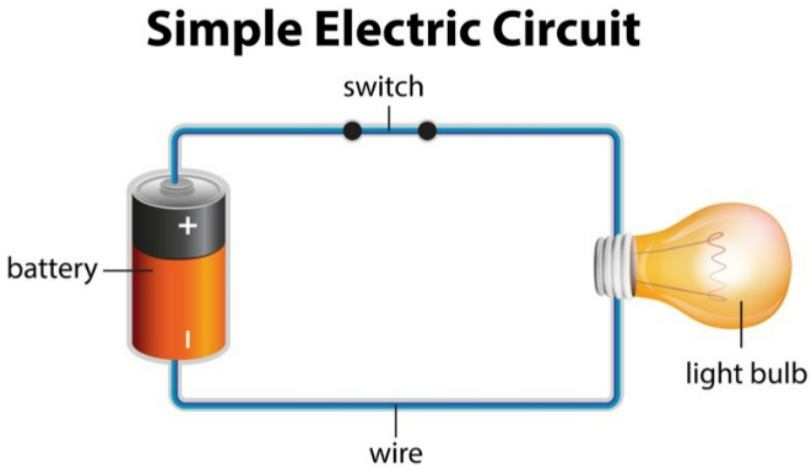
Information for Teacher

- Electric Charge is the property of subatomic particles that causes it to experience a force when placed in an electromagnetic field.
- An electrical circuit is a complete route that an electric current can flow around.

  The first-ever electric circuit was invented by Alessandro Volta in 1800. He made a remarkable discovery by using bowls of salt and a metal strip to produce a flow of electricity.
- A switch is a simple device that is used to either break the electric circuit or to complete.
- *A battery is* an electrochemical device (containing one or more electrochemical cells*)* that may be charged and discharged with an electric current as needed.
- In a battery or galvanic cell, the cathode is the electrode where electricity is given out or flows out.
- In a battery or galvanic cell, the anode is the electrode where electricity moves into.
  - https://www.youtube.com/watch?v=-mmcku7KhDQ

Introduction 05 minutes

- Draw the following diagram wihout writing the names of different parts and ask the following questions.



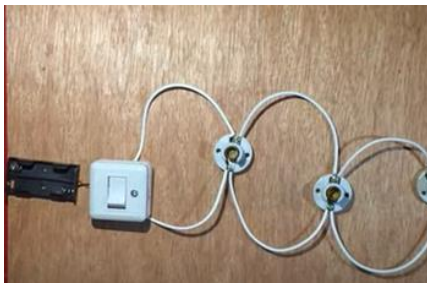
  - Ask the students to identify the diagram (simple electrical circuit).
  - Involve them to identify different parts of electrical circuit. (Label the diagram).
  - Have they ever seen this type of wiring where they turn off one button and in response two or more lights or fans turned off (take verbal response of students).
  - Ask them that in the class room there are five fans (give example of your own classroom). Have all fans separate on/off buttons (students will tell yes).
- After taking students response tells students that there are two types of electric circuit Series circuit and Parallel circuit.
- In series circuit, electrical devices are connected one after the other across a source in a single loop. More than one lights/fans turned off/on by same button are example of series circuit.
- In Parallel circuit, two or more electric devices are connected independently across sources giving multiple paths to current flow.

Development

Activity 1 — 10 minutes

- Tell the students that they will do a practical activity.
- Arrange following material in the class.
  - Bulb receptacles
  - Small bulbs
  - Switch
  - Small battery
  - Wire
  - Screw drivers
  - Plier
  - Tape

- In first step connect positive terminal of bulb receptacle with positive terminal of battery through switch and negative to negative terminal of battery.
- Then place other two bulb receptacle in way that positive terminal of first receptacle is attached with positive terminal of second and of second with third.



- In the same way negative terminals of three receptacles will be connected.
- In the end fit bulbs in receptacles and switched on.
- Tell students that this is practical example of parallel circuit.
- Give chance to the students to repeat this activity by themselves.
- Involve them in discussion on series and parallel circuits.

Activity 2 — 08 minutes

- Divide the students in groups.
- Direct them to draw diagrams of series and parallel circuits on a chart paper.
- Direct them to write down real life application of series and parallel circuits.

- Also write two advantages of both types of electric circuits.
- After completion of allotted time, ask one of the groups to present their work before class.
- Provide guideline and necessary instruction to students.

Activity 3 **08 minutes**

- Select five or four volunteers from the class, take some pieces of ropes and two small poles.
- Tie one rope to one pole and other rope to the other pole and one student will hold both ropes in two hands in the center, it will indicate one device connected to battery.
- Two poles will indicate the two terminals of battery.
- In the same way arrange two more students.
- Now the teacher will tie two big ropes to both poles and vibrate the rope, it will vibrate the poles and ultimately the poles will bring vibration in other three ropes. It is example of parallel circuit.
- Now ask one student to leave the rope and teacher will continue to vibrate the rope.
- You will see that vibration will continue in the two ropes which are connected.
- Now direct students to make circle and hold ropes together with teacher at one end.
- The teacher will vibrate the rope and other students will transfer vibration to next partner.
- This is example of series circuit.

Conclusion/ Sum up/ Wrap up **03 minutes**

- Summarize the main points of the series and parallel circuit.
- Briefly sum up by advantages and disadvantages of both types of circuit.
- Also point out the real-life use of both circuits.

Assessment **05 minutes**

- Write the following statements on the board and ask the students to fill in blanks of following.
  1. In series circuit devices are commenced in _____
  2. In parallel circuit devices are connected in_____

3. In _____circuit electric current flow in one path.
4. _____circuits are used in electricity wiring in our homes.

- Move around in the class and check their work.
- Give your feedback and check how many students have done correctly.

