

converted into yarn. Yarns are woven together to make a fabric.

- Cotton fibres are made from cotton ball.
- Jute fibre is obtained from the stem of a jute plant.
- The process of removing seeds from cotton wool is called ginning.
- Making yarn from fibre is called spinning.
- Handlooms or power looms are used in weaving fabrics.

Improve your learning

1. What will happen if a rain coat is made from cotton fabric? Why?
2. Make a flow chart showing the process of getting a fabric (clothes) from cotton plant.
3. Coconut is also a fibre. Name some things made of coconut fibre.
4. Classify the fabric of following items as natural or artificial- Dhothi, Venkatagiri saree, jeans, umbrella cloth, bed-sheets, your shirt or skirt, rain-coat, gunny-bags.
5. Explain the process of making yarn from cotton wool?

6. Small strand like structures are called
 - a. fabric
 - b. fibre
 - c. loom
 - d. cocoon
7. Making fabric from cotton yarn is called.....
8. What would you do to remove wrinkles from your shirt or skirt?
9. Prepare a bag using cloth. Collect pieces of fabric and make designs on your bag by using them. Display it on school display day.
10. Make a scrap book containing pictures of different types of fabric and name them.
11. With the help of an atlas, discuss with your teacher and prepare an information chart about spinning mills in our state.
12. Collect news items about handloom workers and cotton growers. Analyze one news item in your own way.
13. While purchasing your dress what doubts would you want to clarify from the shop keeper?
14. What did you do to know whether artificial fibers give pungent smell while burning. Write the steps of your experiment.

Polyester, the most commonly used manufactured fiber, is made from petroleum.

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16. The clothes that we wear have a great background. Track the stages (from seed to dress) and write your feelings about the people working at different levels of the track.

15. Observe these logos.



What does this mean? Collect information about this from your school library.

Who Said:

THE STORY OF JUTE

In our state in the districts of Visakhapatnam, Srikakulam and Vijayanagaram jute is widely grown. There is an interesting story about jute.

Long long ago a man was grazing his cattle in the forest near his village. Suddenly it started raining. It did not stop for days. He saved himself by climbing on to a tree. Almost all the forest got submerged in floods. After a couple of weeks he got down from the tree and walked through soaked plants in the mud. He observed that peels of plants stuck to his legs. He went home and removed those peelings from his body. One day his wife saw the dried peels and noticed that they were so strong and spun a thread. Haven't you understood what the plant is?



Rayon, derived from wood pulp.

FIBRE TO FABRIC

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Plants : Parts and Functions

What kind of plants have you seen at home and outside? You must have observed a variety of plants; some are big and some are small. We can find plants near our home, in the school campus, on the way to school, in the parks and almost everywhere.

- Are all plants similar?
- What are the similarities among them?

Let us get to know more about plants, especially about their parts and functions.

Parts of plants

We know that we have different parts in our body. In the same way plants also have different parts. Do you know them? Here is a plant. Try to name its parts. Which plant is this?

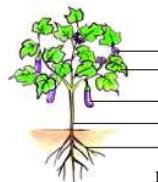


Fig. 1

In this chapter, Let us try to understand about different parts of plants through activities. For this, make groups of 4-5 students. Each group will collect 5 to 6 different types of plants along with their roots. You can collect different small plants from your garden or surroundings but be careful not to damage too many plants.

Activity-1: Identification of plant parts

Observe the collected plants and try to identify their parts. Take the help of Fig. 1 and write your observations in Table 1 given on the next page.

If you don't know the name of any of the plants you can give them a number. You can take the help of your teacher, a gardener or some one else to find the name of the plant. Based on the observations in the Table 1, let us discuss the following questions.

Did you find any plant which does not have roots?

Are the leaves of all the plants similar in size?

Is there any plant without flowers?

What are the common parts that you observe in all plants?

A notch in a tree will remain the same distance from the ground as the tree grows.

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Table 1

S.No.	Name of the plant	Root Yes/No	Stem Yes/No	Leaves Yes/No	Flower Yes/No
1.	Tridax plant	Yes	Yes	Yes	Yes
2.	Plant No. 2				
3.					
4.					
5.					

There are variations in the size and shape of plants but generally all plants have roots, stems and leaves. Have you ever thought about the importance of leaf, stem and roots in plants? What is the role of plant parts? Let us try to understand these things.



Fig. 2(a)

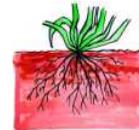


Fig. 2(b)

Table-2

Roots: Different types of roots

Observe the roots of the plants you collected. How are they?

Do all plants have similar types of roots?

Is there any difference?

Compare the roots of your sample plants with Fig. 2(a) and Fig. 2(b). Write 2(a) or 2(b), in the column 'roots are similar to', according to your observations.

S. No.	Name of the plant	Roots are similar to Fig.
1.	Tridax plant	2a
2.	Plant No. 2	
3.		
4.		
5.		

Banana oil is made from petroleum.

PLANTS : Parts and Functions

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- In Fig. 2(a), how does the middle root look like?
- Compare this middle root with the remaining roots of the plant shown in Fig. 2(a).
- Do you find any such main root in plant shown in Fig. 2(b)? How are the roots of this plant?
- Do you find any other differences between Fig. 2(a) and Fig. 2(b)

In some plants, the main root becomes thick and has thin rootlets. This main root is known as **tap root** (Fig. 2(a)) and the rootlets are called lateral roots.

In some plants we find small hair-like roots arising from the base of the stem. This type of root system is known as

fibrous root. Here all roots are similar (Fig. 2(b)) and there is no main root.

Function of the roots

- In activity-1, could you pull out the plants easily from the soil? Or was it difficult? Think why?

Observe the roots of the plants; soil is attached to the roots. Roots help to fix the plant tightly to the soil, so we cannot easily uproot the plant.

Do you know why the roots penetrate deep into the soil?

Activity-2: Absorption of Water

Take two glass tumblers filled with water. Collect two plants having soft stems, along with their roots.

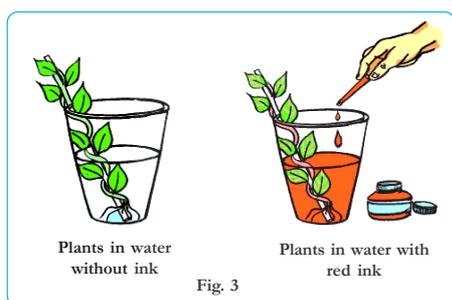


Fig. 3

84% of a raw apple and 96% of a raw cucumber is water.

Add colour (red ink) in one of the tumblers. Place the plants in each of the tumbler (Fig. 3). Let them be for 2–3 hours and then record your observations.

- Why do you think we added red ink in one tumbler?
- Did you see any red spots in the stem or other parts of any of the plants?
- Why did red spots appear on the stem or flower?

We can conclude that roots help in taking up of water from the soil. They do this by absorption. Minerals present in the soil are also absorbed along with the water.

Parts of a leaf

Leaves are another important part of plants. Most plants that we see in our surroundings have different types of leaves.



Fig. 5

Observe the given picture of a leaf and its parts (Fig. 5).

- Where is the leaf attached to the stem?
- What is the flat portion of the leaf called?
- What do you call the small line like structure in the flat portion of the leaf?
- Which part connects leaf lamina with stem?

A leaf contains leaf base, a stalk like structure called petiole and lamina.

Do you know?

Some plants store food in roots and stems. Some plants like radish, carrot, beetroot store food materials in their roots. These roots bulge out and called tuberous roots. Can you give some more examples. Carrot, sweet potato are eaten even when raw!



