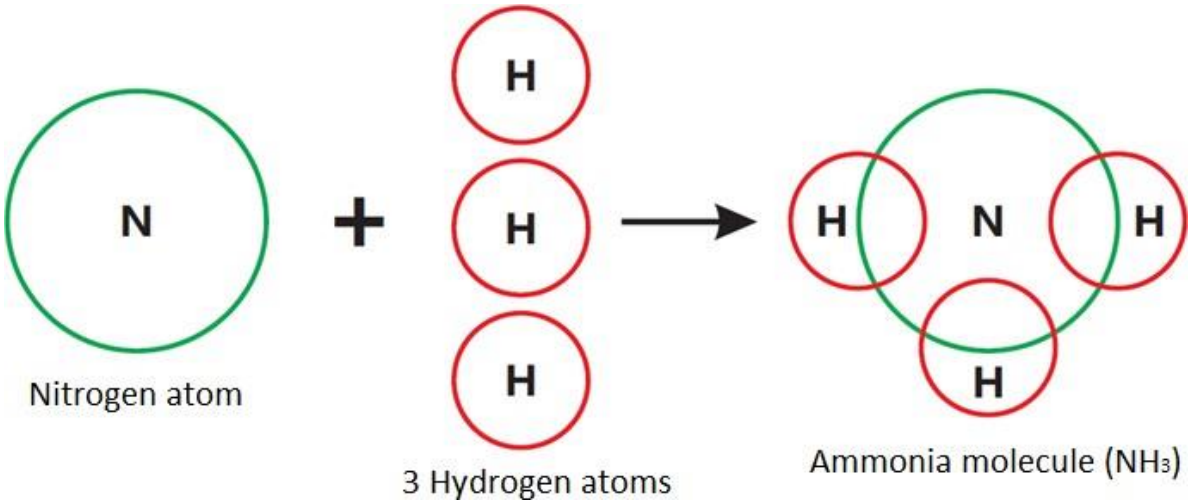
**Different types of atoms**

The type of molecule is made up of different types of atoms bonded together.

**Example:** Water ($H_2O$), ammonia ($NH_3$) and carbon monoxide (CO).




4. Identify the most common metal used in daily life and write its properties.

**Answer:**

The most common metal used in daily life is iron. It is used in the manufacturing of vehicles such as cars, trucks, and trains. It is used for the production of machinery, tools and various equipment. It is also used in many household items like kitchen utensils, appliances and furniture.

**Properties of iron**

The properties of iron are:

- Iron is a silvery-grey metal with a metallic lustre.
- It has a high melting point and boiling point.
- It is malleable, which means it can be easily hammered or rolled into thin sheets.
- It is also ductile, meaning it can be drawn into wires.
- It is moderately reactive, especially when exposed to oxygen and moisture, leading to the formation of rust.
- Iron is magnetic, meaning it can be attracted to a magnetic field.

5. What are metalloids? Give some examples.

**Answer:**

Metalloids, also known as semimetals, are elements that exhibit properties of both metals and non-metals. Metalloids have characteristics of both groups,

making them intermediate in terms of their properties. They can both gain and lose electrons or form a mutual bond.
**Examples:** Silicon (Si), arsenic (Ar) and boron (B).

6. How are elements arranged in the periodic table?
**Answer:**
Elements are arranged in the periodic table based on their atomic number, which represents the number of protons in the nucleus of an atom. The periodic table is organized in such a way that elements with similar properties are grouped in the same columns called groups. The horizontal rows in the periodic table are called periods. Each period represents a new energy level or shell for the electrons.

## E. Investigating questions.

1. Suppose you are given an element. How would you tell if it is metal or non-metal? Explain and suggest five differences between metals and non-metals.
**Answer:**
To determine whether an element is metal or non-metal, we will consider several key characteristics.
- If the given element is metal then it has a shiny appearance otherwise dull surface.
- If the given element is metal then it will be a good conductor of heat and electricity otherwise not.
- If the given element is metal then it has high melting and boiling points.

Differences between metals and non-metals
The differences between metals and non-metals are given below.

| Metals | Non-metals |
|---|---|
| Metals are good conductors of heat and electricity. | Non-metals are poor conductors of heat and electricity. |
| They have a shiny appearance. | They have a dull surface. |
| Metals are malleable and ductile. | Non-metals are typically brittle. |
| They have high density. | They have low density. |

| | |
|---|---|
| Metals have high melting and boiling points. | They have low melting and boiling points. |
| They are usually solid at room temperature except for mercury. | They may be solid, liquid or gas. |

2. Hydrogen and helium both are gases. Investigate how helium is different from hydrogen.

**Answer:**

Hydrogen and helium are both gases at standard temperature and pressure, but they differ in several key aspects.

- Helium has two protons, two neutrons, and two electrons. Hydrogen, on the other hand, consists of a single proton and an electron. It does not have a neutron in its nucleus.
- Helium is less dense than hydrogen.
- Helium is chemically inert, meaning it does not readily react with other elements. Hydrogen, on the other hand, is highly reactive and can form chemical bonds with other elements.
- Helium is widely used for various applications, including as a coolant in cryogenic systems, as a lifting gas in balloons, etc. Hydrogen, on the other hand, is utilized as a fuel source and has applications in the chemical industry and space exploration.

## F. Answer the following questions in detail.

1. Compare and contrast the properties of elements and compounds.

**Answer:**

Comparison between elements and compounds are:

| Elements | Compounds |
|---|---|
| Elements cannot be decomposed into simpler components. | Compounds can easily be broken down into elements. |
| Elements are made up of the same type of atoms. | Compounds are made up of different types of atoms. |

| | |
|---|---|
| Elements are represented by symbols such as H, O, N, O, F, etc. | Compounds are represented by their chemical formulas such as $H_2O$, $NH_3$, NaCl |
| **Examples:** Calcium, sodium, carbon, nitrogen etc. | **Examples**: Sodium chloride, calcium chloride, water, ammonia etc. |

2. What are molecules? How are molecules different from atoms?

**Answer:**

**Molecules**

Molecules are the smallest units of a substance that retain its chemical properties. They are formed when two or more atoms are chemically bonded together. Atoms other than those noble gases are unstable and do not exist independently, They combine with similar or other atoms to form stable molecules.

**Difference between atoms and molecules**

The differences between atoms and molecules are given below.

| Atoms | Molecules |
|---|---|
| An atom is made up of subatomic particles that are protons, neutrons and electrons. | They are formed when two or more atoms are chemically bonded together. |
| Atoms are the basic units of matter that retain their chemical properties. | Molecules are the smallest units of a substance that retain its chemical properties. |
| Atoms have unique chemical properties based on their atomic number. | Molecules exhibit chemical properties that are a combination of the properties of their constituent atoms and the bonds between them. |
| **Examples:** Hydrogen (H), oxygen (O), and carbon (C). | **Examples**: Water ($H_2O$), carbon dioxide ($CO_2$), and methane ($CH_4$). |

3. Write the physical properties of any four elements.

**Answer:**

**Physical properties**

Physical properties are the characteristics of a substance that can be observed or measured without altering its chemical composition or identity. These properties provide information about the behaviour, appearance, and physical state of a substance.

**Physical properties of elements**

The physical properties of elements are given below.

**Oxygen (O)**

- Oxygen is a colourless ans odouless gas.
- It is denser than air.
- Oxygen is slightly soluble in water.
- It is a poor conductor of heat and electricity.

**Hydrogen (H)**

- Hydrogen exists in the form of a gas.
- It is a colourless, odourless and tasteless gas.
- It is lighter than air.
- It is insoluble in water.

**Helium (He)**

- Helium is an inert, colourless and odourless gas.
- It does not react with any other element.
- It is stable.
- It has low melting and boiling points.

**Lithium (Li)**

- Lithium is a solid at room temperature.
- It is soft and whitish.
- It has high melting and boiling points.

**Note: Students can choose any four elements from the periodic table.**

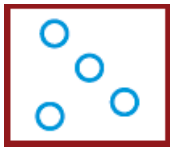
# Term 2 Periodic Unit 2
# Unit 7: Mixtures

## A. Choose the correct option.

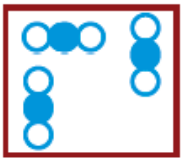
1. An example of a heterogeneous mixture is:
   a. Blood
   b. air
   c. vegetable soup
   d. saltwater

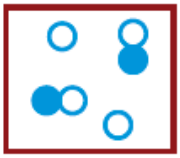
   **The correct answer is a and c.**
2. An example of a pure substance is:
   a. coke
   b. blood
   c. iron
   d. juice

   **The correct answer is c.**
3. The picture that describes a mixture of two elements is:

   a. 

   b. 

   c. 

   d. 

   **The correct answer is b.**
4. Air does not contain:
   a. nitrogen
   b. oxygen

c. carbon dioxide
d. bromine

**The correct answer is d.**

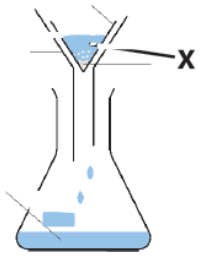
5. The process used to separate salt from salt water by boiling it is called:
   a. filtration
   b. evaporation
   c. distillation
   d. sedimentation

   **The correct answer is b.**
6. The method used to obtain petroleum products is:
   a. distillation
   b. evaporation
   c. filtration
   d. chromatography

   **The correct answer is a.**
7. Ink is a mixture of different colours. The method used to separate the colours of ink is:
   a. filtration
   b. distillation
   c. chromatography
   d. crystallization

   **The correct answer is c.**
8. Brass is made from a combination of:
   a. copper and zinc
   b. zinc and tin
   c. copper and tin
   d. zinc and gold

   **The correct answer is a.**
9. The diagram shows a method for separating a substance that contains x. 'x' is a:




   a. filtrate
   b. residue

c. molecule
d. compound

**The correct answer is b.**

10. The diagram shows a method for separation. It is:



a. evaporation
b. decantation
c. chromatography
d. distillation

**The correct answer is b.**

## B. Match the concentration of gases present in the air with their names.

| Gases in Air | Concentration |
|---|---|
| Nitrogen ($N_2$) | 78% |
| Oxygen ($O_2$) | 21% |
| Carbon dioxide ($CO_2$) | 0.03% |
| Argon and other noble gases | 0.93% |

## C. Constructive response questions.

i. Identify the following substances as pure or mixtures. In the case of mixtures, identify them as homogenous or heterogeneous.

air, water, steel, pizza, salt, milk and cereals, aluminium foil, colourful candies, sugar and copper wire.

**Answer:**

| Substance | Pure substance or a mixture | Homogenous or heterogenous |
|---|---|---|
| Air | Mixture | Homogenous |
| Water | Pure substance | |
| Steel | Mixture | Homogenous |
| Pizza | Mixture | Heterogenous |
| Salt | Pure substance | |
| Milk and cereal | Mixture | Heterogenous |
| Aluminium foil | Pure substance | |
| Colourful candies | Mixture | Heterogenous |
| Sugar | Pure substance | |
| Copper wire | Pure substance | |

ii. 'Solute' and 'solvent' are the terms used for the components of a solution. Sugar and water make a solution. Explain the steps to make a sugar solution and mention which one is a solute and which one is a solvent.

**Answer:**

To make a sugar solution, follow the steps given below:

- Take a clean container or beaker.
- Measure a specific amount of sugar using a spoon or a weighing scale.
- Pour the measured sugar into the container.
- Measure a specific amount of water using a measuring cup.
- Pour the measured water into the container with the sugar.
- Stir the mixture using a stirring rod or spoon until the sugar is completely dissolved in the water.
- Continue stirring until no undissolved sugar particles are left.
- The sugar solution is now ready for use.

In the sugar solution, sugar is the solute because it is the substance that is being dissolved and water is the solvent because it is the substance in which the solute is dissolved.

