5.Materials and Things

Mary was sitting in her room and studying. Suddenly she heard a loud sound from the kitchen. Mary went to the kitchen and saw a cat running away.

• Can you guess what could have happened? Write it down in your note book.

Fig. 1

Mary saw that many objects had fallen on the floor. Some of them were broken and some were not. Can you guess which objects might have broken and which might not have broken? Fill in table 1.

Table 1

Objects that would have broken	Cup, ...
Objects that would not have broken	Stainless steel glass, ...

• Can you decide why some objects broke and some did not?

In our day to day life, we use several objects for different activities. These objects are made of different materials.

For example body of your pen is made of plastic, where as its clip is made of Iron

Activity-1: Finding the materials used to make different objects

A list of things in a house are given in table 2. Name the materials from which each object may possibly be made of :

(If you don't know which material the object is made of, discuss with your friends and find out.)

Table 2

S.N.	Object	Material
1	Door	Wood, metal, rubber, paint.
2	Towel	
3	Bicycle	
4	Knife	
5	Mirror	
6	Shoes	
7	Water bottle	
8	Pot	

• Which objects are made of only one material?

• Which objects are made of more than one material?

• How many types of materials can be used for making chairs?

Fig. 2

List them in the space given below.

There are many objects in our surroundings such as chairs, tables, cycles, bullock carts, utensils, clothes, tyres, water, stones, etc.

We see that different objects are made of different materials. Some objects are made of more than one material. Think of some objects made of more than one material.

Activity -2: Finding the objects made from diffrent materials

Name as many things/objects as you can, made using the materials given in table 3.

Table 3

S. No.	Material	Things/Objects
1	Metal	Utensils, ...
2	Plastic	Bag, ...
3	Glass	Mirror, ...
4	Wood	Table, ...
5	Cotton	Cloth, ...
6	Leather	Shoes, ...
7	Ceramic	Cup, ...
8	Rock	Idols, ...

We see that the same material can be used to make different objects (Fig. 3). Each object is used for a special purpose. So we need to know the properties of materials, as well as the properties of the objects to decide which material should be used for making an object. Some materials are soft and some are hard. Similarly some are shiny whereas some are non-shiny. Depending on these properties materials are used for diffrent objects.

Discuss the following:

- How can we classify materials?
- How do we decide which material should be used for making an object?

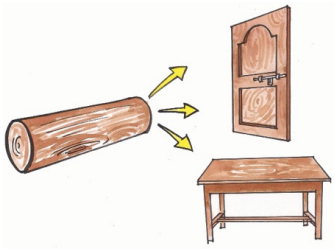

Fig. 3

We use different materials for different purposes based on their properties.

Properties of Materials

- What type of material can you use to make a window when you don’t want someone to see through it?

- What type of material can you use to make a window when you want to see through it?
- Can you make a cricket ball with mud or glass?
- Can you make a chair with glass or mud? If not why?

Let us examine the properties of materials and their usage. We begin with properties that we easily recognize and understand.

Transparency

Why do shop keepers usually store eatables like sweets and biscuits in glass jars? The shopkeeper wants his customers to be able to see these items! We all know that we can easily see through glass. Such materials are said to be **transparent.**

Can you see through plastic? Can you see through wood?

We cannot see through some materials like wood, steel, card board. Such materials are said to be **opaque.**

Activity-3: Identifying transparent and opaque objects

Prepare a list of objects around you and find which of them are transparent and which are opaque. Write them in table4.

Table 4

Objects	Transparent or Opaque
Glass jar	Transparent
Steel glass	Opaque

Fig. 4

Activity-4: Are we able to See through a paper

Take a sheet of white paper and try to see a lighted bulb through it (Fig. 5). Record your observation. Now put a few drops of oil on that sheet and again try to see the bulb through it (Fig. 6). What difference do you notice?

Fig. 5 Fig. 6

You notice that in the first case you can’t see the bulb but in second case you are able to see the bulb.

The materials through which we can see objects, but not very clearly, are said to be **translucent**. Oily paper is an example of a translucent substance.
Some glass panes fixed to windows allow some light to come through but you can't see clearly through them; such type of glass is translucent glass.
Can you give some more examples of translucent objects?