Fig. 4

Pistils have three parts – the stigma, the style, and the ovary.

Activity-3: Are all leaves same?

Observe the leaves of the plants that you collected in activity 1. How are they? Are all the leaves of the same size and shape? See Fig. 5 showing a leaf and its parts.

Compare the leaves of the plants, collected in activity 1, with Fig. 5. Write your observations in table 3. You can also draw what you see in the 'shape' and 'edge' columns if describing is difficult.

Table 3

S. No.	Name of the Plant	Leaf base Yes/No	Petiole Yes/No	Lamina Yes/No	Shape of the leaf	Edges of the leaf
1.	Tridax plant					
2.						
3.						
4.						
5.						

- What are the common parts that you observe in all leaves?
- Do all the leaves have the same shape?

Venation

Observe the leaf lamina carefully. What do you see? You may see some thin line-like structures spread over the leaf.

Activity-4: Venation

The leaf lamina usually consists of a midrib, veins and veinlets arranged in the form of a network. To understand this venation let us do an activity. Put a leaf under a white sheet of paper

or a sheet in your notebook. Hold the tip of a pencil flat and rub it on the paper. Did you get any impression? Is this pattern similar to that on the leaf?

These lines on the leaf are called veins. The long vein present in the middle of the lamina is called midrib. The branches arising from the midrib are called veins and the even finer divisions are veinlets. The arrangement of veins in the lamina is called **venation**. Venation acts as a skeleton of the leaf and give it a shape and support. Think what would happen if there are no veins in the leaf!

Petals are usually colorful, and they attract insects and birds that help with pollination.

Activity-5: Types of Venation

Observe the venation of the leaves that you collected in activity 1. Now compare them with the venations of the leaves shown in Fig. 6.

Record your observations in table 4.

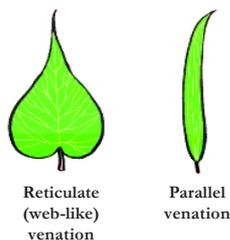


Fig. 6

Table 4

S. No.	Plant	Venation (Reticulate/Parallel)
1.		
2.		
3.		
4.		
5.		

Now compare the results obtained in table 2 with table 4.

- What type of roots are there in plants having parallel venation in their leaves?
- What type of roots are there in plants having web-like venation in their leaves?
- Is there any relation between venation and root system?

You will see that the plants with tap root system have leaves with web-like or reticulate venation and plants with fibrous roots have parallel venation.

Functions of a leaf

Leaves play an important role in the life of plants. Plants also breathe like us. Do you know which part of the plant acts as their nose?

Activity-6: Stomata Observation

Take a fleshy leaf. Peel the outer layer of the leaf and place it on a slide. Put a drop of water on it and observe it under a microscope. Try to find some bean shaped parts.

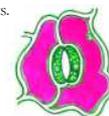


Fig. 7

Pistils have three parts – the stigma, the style, and the ovary.

Compare what you see under the microscope with Fig. 7.

The bean shaped part that you see in the leaf acts like our nose. These are called **stomata**. It is useful in the exchange of gases between the plant and atmosphere.

Do you know?

In Warangal district, there is a traditional cottage industry where pictures of various traditional and mythological figures are drawn with bright colours on dried leaves. This artwork is famous throughout the world.

Activity-7: Transpiration

Do you know that excess water is removed in the form of vapours from the leaf surface. To understand this let us do the following activity. Choose a bright, summer day to do the activity.

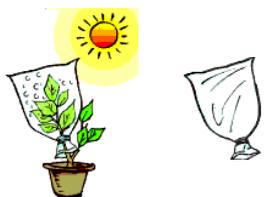


Fig. 8

Select a well watered plant that has been growing in the sun. Enclose a leafy branch of the plant in a polythene bag (Fig. 8) and tie up its mouth. Take another polythene bag of same size and tie up its mouth without keeping any plant. Keep both the polythene bags in the sun. After a few hours observe the inner surface of the bags. What do you see?

Are there any droplets of water in any of the bags? Which bag has droplets? How do you think they are formed there?

Plants release excess water in their body through stomata and some other parts as well. The water is released in the form of vapour and this process is called **transpiration**. These vapours condense and are seen as droplets in the polythene bag. Think, what will happen if transpiration does not take place in plants.

Another leaf function is the preparation of food for the plant by the process of **photosynthesis**. We will discuss more about this in the next classes.

Stem provides support to the plant

Observe the stem portion of some plants that you collected for Activity 1. Record your observations in table 5.

Petals are usually colorful, and they attract insects and birds that help with pollination.

Table 5

S. No.	Name of the plant	Stem grows Vertically/Horizontally	Branches are Present/Absent
1.			
2.			
3.			
4.			
5.			

- Do all plants have stems.
- Are the stems of all plants similar?
- How is the stem of the plant that grows horizontally?

Leaves and flowers grow from the stem. If you observe carefully, you will see a scar on the stem where the leaf arises. The stem branches into sub-branches and bears leaves, flowers and fruits.

Activity-8: Carrying food material

Take two small cuttings from a soft stemmed plant. Set them up like you did in activity 2 (Fig. 9). Wait for 2-3 hours and record your observations.

- What differences did you find between the stem of both the plants?

- Do red spots appear on the leaves or flowers of any of the plants?

Cut a small section of the stem of the plant, kept in red ink and water, with a sharp blade. Take the help of your teacher for this. Put it on a slide. Observe it under a microscope. Do you observe any coloured portion? Now, cut the stem into two halves vertically, from top to bottom. Observe it. Do you see any coloured portion?

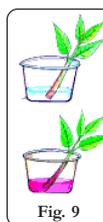


Fig. 9

The coloured ring like structure that you see act as a tube that carries water and food material throughout the plant. The water absorbed by the root is carried through the stem to all parts of the plant.

Fruit is really the part of a flower in which seeds grow. Cherries, apples, and even milkweed pods are fruit.

Do you know?

Some plants like potato, turmeric, garlic, ginger and sugarcane store food material in the stem due to which the stem bulges in size. Generally we think that these are all tubers or roots. Actually they are modified stems.



Fig. 10

How can you say that a potato is stem although it grows under the ground? Think it over.

Most plants around us have roots, leaves, stems and flowers. All parts of the plants carry out some functions, essential for the whole plant. There are diverse forms of plants in nature and plants adapt themselves to the different conditions in nature in different ways. For example, while stems usually support the plant body, in some plants they adapt and start storing food.

Flower is another important part in the plant. Flower has different colourful structures called petals. They attract insects for pollination and produce fruits. We grow plants for colourful flowers which gives beauty to nature. We will learn more about flower in the next classes.

Keywords:

Tap root, fibrous roots, leaf, petiole, lamina, stomata, reticulate venation, parallel venation, transpiration

What we have learnt

- The important parts of a plant are roots, stem and leaves.
- Tap root system and fibrous root system are two types of root systems seen in plants.
- Roots absorb water and minerals from the soil and also help in anchoring the plant body to the soil.
- The stem bears branches, leaves, flowers and fruits.

Buds are small swellings on a plant from which a shoot, leaf, or flower usually develops.

- The stem carries the water absorbed by the roots to different parts of the plant.
- Leaves are involved in preparing food. They also help in exchange of gases and transpiration.
- Leaf base, petiole and lamina are all parts of a leaf.
- Reticulate and parallel venation are found in leaves.