Follow up 01 minutes

- Write down advantages and disadvantages of Series circuit and Parallel circuit.

Answer Key

1. In series circuit devices are commenced in <u>in line _</u>
2. In parallel circuit devices are connected in <u>_parallel to each other</u>
3. In <u>_series</u> circuit electric current flow in one path.
4. <u>Parallel</u> circuits are used in electricity wiring in our homes.

Grade 6 **Lesson Plan 25**

MAGNETISM

Duration: 40 Minutes

Students Learning Outcome:

- Recognize earth's magnetic field which attracts a freely pivoted magnet to line up with it.

Materials:

- writing board and board markers / chalks
- textbook (General Science 6 PCTB)
- magnet bar, thread and stand
- pencil

Information for Teacher

- A material or object that can attract the objects made of iron, nickel and cobalt is called magnet.
- William Gilbert, a physician was the first scientist to create a magnet.
- When humans first discovered magnetic rocks, they likely found that certain parts of these rocks attracted bits of iron or other magnetic rocks more strongly than other parts. These areas are called the poles of a magnet. A magnetic pole is the part of a magnet that exerts the strongest force on other magnets or magnetic material, such as iron.
- The Englishman William Gilbert (1540-1603) was the first to investigate the phenomenon of magnetism systematically using scientific methods. He also discovered that the Earth is weak magnet
- A pivoted magnet is a slender bar of magnetized steel which when mounted so as to swing freely on a pivot will point along the line of the magnetic meridian poles.

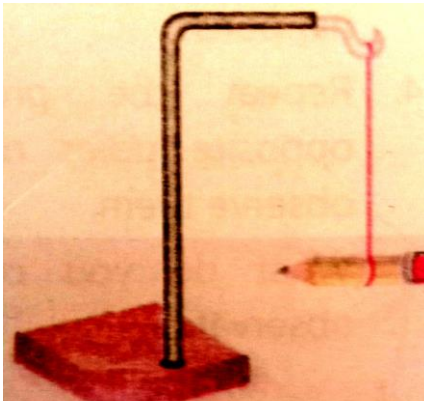
Introduction 05 minutes

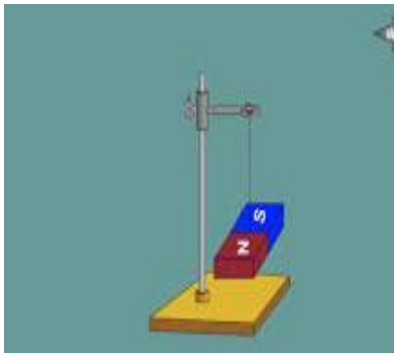
- Start the lesson by asking question to the students that have they seen any magnet?
- Tell the students that a material or object that can attract the objects made of iron, nickle and cobalt.
- Ask students that when they place any metalic piece near magnet will it attract ?(yes)
- Tell the students that area around a magnet in which its magnetic force is experienced is called magnetic field.
- Ask students have they ever brought two magnets close to each other? Did both magnets attract each other from both ends (when two magnets brings close to each other then they attract each other and when bring closer from other ends then they repel each other).
- Tell students that part of the magnet with maximum magnetic force is called pole.
- Bring a magnet bar in the class and show to the students.

Development

Activity 1 10 minutes

- Arrange a practical demonstration in the class.
- Suspend pencil with the help of a thread as shown in below picture.
- Observe the direction of pencil along which it comes to rest.
- Again disturb the position of pencil and ask students to again observe the position after it comes to rest. Ask students has its position changed? You will see that the pencil does not come to rest in any specific direction.





- Now replace the pencil with magnetic bar, do the same.
- Ask students to observe direction of magnetic bar.(it will north –south)
- Again disturb the magnetic bar and when it comes to rest ask students to observe its direction. It will be same as previous.
- Now tell the students that it is due to earth's magnetic field due to which magnetic bar aligned itself again and again in the same direction.

Activity 2 **12 minutes**

- Divide the students in four groups.
- Divide a stand, magnetic bars to each group.
- Then ask them to suspend the magnetic bar and disturb it.
- Ask them to write down the direction of magnetic bar.
- Then place a magnet on table below the suspended magnet.
- Now ask them to note the direction of magnet.
- It will change its direction as compare to previous one.
- That will confirm the earth's magnetism.

Activity 3 **05 minutes**

- Divide students in groups.
- Provide a magnetic bar to each group.
- Ask them to take out pencil, eraser, iron made things, piece of wood, board pins, stapler pins and spread then on table.
- Now ask them to bring magnet near each item and observe that either magnet pulls that particular item or not.
- Now ask them to make table of two columns. In one column write down the things which are pulled by magnet and in other coulomn write names of items which are not pulled by magnet
- Tell the students that material which are attracted by magnet are magnetic material and which are not attracted by magnet are called Non - Magnetic materials.

Conclusion/ Sum up/ Wrap up — 04 minutes

- Summarize the main points of the earth' magnetism.
- Briefly sum up the poles of magnet.
- Allow students to ask questions and give your answers.

Assessment — 02 minutes

- Write the following statements on the board and ask the students to fill in the blanks.
  a) Magnet has _____ poles
  b) Freely suspended magnet rest in _____ direction
  c) Part of magnet with maximum magnetic force is_____.
  d) Materials attracted by magnet are called_____

Follow up — 02 minutes

- Write down answers of following
  - Magnetic field
  - Magnet
  - Repulsive force

Answer Key

Fill in blanks of following.

- Magnet has _____**two**_____ poles
- Freely suspended magnet rest in _**North ---South**__ direction
- Part of magnet with maximum magnetic force is **pole**
- Materials attracted by magnet re called__**magnetic** material

.

