

Chapter # 1

Exercise

Concept Checkers

1. Science is only about observing Mother Nature, knowledge is not required.

- a. True
- b. False**

2. Discoveries are achieved with observations or conducting experiments.

- a. True**
- b. False

3. Scientific method approach is the unsystematic way of conducting tests.

- a. True
- b. False**

Fill in the blanks

1. The word science is derived from a Latin word '*scientia*', meaning Knowledge.

2. Practicing science, results in Useful models of reality.

3. Responsible conduct is required at all times in the laboratory.

Match the suitable pair

- | | |
|--|----------------------------------|
| 1. Discoveries being made on a (v) | i. 'Scientific Methods' approach |
| 2. Systematic way of conducting tests (i) | ii. non-luminous flame |
| 3. No eatables or drinks are allowed in (iv) | iii. from the flames |
| 4. Keep all reading and writing materials away (iii) | iv. the laboratory |
| 5. The hottest part of the flame, known as (ii) | v. daily basis |

Activity Quiz

Observe different objects in your classroom that result from science. Make a list of at least six such objects and compare with classmates. Share the findings with the teacher.

Ans)

- Light Bulb (invented by Edison)
- Electrical Fan
- Chalk (Calcium Carbonate CaCO_3)
- Scissor
- Glue (Obtained from trees and animal feet)
- Ruler (used for measurement)
- Compass (Used to make angles)

Question Bank

1. What is science? And what is the definition and explanation.

Ans) The word science is derived from a Latin word "Scientia" meaning Knowledge." It defines the structure and behavior of physical and natural world through observation and behavior". These discoveries and inventions are made in search of better and efficient living and studying how mother nature works. We are surrounded by the blessings of science such as the electricity, furniture, automobiles etc. In short, practicing science results in useful models of reality.

2. Define Scientific method approach? List and explain the method of conducting the approach.

Ans) Scientific method is systematic approach of making new discoveries. This approach is based on;

- Observation
- Hypothesis
- Predictions
- Experiment
- Conclusion

Observation

This is the initial stage of breaking down the problem. This is where focus study of every information and evidences are made.

Hypothesis

In this stage we are at means of developing solution to the identified problem. In this stage possible proposition is made on the basis of available evidences.

Predictions

This stage helps to make things turn from general to specific. It helps you answer the possible outcome on the basis of the previous steps.

Experiment

This is the stage where you test your hypothesis and prediction. This is the logical process of conducting under controlled conditions for results.

Conclusion

This is the final stage where a summary is made of the outcome and reality check for the initial hypothesis. This stage either approves or rejects the initial hypothesis and prediction

3. What is a laboratory? List and illustrate at least four apparatus used in a laboratory.

Ans) A room or area with special facilities to perform scientific studies are termed as laboratory.

- **Dropper** is used for liquid handling its purpose is to transfer small quantities of liquids. It is usually made of glass tubes with narrow point and the rubber bulb at the top.
- **Test tube** is usually used to hold the substance in place and that you can observe reactions taking place.

- **Beaker** is a simple container for stirring, mixing and heating liquids. Beakers are generally cylindrical in shape with a flat bottom and pointed beak on the top which help in pouring of liquids
- **Physical balance** is a sensitive measurement tool used in laboratories to measure the mass of small quantities.

4. Why are laboratory safety rules important? List all the rules, and explain any eight of them.

Ans) Nature of the experiments performed in the laboratory is hazardous to health; therefore safety measures should be adopted before using laboratories. These safety measures are given below;

- Always wear on apron or lab coat when working with chemicals because these chemicals may damage the skin cells
- Always tie back loose hairs because hairs are very sensitive and can accidentally fall into flames or chemical. Long hair can also disturb your vision which may lead to accidents.
- Always wear safety glasses to prevent getting hazardous materials in your eyes
- Always read the labels on chemicals and pay careful attention to all the warning written on the label to avoid any accident.
- Never eat, drink, or smell the chemicals. Rather, carefully fan the fumes to your nose because these fumes may adversely affect the biological processes of your body.
- Never look directly into a test tube or flask. Look at the contents from the side because in some cases gas bubbles may form which may be hazardous to skin or eyes.
- Never play around during experiments.
- Always wash your hands after handling lab materials to avoid adverse impact on your skin

5. List and draw the various apparatuses used in the laboratory?

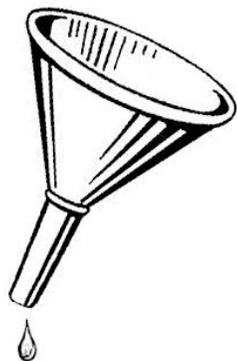
Ans) The tools which are used in laboratory are termed as lab apparatus.

Few basic apparatuses are listed below:

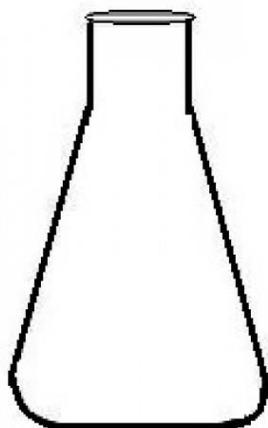
- Test tube



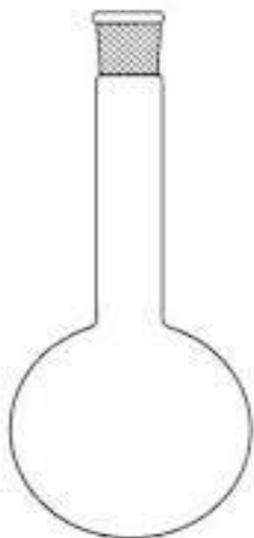
➤ Funnel



➤ Conical flask



➤ Flask



6. Explain and illustrate the working of the Bunsen burner?

Ans) Bunsen burner is a common equipment of laboratory that produces a single open gas flame.

Working:

The burner is connected to the gas outlet, as the gas flows through the pipeline; it is mixed with air flow vent. The air vent has a ring, that helps regulate the air vent. Therefore, the flame is adjusted through the clockwise and anticlockwise movement, for the desirable flame for the experiment. The hottest part of the flame, known as non-luminous flame, can reach up to 1500cc. Bunsen burner can be used to melt a wide variety of metals.

Chapter # 2

Exercise

Concept Checkers

1. Measurement is *not* a form of approximation. Which of the options is *most likely* correct.
a. True
b. False
2. Measurements lead to confusion in production of goods, rendering services, or even precision in laboratory results.
a. True
b. False
3. International System of Unity (*SI unity*) is the widely used system of measurement.
a. True
b. False
4. The SI unit, second, is *mostly* measured by stopwatch.
a. True
b. False
5. SI units of length, for longer measure is commonly kilometer (km), because it is smaller in scale.
a. True
b. False
6. Measuring tapes are usually paired as centimeters and meters.
a. True
b. False

Fill in the blanks

1. Measurements are a process of benchmarking objects or observations with Definitive numbers.
2. The SI Units, broadly classified as Seven base units.
3. Metric rulers measure length in centimetres (cm).
4. Area is a measure of the extent of the surface, of a two dimensional object.