Improve your learning

1. What are the important parts of a plant?
2. How will you tell which part of a plant is the stem and which is the root?
3. Collect any plant from your surroundings. Draw its root structure. What can you say about its root system?
4. John has no place in his house but he wants to plant vegetables like tomato in his house. Suggest him different ways to do so.
5. What will happen if a plant doesn't have any leaves?
6. How does the stem help the plant?
7. What type of venation is found in the leaves of plants with fibrous roots?
8. If the leaves have reticulate venation what would be the type of root?
9. Explain the various parts of a plant with the help of a diagram.
10. Explain the parts of a leaf with the help of a diagram.
11. How can you show that plants absorb water through their roots?
12. Rajani said "Respiration takes place in leaves", is she correct? How can you support this statement.
13. Collect the leaves of various plants. prepare a herbarium. Write a brief report on their shapes, size and venation.
14. Prepare a greeting card with dry leaves.
15. In Activity 1 your teacher suggested not to harm other plants when you collect plants for observations. Why did she suggest so?
16. Observe a plant which has healthy green leaves and beautiful flowers. Write your feelings about the plant in your notebook.

Grapes and clematis have stems that climb with tendrils, which hold onto a surface, as the stems get longer.



Fig. 1

Priya wants to write an article on colours. She started observing her mother while preparing tea. Suddenly her brother Teja rushed into the kitchen shouting "See my white shirt is spoilt. It has colour patches. Yesterday it was fine. Why has it become like this? Who spoilt my shirt?"

Mother saw the shirt and said that it might have got this red patch when it was soaked in soap water along with a new red shirt.

Priya who was listening to all this began thinking about all the changes she had

seen. She had noticed the change in the colour of the tea after milk was added to it. There was a change in the colour of the shirt. She started wondering.

- Why does the colour of the tea change?
- How did the red patch get on her brother's shirt?
- How do colours change?
- Can you find answers to these questions? Discuss with your friends and think of the answers.

The change of state from liquid to gas is called evaporation.

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In our daily life we notice many changes around us. These include the changes from time to time, in the crops growing in the fields fall of leaves, the growth of fresh leaves on trees, change in the colour of the sky, change in colour of leaves of trees etc. Flowers bloom and then wither away. Apart from this we notice some changes in our body like increase in length of nails and hair, increase or decrease in weight, and increase in height etc.

Of all the changes we observe in our daily life, we are able to find out reasons for some of them. For other changes, we are not able to find reasons. To explain any change we need to ask the following questions :

- What has changed?
- How do we know that it has changed?
- What are the possible reasons for that change?
- Which seems to be the most appropriate reason?
- How would we check if the reason is correct?

Let us discuss certain changes in detail.

Changing of milk into curd

We know that curd is prepared from milk. Making curd is our common

experience. Curd is prepared in almost every house.

- Do you know how milk can be converted into curd?

Generally curd is prepared by adding a very small quantity of curd (sample curd) to the bowl containing warm milk. The milk is stirred well. Then the bowl containing milk with the sample curd is covered by a lid and kept still and undisturbed for few hours to get curd.

- What changes do you see when milk is converted into curd?
- How do you know that milk is changed into curd?
- Is there any change in its state?
- Is there any change in its volume?
- Is there any change in the weight?

Activity-1: Comparing milk and curd

Take some milk in a bowl and some curd in another bowl, compare the colour of the milk and curd carefully.

What do you notice? You may notice that there is slight difference in colour from milk to curd.

Now take some milk and curd in separate tea spoons and taste them. Do you find any difference in the taste of milk and curd? You may notice that milk is somewhat sweet and curd can be slightly or highly sour in taste.

The change of state from gas to liquid is called condensation.

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Touch the milk and the curd with your finger to know their state. You will notice that milk is in liquid form and the curd is in semi-solid form. Now measure the level of milk in a bowl and its weight. Then measure the level of the curd and its weight in the bowl.

Write the values of measurement in table

Precautions

Do not try to taste any substance until you know what it is and its properties. Tasting of some substances can be hazardous to health. The test for taste is to be done only under the guidance of teacher and for substances we know are safe.

Table 1

S.No.	Substance	Level in bowl	Weight
1	Milk		
2	Curd		

Compare the measurements, what do you notice?

From this activity, we find that there are changes in milk when it becomes curd. These include change in the colour, taste, and in the state. These indicators of change explain that a change has taken place from milk to curd.

- What can be the reasons for this change?

Activity-2: Finding the conditions for making curd

Take three empty bowls with lids as shown in Fig. 2



Fig. 2

Add some ice-cold milk to bowl 1 and same quantity of some warm milk to the bowls 2 and 3. Then add small quantity of curd to the bowls 1 and 2. Stir them well. The curd must mix in the milk. Cover all the bowls with lids and keep them in your classroom. Leave them and ensure they are not touched even after you have left for home. Observe the changes in the three bowls

The change of state from liquid to solid is called solidification.

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when you come back to the school next day.

What do you notice about the milk in the three bowls?

Has the milk in all the three bowls changed into curd? If not, which has not changed into curd?

Compare bowls 1 and 2, and bowls 2 and 3 separately and try to answer the following questions :

- Why do we notice change only in bowl 2, though we added curd to the milk of bowl 1 as well.
- Why do we notice change in bowl-2 though we took warm milk in both bowls 2 and 3?

When we compare the bowls 1 and 2 though the sample curd is added in both bowls, the bowl having warm milk is converted into curd. The cold milk does not change into curd.

Similarly if we compare bowls 2 and 3, though we have taken warm milk in both bowls, only the milk in the bowl 2 to which sample curd has been added changes into curd. We may note that the warm milk in the other bowl does not change into curd.

These two observations explain that the reason for change of milk into curd is due to addition of sample curd to warm milk.

The adding of sample curd to the milk helps to grow some kind of bacteria in it, and enables conversion of the milk into curd. You will learn more about this type of bacteria in the lesson "living things under microscope".

Let us discuss one more change

Changing seasons

Every year we observe that seasons changes. We go from rains to winter and winter to summer and so on.

- What changes do you observe from winter season to summer season?
- Is there any change in the clothes we wear?
- Is there any change in coldness and hotness of the air around us?
- Is there any change in duration of day and duration of night?
- Is there any change in the food that we eat or drink?

If the winter season changes into summer, we observe change in our clothes. For example, wearing of woolen clothes in winter changes to wearing of cotton clothes in summer. Similarly we observe that the winter season is cool and summer season is hot. In winter, duration of night is longer than in summer. We take cold drinks in summer

Due to heat, a place gets heated and pressure gets lowered.

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but prefer hot tea, coffee or milk in winter. These changes that we observe, show the change of seasons.

- Which of the above changes are because of changes in seasons?
- Which changes could possibly be the causes for the change in seasons?

List the changes that you think are caused by the change of seasons.

We also need to think about what are the reasons for changing seasons?

Activity-3: Comparing duration of day in December and May.

See table 2. Column (1) shows time of sunrise and sunset at a particular place in the month of December, and column (2) shows the same information in the month of May.

- What is the duration of the longest day in December?
- What is the duration of the longest day in May?
- Do December and May belong to the same season? If not, to which seasons do they belong?

By looking at the data regarding the times of sunrise and sunset on a particular day in December and May, we see that days are shorter in December and longer in May. Thus there are short duration days in winter and long duration days in summer.