## D. Answer the following questions briefly.

1. Is it possible to get back water and sand if you mix both? If yes, then how?

**Answer:**

Yes, it is possible to separate water and sand if they are mixed. They can be separated through the process of filtration.

**Materials**

- Water and sand mixture
- Filtration apparatus
- Filter paper
- Container
- Funnel

**Procedure**

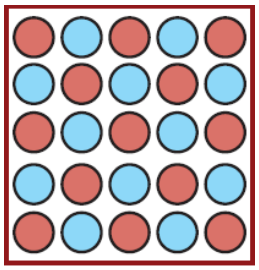
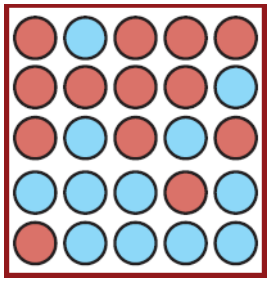
- Take the mixture of water and sand and pour it into a container.
- Place the funnel on top of a clean empty container.
- Slowly pour the mixture into the funnel, allowing the water to pass through while the sand is left on the filter paper.
- Carefully remove the filter paper containing the sand and allow it to dry.
- The water collected in the container is now separated from the sand and can be collected separately.

This process of filtration separates the sand from the water based on their different particle sizes.

2. With the help of a diagram, show the difference between homogenous and heterogeneous mixtures. Give examples.

**Answer:**

The difference between a homogenous mixture and a heterogenous mixture is given below.

| Homogenous mixture | Heterogenous mixture |
|---|---|
| Homogenous mixtures are those in which the components are uniformly distributed throughout the mixture with the same pattern. | Heterogeneous mixtures are those in which the components are not uniformly distributed throughout the mixture without the same pattern. |
| **Examples:** Salt in water, orange juice, etc. are some examples of homogenous mixtures. | **Examples:** Sand in water, soil, etc. are some examples of heterogeneous mixtures. |
|  |  |

3. Is household rubbish an example of a compound or a mixture? Explain.
   **Answer:**
   Household rubbish is an example of a mixture.
   Household rubbish consists of a combination of various materials, such as food waste, plastic packaging, paper, glass, metals, and other items. Each of these materials retains its chemical properties and does not undergo a chemical reaction to form a new substance when they are mixed. Instead, they exist in a physical mixture where the components are not chemically bonded to each other.

4. Is vinegar a mixture? Discuss.
   **Answer:**
   Yes, vinegar is considered a mixture. It is an example of a homogeneous mixture. Vinegar is primarily composed of acetic acid and water. When acetic acid is dissolved in water, it forms a homogeneous mixture where the particles of acetic acid are evenly distributed throughout the water.

5. How is filtration different from evaporation?

**Answer:**

Differences between filtration and evaporation are:

| Filtration | Evaporation |
|---|---|
| Filtration involves filter paper and a funnel to separate the components of a mixture. Filter paper does not allow the insoluble solids to pass through, whereas the liquid will pass through it. | Evaporation involves heating the mixture till all the liquid evaporates leaving behind the solids as a residue. |
| **For example,** if we have a mixture of sand and water, the sand particles will be trapped on filter paper while the water will pass through it. | **For example,** when a mixture of salt and water is heated, water will evaporate eventually, leaving the salt behind. |

## E. Investigating questions.

1. You are provided with two mixtures. One mixture contains sand and sugar and the other contains sand and iron powder. What techniques will you use to separate the components of the mixture? Explain.

**Answer:**

**Separation methods of a mixture of sand and sugar**

To separate the components of the mixture containing sand and sugar, we follow the process of filtration and then evaporation.

**Filtration**

Since sugar is soluble in water, add water to the mixture and stir it. The sugar will dissolve in water, while the sand remains insoluble. Filtration can be used to separate the sand from the sugar solution. The mixture is poured through a filter paper, which allows the sugar solution to pass through, while the sand particles are left on the filter paper.

**Evaporation**

Through evaporation, sugar can be obtained from the sugar solution obtained through filtration. The sugar solution is heated, causing the water to evaporate and leaving behind the sugar crystals.

**Separation methods of a mixture of sand and iron powder**

To separate the components of the mixture containing sand and iron powder, we can use magnetic separation and then sieving.

**Magnetic separation**

Iron is a magnetic substance, so a magnet can be used to separate the iron powder from the sand. When a magnet is moved over the mixture, the iron particles are attracted to the magnet and can be separated from the sand.

**Sieving**

After magnetic separation, there may still be some smaller particles of iron mixed with the sand. Sieving can be employed to separate the larger sand particles from the smaller iron particles. The mixture is passed through a sieve, which has smaller holes to retain the iron particles while allowing the sand to pass through.

2. Water available in your community is salt water. How will you remove salt from it?

**Answer:**

To remove salt from saltwater, we can use the process of distillation.

**Distillation**

The following procedure is used to remove salt from saltwater.

**Materials**

- A heat source
- A flask containing saltwater
- A condenser
- A collection vessel

**Procedure**

- Connect the condenser with the flask which allows the vapour to condense back into liquid form.
- Heat the flask containing the saltwater. As the temperature increases, the water will start to evaporate, leaving the salt behind.
- As the water vapour rises, it passes through the condenser, where it cools and condenses back into liquid form. The condensed water, which is now free from salt, collects in the collection vessel.
- Once the distillation process is complete, you will have distilled water in the collection vessel and salt residue left behind in the flask.

## F. Answer the following questions in detail.

**Science-Key Book-Sun-Grade 6**

1. Differentiate between elements, compounds and mixtures.

**Answer:**

Differences between elements, compounds and mixtures are given below:

| Characteristics | Elements | Compounds | Mixtures |
|---|---|---|---|
| **Definition** | Elements are made up of a combination of one type of atom. | A compound is formed when two or more elements join together chemically. | In mixtures, two or more elements or compounds combine physically. |
| **Properties** | Elements have the same properties that their atom have. | Compounds have different and unique properties from their components. | A mixture retains the properties of its components. |
| **Separation** | Elements cannot be broken down into simpler substances. | Compounds can be separated into their components by using a chemical method. | A mixture can be separated into its components by any physical method. |
| **Composition** | Elements have fixed composition of their atoms. | Compounds have a fixed composition of their constituents. | The composition of mixtures can vary. |
| **Examples** | Gold, iron, carbon, hydrogen. | Water, carbon dioxide, salt, sugar. | Air, steel, blood, seawater. |

2. Describe alloys and their types in detail.

**Answer:**

**Alloy**

A homogenous mixture of two or more metals is called an alloy.

**Properties of alloys**

An alloy may be a mixture of a metal with a metal or a non-metal. The properties of an alloy are different from their components. They have greater strength and hardness than their components. Compared to other metals, alloys

are more resistant to corrosion.

**Types of alloys**

Some common types of alloys are steel, brass, bronze and red gold.

**Steel:** Steel is formed when iron (Fe) is combined with carbon (C). Steel is strong, durable and highly resistant to corrosion. It is widely used in construction, automotive industry, and manufacturing.

**Brass:** Brass is formed by the combination of copper (Cu) with zinc (Zn). Brass is corrosion-resistant, has good electrical conductivity and is easily malleable. It is commonly used in musical instruments, plumbing fittings, and decorative items.

**Bronze:** Bronze is formed by the combination of copper (Cu) and tin (Sn). Bronze has good corrosion resistance. It is used in sculptures, coins and various mechanical applications.

3. Justify air as a mixture of gases. Is air a homogenous or heterogeneous mixture?

**Answer:**

**Air as a mixture of gases**

Air is considered a mixture of gases because it is made up of many gases such as nitrogen, oxygen and carbon dioxide. Argon and other noble gases are present in traces in the air. Nitrogen and oxygen make up about 99% of air. Argon, carbon dioxide and other gases form the remaining 1% of air.

**The concentration of gases in the air**

The following table shows the concentration of different gases in the air.

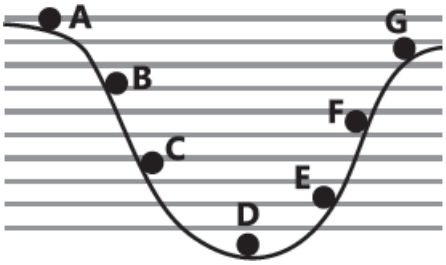
| Gases in Air | Concentration (%) |
|---|---|
| Nitrogen ($N_2$) | 78 |
| Oxygen ($O_2$) | 21 |
| Carbon dioxide ($CO_2$) | 0.03 |
| Argon and other noble gases | 0.93 |

These gases are not chemically combined in air and can be separated. The composition of air is not constant and can vary from place to place depending on the various processes that make use of atmospheric gases. Due to this reason, the air is considered a mixture of gases.

# Term 2 Periodic Unit 2
# Unit 8: Energy

## A. Choose the correct option.

1. The point at which the ball has maximum potential energy is:




   a. A
   b. D
   c. C
   d. E

   **The correct answer is a.**

2. Khadija is swinging back and forth, continuously; in doing so, her kinetic energy is changing into:
   a. elastic potential energy
   b. heat energy
   c. potential energy
   d. sound energy

   **The correct answer is c.**

3. Energy transformation in a microwave oven is:
   a. mechanical to heat
   b. electrical to heat
   c. electrical to kinetic
   d. heat to light

   **The correct answer is b.**

4. For energy sources "clean" means:
   a. not dirty
   b. does not create pollution
   c. creates pollution
   d. smells good

   **The correct answer is b.**

5. The total capacity of installed power generation in Pakistan is:
   a. 36000 KW
   b. 36000 MW
   c. 39000 KW
   d. 39000 MW

   **The correct answer is d.**
6. A pole vaulter runs forward, plants his pole, rises in the air and lands. The point that represents his greatest amount of gravitational potential energy is:
   a. when he initially lands
   b. when he runs forward to plant the pole
   c. just before he starts to fall to the ground
   d. after take-off as the pole expands and lifts the vaulter towards the bar

   **The correct answer is c.**
7. Which of the following is a non-renewable source of energy?
   a. solar
   b. crude oil
   c. hydroelectric
   d. wind

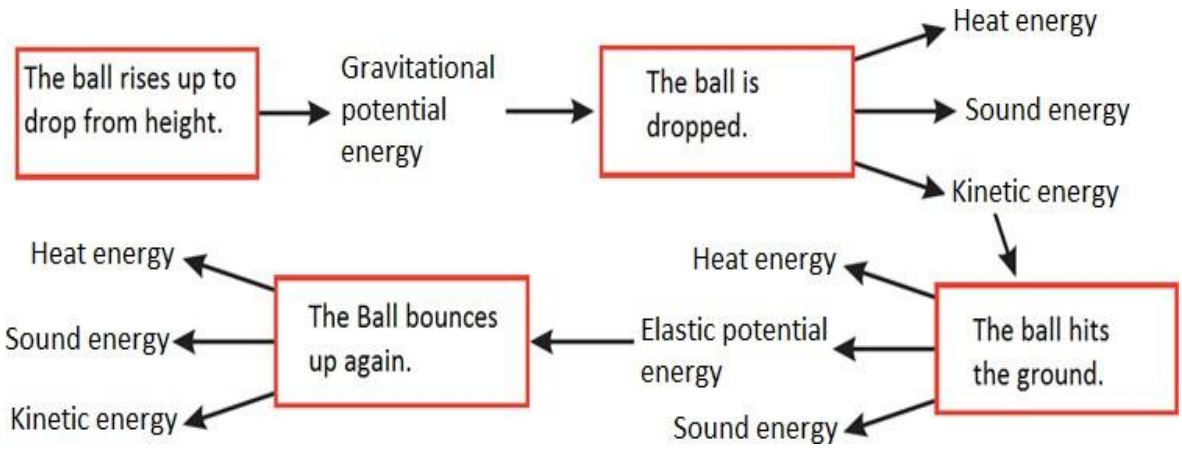
   **The correct answer is b.**
8. Falling water shows the following energy transformation:
   a. gravitational potential energy to elastic potential energy
   b. kinetic energy to gravitational potential energy
   c. gravitational potential energy to kinetic energy
   d. kinetic energy to potential energy

   **The correct answer is c.**
9. Solar heaters use black panels to _____light.
   a. absorb
   b. reflect
   c. transmit
   d. refract

   **The correct answer is a.**
10. The unit of energy is the:
    a. kelvin
    b. gram
    c. kilogram
    d. joule

    **The correct answer is d.**

## B. Complete the following energy flow diagram for a ball dropped from a certain height.




## C. Constructive response questions.

i. To show the relationship between kinetic energy and potential energy, students create a model of a baseball being thrown upwards.