Activity quiz

Measure the area of a ball? Name the apparatus used, and explain how.

Ans) Measurement of a ball should be practically done in class room by using external caliper as an apparatus.

Method

First we have to find the diameter of a ball using external caliper than divide the value of diameter by 2 to find radius e.g $r = d/2$

Now, by using the formula of Area we get,

$$A = 4\pi r^2$$

Question Bank

1. Define International System of Units (*SI units*)? And what are the base units?

Ans) International System of Units (*SI units*) is the widely used system of measurement, better known as the 'metric system'. The SI Units are broadly classified as seven base units namely; *meter, kilogram, second, ampere, kelvin, mole and candela*.

2. List the instruments for measuring length. And define measuring tape and metric ruler, briefly?

Ans) The S.I units of length for shorter distance is meter (m) and Centimeter (cm). While for longer measure is commonly kilometer (km), because it is larger in scale.

List of instruments for measuring length

- Measuring tape
- Metric ruler
- Internal and external caliper
- Vernier caliper

Measuring Tape

Measuring tapes are paired as centimeters and meters or feet and inches. These are commonly in use by tailors or carpenters.

Metric ruler

These rulers are basic instruments in the laboratory. Rulers measure length in centimeters (cm). Accuracy from the rulers could only be achieved, if the eye is placed vertically above spot or mark being read.

2. What does Parallax error mean?

Ans) An apparent change in the position of an object resulting from a change in position of the observer.

3. What are the two advantages of Vernier Caliper over *Internal and External Caliper*?

Ans) This instrument has the ability, to measure internal and external diameter (width) of the object. It is more sophisticated as compared to the Internal and External Calipers. The extreme precision in reading is upto 0.01 cm (0.1 m). Some Vernier Calipers also have a tail-end, to measure depth of test tubes or other narrow openings. The reading of vernier caliper is more accurate than of internal and external caliper because of the absence of parallax error. It is avoided; because the scale on the Vernier Caliper is in direct contact with the metric ruler (main scale).

4. How many steps are required to use Vernier Caliper. Define them?

Ans) There are three steps required to use vernier caliper

Step 1 - Before the measurement starts, jaws of the Vernier Caliper should be closed, so that the zero mark on the Caliper is in line with the zero mark on the main scale. Refer to the illustration on the side. This would help avoid zero error reading.

Step 2 - Now open wide to hold the object, for desired reading, internal or external. For internal reading, open inside jaws enough to touch the object. And likewise, for external reading, open the external jaws until it touches the object.

Step 3 - Now carefully read the measurement, and record the same.

5. Explain positive and negative zero error on Vernier Caliper?

Ans) When experiment is conducted, if the zero on the Vernier Caliper scale is to the right side of the zero on the main scale, this results in positive zero error. Similarly, if the zero on the Vernier Caliper is on the left side of the zero on the main scale, this results in a negative zero error.

6. What is area? How are regular objects and irregular objects measured?

Ans) Area is a measure of the extent of the surface, of a two-dimensional object. The general SI unit used for area is square metre, square millimetre, square centimetre or square kilometre. Areas could be measured for regular and irregular surfaces.

For regular surfaces such as squares, rectangles, triangles, trapeziums and circles, areas are measured through formulae. Whereas, for the irregular surfaces approximation of area is achieved by, dividing into small unit squares (like squares on the graph sheet), and counting them.

Chapter # 3

Exercise

Concept Checkers

1. Mass is simply the amount of matter or particles any substance contains. Though often mass and weight are used interchangeably.

- a. True
- b. False

2. The fundamental property of weight differs at changing gravitational force. Mass, does change in different conditions.

- a. True
- b. False

3. Three litre measuring cup is the volume of the container.

- a. True
- b. False

4. Density is a measure of the compactness of the substance.

- a. True
- b. False

5. Volume and density are not used for measuring three-dimensional objects.

- a. True
- b. False

Fill in the blanks

1. Mass is simply the amount of matter or particles any substance contains.
2. The S.I unit for mass is kilogram or grams.
3. Volume of small irregular shaped objects could be undertaken by using a measuring cylinder.

Match the suitable pair

- | | |
|--|--|
| 1. Volume is the amount of space or shape (2) | density is a measure of matter inside the space. |
| 2. Substances with lower density remain afloat (3) | enclosed by any substance; solid, liquid or gas. |
| 3. Volume is for physical space occupied and (1) | in substances with higher densities. |

Question Bank

1. Design an experiment to measure the mass of 250ml of Tang?
Ans) Measurement experiment should be done practically in the class room

2. Why astronauts float in space despite having mass?

Ans) Astronauts float in space because there is very small quantity of gravity available in the space due to lack of gravitational pull astronaut floats in space.

3. How can you measure the volume of a stone using water displacement technique?

Ans) Volume of stone can be measured by fluid (water) displacement technique using measuring cylinder. The process is;

- Take a measuring cylinder, and fill it with water, and subsequently note the reading of volume of water. This reading is the initial level, before immersing the object.
- Now tie a string to a stone, and lower it in to the cylinder. Make sure it immerses well into the water. Now record the rise in the water level of the cylinder.
- The difference in the two readings is the volume of the stone.

4. What is density? Give its formula and SI unit.

Ans) Density is the measure of mass divided by volume.

OR

The degree of compactness of a substance is termed as density.

Formula; Density= $\frac{\text{Mass}}{\text{Volume}}$

S.I Unit of Density= g/cm³

4. Explain why a pencil floats, while an iron nail sinks in water?

Ans) Pencil floats in water because its density is lower than of water where as iron nail sinks in water due to high density.

Chapter # 4

Exercises

Concept Checkers

1. Time is a measure of successive events from past, present and future.
a. True
b. False
2. It is not possible yet, to measure the smallest fraction of time precisely.
a. True
b. False
3. The speed of 80kmph on a high way means you have to maintain a rate of 80km in half an hour.
a. True
b. False
4. The SI unit for speed is metre per second.
a. True
b. False
5. Least commonly used apparatus to measure temperature is the thermometer.
a. True
b. False

Fill in the blanks

1. Time is also used as an intervals measure between two events, better known as duration.
2. The SI unit for time is second.
3. The SI unit for speed is metre per second.

Match the suitable pair

- | | |
|--|--|
| 1. Time can be measured in intervals as (2) | distance of the lap divided by the time interval. |
| 2. In car racing, speed is calculated as (1) | seconds, minutes, hours, days and so on. |
| 3. Average speed is measured by (4) | moves according to the exposure of temperature. |
| 4. In the Celsius scale (5) | total distance divided by total time taken. |
| 5. Volume of mercury in the thermometer (3) | water freezes at 0 ⁰ C and boils at 100 ⁰ C. |

Question Bank

1. State the properties of time, and explain any three?

Ans) Properties of time are continuous, measurable, recordable and schedulable.