Grade 6 **Lesson Plan 26**

MAGNETISM

Duration: 40 Minutes

Students Learning Outcome:

- Construct an electromagnet and identify its application in daily life.

Materials:

- writing board and board marker / chalk
- textbook (General Science 6 PCTB)
- battery, insulated wire, switch, bulb, compass, iron nail, common pins or paper clips

Information for Teacher

- Electromagnetism is a branch of Physics that deals with the electromagnetic force that occurs between electrically charged particles.
- Magnetism produced by electricity is called electromagnetism.
- Magnetic field is field produced by a magnetic object that exerts a force on other magnetic materials or moving charges.
- A Danish scientist named Hans Christian Ousted made the important discovery that electric current creates a magnetic field.
- Around 1830, Michael Faraday discovered that a magnetic field can generate an electric current if a conductor crosses the lines of force in a magnetic field. This is known as Faraday's law.

Introduction 05 minutes

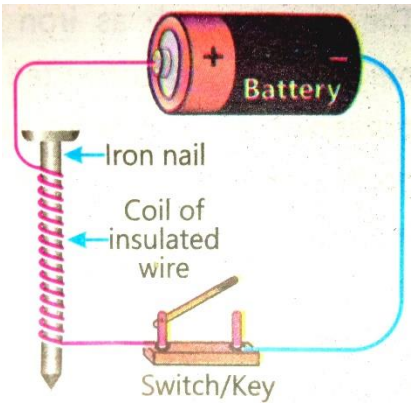
- Teacher will ask the studenst that what is magnet?(a material or object that can attract the objects made of iron, nickle and cobalt)

- Ask students about electromagnet.(An electromagnet is a type of magnet that attracts metals with the help of electricity)
- Ask students that when an object will behave like magnet ?(when electric current flows through it)
- Tell the students that when the electric current will stops flowing through an object, it will demagnetized.
- Tell students that conversion of an object into a magnet is called magnetization and when a magnet loses its magnetic property it is called demagnetization.
- Ask students how a magnet can be made more powerful? (by increasing number of loops, increase in current, Iron core)
- Tell students that when electric current flows through it, it works as magnet otherwise it is only an ordinary piece of metal.
    - https://www.youtube.com/watch?v=Vpb7IQ2Ib_Y
    - https://www.youtube.com/watch?v=5wR4WwoBR8w

Development

Activity 1 — 10 minutes

- Select group of four students to demonstrate following practical.
- At first, arrange the following material on table.
    - Small battery
    - Iron nail
    - Insulated wire
    - Switch

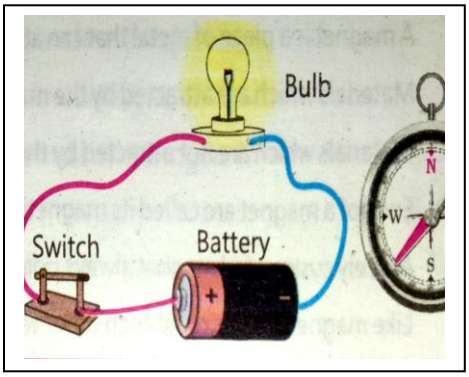


- Ask students to take iron nail and wind insulated wire around it.
- Direct them to connect one end of coil to one terminal of battery.
- Connect the other end of the coil to the other terminal of the battery through an electric switch.

- Turn the switch ON and bring the common pins or paper clips near the tip of the nail.
- Observe what happens with the common pins or paper clips.
- Now turn the switch OFF and observe what happens to the common pins or paper clips.

Activity 2 — 12 minutes

- Select four volunteer students from class.
- Direct them to take following steps
  - Make an electric circuit by connecting a bulb with battery
  - Connect other terminal of battery with bulb through switch.
- Bring a compass needle near the wire when the switch is OFF.
- Note the direction of magnetic needle on the compass.



- Now turn the switch ON and observe the direction of magnetic needle of the compass.
- Turn the switch OFF and observe the compass.
- Observe that the compass needle change its direction as the switch is OFF.

Activity 3 — 05 minutes

- Divide students into four groups.
- Ask them to write down real life uses of electromagnets
- After completion of task, ask groups one by one to come forward and present their work before class.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Briefly describe the electromagnet and its uses.
- Sum-up the way of construction of an electromagnet.

Assessment — 03 minutes

Write the following statements on the board and ask the students to fill in blanks.

a) Electromagnet works during the flow of _____ through an object.

b) Construction of an electromagnet is called_____

c) Losing of magnetic property of an electromagnet is called _____

d) Increasing the number of loops will _____strength of electromagnet.

e) Electromagnet is stronger if _____ is used.

Follow up 02 minutes

Make a list of house appliances in which electromagnet is being used.

Answer Key

a) Electromagnet works during the flow of current through an object.

b) Construction of an electromagnet is called magnetization

c) Losing of magnetic property of an electromagnet is called demagnetization

d) Increasing the number of loops will increase strength of electromagnet.

e) Electromagnet is stronger if metal core is used.

Grade 6 **Lesson Plan 27**

TECHNOLOGY IN EVERYDAY LIFE

Duration: 40 Minutes

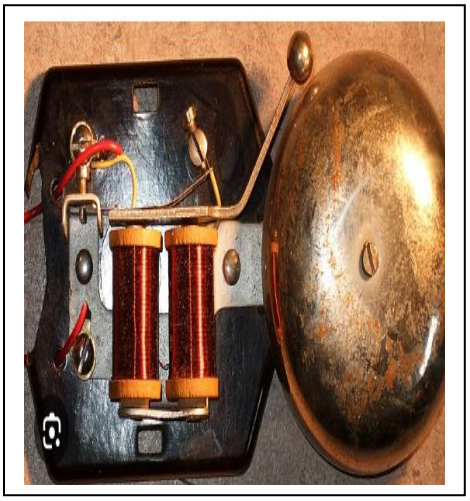
Student Learning Outcome:

- Assemble a circuit to demonstrate the working of an electric bell.