Table-2

Day	December (1)		May (2)	
	Sunrise	Sunset	Sunrise	Sunset
1	06:29	17:40	05:51	18:36
2	06:30	17:40	05:50	18:36
3	06:31	17:41	05:50	18:37
4	06:31	17:41	05:49	18:37
5	06:32	17:41	05:49	18:37
6	06:32	17:41	05:48	18:38
7	06:33	17:41	05:48	18:38
8	06:34	17:42	05:47	18:38
9	06:34	17:42	05:47	18:38
10	06:35	17:42	05:46	18:39
11	06:35	17:43	05:46	18:39
12	06:36	17:43	05:46	18:39
13	06:37	17:43	05:45	18:40
14	06:37	17:44	05:45	18:40
15	06:38	17:44	05:45	18:41
16	06:38	17:45	05:44	18:41
17	06:39	17:45	05:44	18:41
18	06:39	17:45	05:44	18:42
19	06:40	17:46	05:43	18:42
20	06:40	17:46	05:43	18:42
21	06:41	17:47	05:43	18:43
22	06:41	17:47	05:43	18:43
23	06:42	17:48	05:42	18:43
24	06:42	17:48	05:42	18:44
25	06:43	17:49	05:42	18:44
26	06:43	17:49	05:42	18:45
27	06:44	17:50	05:42	18:45
28	06:44	17:50	05:42	18:45
29	06:45	17:51	05:41	18:46
30	06:45	17:52	05:41	18:46
31	06:46	17:52	05:41	18:46

The weather changes, as well as the seasons, because of the earth's rotation on its tilted axis.

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Activity-4: Does the sun rise exactly in the east in all seasons?

In the chapter "playing with magnets" we learnt about the magnetic compass. This helps us to find the North-South direction. Take a magnetic compass find the North-South directions with its help. We know that the East-West direction is exactly perpendicular to North-South direction. Mark East-West direction with the help of magnetic compass and compare it with the direction in which the sun rises during the winter season.

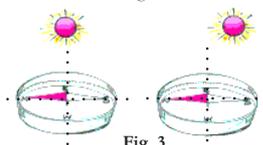


Fig 3

Observe the direction of sunrise three to four times in winter and in summer. Compare it with the exact east direction marked with the help of the compass.

- Do you find any change in direction of sunrise between winter and summer season?
- What difference do we notice?
- Try to find the direction in which the sun rises even if it is not winter at the time of reading the chapter.
- Did the sun rise exactly in the east?

Observing the changes in shadow during winter and summer seasons

Teja likes photos very much. His father took photos in the months of December and May and are given below. Observe Fig. 4(a) and 4(b):



Fig. 4(a)

Fig. 4(a) shows the shadow of a boy, standing on the doorstep of an east facing house, at the time of sunrise. This is on a day in the month of December.



Fig. 4(b)

Digestion is the mechanical and chemical breakdown of food into smaller components.

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Fig. 4(b) shows the shadow formed at the time of sunrise on a day in the month of May.

- What difference do you notice in length and direction of the two shadows?
- What does it say about the change in the direction of sunrise in December and in May?

You may also ask some elders about the change in the direction of the sun rays coming through windows or doors facing east during winter and summer. You can also observe shadows formed by the sun rays through windows and doors in your house or in a neighbour's house.

You will notice that the sun does not

Activity-5: Indicators and causes for change.

The changes observed, indicators of the changes, and possible causes for the changes discussed above are shown in table 3.

Table 3

S. No.	Change	Indicators of change	Causes of the change
1.	Change from milk to curd	Change in : State, taste, smell	The small quantity of curd added to warm milk makes certain bacteria to grow in the milk and it converts to curd.
2.	Changes in seasons	Change in dress we wear, coldness or hotness of air, food/drinks we take, usage of water, fruits and flowers available duration of a day.	The slight change in the direction of sun rise

We have used running water as an energy source for thousands of years.

Science

VI Class

Compare the change of milk to curd with change of seasons.

- Which change is slow and which is fast? Why?
- Which change takes place naturally?
- Which change needs initiation/intervention of human beings to occur?
- Which is a temporary change and which is permanent?

If we compare the two changes i.e. the "change from milk to curd" and "change of seasons", we notice that the change of seasons is slow when compared to change of milk to curd.

But if we compare change of milk to curd and change in electric bulb due to the switch being on or off, the change of milk to curd is a slow change.

Thus the change of milk to curd is a fast change when compared with change of season but it is a slow change when compared with change in electric bulb being put on or off.

Therefore, whether a change is slow or fast is relative.

Similarly, the comparison of above two changes explains that change of seasons takes place naturally, but to change milk into curd we need to add some curd to the warm milk and keep it in such a

way that it is not shaken and remains warm. Thus we need some initiation and intervention from human beings to bring a change in the milk.

Also, seasonal changes are temporary as these changes from winter to summer and summer to rains then rains to winter are continuous. Thus we get winter again. Change of milk into curd is permanent because we cannot get back milk from curd.

The comparison shows that it is possible to classify certain changes as slow or fast, natural or man-made and temporary or permanent.

- Can you think of any other basis for categorization of changes?

Write the indicators and causes for the other changes given below. You may not be able to write the causes of all changes. Try to discuss with your friends and elders to know the causes.

- ☞ Change of ice into water and water into ice
- ☞ Rusting of iron
- ☞ Growth in plants
- ☞ Rice to cooked rice
- ☞ Melting of ice-cream
- ☞ Boiling an egg in water
- ☞ Electric bulb on and off
- ☞ Changes in Atti-Pattu Plant

Are you able to categorize these changes as slow or fast, natural or manmade temporary or permanent?

Curds are a dairy product obtained by curdling (coagulating) milk with rennet.

CHANGES AROUND US

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Activity-6: Categorizing changes

Table 4 describes some changes. Study the changes, discuss in groups with your friends and state the category of each change by writing yes or no in relevant columns.

Table 4

S. No.	Change	Type of change					
		Natural	Man made	Temporary	Permanent	Changes the state	Changes the shape
1	Change from milk to curd						
2	Change in seasons						
3	Change of ice into water and water into ice						
4	Rusting of iron						
5	Growth in plants						
6	Rice to cooked rice						
7	Melting of ice-cream						
8	Egg to boiled egg						
9	Electric bulb on and off						
10	Changes in Atti Pattu						

- How many changes are natural?
- How many are man-made?
- How many changes are temporary?
- How many are permanent?
- How many changes are slow?
- How many are fast?

List them in tables 5, 6 & 7

Coal, oil and gas are called "fossil fuels" because they have been formed from the organic remains of prehistoric plants and animals.

Science

VI Class

Table 5

S. No.	Slow Change	Fast Change
1.		
2.		
3.		

Table 6

S. No.	Permanent Change	Temporary Change
1.		
2.		
3.		

Table 7

S. No.	Natural Change	Man made Change
1.		
2.		
3.		

In this activity we have categorized ten changes in three ways - slow/ fast, permanent/temporary and natural/man-made.

- Are there any other properties by which you can categorize the above changes?

Discuss with your friends and list properties other than those mentioned above for categorization. Prepare a new table for grouping.

Keywords

Changes, change in state, duration of day, indicators of change, slow/fast change, temporary/permanent change, natural/man-made change.

What we have learnt

- Many changes are taking place around us.
- Some changes take place naturally and some changes are initiated by human beings.
- There will be many indicators of changes to show that a change took place.
- There exists a cause for every change.
- We can classify changes around us in many ways; slow-fast, permanent-temporary, natural - man-made etc.
- Classification of changes is also made based on various indicators of change like the change in state, change in colour, change in size, change in taste etc.