Continuous: Time possesses the property of continuity. It is not possible to stop time. For example when our wall clock stops working due to battery problems what we do is to replace the battery and adjust the clock according to current time rather than the time when it stopped working.

Measurable: Time is also used as interval measure between two events better known as duration.

Schedulable: Time also has schedulable property we can organize our days, weeks and even months by scheduling particular time periods for a particular activity.

2. Can time be calculated precisely beyond seconds? Identify three gadgets that can measure time, and explain their accuracy?

Ans) Yes time can be calculated beyond seconds, gadgets like stopwatches are made for this particular reason. Some common gadgets to measure time are;

Wrist watch: Wrist watch is one of the most common devices used to measure time. Wrist watches tell time in hours, minutes and seconds. The accuracy of a wrist watch can be challenged because it cannot measure time precisely beyond seconds.

Mechanical Stopwatch: Mechanical stopwatches can measure time in milliseconds (one millisecond = 10^{-3} second) but the accuracy of this gadget is also questionable because it is not possible to read the exact figures.

Electronic Stopwatch: This gadget can measure time in microseconds (one microsecond = 10^{-6} second) and the accuracy of this device is dependable due to the lack of parallax error.

3. What is meant by 'rate'? If a car averages 10km/l, and has to travel a distance of 30km, how much fuel is required to reach the required destination?

Ans) Rate is a means of measuring between two events or quantities. It denotes change in event or quantity measured against another.

Arithmetic solution:

According to the situation;

Car travels 10km in 1 litre.

First we find the ratio of distance; $30/10 = 3$

Now by multiplying distance ratio with litres of fuel we get; $3 \times 1 = 3$

Hence, car requires 3 litres of fuel to travel a distance of 30km.

4. What is the difference between 'speed' and average speed? If a car travels at a speed of 70km/h for 2 hours, what is the average speed of the car?

Ans) **Speed:** Speed is the ratio between distance travelled and time taken to cover that distance.

Average speed: In general average speed is measured by total distance travelled divided by the total time taken

In this case car is moving with a constant speed of 70km/h for 2 hours therefore original speed will become average speed

Mathematical prove;

Total distance covered $70\text{km} \times 2 = 140\text{km}$

Total time taken = 2h

Average speed = $\frac{140\text{km}}{2\text{h}}$

Average speed = 70km/h.

5. What does temperature measure? Name and describe the instrument commonly used to measure temperature.

Ans) Temperature measures the degree of hotness or coldness of an object or substance. The S.I unit of temperature is Kelvin. Thermometer is commonly used instrument to measure temperature, thermometer is often a sealed glass tube contains a column of liquid (mercury), that rise and fall with the rise and fall of the temperature respectively, the temperature being read where the top of the mercury coincides with a mark on the tube or its frame.

Addition question

If a car travels at a speed of 65km/h for 2 hours and 50km/h for 3 hours, what is the average speed of the car?

Solution:

Total distance = $(65 \times 2) + (50 \times 3)$
= 130 + 150
= 280km

Total time = 2 + 3
= 5h

Average speed = $\frac{280\text{km}}{5\text{h}}$

Average speed = 56km/h

Chapter # 5

Exercises

Concept checkers

1. Matter is anything that is made up of atoms and molecules.

a. True

b. False

2. All matters can be seen, touched, felt or tasted.

a. True

b. False

3. There are four general states of matter, namely; solid, liquid, gas and plasma.

a. True

b. False

4. Diamond, for example is the hardest substance known.

a. True

b. False

Fill in the blanks

1. matter is everything around your surroundings.

2. A substance is proven harder, if it leaves scratch marks on other substances.

3. An object can compress and stretch, due to having the nature of elasticity.

Match the suitable pair

1. Matter broadly covers living and (3)
2. A rubber band is a classic example of (4)
3. Melting point is temperature at which (2)
4. Solubility, a characteristic of being (1)

1. solvent or mixing into a liquid.
2. objects changes a solid state non-living things.
3. elasticity.

Question Bank

1. Define matter?

Ans) Matter is anything that is made up of atoms and molecules. Generally, matter is everything around our surroundings. It can also be defined as, everything that has mass and takes up space. Matter broadly covers living and non-living things. Matter can be seen, touched, felt or tasted. Examples of matter are such as; water, wind, trees, mountains and etc.

2. Define the physical properties of matter?

Ans) Physical properties of matter can be identified according to its properties such as; hardness, strength, elasticity, melting point, solubility, electrical conductivity and heat conductivity.

Hardness of an object can be checked, when two objects are scratched together, the harder object leaves scratches on the other object.

Strength signifies the ability to support or lift heavy objects.

Elasticity is the ability to stretch when stress is applied, and able to retract to its original situation when force is removed.

Melting point is the criteria when a solid or semi-solid object changes state to liquid, when exposed to heat.

Solubility is the ability of a substance to mix or integrate into another liquid substance.

Electrical conductivity is the ability to conduct or transfer electricity from one point to another.

Heat conductivity is the ability to conduct or transfer heat from one point to another. Opposite of heat conductors are known as heat insulators.

3. What physical properties should be looked for in producing the following items; water hose, furniture, house? Explain with reason.

Ans) **Physical property of Water hose:** Water hose should be elastic in nature so that we could tilt it according to our need because we use water hose generally in watering the gardens so that rigid pipe may not be as efficient as flexible one.

Physical property of furniture: furniture should be physically hard and strong because furniture have to carry weights of us therefore hardness and strength is required in making of furniture.

Chapter # 6

Exercises

Concept checkers

1. An element is the simplistic form of substance, which can be broken down or split into other substances by chemical reactions.

- a. **True**
- b. False

2. The most commonly found element is the helium, and second is hydrogen.

- a. True
- b. **False**

3. Compounds are made from atoms of different elements joined by chemical bond.

- a. **True**
- b. False

4. The technique of filtration is suitable to separate a soluble solid from a liquid.

- a. **True**
- b. False

Fill in the blanks

1. Elements are the most general types of matter.
2. Commonalities in metallic elements; Shiny in appearance.
3. Elements can only be separated by chemical reaction, and not physically.

Match the suitable pair

- | | |
|---|--|
| 1. Commonalities in non-metallic element (4) | gases at room temperature |
| 2. Hydrogen and oxygen in nature are (1) | two or more substances |
| 3. One of the properties of compounds; (3) | different elements are chemically joined |
| 4. Mixture is the physical combination of (2) | dull in appearance |

Question Bank

1. What does 'element' mean? How many types of 'elements' are there, name at least two common one?

Ans) An element is the simplistic form of substance, which cannot be broken down or split into other substances by chemical reactions. Elements are the most general types of matter. More than a hundred types of elements are found in the universe (Currently, scientist know of 118 elements). Most of the

elements exist in its natural state, and only handfuls are man-made. The most commonly found elements are Hydrogen and helium in the universe where as oxygen is the most abundant element found in the core of the earth.

