

## Theme

## 1

## Basic Science

**Sub-theme 1: Learning about our environment****Topic 1 Changes in nature****Objectives**

In this topic you will learn how to:

- state the meaning of change
- mention the changes you observe in your surroundings
- state the differences between temporary and permanent changes
- give examples of temporary and permanent changes.

Change means to make or become different from what it was before. Every day we see **changes** in nature. Some changes, like the changes in the cloud patterns and the weather, happen quickly and are clear for everyone to see. Others, like the changing colour of autumn leaves, are much slower and are more difficult to see. Some changes are permanent. Other changes are temporary.

If the composition, colour, position, size or shape of an object becomes different due to some factor from its external or internal **environment**, then we say this object has changed.

**Nature** is all the animals, plants, and non-living things in the world that are not made by people.

**The difference between living and non-living things**

In nature, the most important difference that you will notice is that some things are alive and others are not alive.

**Exercise 1 Observe living or non-living things**

1. Look carefully at the picture above.
2. In your exercise book draw a table like the one below. List all the things you see in the correct columns.

Living things	Non-living things

3. Compare your completed table with a partner. Discuss any differences that you might have found.
4. What is the difference between living things and non-living things?

**Living things** are often called **organisms**. This can be plants or animals or any kind of micro-organism. All living things perform seven vital processes, called life processes. When any one of these life processes stop in the body of an organism, the organism dies.

**Non-living things** do not come from living things. They come from the physical environment. Some examples of non-living things are soil, water, gases, plastics, wax, wood and metal.

As with living things, the characteristics of non-living things can change. We will look at different examples of changes in non-living things.

## Activity 1 Observe changes in nature

1. Go outside and observe your surroundings.
2. Repeat this process every day for a week or longer.
3. Make a list of ten changes you noticed.
4. Describe and then discuss these changes in class.

## Types of changes

### Reversible or temporary changes

A **reversible change** is a change that can be undone or reversed. It might change how the material looks or feels, but it does not create a new material or produce a new substance. Another name for a reversible change is a **physical change**.

## Activity 2 Study reversible changes

1. Cut a square piece of paper into four smaller squares.
2. Cut each square into four more squares.
3. Lay these squares on a table so that they take on the shape of the original piece of paper.
4. Take note of the changes.

You cannot re-join the squares to form the same original piece of paper. Although you changed the shape of the paper, you did not alter the way the paper is made.

Let us discuss other reversible changes of non-living things.

### Boiling, evaporating and condensing

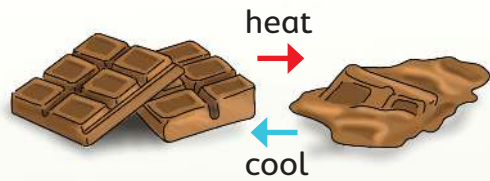
Boil some water in a container. You will see steam rising from the water. Hold an inverted pan by its handle over the steam a little way from the boiling water. Observe the inner surface of the pan. You should see droplets of water.



Boiling

## Melting

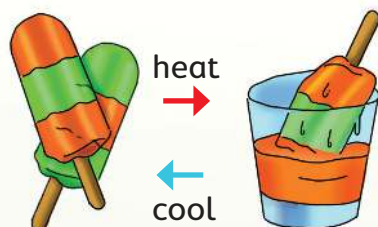
Chocolate that is melted can be changed back to solid chocolate when it cools.



Melting

## Freezing

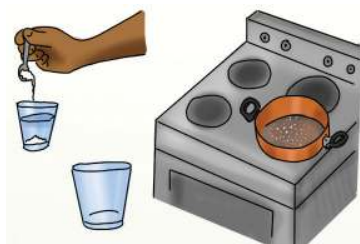
You can freeze orange juice to make ice lollies. The ice lollies can be changed back into orange juice by heating.



Freezing

## Dissolving

When salt is mixed with water, it disappears because it dissolves in the water to make salty water. You can get the salt back again by boiling off the water. The salt then remains behind.



Dissolving

## Moulding

**Moulding** is a process in which a hot liquid is poured into a hollow container. As the liquid cools down and hardens, it takes on the shape of the container. Materials that can be moulded are plastics, glass, ceramic or some metals. Pouring dough in cupcake shapes and making a model out of clay or sand is also an example of moulding.



Some examples of moulds

## Irreversible or permanent changes of non-living things

An **irreversible change** cannot be undone. An irreversible change starts with one material and ends up with one or more new materials or substances. That means a new material is formed. The new material is completely different from the original one and is sometimes useful to us. Another name for an irreversible change is a **chemical change**.