Fuel is any material that stores energy that can later be extracted to perform mechanical work in a controlled manner.

CHANGES AROUND US

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Improve your learning

- Is the change of ice into water a temporary or permanent change? Explain.
- How do you know that rusting of iron is a change?
- If a raw egg is boiled in water, what changes do you notice in it? If you are given two eggs, can you determine which one is boiled and which one is not? Explain.
- Name five changes you notice in your surroundings. Classify them as natural or man-made changes.
- Choose incorrect statements from the following and rewrite them correctly :
 - The coldness in air during winter is a permanent change
 - Boiled egg is a temporary change.
 - There is a cause for every change.
 - An electric bulb going on and off is a permanent change.
 - There is a change in state when ice-cream melts.
- Some changes are listed below, classify them as temporary and permanent.
 - Souring of curd
 - Ripening of oranges
 - The sawing of a piece of wood into two
 - Cooking of food
 - Heating of milk.
- We use clay to make idols. Can we get back clay from the idol? What type of change is it? Explain.
- Carpenter made a chair using wood, what type of change is it?
- Rafi said that "Flour from Rice / Wheat is a man-made change." He wants to make a list of examples of this kind of change, help him expand his list.
- Select a plant in your house / school observe and record changes keeping in view height of plant, number and size of leaves and flowers etc. over a period of 2 months. Display your observations.
- What will happen if a decorative colour paper is dipped in water? Predict the possible changes. Verify your predictions by doing experiments and write down the steps of the process.

The explosion of fireworks is an example of chemical change.

Science

VI Class

- Write various processes involved in making ghee from milk, what changes do you find, during this process.
- Observe the following table and answer the questions give below.

Place	Month	Temperature		Rainfall	Sunrise	Sunset
		Min.	Max.			
Rentachintala	January	21°C	27°C	2.41mm	6.50	17.12
	April	39°C	47°C	0.01mm	6.11	17.47
	August	24°C	34°C	39.12mm	6.37	17.31

- Which month had maximum rainfall?
 - Which season occurs in the month of August? How can you support your answer.
 - In which month is the duration of day minimum? What could be the reason for this?
 - Do you find any relation between sunrise and seasons?
 - What changes can you identify from January to August?
- Farha wondered "How it could be possible for Nature to bring changes in seasons periodically". Can you add some changes like this. How will you explain them?
 - Sita wondered and felt very happy to see the beauty of the fields and insects like twinkling beetle (*Arudra*) during rainy season in their village. Can you list some such changes which make you wonder and feel happy?



A common physical change occurs when matter changes from one phase to another.

CHANGES AROUND US

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11

Water in Our Life

During the festival of Holi, Arvind was playing with his friends. They had gone to the market and bought different colours. They mixed each colour in a bucket of water and poured mugs full of water on each other. They sprayed colours on each other as well. Arvind and all his friends were completely drenched and enjoyed themselves a lot. Then they decided to go and have a wash.



Fig. 1

They went to a well and took bath with several buckets of water. They washed their clothes as well.

- If there was no water, what would happen to Arvind and his friends?
- For what purposes do we need water in our life?
- Do plants and animals also require water like us?

We need water to perform several day to day activities like cooking food,

washing clothes, cleaning utensils etc. We can't survive without water for even a single day.

Activity-1: Water and its uses

Make a group of five students and discuss the uses of water in your daily life. Write down the uses.

Classify the above uses of water in three groups, uses in a house or family, for agricultural purposes and others.

Over 1 billion people use less than 6 litres of water per day.



Fig. 2 : Uses of water in our daily life

Measuring the volume of water

Arvind used buckets of water to clean the colours from his body and his clothes. He said he used seven buckets of water. Is bucket a measure of the volume of water used? How do we measure the volume of water?

We can keep water in different vessels. Often, we say, a glass of water, bucketful of water, bottle of water etc. Do you know any specific unit of measurement of volume?

Almost 4 million people die each year from water related diseases.

Activity-2: Quantity of water

Collect different, used water bottles or water pouches from nearby shops. Observe their labels. What quantity of water is mentioned on the label? Record your observations in your notebook.

- Do all the bottles and pouches have the same quantity of water?

You can also ask the water-vendor how much water there is in a water can or bottle.

Activity-3: How much water do we use daily?

We use water for different purposes. Can you estimate how much water your family uses in a day?

Record your estimates in table 1. Also think how you could reduce the amount of water used and write how much water you can save.

Table 1

Activity	Water used (In liters)	How much can you save ?
Drinking		
Toilets		
Bathing		
Washing clothes		
Other		
Total		

Do you know?

Water, and other liquids as well, is measured in liters and milliliters. The water tanks in some villages and most towns and cities have the capacity to store gallons of water. Gallon is also a measure of volume of liquids.

Water level in the reservoirs is measured in feet. Water released from dams and projects during floods is measured in cusecs (cubic centimeters/sec).

- **Think:** Air and water are freely available in nature but now people have to pay for water along with other commodities. Find out from your parents and grandparents whether they also paid for water.

To estimate in liters the amount of water used, take any 1 liter bottle and find out how many bottles of water are needed to fill a bucket, a glass, a mug

43% of water related deaths are due to diarrhea.

etc. Now, find out how much water is used in a whole day by you and your family. Also, calculate the amount of water you and your family were able to save.

You have a rough idea of how much water your family uses in a day. With this information you may be able to calculate the approximate quantity of water required for your colony/ village/ town/ city. For this, you will need to know the population as well. Ask your teacher about population.

Approximate quantity of water used per day by a person

Number of people in the colony/village etc.

Approximate quantity of water used per day in the colony/village etc.

Approximate quantity of water used per month in the colony/village

Approximate quantity of water per year in the colony/village etc.

Imagine how much water is needed across the world!

Where do we get water from?

We get water from different water sources in our surroundings. In most

villages wells, canals, tanks, ponds, rivers, etc are the main water sources.

- List out the sources from where you get water in your village/ town.
- Are the sources from where you get water for your daily needs and crops the same or not? Give your reasons.

Do you know?

Water is not only available from sources such as the rivers, lakes and ponds but also present in certain fruits and vegetables. Fruits like watermelon and vegetables like cucumber contain a lot of water. Can you suggest some other examples? Our body also contains 70% of water by weight. Think, why we take juicy fruits in summer.

Water on the earth

There are different sources of water on the earth. We know that nearly 3/4th of the surface of the earth is occupied by water. Is this water useful for us?

- Can we drink the water available in the sea?

Sea-water is salty but water used by us in our daily purposes is not salty. It is known as fresh water. Water in ponds, puddles, river, from tube-wells and our taps at home is usually fresh water.

98% of water related deaths occur in the developing world.

Meet your panchayat officer and collect information about safe drinking water scheme in your village. Don't forget to prepare questionnaire for interview. Display your observations in your wall magazine.

Activity-4: How the well was dug

Go to nearby village and look at a well from where people get drinking water. Can you estimate the approximate volume of water in the well? Collect information from elders in the village about the level of water in the well over the years. Is the water level constant or has it changed? How was the well dug? Have you seen a borewell being dug? Write the process in your notebook.

Tapping of ground water by digging a well or borewell is a tough job. Many people put in a lot of hard work in this process. We need to appreciate this and preserve water.

Do you know?

Even though the river Krishna flows through Nalgonda district, it suffers from severe water scarcity. Most people in Prakasam district of our state face a water-crisis. This is because the ground water is polluted and drinking it causes fluorosis.