2. Define 'element grouping'? Elaborate properties of the group.

Ans) Elements are broadly classified in two main groups; metals, and non-metals. Majority of the elements are grouped as metals, and a small number of them are non-metallic.

Properties of metals

- Shiny in appearance
- High densities
- High melting points
- Good electrical/ heat conductors
- Softened/ molded

Properties of non-metals

- Dull in appearance
- Low densities
- Low melting points
- Bad electrical/ heat conductors
- Hard/ rigid/ brittle

3. What is a compound? Can two gases combine to form liquid? Explain.

Ans) A compound is a combination of two or more elements together.

OR

Two or more element combine together to form compound.

Yes; in few cases two gasses can form liquid. For example both, hydrogen and oxygen are gasses at room temperature, but combine together in a proportion creates water, which is a liquid (H₂O)

4. List properties of compound?

Ans) Common properties of Compounds

- You cannot vary the amount of each element in a compound. The composition is fixed.
- The different elements are chemically joined
- The compound has properties different from the elements it contains
- It can only be separated into its elements, by using chemical reactions

5. Define 'mixture' and list properties of 'mixture'?

Ans) Mixture is made from different elements or substances, which are not chemically joined. Therefore, mixture could be of elements, compounds or both. And mixture could be in any of the state; solid, liquid or gas.

Common properties of Mixture

- You can vary the amount of each substance in a mixture
- Different substances are not chemically joined
- Each substance in the mixture retains its own properties
- Each substance is easily separated from the mixture

6. List the techniques for 'separating mixtures'. And explain any three, via the help of experiment.

Ans) Some of the techniques to separate mixtures are listed below.

1. Chromatography
2. Filtration
3. Evaporation
4. Simple distillation
5. Fractional distillation

Additional information

10 Most Abundant Elements in the Universe

Element	Abundance
	measured relative to silicon
<u>Hydrogen</u>	40,000
<u>Helium</u>	3,100
<u>Oxygen</u>	22
<u>Neon</u>	8.6
<u>Nitrogen</u>	6.6
<u>Carbon</u>	3.5
<u>Silicon</u>	1
<u>Magnesium</u>	0.91
<u>Iron</u>	0.6
<u>Sulfur</u>	0.38

Chapter # 7

Exercises

Concept Checkers

1. Air is generally the mixture of gases that is known as hemisphere, on Earth.
a. True
b. False
2. The composition of air has changed and evolved with time.
a. True
b. False
3. Elements in a mixture can be separated without chemical reaction.
a. True
b. False

Fill in the blanks

1. Air, acts as a support for existence in this world.
2. Of the composition of air, nitrogen is the most abundant.
3. Elements that makeup the air can be separated with the help of fractional distillation technique.

Match the suitable pair

- | | |
|---|-----------------------------------|
| 1. Air helps to regulate the cold and hot (2) | non-flammable and anti-combustion |
| 2. Water vapour makes the temperature (3) | temperatures on Earth |
| 3. Nitrogen (4) | differ on Earth |
| 4. Carbon dioxide (1) | colourless and odourless gas |

Activity Quiz

Oxygen supports burning while carbon dioxide doesn't. With help of an experiment prove the statement.

Ans) Take a lit candle and put an upside down glass over it, after couple of minutes you would see witness candle lit goes out this is because all the oxygen within the glass is consumed by the candle. Fire is a chemical reaction that creates light and heat from oxygen and fuel. A lit candle needs to draw oxygen from the air in order to continue burning. If you limit the amount of air available, the candle's flame eventually goes out once it uses up all the oxygen. There is still CO₂ gas left in the jar but lit goes out as oxygen consumed it shows that CO₂ does not support burnig.

Question Bank

1. Define air, and the composition of air?

Ans) Air is generally the mixture of gases that is known as atmosphere, on Earth. All living things require air to breathe, and live. It acts as a support for existence in this world.

Composition of Air

Generally air is composed of three main gases namely; nitrogen, oxygen and argon. Of the composition of air, nitrogen is the most abundant (78%), then oxygen (21%) and lastly argon (almost 1%). Other molecules present in the air are neon, helium, krypton, xenon and hydrogen. These other gases are however not significant in composition in air.

2. Is air a mixture? Define why?

Ans) Yes, air is the mixture of gasses because its elements can be separated from each other without any chemical reaction. Conducting the fractional distillation method can separate the different elements that make up the air. First the air needs to be liquefied (by the help of cooling and compression). Now diffuse the liquid air at different temperatures to extract different gasses.

3. What are the properties of nitrogen and carbon dioxide?

Ans) Nitrogen

- Colourless and odourless gas
- Highest composition in air
- Fractionally less dense than air
- Does not combine with other substances readily

Carbon dioxide

- Colourless and odourless gas
- Heavier in density to air
- Non-flammable and anti-combustion
- Acts as a food source for plants during photosynthesis

4. Design a chemical test to identify carbon dioxide.

Ans) Collect carbon dioxide gas in a tube by downward delivery or using a gas syringe. Light a splint, which is a long, thin strip of wood. Insert the lit splint into the tube with the gas. If carbon dioxide is in the tube, the flame will go out.

Chapter # 8

Exercises

Concept checkers

1. Cells; the basic fractures and is fully functional in all living things.

- a. **True**
- b. False

2. Each cell has same function.

- a. True
- b. **False**

3. Living things with only a cell are known as multicellular.

- a. True
- b. **False**

4. Nucleus, acts as the control centre for some cells.

- a. True
- b. **False** (Because nucleus is the controlling centre for all cell)

Fill in the blanks

1. Cells, were first discovered by Robert Hooke in 1665.
2. Cells function like small compartment that hold all necessary biological equipment to keep an organism alive and successful.
3. A thread-like structure that holds chemical instructions to build the cell, are known as chromosomes.
4. Vacuoles, are small spaces where the air, liquid and food particles are stored.
5. Chloroplast, small disk like structures containing a green substance called chlorophyll.

Match the suitable pair

- | | |
|--|--------------------------------------|
| 1. Cells help to organize different processes (4) | and is a jelly like substance. |
| 2. Cytoplasm, contains numerous micro structures (1) | absorb energy from the sun. |
| 3. The function of the chlorophyll is to (2) | made up of dissolved sugar and salt. |
| 4. Cell sap, liquid substance (3) | with in the living organism. |

Activity Quiz

In some ways you are like your father and in others like your mother. However, you are different from both of them in most of the way. Suggest reasons why is it so.

Ans) A child inherits characteristics from both mother and father's side therefore it has few common characteristics like each parent but its characteristics may differ with both of the parents it is because a child may inherit the characteristics from parents genetic background (i.e. Forefathers). Parents may not express few characteristics of their forefather but these characteristics may occur as recessive characteristics in their gene, these recessive genes may become the dominant characteristic of their offspring's.