Materials:

- writing board and board markers / chalk
- textbook (General Science 6 PCTB)
- pictures of the electric bell / electric bell

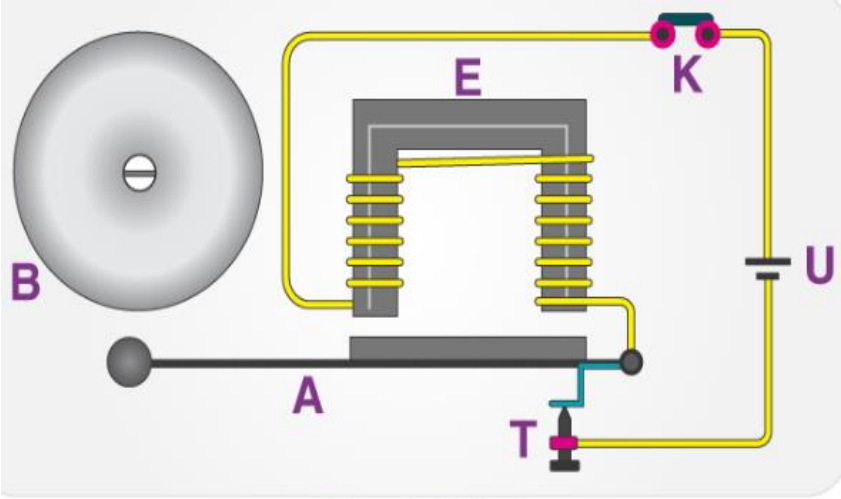
Information for Teachers.



- The electric bell was invented by Alexander Graham Bell, an American scientist. He was born in Edinburg, Scotland on March 3rd, 1847.
- An electric bell is a mechanical or electronic bell that functions by means of an electromagnet. When an electric current is applied, it produces a repetitive buzzing, clanging or ringing sound.
- The primary working principle behind an electric bell is electromagnetism.
- An electromagnet is basically a type of magnet in which the magnetic field is produced with the help of an electric current. When electrical current flows through an electromagnet it works as a standard magnet (generating magnetic fields). When the power generation to an electromagnet stops, the production of the magnetic field also stops.
    - https://www.youtube.com/watch?v=nKljb09wIwU link for understanding of bell working.

Introduction 05 minutes

- Start the lesson by asking questions to the students have they known about the parts of an electric bell.
- Draw following diagram on the board for identification of parts of an electronic bell.



Electric Bell

- Introduce to the students about following parts with the help of diagram.
  - A is Hammer
  - B is Gong
  - E is Electromagnet
  - K is switch
  - U is battery terminal
  - T is adjustable screw

Development

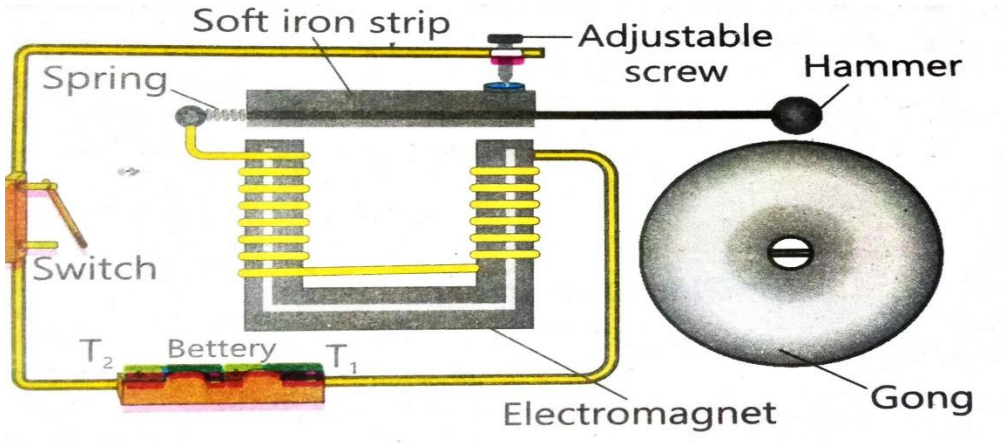
Activity 1 12 minutes

- Arrange following material in the class.
- U shape piece of iron, soft iron strip supported by a spring as armature, metal plate as a gong, iron hammer, flexible steel strip, wire, battery, adjustable screw, etc.
- Select group of four volunteer students give them following directions.

- Turn the metallic wire around the u-shaped piece of iron and make it coil of the electromagnet and fix it on a board.
- Take a soft iron strip attach iron hammer on it one side flexible seat strip on its other side and make it fix in such a way that it should remain in contact with the adjustable screw.
- Fix a metallic gong to the base of the iron hammer in such a way that the hammer can strike on it.
- Connect one end of the coil of electromagnet with terminal T 1 of the battery through an electric switch.
- Connect other end of the magnet with the spring of the soft iron strip.
- The spring is connected with terminal T 2 of the battery through adjustable screw.
- Switch on the circuit while pressing the button and observe what happens

Activity 2 **07 minutes**

- For understanding of working of electric bell.
- Draw following diagram on white board.



- Ask students what will be first step in working of electric bell?
- After taking response tell them that first step is to push the button connected with the switch, the circuit is switched on and current flows through the coil of electromagnet via contact point.
- Then ask students what will happen next?

- After listening their views tell them that the electromagnet is magnetized and attracts the software towards it.
- The hammer attached the soft iron strip gives a strike on the gong producing sound.
- Tell them that when soft iron strip is moved towards electromagnet, it get detached from the screw.
- In this way circuit breaks electromagnet demagnetized and soft iron strip come to its original place.
- The process of being repeated again and again and the bell goes on ringing till the push on the button is not released.