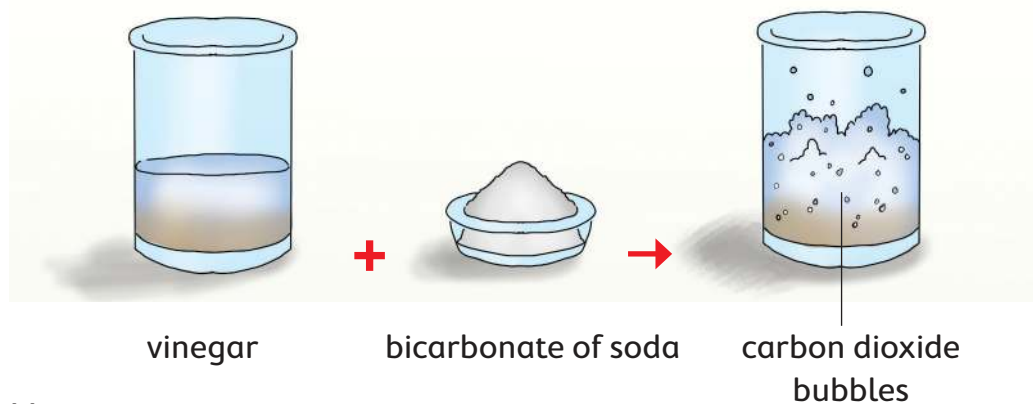
Let us discuss irreversible changes.

### Heating, cooking or baking

If you bake cake, you heat the raw dough by cooking it in the oven. Once the dough is baked it cannot become raw dough again.

### Mixing

When vinegar and bicarbonate of soda are mixed, the mixture changes and lots of carbon dioxide bubbles are made. These bubbles, and the liquid mixture left behind, cannot be changed back into vinegar and bicarbonate of soda again.



Mixing



When the egg is cooked, the egg white and yolk change completely and cannot be changed back to raw egg. This is called an irreversible or permanent change.

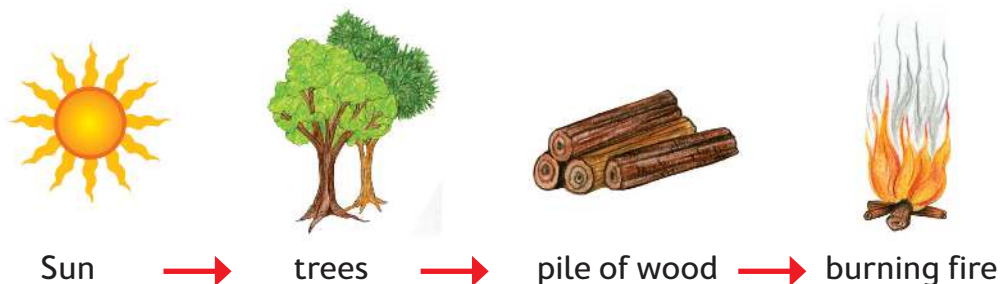


Baked cupcakes

## Burning

When you burn wood, you get ash and smoke. You cannot change the ash and smoke back to wood.

Wood is often collected and burnt to give us heat and light. On a cold evening, it is wonderful to sit around a fire to tell stories and warm yourself with friends.



Burning wood is a chemical change.

## Rusting

When iron is left outside for a long **time**, the oxygen in the air reacts with the iron, causing it to form a new substance called rust. This process is called **oxidation**. **Rusting** is a chemical process, because rust is a new substance that is made from iron and oxygen. If the iron is left in wet or damp places, the iron will rust a lot faster. When iron rusts, reddish brown flakes form. The iron becomes weak and is easy to break.



Rust makes metal objects deteriorate.

### Fascinating facts

If you stop water and air getting to iron, maybe by painting it, you can then stop the rusting process.

### Activity 3 Observe how things rust

#### You will need:

- scraps of iron and steel
- a piece of aluminium foil
- a coin
- an old screw
- a magnet (the back of a fridge magnet)
- an old metal button
- an old washer

#### Method:

1. Make sure all the items you have collected contain some iron. If they do then the magnet will be attracted to them.
2. Place all the items outside in a place where they will be exposed to the weather. This experiment will take a bit of time, so make sure they will not get in the way of anyone.
3. Observe the things every day for about a month. Take note of which things rusted.