Can you identify the functions of cell parts with the following terms? Explain your answer.

1. Warehouse (vacuoles). These are small spaces where the air, liquid, and food particles are stores.
2. Filter (cell membrane). It is a thin layer that regulates the movement of materials in and out of the cell.
3. Computer centre (nucleus). It acts as the control center for the entire cell. It controls all the reactions that occur in the cell.
4. Laboratory (Cytoplasm). It is a jelly like substance. All chemical reaction takes place in cytoplasm
5. Food factory (Chloroplast). Its function is to absorb energy from sun, and makes the food through the process known as photosynthesis.
6. Stiff box (cell wall). It is a thick layer which helps to retain the shape of the cell

Question Bank

1. Define cells? Discuss discovery and scientific benefit of cell study?

Ans) Cells are the building blocks of life, present in every living thing. It forms the basic structures and is fully functional in all living things. They were first discovered by Robert Hooke in 1665. He witnessed them under a microscope, cells are invisible to the naked eyes. Scientists have been constantly studying the cell structure and new breakthrough discoveries have benefitted the human biology in fighting many diseases.

2. What are the main parts of an animal cell? State their properties and functions.

Ans) main parts of animal cell are;

- **Nucleus:** This acts as the control centre for the entire cell. It controls all the reactions that occur in the cell.
- **Chromosomes:** A thread-like structure that holds chemical instructions to build the cell, control its functions and determine its structure. It is passed down from one generation to another. Chromosomes hold the inherited characteristic.
- **Cytoplasm:** This is the biggest part of the plant cell. It contracts the cytoplasm to a thin lining. In every cell there is usually one vacuole filled with cell sap.

- **Vacuoles:** These are small spaces where the air, liquid and food particles are stored. These are minute and large in number.
- **Cell membrane:** It is a thin layer that regulates the movement of materials in and out of the cell. It is permeable, so only allows certain materials movement to enter or leave the cell.

3. What are the main parts of a plant cell? State their properties and functions.

Ans) Main parts of plant cell are;

- **Chloroplast:** A green substance called chlorophyll. The function of the chlorophyll is to absorb energy from the sun, and makes food through the process known as photosynthesis.
- **Vacuole:** This is the biggest part of the plant cell. It contracts the cytoplasm to a thin lining. In every cell there is usually one vacuole filled with cell sap.
- **Cell sap:** This is a liquid substance, made up of dissolved sugar and salt. The function of the cell sap is to take in water, and keep the cell firm. The plant may wither, if the cell sap loses too much water.
- **Starch grains:** These are stored food, like starch grains, found in cytoplasm.
- **Cell Wall:** This functions as a bonder between other plant cells. It supports to hold together and retain shape by the help of a thick layer of cellulose.

4. How is plant cell different from animal cell?

Ans) Plants cell may differ from animal cell in many ways, such as plant cell possess cell wall, cell sap and chloroplast where animal cell has no need of such elements. Both plant and animal cell have vacuole but in plant cell one large size vacuole is present which store cell sap where as animal cell vacuoles are smaller and stores liquid and food particles.

Chapter # 9

Exercises

Concept Checkers

1. There are specific types of cells for various functions, within a living organism.
a. True
b. False
2. In unicellular organisms, similar tasked cells are grouped together.
a. True
b. False
3. Cells grouped together to effectively perform tasks, are better known as tissues.
a. True
b. False
4. In plants, an organ such as a leaf is important to produce food.
a. True
b. False

Fill in the blanks

1. Every cell under the grouping of fat tissues, store fat deposits to protect the outer body from harming the internal system.
2. The transport system in plants provides the water and minerals required from the roots.
3. A system is made from a group of different organ.

Match the suitable pair

- | | |
|---|-------------------------------|
| 1. Different tasks are served by (1) | different types of cells. |
| 2. Leaf converts resource into food, to circulate (3) | tissues, organs or system. |
| 3. Several organs are linked together (4) | life around the entire plant. |
| 4. In unicellular, there are no (2) | to form a body system. |

Question Bank

1. What are tissues? Do unicellular organisms have tissues, explain why?

Ans) Similar tasked cells are grouped together to effectively perform tasks, these grouping are better known as tissues. Unicellular organisms do not have tissues because they are consisting of only one cell.

2. What are organs? Give examples of four organs, and elaborate function of two organs.

Ans) Different tissues in living organisms group together to form organ that are responsible for one or more task. Organs in animals are such as; heart, lung, stomach, brain, kidneys and etc. Each organ has an important function for the body.

Function of organs

Heart: The heart is a muscular organ in humans and other animals, which pumps blood through the blood vessels of the circulatory system. Blood provides the body with oxygen and nutrients

Stomach: The stomach plays the function of food storage bag in animal body. It also helps in food digestion.

3. Name the organs used in the respiratory system. Explain the function of any one organ.

Ans) The respiratory system is involved in the intake and exchange of oxygen and carbon dioxide between an organism and the environment.

Following are the organs used in respiratory system;

1. Nasal passage
2. Oral cavity
3. Pharynx
4. Larynx
5. Trachea
6. Lungs
7. Bronchi
8. Heart

Functions of nasal cavity;

The nose and nasal cavity form the main external opening for the respiratory system and are the first section of the body's airway. Nasal passage is the respiratory tract through which oxygenated air enters and carbon dioxide exits.

4. What does 'division of labour' mean in multicellular organisms?

Ans) Different substances coming together and working as a unit is known as division of labour. This division of labour helps cell to have a special features and allow them to carry particular tasks, effectively and efficiently. And all these division of labour are simultaneously working together, so that the body maintains its movements, growth and sustainability.

Chapter # 10

Exercises

Concept Checkers

1. Energy is required for specific things.
 - a. True
 - b. False**
2. Potential energy, the energy that is in motion.
 - a. True
 - b. False**
3. A roller coaster ride, when it is moving upwards it uses kinetic energy.
 - a. True**
 - b. False
4. Heat energy flows from region of higher temperature to the region of lower temperature.
 - a. True**
 - b. False

Fill in the blanks

1. Whenever you apply energy, it either creates a reaction or motion.
2. The higher the speed or greater the mass, the greater is the Kinetic energy.
3. Mechanical energy, example is the wind that turns the windmill to create electricity.
4. Nuclear energy is released in two circumstances; nuclear fission or nuclear fusion.