Activity 3 — 07 minutes

- Divide the class into four groups.
- Provide them charts.
- Ask them to write down uses of electric bell system in daily life as doorbell or car horn.
- Then each group will come forward and demonstrate the bell uses by role play and remaining groups will guess what they trying to demonstrate.
- In this ways, all possible uses of electric bell will be discussed in class.

Conclusion/ Sum up/ Wrap up — 03 minutes

- Summarize the main points regarding assembling of electric bell.
- Briefly sum up the working of electric bell.
- Also point out the real-life use of electric bell

Assessment — 03 minutes

Write the following statements on the board and ask the students to fill in the blanks;

1. An electromagnet is a type of _____
2. Electromagnet works only during the_____
3. During the working of electric bell electric circuit breaks and closed_____.
4. U shape piece of iron will work as an _____.

Follow up — 03 minutes

Write down step wise procedure of assembling of an electric bell.

Answer Key

1. An electromagnet is a type of _magnet_
2. Electromagnet works only during the flow of current_
3. During the working of electric bell electric circuit breaks and closed repeatedly.
4. U shape piece of iron will work as an _electromagnet_.

Grade 6 **Lesson Plan 28**

SOLAR SYSTEM

 Duration: 40 Minutes

Student Learning Outcome:

- Differentiate between the characteristics of different planets.

Materials:

- writing board and board markers / chalk
- textbook (General Science 6 PCTB)
- poster of solar system
- worksheet – assessment

Information for Teacher

- Student have already learnt about space and satellites in their previous class.
- Now they will learn more about the solar system and uses of satellites.
- Use videos to explain the position of the Sun and other planets.
- Poster of solar system and planets may also be used during teaching.
- Tell the students to explore more about the solar system. They can watch scientific videos on solar system and planets.
- Use Textbook General Science 6 PCTB for teaching and learning support material.

Introduction 07 minutes

- Ask the students to tell the name of objects which they see in the sky during day and night.
- Encourage the students to share their answers and write their responses on the board. (sun, moon, starts)

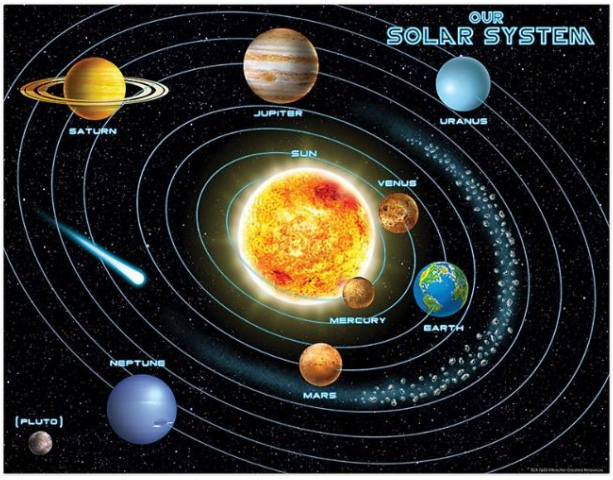
- We see several stars shining in the sky at night. Have you ever thought that what these stars are?
- After taking responses, tell the students that these are huge spheres of burning gases which emit heat and light.
- A huge object, which emits its own heat and light, is called a star.
- Some objects that revolve around the Sun are called planets.
- Tell the students that the solar system is consists of the Sun and the other objects that are revolving around the Sun.
- Tell students that Sun is the main star of our solar system and we receive heat and light from it.
- Tell them that there are eight main planets which revolve around the Sun.
- There are some small planets like Pluto which revolve around the Sun but due to small size did not qualify for being planets.
- Play this video if multimedia facility available in the class.
    - https://www.youtube.com/watch?v=Ae2WILpICUc

Development

Activity 1 — 10 minutes

- Ask the students that what the natural source of light and heat is.
- After getting their response, draw a picture of the Sun on the board.
- Tell the students that the Sun has central position in the solar system; the planets and many other object are revolving around the Sun.
- Show a video about the solar system to the students / display the poster of solar system in front of the class / draw a solar system model on the board and label the Sun and the planets accordingly.
- Introduce the names of other planets.

- Tell the participants that the solar system is made up of the Sun and everything that orbits around it. This includes planets, moons, asteroids, comets, and other objects.



- The eight planets that orbit the Sun are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. These planets are very different from one another in terms of their size, composition, and distance from the Sun.
- The Earth is also a planet.
- Ask the participants whether the Sun is moving around the Earth or the Earth is moving around the Sun.

Activity 2 **15 minutes**

- Divide the students into nine groups.
- Provide pieces of different color chart to each group.
- Allocate one planet to each group and Sun to one group.
- Demonstrate to the students to cut the chart in round shape.
- Direct them to read characteristics, i.e., size, distance from Sun, revolution and rotation time of assigned planet on chart from the textbook (Science Text book Grade 6th page number 136).
- Call one student from each group holding the chart.
- Arrange them in a way that the Sun will be in the center and remaining planets will be in a circle.
- The circle will start rotating and every student in circle will describe the characteristics of assigned planet.
- In this way characteristics of whole planets will be discussed in the class.

Conclusion/ Sum up/ Wrap up — 02 minutes

Conclude the lesson that:

- The Sun and the planets are the main components of solar system.
- The Sun has the central position in the solar system and the other objects are revolving around the Sun.
- The objects that revolve around the Sun are called planets.
- Planets are not stars because they do not shine with their own light.

Assessment — 05 minutes

- Instruct the participants to open page 142 of the Text book General Science- 6 and solve question 12.1 individually.
- Take a quick round to observe their work and guide the participants where necessary.
- Check their work and then solve all questions with the help of participants.