**Answer:**

In the model of a baseball being thrown upwards, students can demonstrate the relationship between kinetic energy and potential energy by considering the different stages of the baseball's motion.

The materials needed and the procedure to create the model are given below.

**Materials**

- A small baseball
- A ruler or measuring tape
- Markers or labels for labelling the stages

**Procedure**

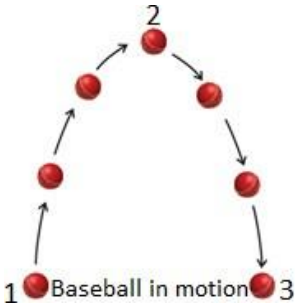
- Start by holding the baseball at a certain height in your hand. This represents the initial position of the baseball.
- Identify and label the following stages in the model:
  Stage 1: Initial position of baseball
  Stage 2: Throwing the baseball upwards
  Stage 3: Maximum height reached by the baseball
  Stage 4: Descending back towards the ground
  Stage 5: Return to the initial position

- When the baseball is thrown upwards, its kinetic energy gradually transforms into potential energy.
- The baseball gains kinetic energy as it starts moving upwards after throwing.
- As the baseball reaches its maximum height, it has converted all of its kinetic energy into potential energy.
- The potential energy is at its maximum when the baseball is at its highest point and it has no kinetic energy at this point.
- As the baseball starts descending towards the ground, the potential energy is gradually converted back into kinetic energy.
- When the baseball returns to its initial position, it has regained its initial kinetic energy and no longer possesses potential energy.

ii. Describe energy conversions at points 1,2 and 3.

**Answer:**

1. Kinetic energy
2. Potential energy
3. Kinetic energy




## D. Answer the following questions briefly.

1. Differentiate between kinetic energy and potential energy.

**Answer:**

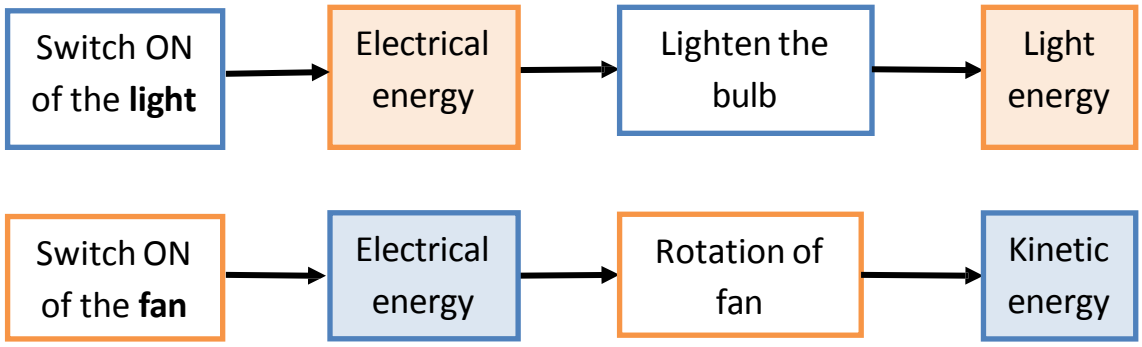
The difference between kinetic energy and potential energy is given below.

| Kinetic energy | Potential energy |
|---|---|
| The energy possessed by a body due to its motion is called kinetic energy. | The energy possessed by a body due to its position is called potential energy. |
| Kinetic energy is an active form of energy. | Potential energy is a stored form of energy. |
| Sound, heat, light and electrical energy are types of kinetic energy. | Gravitational energy, elastic energy and chemical energy are types of potential energy. |
| **For example,** a moving bicycle, a running horse and a rotating ceiling fan all possess kinetic | **For example**, a car that is parked at the top of a hill, a yoyo before it is released and a book on a table |

| | |
|---|---|
| energy. | before it falls all possess potential energy. |

2. When a fast-moving car puts on brakes, where does the energy go?
   **Answer:**
   When a fast-moving car puts on brakes, the energy is primarily converted into heat energy.

3. Draw an energy flow block diagram for a light bulb and fan.
   **Answer:**




4. What do we mean when we say these types of resources are non-renewable?
   **Answer:**
   When we say that certain types of resources are non-renewable, it means that these resources are finite in quantity and cannot be replenished or replaced. Non-renewable resources are formed over millions of years through natural processes and their rate of formation is extremely slow compared to their rate of consumption. Once these resources are depleted, they cannot be regenerated within a reasonable timeframe.

5. If you had to choose one energy source to spend your entire life on, which source would you choose? Why?
   **Answer:**
   If I had to choose one energy source to spend my entire life on, I would choose hydroelectric power. With hydroelectric power, we can generate electricity. Electricity can be converted into light, kinetic, potential, sound energy, etc.
   Although all renewable energy sources like solar and wind have the advantage of being clean, abundant, and sustainable. They do not produce greenhouse gas

emissions or contribute to air pollution, and their availability is not limited by depletion. These sources are also becoming more cost-effective and technologically advanced.

**Note: Chosen of energy source can be varied according to the student's interest.**

## E. Investigating questions.

1. Predict why we are facing an energy crisis.

**Answer:**

**Factors contributing to the energy crisis**

Several factors contribute to the energy crisis we are facing:

- As the global population increases and economies develop, the energy demand continues to rise.
- Industrialization, urbanization, and increased reliance on technology and appliances contribute to a higher energy consumption rate.
- Non-renewable energy sources, such as fossil fuels (coal, oil, and natural gas), are finite and are being depleted at a rapid rate.
- As non-renewable resources become scarce, it becomes more challenging and expensive to extract them, leading to an energy supply-demand gap.
- The use of fossil fuels has negative impacts including air pollution, greenhouse gas emissions, and climate change, and has prompted the need to transition to cleaner and more sustainable energy sources.
- The transition to renewable energy is not happening fast enough to meet the increasing demand, leading to an energy crisis.

2. Investigate the different sources of energy in your area. Find out if they are renewable or non-renewable. If major sources are non-renewable, suggest some ways to shift to renewable sources.

**Answer:**

**Sources of energy in our area**

Some common sources of energy and their renewable or non-renewable nature:

- Fossil fuels, including coal, oil, and natural gas, are widely used for electricity generation, transportation, and heating. They are non-renewable resources and contribute to environmental issues such as air pollution and climate change.

- Nuclear power plants generate electricity through nuclear reactions. While nuclear fuel is not renewable, it can provide a significant amount of power with low greenhouse gas emissions.
- Solar panels convert sunlight into electricity. Solar energy is renewable, abundant, and produces no direct emissions.
- Wind turbines convert the kinetic energy of wind into electricity. Wind energy is renewable and has a relatively low environmental impact. It requires suitable wind resources and appropriate locations for installation.
- Hydroelectric power utilizes the energy of flowing or falling water to generate electricity. It is renewable, but the availability of suitable locations for large-scale hydroelectric projects may be limited.

**Suggestion**

To shift to renewable energy sources, some suggestions include:

- Governments can provide incentives and favourable policies to encourage the adoption of renewable energy, such as feed-in tariffs, tax credits, and renewable portfolio standards.
- Investing in research and development of renewable energy technologies can drive innovation, improve efficiency, and lower costs.
- Promoting energy efficiency measures in buildings, industries, and transportation sectors can reduce overall energy demand and make the transition to renewable energy more feasible.
- Raising awareness about the benefits of renewable energy and promoting energy conservation can encourage individuals and businesses to make sustainable choices.

## F. Answer the following questions in detail.

1. Explain the types of energy in detail.

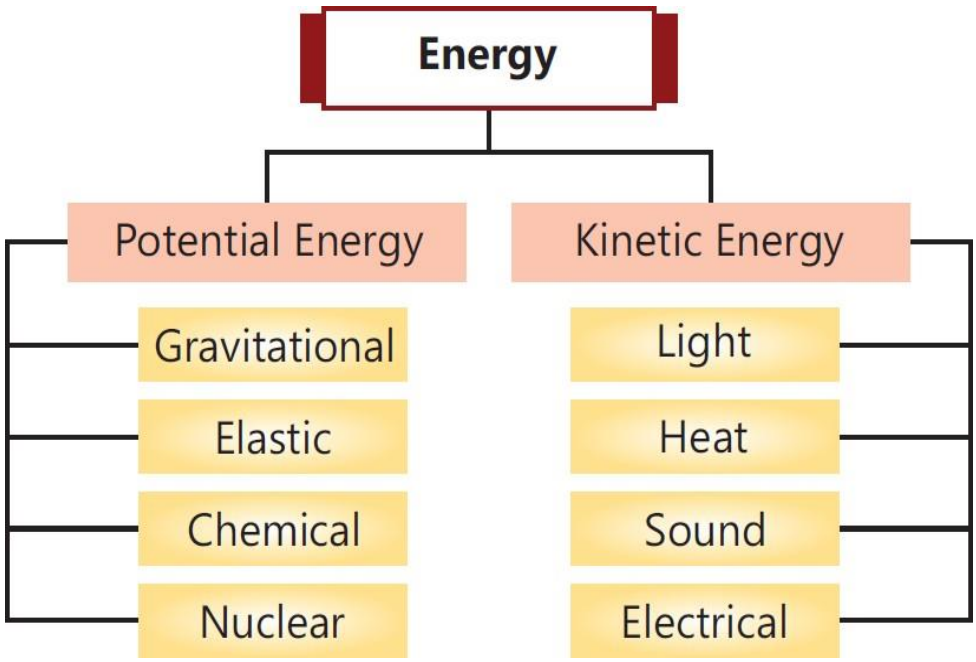
**Answer:**

**Energy**

The ability or capacity of a body to do work is called energy. In other words, if a body has no energy, it cannot do work. The fundamental unit of energy is the joule (J).

**Types of energy**

There are two types of energy, kinetic energy and potential energy.




**Kinetic energy**

The energy possessed by a body due to its motion is called kinetic energy. For example, a moving bicycle, a running horse, or a rotating ceiling fan all possess kinetic energy. Sound, heat, light and electrical energy are types of kinetic energy.

**Sound energy:** Anything that you hear is sound energy. It is produced by the vibrations of objects or particles.

**Light energy:** It is a form of energy which can help us to see. It is also known as radiant energy.

**Heat energy:** It is also called thermal energy. It is the energy that an object has because of the movement of its molecules. It can be transferred from one object to another object.

**Electrical energy:** Energy generated by tiny charged particles is electrical energy. A lightning flash is one form of electrical energy.