Match the suitable

- | | |
|--|--------------------------------------|
| 1.Examples of Kinetic energy are; (3) | solids, liquids, and gases. |
| 2. Heat energy flows through (4) | are split into lighter elements. |
| 3. In nuclear fission, heavier elements (2) | moving water, wind and electricity. |
| 4. Green plants trap the light energy from the sun (5) | solids, liquids and gases. |
| 5. Sound can travel between (1) | and convert it into chemical energy. |

Activity Quiz

Describe the energy changes for the following

1. Burning candle (Chemical energy turn into light and heat energy)
2. A lit bulb (electrical energy transform into light and heat energy)
3. Rollercoaster (When the coaster starts from bottom and moves towards top due to motion its kinetic energy rises, at the top of the channel when coaster takes a pause its kinetic energy becomes zero and potential energy becomes maximum due to vertical position, when coaster starts the downward ride kinetic energy becomes maximum due to motion, at the ground both kinetic and potential energy becomes zero.
4. Aiming arrow (Muscular energy transform into the stored energy in the bow)
5. Hammering nail (Kinetic energy due to the swing of hammer transform into sound and heat energy)

Question Bank

1. Define energy?

Ans) Energy is the ability to cause change in matter or the environment. Whenever you apply energy, it either creates a reaction or motion. It is the ability to do work.

2. Name the different forms of energy. And define at least four forms of energy.

Ans) Energy has number of different forms such as,

- Kinetic energy
- Potential energy
- Mechanical energy
- Heat energy
- Nuclear energy
- Chemical energy
- Electrical energy
- Sound energy

Kinetic energy: This is the energy that is in motion. Examples are as; moving water, wind and electricity. Therefore every moving object has kinetic energy. And it is positively associated with speed and mass. This means higher the speed or greater the mass, the greater is the kinetic energy.

Potential energy: Energy is measured in the amount of work it does. Potential energy is a stored energy. For example a roller coaster ride, when it is moving upwards it uses kinetic energy, and when it is at the top it converts in to potential energy.

Mechanical energy: It is the energy of motion that does the work. Example is the wind that turns the windmill to create electricity.

Heat energy: Heat energy flows from region of higher temperature to the region of lower temperature. It flows through solids, liquids, and gases.

3. Can energy be destroyed? Explain with the help of an example.

Ans) Energy cannot be destroyed but it can be transform from one form to another for example if a moving car hits a parked car for instance moving car may come in rest but that does not means its kinetic energy destroyed rather that kinetic energy may transform in to various energies i.e. kinetic energy of parked car (as parked car come in motion), sound produce due to collision and heat energy due collision.

Chapter # 11

Exercises

Concept checkers

1. Food is broadly divided into six classes.
 - a. True
 - b. False**
2. Carbohydrates are commonly known as sugar and branches in food.
 - a. True
 - b. False**
3. Excess of carbohydrate in the body is stored in the form of fat.
 - a. True**
 - b. False
4. It is not advisable to retain too much of fat in the body.
 - a. True**
 - b. False
5. Vitamins are of two categories; water soluble or fat soluble.
 - a. True**
 - b. False

Fill in the blanks

1. A human body's main source of energy is carbohydrate.
2. Fat is insoluble in water, and can help to keep you warm in winter.
3. The function, structure, and regulation of our body are not possible without the proteins.
4. Vitamins such as A, D and E are stored in fat tissues and are slowly released with the system.
5. Lack of **fibre** in our body can cause serious complications.

Match the suitable

- | | |
|---|-------------------------------------|
| 1. There are various types of food required (5) | such as vitamin B complex. |
| 2. Examples of sugar are (3) | is water. |
| 3. Use of proteins is part of the (6) | glucose and lactose. |
| 4. Minerals are required by body tissues and (4) | used in some chemical reactions. |
| 5. Water soluble vitamin leaves the body easily (1) | to sustain and strengthen our body. |
| 6. More than 70% of our body weight (2) | essential nutrients in our body. |

Activity Quiz

How and why an athlete's diet is different from a non-athlete's diet.

Ans) Athlete diet differ from non athlete because of the intensity of their sport and regular training, athletes have higher calories and fluid requirement therefore we witness substantial difference in the diet of athlete, to meet the calories requirement athlete have to take variety food sources which must contain appropriate amount of carbohydrates, proteins, vitamins and minerals.

Design a balanced diet for a toddler, teenager and adult.

Ans) **Balance diet for a toddler**

Calories: 1000-1200 (depending on the growth and activity level)
Protein: 2-4 Ounces
Fruits: 1-1.5 Cups
Grains: 3-5 Ounces
Dairy: 2 Cups

Balance diet for a teenager

Calories: 1800 – 3000 (depending on the growth and activity level)
Proteins: 5 – 7 ounces
Fruits: 1.5 – 2.5 cups
Vegetables: 2.5 – 4 Cups
Grains: 6 – 10 ounces
Dairy: 3 Cups

Balance Diet for adult.

Calories: 2000 – 2500 (Depending on the activity level)
Proteins: 4 – 6 ounces
Fruits: 2.5 – 3.5 cups
Vegetables: 3 – 4 Cups
Grains: 8 - 10 ounces
Dairy : 3 – 3.5 Cups.

Question Bank

1. What is 'food'? How many different classes of food are there?

Ans) Food is the form of energy of our body required to sustain and strengthen our body. Food is broadly divided into seven classes namely; carbohydrates, fats, proteins, mineral salts, vitamins, fibre and water.

2. Explain at least five classes of food, with aid of examples.

Ans) The main classes of food are;

Carbohydrates

Carbohydrates are commonly known as sugar and starches in food. They are made up of carbon, hydrogen and oxygen. Body's main source of energy is carbohydrate. They are broken down in the body as glucose and then converted into carbon dioxide and water with the release of energy. Examples of sugar are glucose and lactose.

Fats

Fat can be burned to produce energy, and is twice more beneficial as energy resource compared to carbohydrate. However it is not advisable to retain too much of fat in the body, it is harmful health wise. Foods like milk, butter, cheese and meat are plentiful in fat.

Proteins

They are large molecules of amino acid and are made up of elements; carbon, hydrogen, oxygen and nitrogen. The function, structure, and regulation of our body are not possible without the proteins. Even our muscles, skin, bones and many other parts contain proteins. Meat, eggs, fish, milk, peanuts and etc., are rich with proteins.

Fibre

It is made of cellulose, and is not broken down within our body. It leaves our body as solid waste. Food containing fibre moves through our intestine, and is fairly important because without it we may constipate. Foods such as; brown bread, brown rice, fruits, beans and lentils are rich in fibre.

Water

This marks the most important substance for living organisms. More than 70% of our body weight is water. It helps to break down food, dissolve and transport nutrients around our body. Chemical reaction in the body takes place in cytoplasm, and is only possible if it contains enough water. We lose water through perspiration or discharge of urine, therefore daily healthy intake of water (doctors recommend 8 glasses per day) is essential for a healthy body.

3. What does 'balance diet' mean? Why is it important?

Ans) A balanced diet contains the right amount of energy required to meet the individuals daily need. Each of the classes discussed above should be a part of the diet, for healthy mind and body. If excess food enters the body, compared to the resource used, it ends up as fat. This can lead to problems and complication in the body. Therefore all items should be consumed in due measures, and excess should be avoided.