You have read about the different types of water sources in our

surroundings. The water level in them depends upon rainfall. Generally, we observe that the water levels in wells or other water sources go up in rainy season and down during the summer season.

- What happens if there is less rain fall or too much rain fall?

Activity-5: Droughts - water scarcity

Form groups of 4 to 5 students and discuss the following topics in each group. Prepare and submit a group report. The topics to be discussed are :

Group-1 : What will happen if rainfall this year is less than last year?

Group-2 : What would happen if there was no rainfall for five years?

Group-3 : What could be the possible reasons for water scarcity in a particular place?

Group-4 : What problems can arise due to water scarcity in a particular place?

In our region, if there is no rain for a long period (4 to 5 years), it may



Unsafe water is the biggest killer of children under five; around 90% of all diarrheal deaths are in this age group.

cause droughts. During this period, it is very difficult to get food and fodder; drinking water is scarce. People need to travel long distances to collect water. Soil becomes dry agriculture and cultivation is difficult. Many people who depend on farming for their livelihood, migrate to other places in search of jobs. In our state, Anantapur and Mahaboobnagar districts are treated as drought prone areas.

Activity-6: Drought affects our life

Here is a letter for you try to understand how drought affects our lives. Discuss the following points

- What problems were faced by Ramanna?
- How can Firoz help him?

Water scarcity is a problem in some districts of our state, as mentioned earlier. Here rainfall is less and farmers are largely dependent on irrigation using underground water to raise crops.

- What will happen if farmer grow crops that require more water in these districts?

If several bore wells are dug and underground water is tapped constantly, what will happen to the source of ground water?

Discuss with your friends the reasons that can cause reduction of ground water.

Kosgi

Dear Firoz,

I hope you are fine there. Nowadays, we are facing severe problems due to drought. For the last five years we have had no rains. All our fields have dried and there are cracks on them. We fail to grow any crop. My father invested money on bore wells with no results. We get water, after a great struggle, at the bore-well which is five kilometers from our village. The days have become very bad. Several people have sold their cattle and migrated to Hyderabad and Bengaluru. My family also wants to do so. I request you to ask your parents to search for a job for my father at your place. My father may have been a well-known, rich farmer here but he is willing to do any kind of job there.

Yours loving friend
Ramanna

The recommended daily water requirement for sanitation, bathing, cooking and consumption is approximately 50 litres per person per day.

Activity-7: How much water do we waste?

After playing in the ground you may wash your hands and legs under the tap in your school. Measure the time the tap is on open for you to complete your wash. Then take a bucket put it under the tap open the tap for the same time that you measured with the same flow of water. How many students of your class can wash their hands and feet with the bucket of water that you collect from the tap?

List out those situations in our life where we waste water unwisely and make suggestions to avoid this.

Activity-8: Floods a natural hazard

Usually, during the rainy season, you may have come across pictures of this type in newspapers (Fig. 4). Discuss the following.



Fig. 4

- What does the picture tell us?
- Does excessive rainfall in certain areas of our country lead to such a condition?
- Are there other reasons as well that can lead to this situation?
- Did you ever face or hear about flood? On the basis of the newspaper cutting or your own experience in this matter if any, write down a few lines on floods.

We can't live single day with out water. It is unwise pumping water if it leads to drought. Arvind decided that water is precious. Don't waste even a single drop of water. We must preserve water not only for us but also for future generations.

Keywords

Water sources, drought, floods, migration

What we have learnt

- We need water for domestic use, agriculture, industries etc.
- We get water from sources like ponds, lakes, rivers etc.
- Of the water available on the earth, only 1% is fresh water.

Agriculture is responsible for about 70% of the world's water usage. Industry uses a further 22%.

- We depend on rains for water.
- Long periods of less rainfall usually causes condition of droughts.
- Floods are natural disasters that affect human life.

Improve your learning

1. How can you say water is necessary for us?
2. Ravi wants to know the measuring units of water. What will you tell him?
3. Why do people need protected drinking water scheme?
4. List out the activities that we perform in our daily life that consume water.
5. In ----- season we face severe water scarcity. Give your reason.
6. The nature of sea water is -----
a) Salty b) Tasteless
c) Odourless D) Sweet
7. If we use water in the same way what will happen in future. Write your suggestions to prevent water wastage.
8. Prepare a map of your village showing different water sources.
9. Make a pamphlet on "Don't waste water". Display it on wall magazine
10. Collect information about water related games and make a scrap book.
11. Find out the relationship between water shortage and drought?
12. Justify the statement "droughts and floods are a result of actions made by man". Investigate your reasons.
13. Aravind never forgot to switch off water pumping motor in time. Do you support him? Why?
15. If people are suffering due to severe floods, what would you do to help them?

Who said:

Killer Cover

We people are using polythene bags, covers, disposable plates, glasses for various purposes in our daily life. Most of the food items are also available in polythene pouches and packets in the market. These disposable materials do not decompose in the soil. They obstruct water flow in canals and drainages during heavy rains and causes to floods, particularly in urban areas and thus creates hurdles to human life.

It takes up to 5000 litres of water to produce 1kg of rice.

Niharika's father Ranganna had to go to the fields after dinner. Watering the field in the night had become a usual practice due to power cuts throughout the day. Ranganna walked out of the house and called Niharika asking for a torch-light. She took the torch and cells out from the cupboard and handed over the torch-light to her father after inserting the cells. He switched on the torch but it did not light up.

- What could be the problem?

Was there something wrong with the torch-light? Niharika took back the torch and opened it and realised her mistake. She had inserted the cells in a wrong way. She changed the position of the cells and handed over the working torch-light to her father.

Why does the position of cells affect the working of a torch-light?

What does a cell contain?

Activity-1

Let us take a torch cell (Fig. 2) and observe it. Can you describe it?



Fig. 1



Fig. 2

Cell

The cell consists of a cylindrical metal can. Its heaviness suggests that it is filled with some chemicals. The protrusion on one end is due to a carbon rod in the centre. At the top of the cell a metal cap is fixed. The entire can is sealed.

Greek philosopher Thales of Miletus (c.624–546 BCE) discovered static electricity.

Have you seen (+) and (-) signs on a cell? These signs indicate the two terminals of a cell.

Note:

Do not connect the two terminals of a cell with a single wire.

Bulb

Observe a torch-bulb or an electric bulb carefully (Fig. 3). What does it contain.

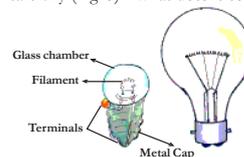


Fig. 3

A torch bulb consists of a glass chamber fixed on a metal base. Two metal wires are firmly fixed. One wire is attached to the metal cap and the other is attached to the base at the centre of the metal cap. (The arrangement in an electric bulb is different. In an electric bulb, two metallic wires are attached to the two terminals at the bottom of the metal cap.) These wires act as two terminals. The two terminals do not touch each other.

The part of the bulb that glows is the filament, which is a thin spring like wire attached to the two metal wires inside the glass bulb.

- Why do bulbs and cells have two terminals?
- How does a bulb glow with the help of a cell?

Activity-2: Simple electric circuits

Take four wires of different colours, say blue, green, red and yellow, each about 15 cm long. Electric wires are often covered with plastic. First, remove about two centimeters of the plastic covering from both ends of each wire. Now attach two wires (Blue and Green) to a bulb and two wires (Red and Yellow) to a cell with a cello tape or cell holder as shown in Fig. 4(a). We can use a cell holder to hold the cells and wires together tightly.