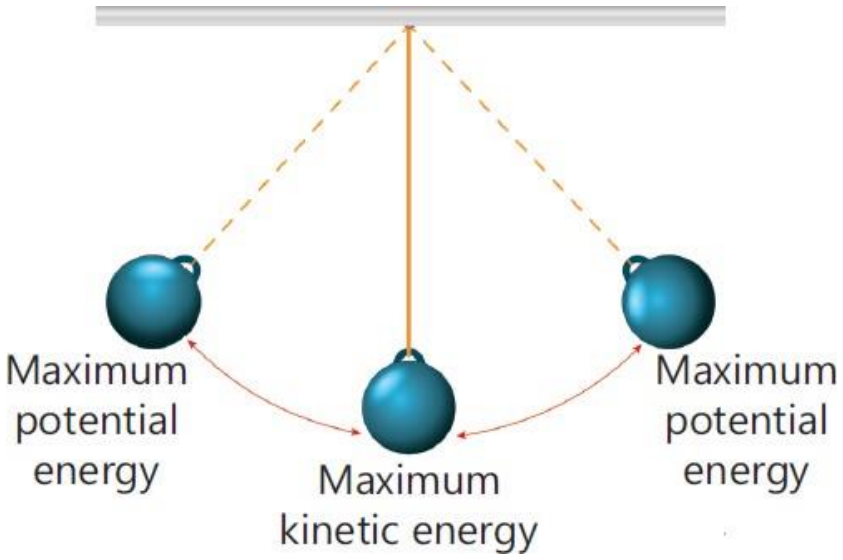
**Potential energy**

The type of energy possessed by a body due to its position is called potential energy. It is the stored form of the energy. Gravitational potential energy, elastic potential energy and chemical potential energy are types of potential energy.

**Gravitational potential energy:** The energy stored in a body when a body is at a certain height is known as gravitational potential energy.

**Elastic potential energy:** When a body is stretched or compressed, it has elastic potential energy in it.
**Chemical potential energy:** The energy stored in food is an example of chemical potential energy.

2. State the law of conservation of energy and describe the energy transformed with the example of a simple pendulum.
**Answer:**
**Law of conservation of energy**
The law of conservation of energy states:
"Energy can neither be created nor destroyed, it is only transformed from one form to another."
**Example:** When we swing a pendulum, it has maximum potential energy but zero kinetic energy at the top. So, the system at this point has potential energy. When it swings back down, potential energy changes into kinetic energy. At all times, the sum of both types of energy remains constant.
Energy dissipates gradually because of air friction/resistance. However, it is observed that during energy transformation some energy is lost and disappears in the atmosphere.




3. Discuss the advantages of renewable sources of energy.
**Answer:**
**Renewable sources of energy**
Renewable energy is derived from many of Earth's naturally occurring

resources, including wind, water, and the Sun. These energy resources cannot be exhausted and can be used again and again.

**Advantages of renewable sources of energy**

Following are some advantages of renewable sources of energy.

**Eco friendly:** Renewable energy is considered clean energy since it doesn't cause severe environmental pollution, and it has low or zero carbon and greenhouse emissions.

**Sustainability:** This implies that they do not deplete over a lifetime, and there is zero possibility that they will run out (sustainable source of energy).

**Job opportunity:** Renewable energy is creating economic development by providing new and stable jobs in world economies. Many new jobs are introduced such as installing solar panels, auditing energy efficiency, developing electric vehicles and more.

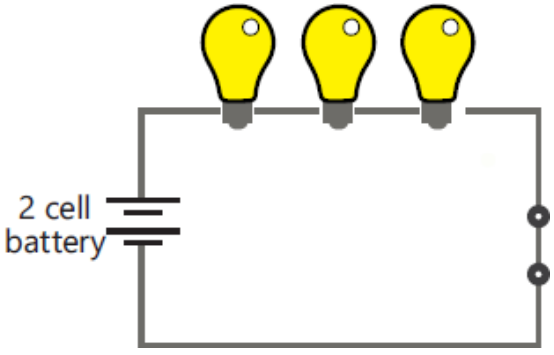
**Less maintenance of facilities:** Renewable energy technologies require less overall maintenance than traditional generators that use traditional fuel sources.

# Term 3 Periodic Unit 1
# Unit 9: Electricity

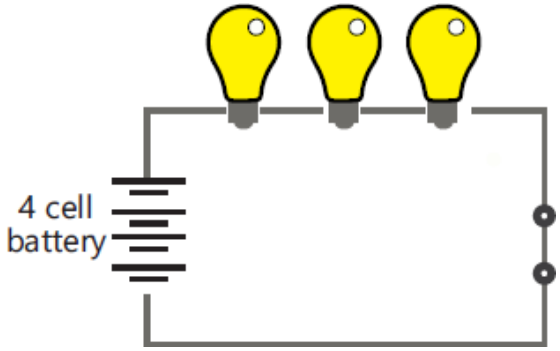
## A. Choose the correct option.

1. Lightning is an example of static electricity; the statement that supports this is:
   a. electricity is produced due to some energy source
   b. electricity is produced due to friction between clouds
   c. electricity is directional, not random
   d. electrons travel from the negative terminal to the positive terminal
   **The correct answer is b.**
2. Ali removes a bulb from a three-bulb circuit, the other two bulbs remain on the circuit in which bulbs are connected is an/a:
   a. open circuit
   b. short circuit
   c. series circuit
   d. parallel circuit
   **The correct answer is d.**
3. When in a circuit a switch is open, it means:
   a. the circuit is working and gives energy
   b. the circuit is broken and charges cannot flow
   c. the circuit is turning the bulb on
   d. charges are flowing in the wire
   **The correct answer is b.**
4. The circuit that will make the bulbs glow brightest is:

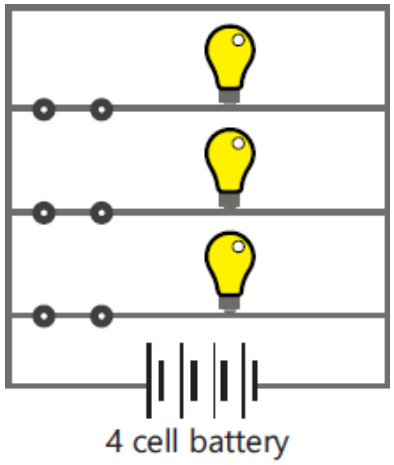
   a.



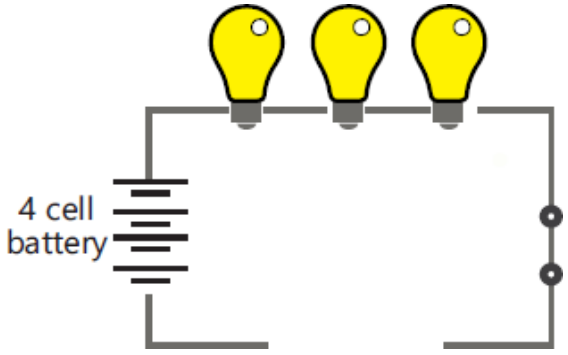
b.




c.




d.




**The correct answer is c.**

5. A circuit made of wires, a lamp, a switch, and a cell. What change is needed for the lamp to glow?
   a. the switch needs to be opened
   b. the switch needs to be closed
   c. the cell needs an insulator
   d. the wire needs to be connected to the bottom of the cell

   **The correct answer is b.**
6. A bulb in a circuit glows only when the circuit is:
   a. open
   b. closed

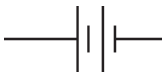
c. both open and closed
d. open if the bulb is not fused

**The correct answer is b.**

7. Substances that do not allow electricity to pass through are called:
   a. insulators
   b. bad conductors
   c. conductors
   d. both insulators and conductors

   **The correct answer is a.**
8. A dry cell has terminals:
   a. 1
   b. 2
   c. 3
   d. 4

   **The correct answer is b.**
9. By increasing the number of bulbs in a parallel circuit, the brightness of bulbs:
   a. decreases
   b. remains the same
   c. increases
   d. first increases then decreases

   **The correct answer is b.**
10. The symbol  is used for:
    a. a cell
    b. a battery
    c. an open circuit
    d. a closed circuit

    **The correct answer is b.**

**B. Observe the following circuits and write their names. Also, state which circuit will work and which will not. Give a reason for your answer.**



**Series Circuit**

This circuit will work properly.

**Reason**

This circuit is a close circuit.

The bulbs are properly connected with the battery.



**Parallel Circuit**

This circuit will not work.

**Reason**

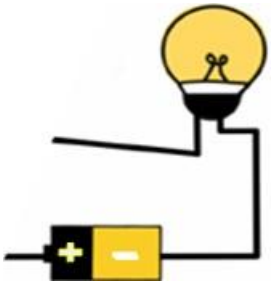
This circuit is an open circuit.

The bulbs are not connected with battery.

## C. Constructive response questions.

i. Ali wants to complete the circuit in order to light up the bulb. Which of the following things will help him to make the bulb glow?

1 Metal knife
2 Plastic spoon
3 Rubber band
4 Metal nail
5 Wooden toothpick
6 String of metal paper clips



**Helpful materials:** _____

**Reason:** _____

**Answer:**

To help Ali complete the circuit and make the bulb glow, he should use materials that conduct electricity. The materials that will help him achieve this are:

**Helpful materials:** Metal knife, metal nail and a string of metal paper clips.

**Reason:** These materials are made of conductive metals, which allow the flow of electrical current. When Ali uses any of these materials to connect the

electrical components in the circuit (such as the bulb, battery, and wires), they will create a continuous path for the electricity to flow, thereby completing the circuit and making the bulb glow.

The other materials listed as a plastic spoon, rubber band and wooden toothpick are non-conductive or insulating and will not facilitate the flow of electricity in the circuit.

## D. Answer the following questions briefly.

1. Can we run home appliances on static electricity? Justify your answer.

   **Answer:**

   No, we can not run home appliances on static electricity because static electricity is generated through friction or contact between objects. It has very low voltage and limited duration. Home appliances need a stable and continuous source of electricity and static electricity does not provide that.

2. The components of a circuit are connected in order and its switch is ON; still, the bulb does not glow. What could be the possible reason?

   **Answer:**

   If the components of a circuit are connected correctly in order, the switch is ON, but the bulb does not glow, several possible reasons could be:

   - The bulb may be burnt out or defective.
   - There might be loose or disconnected wires or connections in the circuit. It could be at any point including the bulb socket, switch or battery terminals.
   - The switch may be faulty and not allow the current to flow through.
   - The battery might be depleted or dead.

3. What is a circuit diagram? Describe its types.

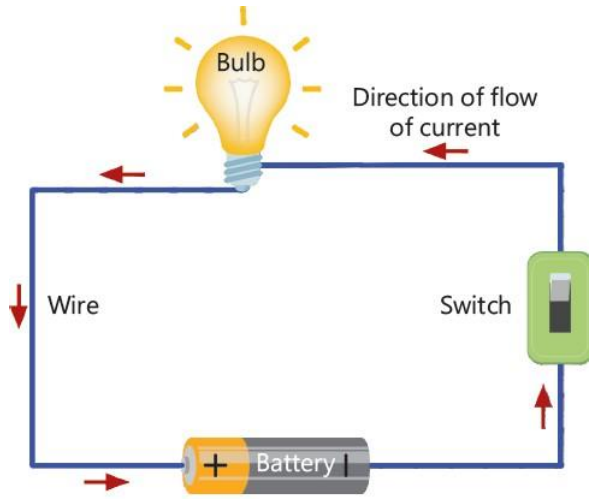
   **Answer:**

   A visual display of an electric circuit is known as a circuit diagram.

   Circuit diagrams can be drawn in two ways.