  OR
- Provide worksheet-Assessment and ask the students to solve individually.
- Move around in the class and check their work.

  Give your feedback.

Follow up — 01 minutes

- Write down characteristics of planets.

Answer Key : Worksheet – Assessment

- Satellite
- Moon
- Moon
- Artificial satellite
- Artificial satellite

Worksheet-Assessment

Choose the correct answer.

1. **If a celestial body moves around a planet or a star, it is called a natural…….of that planet or star.**
   - ☐ Star
   - ☐ Sun
   - ☐ Satellite
   - ☐ Artificial satellite
2. **The natural satellite of the Earth is called the…….**
   - ☐ Star
   - ☐ Sun
   - ☐ Moon
   - ☐ Jupiter
3. **A well-known example of a natural satellite is the…….. the only natural satellite of the Earth.**
   - ☐ Moon
   - ☐ Stars
   - ☐ Sun
   - ☐ Comets
4. **Earth imaging, weather forecasting, telecommunication are done with the help of……**
   - ☐ Sun
   - ☐ Natural satellites
   - ☐ Moon
   - ☐ Artificial satellites
5. **A man-made object moves which around a celestial body it is called a……..**
   - ☐ Asteroids
   - ☐ Artificial satellite
   - ☐ Star
   - ☐ Natural satellite

Answer Key

- The planet nearest to Sun is Mercury_
- The largest planet of Solar system_Jupitor
- _Mars__is called red planet.
- Planet which similar to earth in size is Venus_
- The Sun is star__

Grade 6 **Lesson Plan 29**

SOLAR SYSTEM

Duration: 40 Minutes

Student Learning Outcome:

- Investigate how artificial satellites have improved our knowledge about space and are used for space research.

Materials:

- writing board and chalk / board marker (red, blue and black)
- textbook (General Science 6 PCTB)
- chart paper and markers

Information for Teachers

- First successful measurement of the distance to a nearby star in 1838 by the German astronomer Friedrich Bess
- The first human in space was the Soviet cosmonaut Yuri Gagarin, who made one orbit around Earth on April 12, 1961, on a flight that lasted 108 minutes.
- As of May the 4th (be with you) 2023, the satellite tracking website “Orbiting Now” lists 7,702 active satellites in various Earth orbits.
- Satellites measure the temperature of the Earth and the amount of greenhouse gases in the air.
- As of 2023, there are two fully operational space stations in low Earth orbit (LEO) – the International Space Station (ISS) and China's Tiangong Space Station (TSS).
- The International Space Station is a large spacecraft in orbit around Earth. It serves as a home where crews of astronauts and cosmonauts live.

- The ISS is not owned by one single nation and is a "co-operative programme" between Europe, the United States, Russia, Canada and Japan, according to the European Space Agency (ESA).
- The Badr-A was Pakistan's first indigenously developed and manufactured digital communications and an experimental artificial satellite which was launched into low Earth orbit by Pakistan on 16 July 1990, through a Chinese carrier rocket.

Introduction 05 minutes

- Ask students to define satellite. (The heavenly bodies which are moving around the star or planet are called satellites)
- Ask them how many types of satellites are there? (natural and artificial satellite)
- Tell the students that artificial satellites are man and are launched into the space for orbiting the earth. These man-made satellites are called artificial satellites.
- Ask them that what are uses of artificial satellites?
- After taking students response tell them that besides other uses these satellites are used for space research.
- On April 19, 1971, the Soviet Union placed into orbit Salyut, the world's first space station.
- Satellite data is helping to build detailed maps of our Solar System, providing scientists with vital information about the geology and atmosphere of distant planets.

Development

Activity 1 10 minutes

- Ask students to define satellite. (The heavenly bodies which are moving around the star or planet are called satellites)
- Ask them how many types of satellites are there? (natural and artificial satellite)
- Tell the students that artificial satellites are man and are launched into the space for orbiting the earth. These man-made satellites are called artificial satellites.

- Ask them the use of artificial satellites?
- After taking students response tell them that besides other uses these satellites are used for space research.
- On April 19, 1971, the Soviet Union placed into orbit Salyut, the world's first space station.
- Satellite data is helping to build detailed maps of our Solar System, providing scientists with vital information about the geology and atmosphere of distant planets.

Activity 2 **10 minutes**

- Divide the class into small groups, ideally with 3-5 students in each group.
- Ask the students to read page number 139 – 141 from textbook of grade 6.
- Assign each group a specific type of artificial satellite. For example, one group can be assigned the **Sputnik**-1 another the **Geo Stationary Satellite**, and so on. Make sure each group has a different type of artificial satellite.
- Instruct each group to guess the satellite game that represents their assigned type of the artificial satellite.
- Instruct them to use chart paper and markers.
- Each group should design their game in a way that when solved, it provides information about their assigned type. This can include relevant diagrams, descriptions, or key characteristics of that particular satellite type.
- Once the games are completed, each group exchange their game with another group.
- Make sure that no two groups have the same game.
- Instruct the groups to guess the satellite poster they received from another group. Encourage them to collaborate and discuss the information presented in the game.
- Allocate a specific amount of time for each group to complete the task. You can set a timer or provide a time limit, depending on the complexity of the puzzles.
- After the allocated time, instruct each group to present their findings infront of the class.
- Tell students to appreciate each other by clapping.

Note: This activity encourages collaborative learning and deepens students' understanding that how Artificial satellites have improved our knowledge about space and are used for space research. By exchanging and solving puzzles created by their peers, students actively engage with the material, enhance their comprehension, and reinforce their knowledge through hands-on participation.

Conclusion/ Sum up/ Wrap up — 03 Minutes

- Summarize the key points regarding space research briefly.