Try This

- Take a torch, switch it on and see. Does the light pass through the torch glass?
- Now cover the torch glass with your palm. What do you observe?
- Now cover the torch glass with oily paper. What do you observe?

In the above activity, when do you observe transparent, translucent, and opaque property? Discuss.

State of the materials

In the chapter on rain you have studied the relationship between ice, water and water vapour, the three states of water.
You would have noticed that when ice is added to a glass of lemon juice, the ice begins to melt and after some time all of it becomes water and the outer surface of the glass becomes wet.
If we heat the water in a vessel we notice that after some time water vapour is produced. If heating is continued, more and more vapour is produced in the form of steam and the quantity of water in the vessel keeps decreasing.
Some materials change their state from solid to liquid, liquid to gas on being heated and from gas to liquid, liquid to solid on being cooled. We sort materials as solids, liquids or gases based on their state at normal temperature.
Can you think of any material other than ice that goes from solid to liquid, liquid to gas (vapour)?

Activity-5: Light a candle

You may have lit a candle with a matchstick many times, holding the burning matchstick to touch the wick of the candle until the wick catches fire.
But can you light the candle without touching the wick with a burning matchstick?

Do you think this is impossible? Let us see how it can be done.

Place a candle in a safe place and light it. The first time, the candle cannot be lit without touching the wick with the burning matchstick. So do just that the first time. Let the candle burn for some time.

After about two minutes, hold a burning matchstick in one hand and blow the candle out. What did you notice? Did you see a column of white smoke rising from the wick as soon as you extinguished the flame?

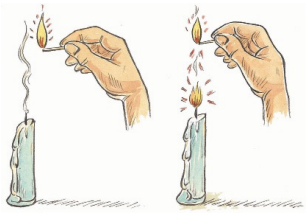

Fig. 7

Now quickly bring the burning matchstick close to this smoke, but do not touch the wick with it. What happens?

- Did the candle not catch fire from a distance?

If you wish, you can make a game of this. See which student in your class can light the candle from the farthest distance.

Discuss with your friends how and why the candle got lit from a distance.

- Does the white smoke represent candle wax in the state of gas?

How can you know the diffrent states of materials?

We observe that certain materials can change their shape according to the shape of the containers they are put into, while some retain their shape. Those materials which change shape are mainly **liquids** such as water, rasam, milk, oil, kerosene, etc. Those materials

which do not change shape are **solids** such as wood, rock, brick, plastic objects, and vegetables etc.

Activity-6: Classification of Materials

Think of different solids, liquids and gases around you and group them in table 5.

Table 5

Solids	Liquids	Gases
Stone	Milk	Smoke

Discuss with your friends and find out who had the longest list. Now consider only one group, say liquids, from the observation of liquids can you list their properties? For example, liquids take the shape of the container they are put into. Write all possible properties of solids, liquids and gases in your notebook. Discuss about them with your friends and teachers.

A sweet dilemma

While thinking about properties of solids, a group of students in class 6, put sugar in a glass, in a bowl and in a vessel. They observed that sugar takes the shape of the container. Since they know that liquids take the shape of the container, they concluded that sugar is a liquid.

The second group in the class disagreed with the first. What do you think? Is sugar a solid or a liquid? How will you decide? Razia, a student from the second group came up with an idea. She took a single crystal of sugar and one drop of water and declared that sugar is a solid while water is a liquid. The first group also had to agree with her argument.

- What must she have argued using only one crystal of sugar and one drop of water?

Discuss with your friends and find out why sugar is a solid although it takes the shape of the container.

- Is common salt a solid or a liquid?

Activity-7: Sinking or floating in water

Let us assume that a tomato, brinjal, potato, iron nail, sponge, wood, stone, leaf, piece of chalk and paper are given to you. Predict which of them sink or float in water. Record your predictions in table 6.

Table 6

Prediction	Object
Sinks	Stone ...
Floats	

Now try to test whether your predictions are correct or wrong by dropping the above objects in a beaker of water one by one. What do you find record your observations in the following table.

Object	Prediction	Finding

Fig. 8

For which objects is your prediction wrong? Why?
Now, add a lot of salt to the water in the beaker. Try this same activity with water which is excessively salty.