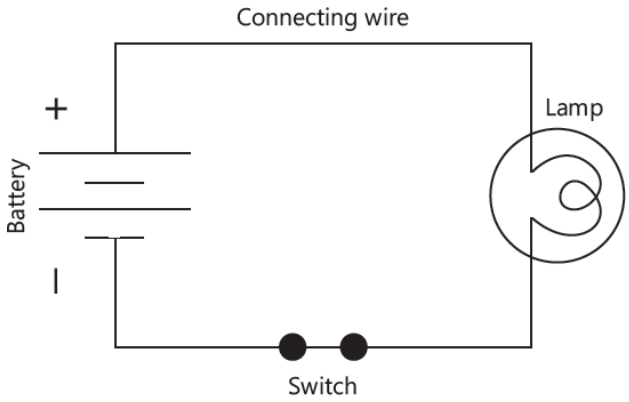
   - Pictorial circuit diagram
   - Schematic circuit diagram

   **Pictorial circuit diagram:** The diagram is drawn using basic images for the visual representation of an electric circuit is called a pictorial circuit diagram.




**Pictorial diagram of a circuit**

**Schematic circuit diagram:** The diagrams are drawn using standard symbols of an electrical circuit, called a schematic circuit diagram. Schematic diagrams are more technical and used by scientists and electricians.




**Schematic diagram of a circuit**

4. Differentiate between a series circuit and a parallel circuit.

**Answer:**

The difference between a series circuit and a parallel circuit is as follows.

| Series circuit | Parallel circuit |
|---|---|
| In a series circuit, components are connected end to end, one after the other, providing a single path for the current to flow. | In a parallel circuit, components are connected side by side or across each other, providing multiple paths for the current to flow. |

| | |
|---|---|
| The current flows around the circuit in a single loop. | The current travels across many different paths before reaching the positive terminal of the battery. |
| The current remains the same in a series circuit. | The current is not the same across each bulb in a parallel circuit. |
| The voltage across each bulb is not the same in a series circuit. | The voltage is equal across all the bulbs of the parallel circuit. |
| If any bulb becomes non-functional the entire circuit stops working. | If any bulb becomes non-functional, other bulbs of the circuit remain functional. |

5. Ahmed used a 2-cell battery to make a circuit with two bulbs joining the circuit end to end. What changes would you suggest to make the bulbs glow brighter using the same components?

**Answer:**

To make the bulbs glow brighter in a 2-cell battery circuit using the same components, Ahmed can make the following suggestions.

- Ahmed can add more cells in series to increase the voltage supplied to the circuit, which can make the bulbs glow brighter. For example, using a 3-cell or 4-cell battery instead of a 2-cell battery would provide more voltage.
- Ahmed can use bulbs with lower resistance which draw more current for a given voltage, resulting in the bulbs glowing brighter.
- Minimize the resistance in the rest of the circuit (wires, switches, etc.) to ensure that most of the voltage is dropped across the bulbs, making them brighter.

## E. Investigating questions.

1. Imagine the structure of an atom. Does it play any role in the production of static electricity? Justify your answer with appropriate reasons.

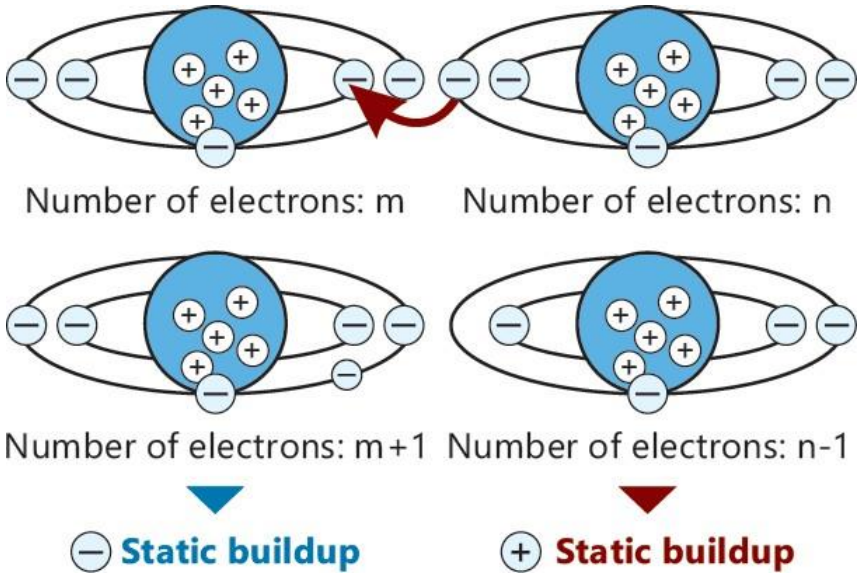
**Answer:**

**Role of atom structure in static electricity production**

The structure of an atom plays a crucial role in the production of static electricity. Static electricity is generated when there is an imbalance of electric charges between objects, resulting in the transfer of electrons. This process is fundamentally linked to the structure of atoms, particularly the outermost or valence electrons.

**Imbalance of charges**

When two objects come into contact and then separate, electrons can be transferred between them. If one object gains electrons (becomes negatively charged), and the other loses electrons (becomes positively charged), an electric charge imbalance occurs.




**Static electricity generation**

When two materials are rubbed together or come into contact, the electrons may transfer from one material to the other, leading to the creation of static charges. For example, rubbing a balloon against hair can transfer electrons, causing the balloon to become negatively charged and the hair positively charged.

2. If you get a chance change the circuit combination of fairy lights from series to parallel. Can you do this? Explain.

**Answer:**

Yes, we can change the circuit configuration of fairy lights from series to parallel, but it may require some modifications to the wiring.

Each bulb would need its connection to the power source, typically with separate wires leading to each bulb socket. This way, if one bulb fails, the others will stay lit, as the circuit remains uninterrupted. Switching from series to parallel can make the fairy lights more reliable, as a single bulb failure would not affect the entire string. However, it requires additional wiring and sockets,

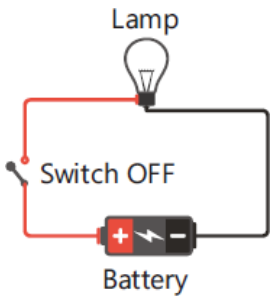
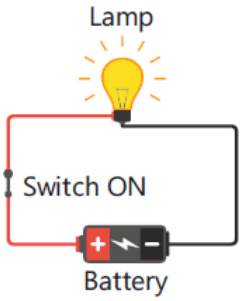
making it more complex to set up.

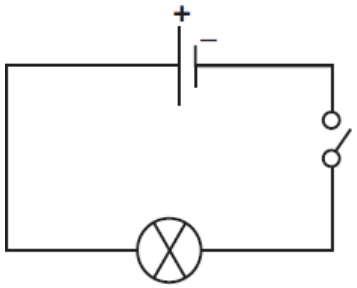
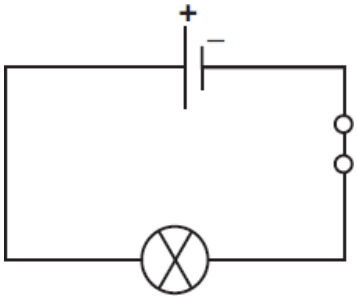
## F. Answer the following questions in detail.

1. Draw a detailed comparison between open and closed circuits.

**Answer:**

The comparison between an open circuit and a closed circuit is given below.

| | Open circuit | Closed circuit |
|---|---|---|
| **Definition** | In an open circuit, electric current does not flow from an energy source (battery) to the connected appliances or other components due to an incomplete path. | In a closed circuit, electric current flows from an energy source (battery) to the connected appliances or other components due to a complete path. |
| **Conditions** | The circuit will remain open if its switch is off, the wire is broken or the appliances are burnt out. | The circuit will work only when the switch is on, the wires are connected and the appliances are in order. |
| **Path** | It is represented by an incomplete loop or a break in the circuit diagram. | It is represented by a continuous loop in the circuit diagram. |
| **Electrical devices** | Open circuits do not allow electrical devices to function. | Closed circuits allow electrical devices to operate and use energy. |
| **Pictorial Diagram** |  |  |

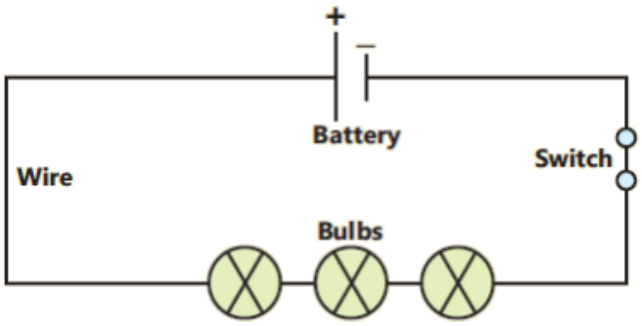
| | | |
|---|---|---|
| **Schematic Diagram** |  |  |

2. Draw the circuit diagram of series and parallel circuits. Also, discuss the advantages and disadvantages of both.

**Answer:**

**Series circuit**

The components are connected end to end, one after the other, providing a single path for the current to flow in a series circuit.




**Advantages of a series circuit**

A major advantage of a series circuit is that we can add additional power devices, usually using batteries. This will greatly increase the overall power supply, resulting in more output.

For example, the electric circuit used to turn on many LEDs at a time is a series circuit.

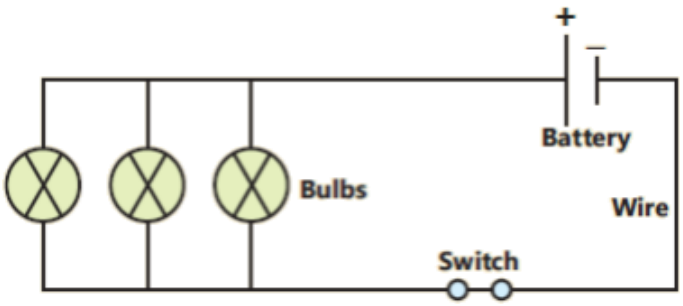
**Disadvantages of a series circuit**

- In a series circuit, there is only one path for the flow of current.
- A break at any part of the circuit stops the flow of current in the whole circuit.

**Parallel circuit**

The components are connected side by side or across each other in a parallel

circuit, providing multiple paths for the current to flow.




**Advantages of a parallel circuit**

- Parallel circuits are mainly used in many electrical devices and appliances.
- In parallel circuits, there is more than one path for the flow of current.
- A break in any branch of the circuit stops the flow of current through that branch only.
- The flow of current in other branches is not affected.

**Disadvantages of a parallel circuit**

- A parallel circuit needs more wiring. It draws more power than an equivalent series circuit and is costly too.
- It gets heated up due to a high power flow.
- Parallel circuits are difficult to design because they have complex multiple branching paths.

3. Discuss different cases to enhance the brightness of bulbs when they are connected in series and parallel combinations.

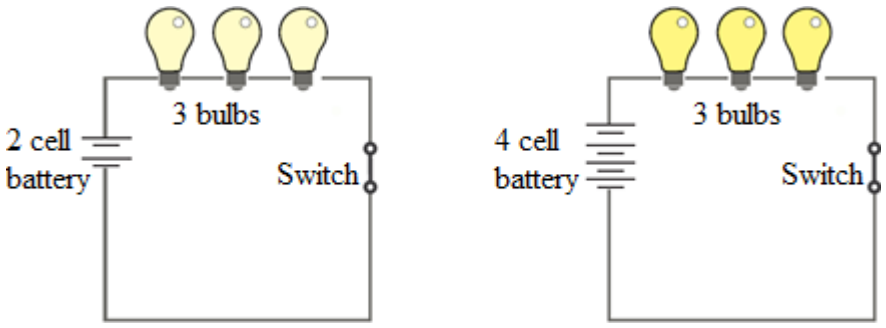
**Answer:**

**Enhancing brightness in series and parallel combinations**

The brightness of bulbs can be enhanced by the increasing number of batteries in series and parallel circuits and by using a thin wire in series circuits.