[Take an old inner tube of a bicycle and cut it into narrow bands. Each band should be wide enough to cover the knob of the cell. This is your cell holder.]

Now connect the wires in different forms as shown in Fig. 4(b) to 4(g). In each case, check whether the bulb glows or not. Record your observations in table 1

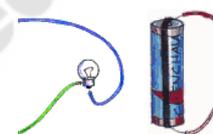


Fig. 4

English scientist William Gilbert (1544–1603) was the first person to use the word "electricity." He believed electricity was caused by a moving fluid called humor.

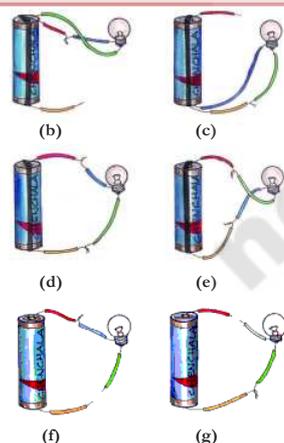


Fig. 4(a)

Table 1

Connection	Does the bulb glow (Yes/No)
Fig 4(b)	
Fig 4(c)	
Fig 4(d)	
Fig 4(e)	
Fig 4(f)	
Fig 4(g)	

In which case does the bulb glow? Why? In which case does the bulb not glow? why?

You may observe that the bulb glows in connections shown in Fig. 4(d) and Fig. 4(e), but not in other cases?

We observe that in Fig. 4(d) and Fig. 4(e) the connections form a closed path while in the remaining cases we find some gap in the path.

What is a circuit?

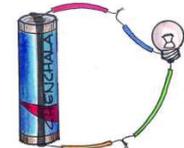


Fig. 5 : A simple electric circuit

Fig. 5 shows a closed circuit. It consists of a cell (power source), a bulb, and connecting wires.

An electric circuit provides a complete path for electricity to flow between cell and the bulb.

A similar circuit exists for an electric bulb which we use in our houses. The two electric supply wires (called **live** and **neutral**) are connected to the two terminals of the bulb through a switch. When the switch is closed (put on) the circuit provides complete path for electricity.

American printer, journalist, scientist, and statesman Benjamin Franklin (1706–1790) carried out further experiments and named the two kinds of electric charge "positive" and "negative."

Many times in our houses we observe that though electricity is available some bulbs glow and some don't glow.

What could be the reason for that?

Observe a bulb which is not glowing. Do you find any difference in the filament of glowing bulb and the bulb that is not glowing?

The bulbs which don't glow are said to be fused. If we connect a fused bulb in a circuit the circuit remains open and there is no closed path for the flow of electricity. Hence the bulb doesn't glow.

Switch

We use switches to put ON or put OFF the torch light. Similarly we use various switches in our house to put ON or put OFF the electric bulbs, tubes, fans etc.

What is a switch? How does it work?

Let us observe

Activity-3: Electric Switch

Connect a circuit on a wooden plank or on a thermocole sheet as shown in Fig. 6.

Insert two drawing pins at A and B. Insert a safety pin in between A and B, such that one end of the pin is completely in contact with B and the other end is left free. Now observe the bulb. What do you notice? Now touch the safety-pin to pin A and observe the bulb again. What happens? Why doesn't

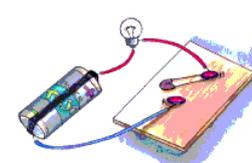


Fig. 6 : Circuit with a switch

the bulb glow when the safety pin is left free at one end?

In the above activity, the safety pin is used to close / open the circuit. Electric switch is an arrangement to close or open (break) a circuit.

The switch allows the flow of electricity when it is ON and cuts off the flow of electricity when it is OFF. In this way, the switch is used to allow / stop the flow of electricity to the bulb or any other electrical device.

The flow of electricity in a circuit is called **current**.

Torch-light

- What does a torch consist of?
 - What makes the torch bulb glow?
- Take a torch and observe its internal parts (Fig. 7).

Italian biologist Luigi Galvani (1737–1798) touched two pieces of metal to a dead frog's leg and made it jump. This led him to believe electricity is made inside animals' bodies.

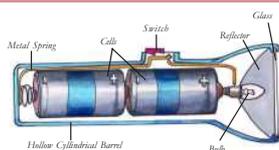


Fig. 7 : Inside view of a torch-light

Torch-light is used as a source of light. The parts of a torch-light are hollow cylindrical barrel, cells, bulb, switch, glass cover and metal spring.

Torch consists a hollow cylindrical barrel in which cells are fitted. At one end of it there is a lid with screw which can be opened and closed. When the lid is closed and switch is ON, the circuit is completed and current flows in the circuit which makes the bulb glow.

In Niharika's case, it was just the position of cells that made the bulb to glow. Can you predict other reasons for the torch not working?

Activity-4: Let us do

Take a torch which has two cells. Arrange the cells in the torch in as many ways as you can. In which cases does the bulb glow and in which cases it doesn't? Draw pictures showing different positions of cells and glowing of bulb. Can you find out why the bulb glows only when cells are placed in a particular position?

Danish physicist Hans Christian Oersted (1777–1851) put a compass near an electric cable and discovered that electricity can make magnetism.

Science

VI Class

Conductors and insulators

In activity-2, we used wires after removing the plastic covering at both the ends. Why don't we use the wires without removing the plastic covering? What material do you find in electric wires?

Why are we advised to wear rubber chappals while working with electricity? Let us find out

Activity-5: Identifying conductors and insulators

Take the circuit which we used in activity-3, as shown in Fig. 8. Remove the safety-pin from the drawing pins so that you have two open terminals A and B. Insert different objects like a hair pin, safety pin, eraser, plastic scale, match stick, piece of a metal bangle, piece of a glass bangle, paper clip etc. in the gap between A and B. With each insertion, check whether the bulb glows or not. Record your observations in table 2 for each case.

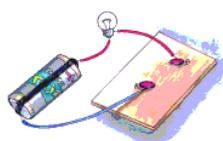


Fig. 8 : An open electric circuit

Table 2

S.No.	Object	Name of the Material	Does the bulb glow (Yes/No)
1.	Hair pin	Metal	Yes
2.	Pencil lead		
3.	Eraser	Rubber	
4.	Plastic scale	Plastic	
5.	Match stick		
6.	Divider from geometry box		
7.	Piece of paper		
8.	Iron nail		
9.	Piece of Metal bangle		
10.	Piece of Glass bangle		
11.	Paper clip		
12.	Piece of chalk		
13.	Safety pin		

If you look at table 2, after recording your observations you will find that the bulb glows in some cases and does not glow in other cases. Can you guess the reason?

Substances which allow electric current to flow through them are known as **conductors** of electricity.

Substances which do not allow electric current to flow through them are known as **insulators**.

Using the above definitions, can you group the objects you observed in your daily life as conductors and insulators? Make a list of objects and group them as

Michael Faraday (1791–1867), an English chemist and physicist, developed the first, primitive electric motor.

SIMPLE ELECTRIC CIRCUIT

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conductors and insulators and write in table 3?

Table 3

Conductors	Insulators

The story of bulb

The story of invention of bulb is very interesting. We may think that a bulb is a very simple gadget, just press a switch and it lights up. But do you know that many scientists worked hard for many years before the first successful bulb was made? One of them was Thomas Alva Edison who ultimately succeeded in making the first bulb.



Fig. 9 : Thomas Alva Edison

From childhood, Edison was of an inquisitive nature and he learned science

by performing experiments himself. You will be amazed to know that in his lifetime he invented more than one thousand inventions.