- What do you observe?
- Do you get the same result? Discuss.

Activity 8: Do iron objects float?

Take some water in a wide mouthed bowl. Put an iron nail in it. What do you observe? Put an empty iron tin in that bowl. What do you observe?
Also try to observe whether a wooden piece floats on water. What happens when a wooden bowl is dipped in water?

What do you conclude from this activity?
Some materials in one shape will sink in water but float on water when they are in other shape. The materials that can sink can be made to float, but all the materials that float cannot be made to sink.

Activity-9: Soluble or insoluble in water

Take five beakers with water. Take small quantities of sugar, salt, chalk powder, sand and saw dust. Add each material to separate beakers and stir. Observe the changes and record your observations in table 7.

Table 7

S.No	Material added	Dissolves(Yes/No)
1.	Sugar	
2.	Salt	
3.	Sand	
4.	Saw dust	
5.	Chalk powder	

We observe that certain materials dissolve when mixed with water. These substances are said to be **soluble** in water. The materials that do not dissolve are said to be **insoluble.** Repeat the activity with different liquids like vinegar, lemon juice, coconut oil and kerosene and add them to water. What do you observe? Discuss with your friends.

Keywords

Material, object, metal, transparent, opaque, translucent, solid, liquid, gas, sink, float, soluble, insoluble

What we have learnt

- Objects around us are made of a large variety of materials.
- Based on their properties, we use different materials for different purposes.
- Some materials such as glass are transparent, some materials such as wood are opaque and materials like oily paper are translucent.
- Materials can exist in three important states; as solids, liquids and gases.
- Some materials sink in water and some materials can float on water.
- Some materials are soluble in water and some materials are insoluble in water.
- Materials are grouped together on the basis of similarities and differences in their properties.

Improve your learning

1. Name any five objects which are made up of only one material?
2. Name any five objects which are made up of more than two materials?
3. List five things which we can make using each of the following materials :

a. glass b. metal
c. plastic d. wood

4. Mary saw a ship travelling on a sea. She knows that iron nail sinks in water. She has many doubts, what are her doubts? Write them.
5. Mary, while examining whether a boiled egg sinks or floats, found that it floats but Vakula made it sink, How is it possible? Guess and write it.
6. Drop an egg in a beaker of water. Now drop the same egg in another beaker of water in which excessive salt is added. Write your observation.
7. Do the following activities. Write down your observations. What do you conclude.

a. Mix chalk powder in water.

b. Place a piece of candle in water.

c. Add some oil drops to a beaker of water.

8. Make a list of items from your kitchen like utensils, food ingredients etc. classify them as follows.
9. Collect different plastic items from your surroundings. Classify them as transparent, opaque and translucent.

Item	Sink / Floatin water	Soluble /Insoluble in water

10. Draw different objects made up of wood which we use in our daily life.
11. Make a few models you like using clay.
12. We know that a ship, even though it is madeup of tonnes of iron, floats on water. How do you feel about the scientists who found the scientific principles and efforts in making a ship?
13. We use so many wooden items in our daily life. Is it good to use wood? What happens by excessive use of it? What is the reason? Is there any alternative for this?

The color of a transparent object depends on the color of light it transmits.
When white light shines on an object it may be reflected, absorbed, or transmitted.

We do not actually see colors. What we see as color is the effect of light shining on an object.

Actually, objects sink or float because their density is more or less than the density of whatever medium they are floating in.

Water has a density of 1g/ml therefore if you had an object with a density less than 1g/ml it will float.

Water is more dense than ice. It’s the CRYSTALLINE STRUCTURE that makes ice less dense.

The word candle is derived from the Latin word candere, meaning to shine.

You can’t make candles without this ingredient – the wax Beeswax has many desirable benefits including its natural, sweet smell and its smokeless.
The word candle is derived from the Latin word candere, meaning to shine.

If green light passes through a transparent object, the emerging light is green; similarly if red light passes through a transparent object, the emerging light is red.

The Sun, The Moon and The Stars would have
disappeared long ago had they happend to be within the reach of predatory human hands.
..... Havelock Elllis