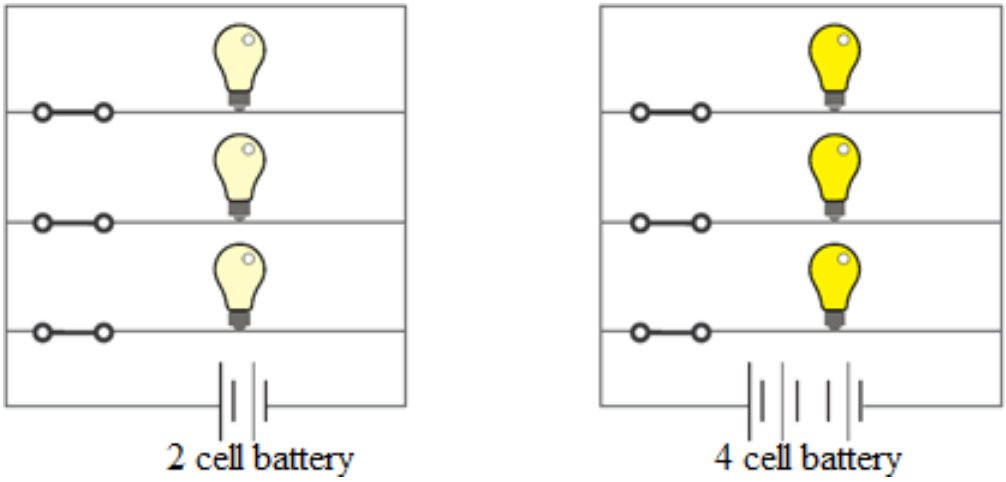
**Number of batteries in a series circuit**

In a series circuit, an increase in the number of batteries increases the brightness of bulbs. When batteries are added to the circuit, the voltage of the overall circuit is increased. Therefore, the division of voltage across each bulb also increases.



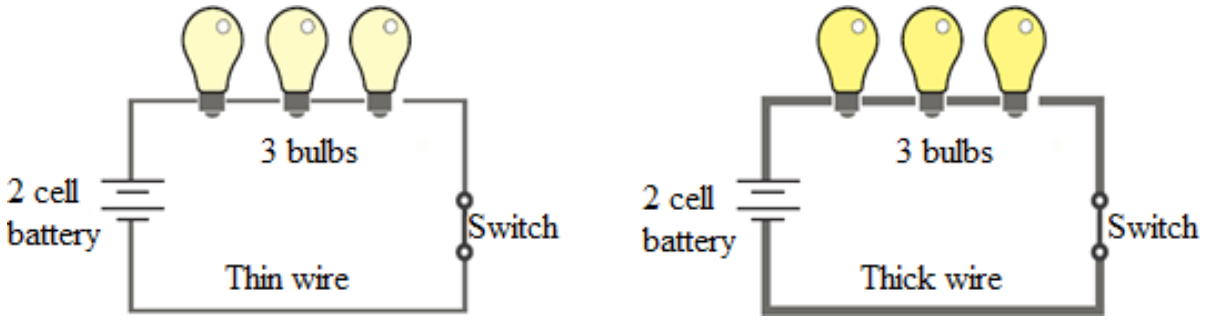

**Number of batteries in a parallel circuit**

In a parallel circuit, the amount of voltage does not affect the brightness of bulbs. Additional batteries enhance the overall life of the circuit. Double batteries in parallel will last twice as long as a single battery.




**The thickness of the wire in a series circuit**

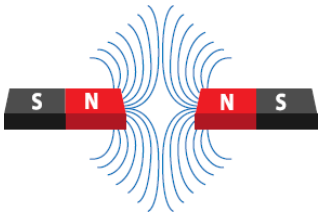
An increase in the thickness of the wire affects the brightness of the bulbs. The higher the thickness of the wire, the higher the brightness of the bulbs because of an increased flow of current in the thick wire.



# Term 3 Periodic Unit 1
# Unit 10: Magnetism

## A. Choose the correct option.

1. The pole of the magnet that points towards the south of the Earth is called:
   a. south
   b. north
   c. west
   d. east
   **The correct answer is a.**
2. The directions on Earth can be found by using:
   a. a magnet
   b. light
   c. a circuit
   d. a compass
   **The correct answer is d.**
3. Look at the picture and name the phenomenon:
   a. repulsion
   b. attraction
   c. collision
   d. crashing
   **The correct answer is a.**




4. Which of these is a method of magnetizing a magnet?
   a. hammering
   b. rubbing
   c. stroking
   d. heating
   **The correct answer is c.**
5. Which of the following materials is attracted to a magnet?
   a. a silver spoon
   b. a book
   c. a common pin
   d. a comb
   **The correct answer is c.**
6. A magnetic field is produced by:
   a. static charges

b. moving charges
c. positive charges
d. a neutral wire

**The correct answer is b.**

7. Hair is attracted towards a comb due to:
   a. moving charges
   b. static charges
   c. neutral charges
   d. magnetic field

   **The correct answer is b.**
8. A magnetic compass always points in:
   a. N-S direction
   b. S-S direction
   c. N-N direction
   d. E-W direction

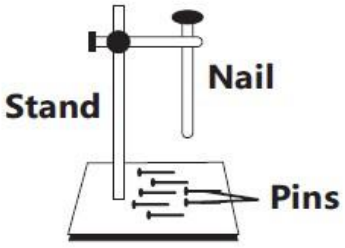
   **The correct answer is a.**
9. The power of attraction of a bar magnet is maximum at its:
   a. centre
   b. north pole
   c. south pole
   d. both poles

   **The correct answer is d.**
10. Which one of these is a magnetic material?
    a. iron
    b. paper
    c. a rubber band
    d. a wooden spoon

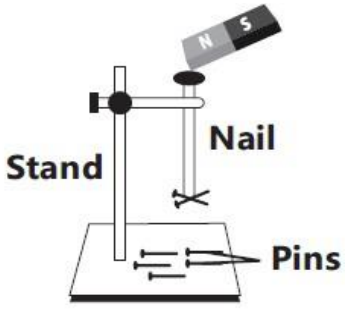
    **The correct answer is a.**

## B. Constructive response questions.

Prepare the following setup and ask students to answer the questions below:




No pin clings to the nail




Some pins cling to the nail

i. Why do pins not cling in the first step?

**Answer:**

The pins do not cling to the nail in the first step because the nail, by itself, is not a magnet. It lacks magnetic properties. Therefore, it cannot attract or hold onto objects like pins.

ii. What happens when a bar magnet is brought close to a nail?

**Answer:**

When a bar magnet is brought close to a nail, the nail becomes temporarily magnetized by the influence of the magnetic field of the magnet. This magnetization occurs because the domains (small magnetic regions) within the nail align in the direction of the magnetic field produced by the bar magnet. As a result, the nail exhibits magnetic properties and can attract and hold objects like pins.

## C. Answer the following questions briefly.

1. Explain how electric current possesses a magnetic field around it. Verify it using a magnetic compass.

**Answer:**

When an electric current flows through a conductor, it generates an invisible magnetic field around it. This phenomenon is a fundamental principle of electromagnetism.

If a magnetic compass is placed near a live wire or a circuit with a current, the

compass needle deflects, aligning itself with the magnetic field produced by the current. Which is the evidence of the verification that electric current possesses a magnetic field.

2. Explain the different types of magnets.

**Answer:**

There are 2 different types of magnets.

- Temporary magnet
- Permanent magnet

**Permanent magnet:** When a material is magnetized, it gets magnetic properties. The strength of a magnet depends on the nature of the material used to create a magnet. It does not require a continuous supply of electric current to maintain a magnetic field. It is usually made up of hard materials. The poles of this type of magnet cannot be changed.

**Example:** An example of a permanent magnet is alnico, a ceramic-like material made from iron oxide with nickel, strontium or cobalt.

**Temporary magnet:** Temporary magnets become magnetized in a magnetic field. When the magnetic field is removed, it also loses its magnetic properties.

**Example:** Paper clips, screws and iron nails are examples of temporary magnets.

3. Mahnoor's mother was arranging her stitching box. Suddenly, the stitching box slipped from her hand and all the needles in the box got scattered on the ground. How can she collect all the needles without wasting her time?

**Answer:**

To collect scattered needles without wasting time, Mahnoor's mother can use a bar magnet. By passing the magnet over the area where the needles are scattered, the needles will be attracted to the magnet and can be easily collected without the need to pick them up one by one.

4. What is magnetism?

**Answer:**

The force that is applied by magnets when they attract other objects is called magnetism.

5. What are permanent magnets? Give examples.

**Answer:**

When a material is magnetized, it gets magnetic properties. The strength of a

magnet depends on the nature of the material used to create a magnet. It does not require a continuous supply of electric current to maintain a magnetic field. It is usually made up of hard materials. The poles of this type of magnet cannot be changed.

**Example:** An example of a permanent magnet is alnico, a ceramic-like material made from iron oxide with nickel, strontium or cobalt.

## D. Investigating questions.

1. Observe and describe how to magnetize a magnet.

**Answer:**

**Magnetization**

The process by which a material attains magnetic properties temporarily or permanently is called magnetization.

**Methods of magnetizing a magnetic substance**

Magnetization can be done by certain methods.

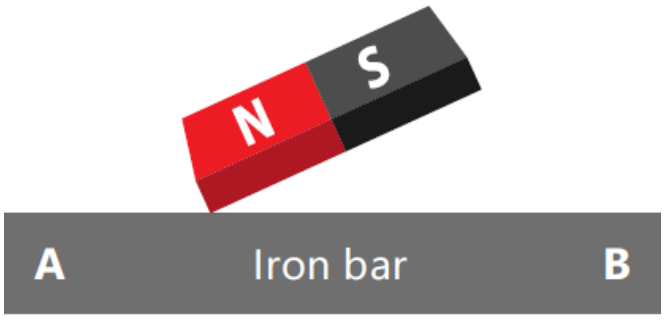
- Stroking method
- Electrical method

**Stroking method**

Stroking a magnet in one direction along with the object to magnetize will make a domain in that particular direction. A bar of steel can be magnetized by stroking it with a bar magnet.

**Single touch method:** A magnet is rubbed along a magnetic substance from one end to another.

**Double touch method:** Opposite poles of two magnets are placed in front of each other at the centre of the magnetic substance and rubbed in opposite directions.

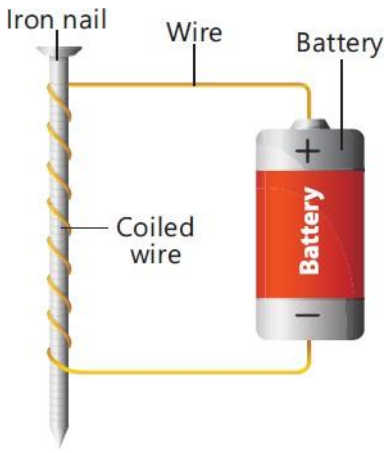



**Stroking method**

**Electrical method**

A magnet made by using electric current is called an electromagnet. It will be a magnet if the current is passing through conductors like steel, iron, etc. so it is a temporary magnet. Electromagnets can become permanent if the material is placed in a coil and a very strong current passes through it.

For example, a bar of steel or iron can be magnetized by placing it in a coil of wire. When we pass direct current through the wire, it will get magnetized as shown in the figure below.



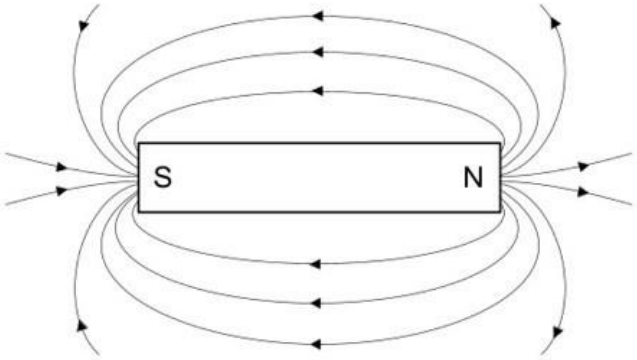

**Electrical method**

2. Draw the magnetic field of a bar magnet. Explain why the magnetic compass always aligns itself to the north-south direction.