Assessment — 04 Minutes

Draw the following table on the board and ask the students to mark C for correct and I for incorrect against each statement.

Instruct them to correct the statement, if it is wrong in the next column.

Move around in the class and check students work.

Statement	C/I	Correct Statement
Sputnik- was launched by USA.		
NASA belongs to Russia.		
Explorer-1 was launched by china		
Moon is artificial satellite		
Mir space station belongs to Pakistan		

Follow up — 03 minutes

- Draw a table showing key achievement regarding the space research and discoveries.

Answer Key

Statement	C/I	Correct Statement
Sputnik- was launched by USA.	I	Sputnik- was launched by Soviet Union.
NASA belongs to Russia.	I	NASA belongs to USA.
Explorer-1 was launched by china	I	Explorer-1 was launched by USA
on is artificial satellite	I	Moon is natural satellite
Mir space station belongs to Pakistan	I	Mir space station belongs to Russia

Grade 6 **Lesson Plan 30**

SOLAR SYSTEM

Duration: 40 Minutes

Student Learning Outcome:

- Describe the uses of various satellites in space i.e., geostationary, weather, communication and global positioning system (GPS).

Materials:

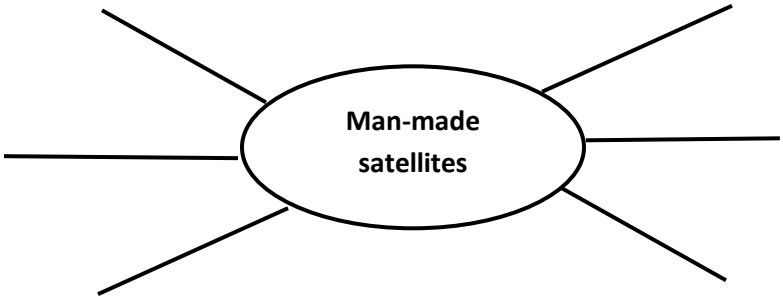
- writing board and board marker / chalks
- textbook (General Science 6 PCTB)
- chart / poster (Use of satellites)

Information for Teacher

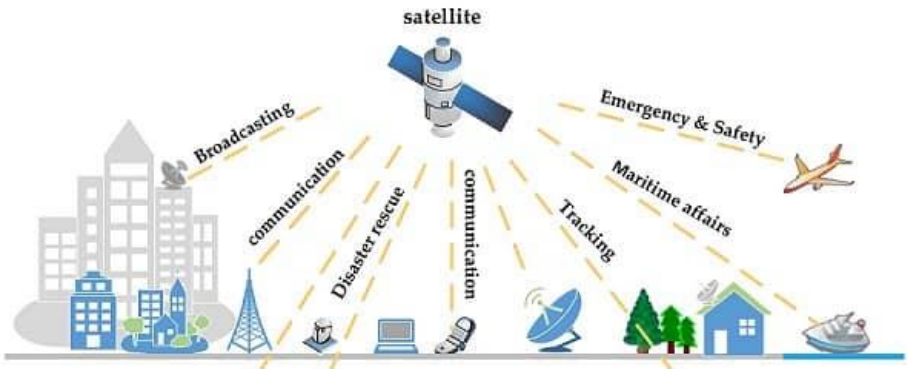
- Satellites are used for many things such as communication, oceanography, astronomy, the surveillance, they help many scientists get a perceptive view of all kinds of objects anywhere in the world.
- Satellites send television signals directly to homes, they send the signals from a central station that generates programming to smaller stations that send the signals locally via the cables or the airwaves, the news broadcasts are sent from the field to the studio via the satellite.
- Satellites offer flight phone communications on airplanes, They are the main conduit of voice communication for rural areas and the areas where the phone lines are damaged after a disaster, and they provide the primary timing source for cell phones and pagers.
- Use brainstorming to describe the uses of satellites
- Allow the students to explore the world around them that how they are using navigation and TV signals, etc.

Introduction 10 minutes

- Ask students about what is satellite?
- Involve the students in discussions and after getting their responses tell them that;
  - A satellite is a body that orbits around another body in space. There are two different types of satellites – natural and man-made.
  - Examples of natural satellites are the Earth and Moon. The Earth rotates around the Sun and the Moon rotates around the Earth.
  - A man-made satellite is a machine that is launched into space and orbits around a body in space..
- Now ask students what are the uses of man-made satellites.
- Involve them in discussions and do a brainstroming.



- Show the following chart of uses of satellites to the students.



- Ask the students how they watch the match live on television which is being played in somewhere other part of world?(take students response)

- Tell the students that all these types of activities are make possible by artificial satellites.
- Tell students that a large number of man made satellites are launched into the space for orbiting the earth and these are called artificial satellites.

Development

Activity 1 — 10 minutes

- Draw following table on the board and fill it with the help of students.
- Envolve the students in discussion on uses of artifcial satalites.

Types of satellite	Characteristics
• Geostationary satellite	• Revolve around the earth • Height 3600 km • Path is called geostationary orbit • Complete one revolution in 24 hours
• Polar orbiting satellite	• Move in polar orbit around south and north pole
• Low earth orbit satellite	• They orbit close to earth • Complete one revolution around earth in 90 minutes • These satellites revolve around the earth in in six different orbits. • They form Global Positioning system
• Landsat	• It is managed by NASA and US geological survey • Landsat-7 and Landsat-8 are currently active
• Communication satellite	• There are 200 Earth base stations to receive information through these satellites • Largest communication satellite system is managed by 126 countries, International Telecommunication Satellites Organization.

Activity 2 — 07 Minutes

- Play the following video through multimedia or through mobile phone.
  - https://www.youtube.com/watch?v=aXDrHhds18ce
- Explain contents of this video to students before start of this activity.
- Make the following table on the board and ask the students to copy in their notebooks.