### Activity 4 Make a candle

#### You will need:

- pieces of white candles
- wax crayons
- a pan
- a piece of string
- a skewer
- a paper cup



#### Method:

1. Put the candles and the wax crayons into a pan.
2. Ask an adult to melt them slowly over low heat. Stir them gently to mix them together.
3. Make a small hole in the bottom of the cup with a skewer.

4. Thread string through the hole. Tie a knot underneath it.
5. Ask an adult to pour the wax into the cup with the piece of string dangling outside it.
6. Hang your wax candle up by the piece of string to dry. The wax will turn hard. Why?

**Be careful**

Hot wax can burn your skin badly.

Wax can change from a solid to a liquid when it is heated. It will become solid again when it cools.

### How does a burning candle show both physical and chemical changes?

A candle is a solid block of wax with a wick inside it.

chemical change  
(soot)

physical change  
(melting wax)



Physical and chemical changes

#### Physical change

When the candle is lit, the heat of the flame melts the solid wax and it becomes liquid wax. This means that a physical change has taken place because the wax has changed from a solid state to a liquid state. Also, as the wax melts, the size of the candle decreases. When it becomes solid again, it forms a different shape.

#### Chemical change

When we light the candle, the wax acts as a fuel. The carbon in the fuel combines with oxygen to form another chemical substance, carbon dioxide and water. Also, the carbon that does not burn forms a black substance called soot. This means that a chemical reaction has taken place because new substances are formed. This chemical reaction is known as **combustion**.



## Topic 2 Our weather

### Objectives

In this topic you will learn how to:

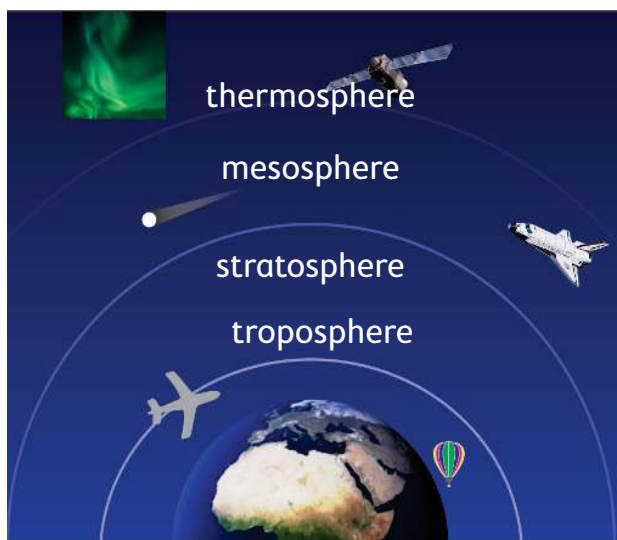
- state the meaning of weather
- identify the factors affecting the weather
- relate weather conditions to changes in these factors
- name the standard weather instruments
- improvise simple weather instruments
- identify and write simple weather symbols
- observe weather changes over a period of about three weeks
- use the weather symbols to keep records of weather changes
- prepare a weather chart.

### The meaning of weather

What is weather? By **weather**, we mean the conditions outside at a particular time and in a particular place. It means how hot or cold it is and whether it is windy or rainy.

If you look at the drawing below, you will see that the Earth has a blanket of air around it. This is called the **atmosphere**. It stretches for about 10,000 km up into the sky and is made up of five different layers of gases.

The atmosphere protects the Earth from the harmful rays of the Sun. It also allows all living things on Earth to breathe. All weather conditions happen in the layer nearest to the Earth, the troposphere.



The layers that protect the Earth

## Factors affecting the weather

### The Sun

The **Sun** is a ball of extremely hot gases. It is so hot that even though the Earth is millions of kilometres away from it, its heat can still be felt on Earth. The Sun gives the Earth heat and light. When we have summer, our part of the world is tilted towards the Sun. It gets more direct heat from the Sun. When we have winter, our part of the world is tilted away from the Sun, causing colder weather. The Sun's heat causes weather conditions such as clouds, wind and rain to form.

### Clouds

**Clouds** form when the Sun heats up the water on the Earth and causes tiny drops of water to become part of the air. The moist air is hot and rises high into the sky. It cools down and the droplets join together to form clouds.

The shape and colour of the clouds tell us how high they are and if these clouds could bring rain, hail or snow.



These clouds are high and unlikely to bring rain.



These clouds are high above the Earth where strong winds spread them out into feathery shapes. They do not contain much water and will not bring rain.



These clouds are lower and the grey colour means that it will rain soon. The darker the clouds are, the more water they carry.