**Answer:**

To draw a simple magnetic field:

- We draw an arrowhead field line.
- The field line comes from the north pole and goes towards the south pole.
- The field lines are more concentrated at the poles.



**Magnetic compass**

A magnetic compass always aligns itself with the Earth's magnetic field, pointing toward the magnetic north pole. This alignment occurs due to the magnetic forces acting on the compass needle.

**Magnetic compass aligned in a north-south direction**

The following are the reasons why a magnetic compass aligns itself to the north-south direction:

- The compass needle is a small magnet itself.
- When it is free to move, the north pole of the compass needle is attracted to the Earth's magnetic north pole, which is located near the geographic North Pole.
- The south pole of the compass needle is attracted to the Earth's magnetic south pole, located near the geographic South Pole.
- These magnetic attractions cause the compass needle to align itself along the north-south direction of the Earth's magnetic field.

This natural alignment of the compass needle makes it a valuable tool for navigation, as it helps us determine directions relative to the Earth's magnetic field.

## E. Answer the following questions in detail.

1. Write the working principle of a doorbell.

**Answer:**

**The working principle of a doorbell**

In the doorbell, there is an electromagnet. A doorbell uses a magnetic field produced by an electromagnet.

**Components of a doorbell**

Following are the components of a doorbell.

- The push button or switch is located outside the house, it is the part you press to ring the doorbell.
- An electromagnet is located inside the doorbell, which is a coil of wire wrapped around an iron core.
- A small metal (iron) strip attached to the end of the electromagnet is called the armature.
- A metal bell that makes a ringing sound when struck.

**Operation**

When the switch is pressed, it allows the current to flow through the circuit of

the doorbell. The electric current passes through the coil of wire in the electromagnet. It generates power and the magnetic field attracts the iron strips towards it. It causes the striker to hit the gong and the bell rings (Ding Dong). When you release the switch, the circuit is broken and the current stops flowing through it. The doorbell loses its magnetic field and the connected spring returns to the rest position. It is restored and the current flows through the circuit and the process begins to repeat whenever the doorbell rings again.

2. Write the difference between attraction and repulsion.

**Answer:**

The difference between attraction and repulsion is given below.

| Attraction | Repulsion |
|---|---|
| Attraction occurs when the different poles are brought closer to each other. | Repulsion occurs when the same poles are brought closer to each other. |
| Unlike poles attract each other. | Like poles repel each other. |

3. Describe the Earth as a huge magnet.

**Answer:**

**Earth-a huge magnet**

Our Earth is like a huge magnet having a magnetic field around it.

Here are key points describing Earth as a magnet:

**Magnetic field:** Scientists think that the movement of molten metal in the Earth's outer core produces an electric current. The current creates a magnetic field.

**Magnetic poles:** The regions near the geographic north and south poles act as the north and south poles of a large bar magnet having a strong field at its ends. Geomagnetic poles move due to the activity beneath the Earth's surface.

**Magnetic field lines:** Earth's magnetic field has magnetic field lines that emerge from the magnetic south pole and curve around to re-enter at the magnetic north pole. These field lines create a continuous loop, just like those of a bar magnet.

**Navigation:** The shape of the Earth's magnetic field is like that of a bar magnet. When we place a suspended magnet in the environment, it detects the North Pole. A compass can detect the Earth's magnetic field and the Earth's

geographic poles. People have used a magnetic compass to navigate using the Earth's magnetic field for centuries. The needle of the compass moves towards the Earth's magnetic poles. The north end of the needle points to the geographic North Pole of the Earth.

# Term 3 Periodic Unit 2
# Unit 11: Technology in Everyday Life

## A. Choose the correct option.

1. Which of the following is an organic fertilizer?
   a. urea
   b. compost
   c. ammonia
   d. potassium chloride
   **The correct answer is b.**
2. Aluminium foil in a solar oven:
   a. absorbs light
   b. provides insulation
   c. reflects light
   d. refracts light
   **The correct answer is c.**
3. Cheese is made from:
   a. yoghurt
   b. cream
   c. milk
   d. whey
   **The correct answer is c.**
4. The most essential nutrient required for plant growth is:
   a. nitrogen
   b. iron
   c. oxygen
   d. sulphur
   **The correct answer is a.**
5. Use of fertilizers:
   a. increases plant growth
   b. decreases plant growth
   c. stops plant growth
   d. has no effect on plant growth
   **The correct answer is a.**
6. Yoghurt is made by the action of:
   a. a virus

b. fungi
c. bacteria
d. both fungi and a virus

**The correct answer is c.**

7. Newspaper in a solar oven can be replaced with:
   a. aluminium
   b. wool
   c. cotton
   d. iron

   **The correct answer is b.**

## B. Answer the following questions briefly.

1. Search the internet for the names of nitrogen fertilizers.

   **Answer:**

   Following are some common nitrogen fertilizers.

   - Urea
   - Ammonium nitrate
   - Ammonium sulfate
   - Calcium nitrate
   - Potassium nitrate

   These fertilizers provide plants with essential nitrogen nutrients to promote their growth.

2. Identify the food you eat in which beneficial microorganisms are used.

   **Answer:**

   Foods that use beneficial microorganisms are:

   - Yoghurt
   - Cheese
   - Bread
   - Vinegar

   These microorganisms contribute to flavour, texture, and preservation.

3. How can we convert solar energy to electrical energy?

**Answer:**
Solar energy is converted into electrical energy using solar panels. These panels contain semiconductor materials that absorb sunlight and generate an electric current. The generated electricity can be stored in batteries.

4. On which principle does an electric bell work?
**Answer:**
An electric bell works on the principle of electromagnetism. When we press the switch of the bell the electromagnet moves the hammer and the hammer hits the gong which produces sound.

5. Describe the function of an electric bell.
**Answer:**
An electric bell is a device used to produce sound when its button is pressed. It is used in doorbells, school bells, alarms, etc.

## C. Investigating questions.

1. Grow a vegetable of your choice and observe the effect of nitrogen fertilizer on it. Conclude your observations.
**Answer:**
**Effects of fertilizers on plant growth**
Fertilizers contribute to the growth of plants. To check the effects of nitrogen fertilizers on plant growth, let us perform an experiment
**Material**
- 2 earthen pots
- Vegetables / seasonal plant seeds
- Potting soil
- Fertilizer
- Permanent marker

**Procedure**
- Fill each pot with potting soil.
- Put seeds of a plant of your choice in both pots.
- Label the first pot as 'Control'. This pot does not get nitrogen fertilizer.
- Now add nitrogen fertilizer to the other pot.
- Water both groups regularly and ensure they receive the same amount of sunlight.

- For several weeks, observe the growth of the plants in both pots.
- Note any differences in plant height, leaf colour, flowering, or fruit production between the two groups.

**Conclusion**

The use of nitrogen fertilizer had a significant impact on the growth and development of the chosen vegetable because nitrogen is the most essential nutrient required by plants for growth and development.

2. Search the internet and design a recipe for making bread.

**Answer:**

The basic recipe for making homemade bread is given below.

**Materials**

- 2 cups warm water
- 4 tablespoons instant yeast
- 1 teaspoon sugar
- ¼ cup vegetable oil or melted butter
- 5 cups all-purpose flour
- 1 ½ teaspoons salt

**Procedure**

- Add the yeast and sugar to the warm water. Mix them and leave for 15 minutes.
- Pour the flour into a large mixing bowl and add the oil, salt and yeast mixture. Mix all ingredients until a dough forms.
- Knead the dough on a floured surface until it becomes smooth and elastic.
- Put the dough in an oiled bowl and cover it with a clean kitchen towel.
- Put the dough in a warm place and let it rise for about 1 hour.
- Preheat the oven to 350 °F (180°C).
- Punch and knead the risen dough to remove excess air.
- Shape the dough into a loaf and place it in a greased loaf pan.
- Bake the bread in the preheated oven for 30 minutes.
- Remove the bread from the oven and let it cool. Enjoy your bread.

**Note: Students are free to modify the recipe to their preferences by adding any other ingredients for added flavour and texture.**

## D. Answer the following questions in detail.

1. Heat your lunch in a solar oven and describe the whole process.

   **Answer:**

   **Solar oven**

   A solar oven is a device that uses the energy from sunlight to cook or heat food.

   **Heating lunch in a solar oven**

   - Setting up the solar oven in an area with direct sunlight.
   - Open the reflectors of the solar oven. These reflectors are designed to concentrate sunlight onto the cooking area.
   - Place the lunch or food inside the cooking chamber of the solar oven to heat. This chamber is usually covered with a transparent lid or glass that allows sunlight to enter but traps the heat inside.
   - Close the lid securely to create a sealed environment. Sunlight enters through the transparent lid and gets absorbed by the food and cooking utensils inside.
   - As the sunlight is absorbed, it gets converted into heat energy. The trapped heat inside the oven begins to raise the temperature of the food.
   - Over time, the food reaches the desired temperature, and the lunch is heated or cooked using only solar energy.
   - Keep an eye on the food, as cooking times may vary depending on factors like sunlight intensity and the type of food being cooked.
   - Once the food is ready, carefully open the solar oven, remove the lunch and enjoy the solar-cooked meal.

2. Demonstrate the principle of electromagnetism.

   **Answer:**

   Following is the procedure to demonstrate the principle of electromagnetism.

   **Materials**

   - A battery
   - Insulated copper wire
   - A large iron nail
   - A paperclip

   **Procedure:**

   - Leave one end of the wire exposed and wrap the rest of it tightly around the iron nail.
   - Attach one end of the wire to one terminal of the battery.
   - Touch the free end of the wire to the other terminal of the battery.
   - The iron nail becomes magnetized temporarily while the wire is connected to

the battery. It can pick up small magnetic objects like paper clips.

- Disconnect the wire from the battery, and the magnetization of the iron nail will cease.

This experiment demonstrates how electricity flowing through a wire can create a magnetic field, turning a piece of iron into a temporary magnet.

3. How will you make your electric bell?

**Answer:**

Let us make an electric bell using recyclable materials.

**Materials**

- Motor
- Wooden board
- Wire
- Wire connector
- Hex nut
- Plastic lid
- Glue
- 4v battery
- Switch with wire

**Procedure**

- Attach a bell cover to the wooden piece with glue.
- Fix the hex nut to one end of the wire.
- Attach the other end of the wire to one hole of the wire connector and the motor to the other hole.
- Take the plastic lid of a bottle and make a hole in its centre.
- Fix the motor on this lid with glue. Attach it to the wooden board.
- Using glue fix a small wooden piece to the wooden board.
- Also, attach the battery to the board.
- Attach one wire of the switch to the battery and the other to the motor.
- Connect the other terminal of the battery with the motor.
- Fix to switch to the board with glue.
- You can show your model to the class.