Weather update	Communication satellite
Earth picture	Geostationary
Dish antenna	GPS
Passenger rout selection	Landsat
Record earth features	Geostationary
communication	Landsat

- Instruct them to match the columns individually.
- Select some students randomly and ask them to present their work before class.
- Direct remaining students to make corrections where needed.

Conclusion/ Sum up/ Wrap up — 05 minutes

- Conclude the lesson with the help of students.
- Involve them to tell the uses of satellites in our daily life.
- Briefly sum up the major uses of artificial satellites.

Assessment — 05 minutes

Write down major functions of geostationary satellite.

OR

Write the following statements on the board. Instruct the students to fill in the blanks.

1. _____satellite is used to track the earth resources.
2. GPS stands for_____
3. An airplane pilot can use _____ to locate his position.
4. _____ is used for receiving messages from earth.

Follow up — 03 minutes

Write down some important uses of artificial satellites.

Answer Key

Write down some important uses of artificial satellites.

1. They are used in communication.
2. They are used in weather forecasting system.
3. They are used in GPS (Global Positioning System)
4. They are used to transport instruments and passengers to the space to perform experiments.

Fill in the blanks.

1. Landsat is used to track the earth resources.
2. GPS stands for Global Positioning System.
3. An airplane pilot can use GPS to locate his position.
4. Satellite Revolving Station is used for receiving messages from earth.

GLOSSARY

Sr.no.	Words	Meanings
1	Compare	Note the similarity or dissimilarity between.
2	Outermost	The one that is furthest from the center.
3	Domains	An area of territory owned or controlled by a particular ruler
4	Tissue	A group of cells that possess a similar structure and perform a specific function
5	Offspring	The product or result of something
6	Variation	A change or slight difference in condition, amount, or level, typically within certain limits.
7	Identical	Similar in every detail; exactly alike
8	Fusion	The process or result of joining two or more things together
9	Metalloid	Element which has properties in between metals and non-metals.
10	Electronic Configuration	The electron configuration of an element describes how electrons are distributed in its atomic orbitals.
11	Proportion	The ratio, quantity, or comparative amount
12	Homogeneous	Homogeneous means that the properties are the uniform throughout
13	Heterogeneous	Heterogeneous means that the properties are different

14	Automobiles	Also called auto or car, a four-wheeled vehicle designed primarily for passenger transportation
15	Stationery Phase	Stationary means “not moving” so, stationary phase is on the paper and does not move through it.
16	Mobile Phase	Mobile means “moving” so, mobile phase is the solvent that moves through the paper, carrying different substances with it.
17	Hypothesis	A supposed situation or statement made as a starting point for further investigation.
18	Winding	A twisting movement such as winding a spring
19	Dissipation	Dissipation is a term used to describe ways in which energy is wasted. Any energy that is not transferred to useful energy is said to be dissipated.
20	Convert	Change the form, character, or function of something.
21	Destroyed	End the existence of (something) by damaging or attacking it.
22	Retain	Continue to have (something); keep possession of.
23	Thermodynamics	study of the relations between heat, work, temperature, and energy
24	Compact	Closely and neatly packed together; dense.
25	Conversion	The process of changing or causing something to change from one form to another

26	Deplete	Diminish in number or quantity.
27	Precursor	a substance from which another is formed
28	Hydroelectricity	Electricity produced by using power of running water
29	Fossils	Trace of an animal or plant of a past geologic age that has been preserved in Earth's crust
30	Sufficient	Enough, adequate
31	Fuel	Material such as coal, gas, or oil that is burned to produce heat or power.
32	Disposable	An article designed to be thrown away after use.
33	Insulation	Covered by non-conducting material to prevent the passage of electricity
34	Displacement	The action of moving something from its place or position
35	Flow	Move steadily and continuously in a current or stream
36	Cutoff	An act of stopping or interrupting the supply of something.
37	Restore	Bring back or re-establish
38	Series	A number of events, objects, or people of a similar or related kind coming one after another.
39	Subatomic	Smaller than or occurring within an atom.

40	Terminal	Forming or situated at the end or extremity of something.
41	Application	The action of putting something into operation.
42	Pivoted	Fixed on a pivot.
43	Repulsive	When two poles or charges pushes away each other
44	Compare	Note the similarity or dissimilarity between.
45	Core	A piece of magnetized material,
46	Metal	Metals are elements that are good conductors of heat and electricity
47	Loop	Something having a shape, order, or path of motion that is circular or curved over on itself.
48	Terminal	A point of connection for closing an electric circuit.
49	Insulated	Covered in non-conducting material to prevent the passage of electricity.
50	Strike	hit forcibly and deliberately
51	Repetitive	containing or characterized by repetition
52	Buzzing	making a low, continuous humming or murmuring sound.
53	Clanging	noisy
54	Gong	a metal disc with a turned rim, giving a resonant note when struck

55	Allocate	Distribute (resources or duties) for a particular purpose
56	Revolve	Move in a circle on a central axis
57	Emit	Produce and discharge (something, especially gas or radiation).
58	Astronomy	The branch of science that deals with celestial objects, space, and the physical universe as a whole
59	Radical	(Especially of change or action) relating to or affecting the fundamental nature of something; far-reaching or thorough.
60	Interstellar	the region of space between star systems within a galaxy
61	Rover	A person who spends their time wandering.
62	Sphere	A round solid figure
63	Transmitter	a set of equipment used to generate and transmit electromagnetic waves carrying messages
64	Orbit	The curved path of a celestial object
65	Forecast	Predict or estimate (a future event or trend).
66	Geological	Relating to the study of the earth's physical structure and substance
67	Meteorological	Relating to the atmosphere, especially as a means of forecasting the weather