Chapter # 12

Exercises

Concept Checkers

- Force is a push or a pull upon an object resulting the object's interaction with another object.
a. True
b. False
- Forces cannot change the shape of objects or the way they are moving.
a. True
b. False
- Effect of forces on objects; change the speed of a moving object.
a. True
b. False
- Friction is used in cars when brakes are applied.
a. True
b. False
- Every object in the universe that has mass exerts gravitational pull, or force, on every other mass.
a. True
b. False
- If the area is the same, the lesser the force applied, the greater will be the pressure.
a. True
b. False
- Is low pressure useful while walking on the snow.
a. True
b. False

Fill in the blanks

- Activities such as lifting, stretching and pressing all need pushes or pulls.
- Friction, is a type of a force that slows the movements of objects.
- The Earth's gravity pull is towards the centre.
- The SI unit of force is newton (N).
- Depending on the force applied on the object, it could be high pressure or low pressure.

Match the suitable pair.

- | | |
|--|------------------------------|
| 1. You cannot see a force but you (2) | move a stationary object. |
| 2. Effect of forces on objects; (1) | can see the outcome. |
| 3. A pen writes only as (5) | when brakes are applied. |
| 4. Friction reduces the speed of the car (3) | in objects with more mass. |
| 5. Gravitational force is more evident (4) | frictional force is applied. |

Activity Quiz

Give some example how friction is used in performing our daily life activities.

Ans) friction is very useful in our daily life, such as;

Walking: Friction plays a very vital role in our walking; we could not walk without the friction between our shoes and the ground. For example, if we try walking on slippery surface (oily Ground) it would be very difficult to control our body although there is a little friction.

Writing: Writing with a pencil requires friction. We could not hold a pencil in our hand without friction. It would slip out when we tried to hold it to write. The pencil would not make a mark on the paper without friction.

Driving: Our car would not start moving if it wasn't for the friction of the tires against the street. With no friction, the tires would just spin.

Explain how friction helps paratrooper to land safely on the ground?

Ans) when a paratrooper jumps from high altitude the person moves toward the ground because gravity force (pull) at a very high speed, when he release his parachute, it helps him slow down his speed due to air resistance or drag force (friction force). The [air pushes the parachute](#) back up and creates a force opposite to the force of gravity. Because of these nearly balance push and pull forces paratrooper lands on the ground safely.

Why does a sharp knife cuts better than a blunt knife?

Ans) In the case of sharp knife force is applied on a small region. While for blunt knife though force is same but is being applied on a larger area. So pressure for sharp one is higher. And when the area is large it also provides a greater resistance when same amount of force is applied than the smaller area.

Question Bank

1. Briefly explain what is force? And what are the effects of force on objects?

Ans) Force is a push or a pull upon an object resulting the object's interaction with another object.

Therefore whenever two objects come into contact there is force between them. Forces can change the shape of objects and change the way they are moving.

Force Effect

Listed below is the effect of forces on objects;

- a) Change the shape of an object, on which force is applied
- b) Change the size of an object, on which force is applies
- c) Change the speed of a moving object
- d) Change the direction
- e) Bring a moving object to stationary position
- f) Move a stationary object

2. What does friction mean? Define and explain frictional force?

Ans) This is a type of a force that slows the movements of objects. This force only comes in to being when the two objects come into contact.

Explanation: friction force plays a vital role in our daily life it helps us in walking, driving and writing etc without friction force we might not stand on our feet. There are some negative effects of friction too. When racing, the cyclists compete in speed and timing with one another. Trying to overcome the obstacles of wind and tiredness, the cyclists have to exert increasing force to compete among other racers.

3. What is gravitational force? Elaborate the phrase 'when you bring two different poles of magnet close to one another, you can witness the repulsion between them'.

Ans) The force of attraction of mass of an object to another mass of an object is called gravitational force. It is more evident in objects with more mass, compared to the ones with small masses. Every object in the universe that has mass exerts gravitational pull, or force, on every other mass.

4. What is the SI unit of force? How is force measured?

Ans) The SI unit of force is newton (N), named after Sir Isaac Newton. Forces can be measured using a force meter. A force meter contains a spring connected to a metal hook. The spring stretches when a force is applied to the hook. The bigger the force, the longer the spring stretches. On Earth 100 grams has a weight of about 1N.

5. Define pressure? Give its SI Unit.

Ans) It is a continuous physical force exerted on or against an object in contact with. Depending on the force applied on the object, it could be high pressure or low pressure. The SI unit of pressure is Newton per square metres (N/m^2).

Chapter # 13

Exercise

Concept Checkers

1. Scientists believe the Universe is 4 per cent ordinary matter, 73 per cent dark matter, and 23 per cent dark energy.

- a. True
- b. False**

2. Astronomers believe that the Universe came into being about 13.7 billion years ago, in an explosion known as the Bing Bang.

- a. True**
- b. False

3. The light from our nearest star, Proxima Centauri, takes over four years to reach us.

- a. True**
- b. False

4. A supernova also occurs if a white dwarf star in a binary pair blows up when material from the other star falls on it.

- a. True**
- b. False

5. All the planets orbit the Sun in much the same plane (level).

- a. True**
- b. False

Fill in the blanks

1. Everything that exists - stars, planets, galaxies, and all that lies between - makes up the universe.

2. The big bang created an incredibly hot Universe a fraction of the size of an atom.

3. All the stars we see in the sky belong to our home galaxy, the Milky Way galaxy.

4. All planets orbit the Sun at different distances.

Match the suitable pair

- | | |
|--|---|
| 1. Stars are not scattered evenly throughout (iii) | i) a supernova. |
| 2. The spaces between the stars is not empty, (v) | ii) anticlockwise |
| 3. A massive star dies in an explosion called (i) | iii) the Universe. |
| 4. The Sun is over 100 times wider than (iv) | iv) Earth. |
| 5. The planets also all travel in the same direction –(ii) | v) but filled with gas and dust called nebulas. |

Question Bank

Q1. Define the following terms:

- a) Galaxy b) Atom c) Milky Way d) Stars e) Sun f) Moon
g) Comets h) Astroids

Ans)

- a) **Galaxy:** Stars are grouped together in a great star island, called galaxy.
- b) **Atoms:** The smallest particle of a chemical element that can exist.
- c) **Milky way:** The galaxy in which we live is termed as milky way.
- d) **Stars:** Stars are massive globes of intensively hot gas. They produce huge amounts of energy, which is given off as heat and light.
- e) **Sun:** Dominating our corner of space is a star we call sun. it travels through space with a family of planets, moons and other bodies which form the solar system.
- f) **Moon:** A moon is a body that orbits a planet. Altogether we know more than 160 moons in the solar system. Earth has one moon.
- g) **Comets:** A comet is an icy [small Solar System body](#) that, when passing close to the [Sun](#), heats up and begins to [outgas](#).
- h) **Asteroid:** A small rocky body orbiting the sun. Large numbers of these, ranging enormously in size, are found between the orbits of Mars and Jupiter.