# Term 3 Periodic Unit 2
# Unit 12: Solar System

## A. Choose the correct option.

1. Read the statement given below and tell the name of the planet. 'I am big, have a red spot and I am made of gases.'
   a. Mars
   b. Jupiter
   c. Venus
   d. Neptune
   **The correct answer is b.**
2. Pluto is degraded from the planet list because:
   a. it revolves around the Sun
   b. it is spherical in shape
   c. it has other celestial objects in the neighbourhood
   d. it is not in spherical shape
   **The correct answer is c.**
3. The rocky object found between Mars and Jupiter is:
   a. a comet
   b. an asteroid
   c. a meteorite
   d. a satellite
   **The correct answer is b.**
4. If you are stuck in an avalanche, the satellite which will help to detect you is a:
   a. weather-forecasting satellite
   b. communication satellite
   c. search and rescue satellite
   d. spy satellite
   **The correct answer is c.**
5. The terrestrial planet is:
   a. Jupiter
   b. Mars
   c. Neptune
   d. Uranus
   **The correct answer is b.**
6. The brightest planet is:

a. Mercury
b. Venus
c. Mars
d. Jupiter

**The correct answer is b.**

7. Rocky objects revolving around the Sun are called:
   a. meteorites
   b. asteroids
   c. meteoroids
   d. meteors

   **The correct answer is b.**
8. Smaller icy celestial objects revolving around the Sun are called:
   a. asteroids
   b. comets
   c. stars
   d. planets

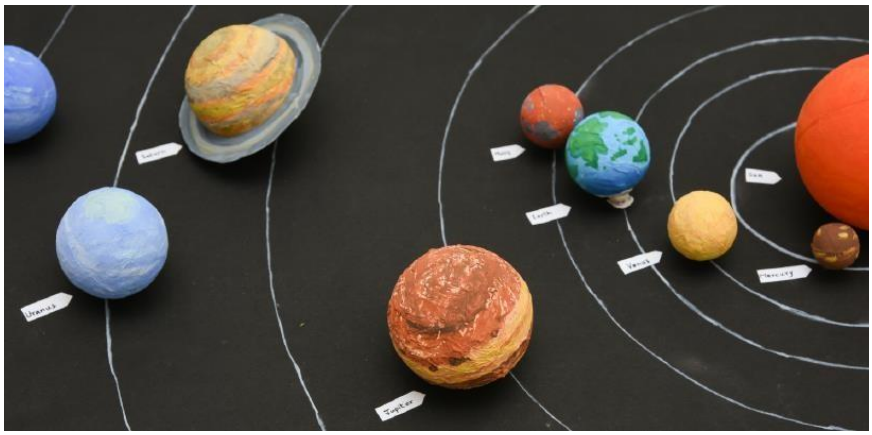
   **The correct answer is b.**
9. A bright ball with a long shiny tail is created by:
   a. comets
   b. asteroids
   c. both comets and asteroids
   d. meteoroids

   **The correct answer is a.**
10. Pluto is referred to as a:
    a. planet
    b. dwarf planet
    c. star
    d. comet

    **The correct answer is b.**

## B. Constructive response questions.

i. Make a model of the solar system with planet name tags as shown in the figure.



**Answer:**

Following is the procedure to make a model of the solar system.

**Materials**

- Different-sized polystyrene balls (1 large, 2 medium and 2 small)
- Modelling clay
- Cardboard
- Scissors
- Papers
- Markers
- Compass
- Pencil
- Paints
- Paintbrush

**Procedure**

- Take a cardboard and cut it into a rectangular shape.
- Colour the cardboard with black paint.
- Take one large ball to make the Sun, two medium balls to make Jupiter and Saturn and two small balls to make Uranus and Neptune.
- Paint the entire surface with yellow paint to make the Sun.
- Paint Jupiter with red, orange, and white paint and Saturn with pale yellow (a mix of yellow and white paint), swirled into patterns.

- Paint Uranus a pale blue, made by mixing blue and white paint. Paint Neptune with dark blue.
- Take a cardboard and cut out a ring for Jupiter and Saturn.
- Paint them accordingly and glue the rings around these planets.
- Roll five small balls using several colours of modelling clay to make Earth, Mercury, Venus and Mars.
- Make a hole in each ball of clay by using a large needle and let them dry.
- Paint the planets for more detail on them.
- Paint white dots onto the black cardboard to show stars.
- Pass the fishing wire through all the planets and tie them with the cardboard.
- Arrange the planets on the cardboard according to the sequence of the solar system.
- Cut the paper strips and write the name of each celestial object of the solar system on it.
- Paste them near each celestial object.

**Note: Students are free to modify the model according to their creative ideas.**

ii. What are satellites? Enlist the natural satellites of each planet.

**Answer:**

**Satellites**

The objects that orbit larger celestial bodies, such as planets or stars are called satellites. They can be natural, like moons, or artificial, like man-made objects launched into space for various purposes.

**Natural satellites of planets**

The natural satellites of each of the eight planets in our solar system are:

**Mercury:** It has no natural satellites.

**Venus:** It also has no natural satellites.

**Earth:** It has one natural satellite, which is simply called ‘the Moon’.

**Mars:** It has two small natural moons named ‘Phobos’ and ‘Deimos’.

**Jupiter:** It has 95 natural satellites.

**Saturn:** It has 83 natural satellites.

**Uranus:** It has 27 known natural satellites.

**Neptune:** Neptune has 14 known natural satellites.

## C. Answer the following questions briefly.

1. If Neptune is your home planet, what challenges will you face there?
   **Answer:**
   If Neptune were our home planet, we would face numerous challenges due to its extreme conditions:
   - Neptune is the coldest planet in our solar system. Staying warm there would be a significant challenge.
   - Neptune is dark and far away from the Sun. There is no light to see.
   - Neptune experiences very strong winds, which could make travel and habitation for us difficult.
   - Neptune is a gas giant without a solid surface to stand on. This would pose challenges for construction, transportation and living arrangements.
   - The atmosphere of Neptune contains methane. The presence of methane in the air makes life difficult to survive and breathe.

2. Differentiate between asteroids and comets.
   **Answer:**
   The difference between asteroids and comets is given below.

| Asteroids | Comets |
|---|---|
| Asteroids are rocky or metallic objects that orbit the Sun between Mars and Jupiter. | Comets are icy bodies that also orbit the Sun, but they have elliptical orbits around the Sun. |
| They are generally composed of metals or rocky materials. | Comets are composed of ice, dust, and rocky material. |
| They are irregular in shape. | They form a bright outflowing tail with ingrained dust particles around the comet nucleus. |
| Asteroids do not have tails. | Comets have a characteristic coma (the glowing head) and one or more tails that point away from the Sun. |

3. Describe why artificial satellites are sent into space.

**Answer:**

Artificial satellites are sent into space for various purposes, including:

- They enable global communication by transmitting signals for television, radio, internet and telephones.
- Satellites provide valuable data for weather forecasting, environmental monitoring and disaster management.
- They play a crucial role in the Global Positioning System (GPS), allowing accurate navigation on Earth.
- Satellites are used for space exploration, astronomical observations and scientific experiments.
- Satellite technology advances various industries, including agriculture, transportation and resource management.

4. Ali was crossing a jungle with his friends. Unfortunately, he got lost in the jungle. Tell how Ali will be able to locate his friends.

**Answer:**

Ali can be able to locate his friends in the jungle using GPS system of his mobile phone.

5. Differentiate between geostationary and polar-orbiting satellites.

**Answer:**

The difference between geostationary and polar-orbiting satellites is given below.

| Geostationary satellites | Polar-orbiting satellites |
|---|---|
| Satellites that travel from west to east over the equator are called geostationary satellites. | Satellites that travel from pole to pole in the north-south direction are polar-orbiting satellites. |
| These satellites orbit 36,000 km above the equator and move with the rotation of the Earth. | Launching these satellites requires a lot of energy because of the rotation of the Earth. |

## D. Investigating questions.

1. If you get an opportunity to launch a satellite, will you make it geostationary or polar-orbiting? Give reasons.

**Answer:**

I would choose a geostationary satellite because of the following reasons.

I want continuous and stable coverage of a specific region on Earth, such as for communication, weather monitoring, or television broadcasting, a geostationary orbit would be the preferred choice.

Geostationary satellites remain fixed relative to a specific point on the Earth's surface, making them ideal for applications where uninterrupted coverage is essential.

This orbit allows for real-time data transmission and consistent observation of a specific area.

**Note: Choice of satellite can be varied according to the student's interest.**

2. Suppose you found a heavenly body in the solar system. Observe it and explain how you will categorize it.

**Answer:**

When categorizing a heavenly body in the solar system, I consider various factors, including its size, composition, location, and orbital characteristics.

The following steps outline how a heavenly body might be categorized:

- The first step is to observe the heavenly body using telescopes or space probes. I gather data on its size, shape, surface features, and any surrounding objects like moons or rings.
- Determining the body's size and mass is crucial. This information helps classify it as a planet, dwarf planet, asteroid, or comet. Planets are typically larger and more massive, while asteroids and comets are smaller.
- Analyzing the body's orbital characteristics is essential. Planets follow nearly circular orbits around the Sun, while comets often have highly elliptical orbits that take them far from the Sun before returning.
- Studying the body's composition through spectroscopy can provide insights into its chemical makeup. This can help determine if it's composed of rock, ice, or gas.
- Examining surface features, such as craters, volcanoes, or geological formations, can offer clues about the body's history and geological activity.
- If the body has moons or rings, these should be considered in the categorization. Planets often have moons, while some asteroids may have companions.
- Finally, scientists compare the body's characteristics to those of known

objects in the solar system to make a classification. For example, if it shares similarities with other asteroids, it may be classified as an asteroid.

- Ultimately, the categorization of a heavenly body is based on a combination of these factors and is subject to revision as more data becomes available through continued observation and exploration.

## E. Answer the following questions in detail.

1. Explain the characteristics of asteroids and their types.

**Answer:**

**Asteroids**

Millions of rocky objects revolve around the Sun but they are too small to be called planets. They are called asteroids. They are irregular in shape. They vary in size from a few metres to hundreds of kilometres in diameter. Most of them are pitted or crated.

**Regions of asteroids**

In our solar system, asteroids are found in three regions.

- The first region is between Mars and Jupiter. Most asteroids are found in this region in the form of a ring over an area of 100 km.
- The second region is where the gravitational pull of the Sun and the planet is balanced. Asteroids found in this region are called Trojan asteroids. Jupiter, Mars, Neptune and our Earth have Trojan asteroids.
- The third region is where many asteroids are circling the Earth. Around 10,000 asteroids were found in this region are called Near-Earth Asteroids (NEAs).

**Types of asteroids**

Asteroids are of three types.

**Carbonaceous asteroids:** Carbonaceous asteroids are made up of clay and stony silicate rocks. Grey in colour. Found in the outer region of the asteroid belt.

**Silicaceous asteroids:** Silicaceous asteroids are made up of silicate mixed with iron. Greenish to reddish. Found in the inner region of the asteroid belt.

**Metallic asteroids**: Metallic asteroids are made up of iron. Reddish in colour. Found in the middle region of the asteroid belt.

2. Explain how life has become easier because of weather forecasting and communication satellites. How is it different from the past?

**Answer:**

**Uses of satellites**

Artificial satellites carry out a variety of functions. They are designed to perform specific functions. They can collect data and information more quickly than any instrument present on Earth. Some important types of satellites are given below.

**Communication satellites**

These satellites allow radio, television and telephone transmissions to be sent live anywhere in the world.

**Examples:** Typical examples of communication satellites are Telstar, Intelsat, Optus D1, Anik E, etc.

**Weather-forecasting satellites**

These satellites monitor and predict the weather and climate of the Earth. These satellites also measure temperature, air pressure, rainfall, humidity, etc. and predict hurricanes.

**Examples:** Meteosat, TIROS, COSMOS and GOES are some examples of weather forecasting satellites.

3. Describe the global positioning system in detail.

**Answer:**

**Global Positioning System (GPS)**

GPS is used to figure out our exact location anywhere in the world.

**Components of GPS**

GPS has three main components:

- Satellites
- Ground stations
- Receivers

**Working of GPS**

It comprises 24 satellites that revolve in geostationary orbit. A receiver can be in your phone or car. Satellites send signals to a receiver that calculates its position based on the distance and position from other satellites. This system determines the distance between a GPS satellite and a GPS receiver by measuring the amount of time taken by signals to reach its receiver. Nowadays millions of people rely on GPS to find their locations, hire a taxi or online orders.