Q2. What is the universe made of?

Ans) Everything that exists stars, planet, galaxies, and all that lies between makes up the universe. Scientists believe the Universe is 4% ordinary matter, 23% dark matter, and 73% dark energy.

Q3. How could you explain about the "dark energy" and matter?

Ans) Almost nothing is known about dark energy, but this is the name given to something that appears to exert a force making the Universe expand.
Matter is everything that has mass and occupies space.

Q4. Explain how the "Big Bang" created the universe?

Ans) Astronomers believe that the Universe came in to being about 13.7 billion year ago, in an explosion known as the Big Bang. In an instant, space and the building blocks of matter were created, and time

began. From that moment, the universe began to expand, and continue to expand today. Over billions of year, matter formed into large, complex structures that continue to evolve.

Q5. What do you mean by:

a) Constellation b) Nebulas c) Supernova

Ans)

- a) **Constellation:** many stars form the patterns that we can recognize. We call these patterns th constellations.
- b) **Nebulas:** The space between the stars are not completely empty, but are filled with clods of gas and dust called nebulas.
- c) **Supernova:** A massive star dies in an explosion called a supernova.

Q6. What is Solar Eclipse? Draw it's figure to explain the total and partial eclipse.

Ans) Sometimes, as the Moon circles around the Earth, It passes directly in front of the Sun and blocks out its light. This is known as a solar eclipse. If the Moon only partially covers the Sun, we observe a partially eclipse. If it covers the sun completely, we observe a total eclipse.

Q7. With the help of diagram explain the solar system with it's eight planets.

Ans) Our tiny corner of the Universe is dominated by a star we call the Sun. Trapped in the gravity of the Sun is a huge family of bodies – Planets, Moons dwarf planets, Asteroid, Kuiper belt objects, and comets, which hurtle with it through space. This is our solar system.

Chapter # 14

Exercise

Concept Checkers

1. Astronomers observe the Universe using stascopes, which focus light from distant objects and make them clearer.

- a. True
- b. False**

2. Satellites are built of the lightest materials possible to make them easier to launch.

- a. True**
- b. False

3. The Chinese developed the first rockets.

- a. True**
- b. False

4. The USSR launched the first artificial satellite, Sputnik 1, in October 1975.

- a. True**
- b. False

Fill in the blanks

1. The scientific study of the stars and other objects in space is called astronomy.
2. Galileo was a physicist, mathematician, and an astronomer.
3. In a rocket, fuel is burned in oxygen in a combustion chamber to produce a mass of hot gases.
4. Space shuttle first launched, on 12April , 1981.

Match the suitable pair

1. The extravehicular activity, or EVA (2) International Space Station.
2. A spacecraft designed to stay in orbit for many years3 is popularly called spacewalking.
3. Is a project by many countries working together –(1) a space station.

Question Bank

Q1. Define the following terms:

- a) Astronomy b) Observatories c) Orbits d) EVA e)HST
f) ISS

Ans) **Astronomy:** The scientific study of the stars and other objects in the space is called astronomy.

Observatories: Optical observatories study the visible radiation (light) from objects in the space, and most are located high up on mountains tops where the air is thinner, drier and less polluted than at lower altitudes.

Orbit: Satellites circle in space around Earth in variety of paths, or orbits. They are kept in orbit by achieving a balance between their speed and the force of gravity.

EVA: Up in orbit, astronauts sometimes have to work outside their spacecraft. This extravehicular activity, or EVA, is popularly called spacewalking.

HST: Hubble Space Telescope (HST) is a kind of space Telescope. Some of the most stunning images ever obtained of our universe have been sent back by the HST. It works in mainly visible light, but can also take infrared images.

ISS: The International Space Station (ISS) is a project by many countries working together. Space station is a spacecraft design to stay in the orbit for many years. Conditions inside are carefully controlled and a comfortable atmosphere is maintained.

Q2. What are rockets? How do they work?

Ans) There would be no space exploration without rockets, but they are not a modern invention. The Chinese developed the first rockets around ad 1200. Unlike ordinary engines, a rocket carries its own supply of oxygen to burn its fuel. That is why it can work in airless space. The fuel and oxygen- provider, or oxidizer, are called propellants, because when they burn they produce a stream of gases that propels the rocket forwards.

Q3. What are satellites and discuss their workings.

Ans) An object that circles another in space is called its satellite. Earth has one natural satellite, the Moon, but a swarm of artificial satellites. The USSR launched the first artificial satellite, Sputnik 1, in October 1957.

Working: Satellites are built of the lightest materials possible to make them easier to launch. They can carry a wide variety of instruments, such as cameras, telescopes, radiation sensors, and radio equipment. Panels of solar cells provide electricity to power the instruments.

Q4. Give the uses of various satellities.

Ans) satellites are very useful these days few of their uses are;

Communication: Earth stations use huge dish antennae to beam radio waves up to communication satellites. The satellites beam them back down to other Earth stations in the same or a different country. Many national and most international telephone calls, emails, and fax messages are now handled by networks of communications satellites, many of them in geostationary orbit.

Imaging: satellites are now used as navigator. These satellites also help in monitoring changes in the environment and earth's natural resources.

Q5. What do you know about space travel and space shuttle.

Ans) **Space travel:** Less than four years after the launch of the first satellite into space, Sputnik 1 in October 1957, human space travel began. Since then, American astronauts have walked on the Moon, and Russian cosmonauts have remained in space for more than a year at a time in space stations. Today, astronauts are launched by both rockets and the SPACE SHUTTLE. In the future, astronauts are likely to return to the Moon to set up bases, and even travel to Mars to explore the secrets of our neighboring planet.

Space shuttle: When it was first launched, on 12 April, 1981, the space shuttle began a new era in space flight. Until then, all launch vehicles had been expendable — they could be used only once. But the space shuttle is re-usable — most parts can be used again. The shuttle is made up of twin booster rockets, a winged orbiter which carries the crew, and an external fuel tank.

Q6. Briefly write a note on the following:

- a) Astronauts
- b) Space stations
- c) International Space Stations
- d) Space observatories

Ans) **Astronauts:** A person who is trained to travel in spacecraft.

Space Station: A space station is a spacecraft designed to stay in orbit for many years.

International Space Station: The International Space Station (ISS) is a project by many countries working together. Space station is a spacecraft design to stay in the orbit for many years. Conditions inside are carefully controlled and a comfortable atmosphere is maintained.

Space observatories: High above the Earth's atmosphere, space observatories such as the HUBBLE SPACE TELESCOPE can view the Universe much more clearly than observatories on the ground. They can also pick up different, invisible forms of radiation that the atmosphere absorbs, such as gamma rays, X-rays, ultraviolet rays, and infrared rays.