Even an intelligent scientist like Edison had to work hard for many years before he could make a bulb that worked. First of all, he passed electricity through a thin, thread-like platinum wire. He noticed that the wire did give out light after being heated, but it burned out after only a few seconds. Edison then thought that if the air surrounding the wire coil was removed then, perhaps, the wire would not burn out so quickly.

He made a glass casing and fitted a filament of platinum wire in it. He then removed all the air from within the glass casing. He passed an electric current through the wire and, to his delight, the bulb lit up and did not burn out for eight long minutes.

He began experimenting with different materials while searching for a better choice of filament. He tried cotton thread coated with soot. This filament burned continuously for 45 hours. One summer day he saw a man fanning



Edison's first bulb

himself with a bamboo fan. An idea struck his curious mind - "Well, why not try bamboo fiber as a filament?" He executed his idea and amazingly the bamboo filament burned continuously for a number of days. Finally he succeeded in making a cotton filament that was even better than the bamboo one.

Today we use the same kind of bulbs as were first made by Edison. The only difference is that our bulbs have a filament made of a metal called Tungsten.

Keywords

Electricity, cell, bulb, fused bulb, terminals, filament, switch, circuit, conductor, insulator, tungsten

What we have learnt

- Cell is the source of electrical energy in a torch-light.
- Cell has two terminals, (+) and (-).
- Bulb, consists of a filament which gives light and two terminals.
- Electricity requires a closed path for it to flow.
- A switch helps us to allow or break the flow of electricity in a circuit.
- Torch-light consists of cell, bulb and switch.

- Substances which allow the flow of electricity are known as conductors of electricity
- Substances which do not allow the flow of electricity are known as insulators to electricity.
- The electric bulb was invented by Thomas Alva Edison.

Improve your learning

- What is an electric circuit? Explain with a diagram.
- What are the parts of a torch-light?
- In a bulb the part which gives us light is :
 - Metal base
 - Glass chamber
 - Filament
 - Terminals.
- Classify the following into conductors and insulators :
 - Water
 - Plastic pen
 - Pencil lead
 - Dry cotton cloth
 - Wet cotton cloth
 - Dry wood
 - Wet wood

Building on his earlier discoveries, Michael Faraday invented the electric generator.

Science

VI Class

The world's first experimental electric power plant opened in Godalming, England.

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5. Niharika observed an electrician repairing a street light wearing gloves on his hand. She asked him some questions. What would be those questions?
6. In activity 4 we observed some situations where the torch bulb glows. Niharika challenged her friends that she could make the bulb not glow even with the cells kept in proper position. What would she have done?
7. Connect a circuit as shown in the following diagram.



Fig 11

9. Draw a circuit diagram showing a cell, switch and a bulb.
10. A circuit is connected with a cell, bulb and a switch, but the bulb is not glowing. Write all possible reasons for this.
11. You have studied the story of Thomas Alva Edison. Write a note appreciating his efforts in inventing the bulb.
12. List the daily activities in which we use electricity.
13. If you put the switch on, a light will glow, a fan will rotate, a iron box heats up etc. All these different functions will be performed by electricity. How do you feel about the comforts given by this great invention to human beings?
14. Write a list of electrical appliances in your house. Classify them as follows.

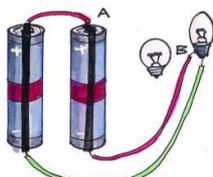


Fig 10

- a) Does the bulb glow? Why?
- b) Draw the circuit so that the bulb glows.
- c) Verify it by connecting cells and bulb as per the circuit drawn.
8. What will happen if the cells in a torch are arranged as shown in the following figure? Why?

Thomas Edison (1846–1931) built the first large-scale electric power plants in the USA.

Science

VI Class

Works with cell as a source	Works with electric current as a source	Works with both cell and electric current as a source

15. Connect circuits as shown in the following figure. Write your observation in each case.



16. Match the following :

- | | | |
|--------------------|-------------------------------|-----|
| 1) Cell | A) Conductor | () |
| 2) Switch | B) Source of electricity | () |
| 3) Safety pin | C) Filament | () |
| 4) Eraser | D) To close or open a circuit | () |
| 5) Glowing of bulb | E) Insulator | () |

Don't play with household power sockets or push things into them. Don't take apart electrical appliances, because dangerous voltages can linger inside for a long time after they are switched off.

SIMPLE ELECTRIC CIRCUIT

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13

Learning How to Measure

Rasheed went to a cloth shop with his mother to buy clothes. The cloth merchant used a metal rod to measure the length of cloth. Rasheed asked his mother what that metal rod was and why did the merchant use it? Mother told him that the metal rod was a meter scale that was used to measure lengths. Later, both of them went to a flower market and purchased a string of jasmine flowers. While cutting the jasmine flower string, the woman selling the flowers measured its length with her hand.

- Why did the woman use her hand to measure the length of the 'jasmine flowers' string?
- Which method is correct?
- How can we decide the correct method of measurement?

You might have observed many situations of measurement of length as in the above examples, where sometimes we use instruments and sometimes hands, foot, palms etc.

Write some more examples where we use instruments to measure the lengths and some examples where we don't use any instruments, but use foot, hand-span, palms etc. to measure the length.

Discuss which method is correct with your friends and why you think that a particular method is correct.

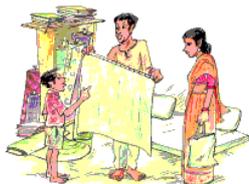


Fig. 1

Rasheed was confused and started thinking :

- Why was a meter scale used to measure the length of cloth?



Fig. 2

We use meter as a unit of length and subsequently, centimeters and millimeters as smaller units of length.

Science

VI Class

Activity-1: Measuring Lengths

Measure the length of one side of a table using your hand-span (Fig. 3). Ask your classmates to do the same. Record the length of the table in terms of number of hand-spans in table 1 :



Fig. 3

Table 1

S. No.	Name of the student	Number of hand-spans
1.		
2.		
3.		
4.		
5.		

Do all of you get the same number of hand-spans for the length of the table?

- Who got more number of hand-spans?
- Why is there a difference in number of hand spans though you measured the same table?

Now find the length of your classroom using your foot-span. Enter your observations in terms of number of foot-spans in table 2 :

Table 2

S. No.	Name of the student	Number of foot-spans
1.		
2.		
3.		
4.		
5.		

- Is the number of foot-spans same when different students measure the length of classroom?
- Who got more number of foot-spans? Why?
- Who got least number of foot-spans? Why?

We do not get the same measurements in two cases mentioned above because the hand-spans / foot-spans are not same for each one of us.

We often use these type of conventional methods to measure certain lengths. For example, cubits for the length of a string of flowers and length and breadth of a

The Danyang-Kunshan Grand Bridge is the world's longest bridge. It is a 164.8 kilometres (102.4 mi) long

LEARNING HOW TO MEASURE

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playground using strides. Similarly, we use this system of measurement while playing 'sirra gona', (gilli danda), where the length of the stick is used as the unit to measure the desired distance.

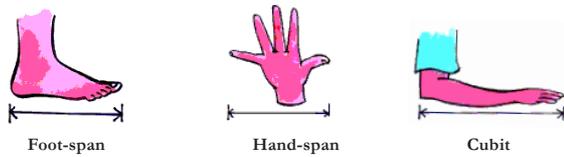


Fig. 4

The story of the scale

Many hundred years ago, people used to measure distances with their hand-spans, strides or foot-spans. One day a very tall man went to a shop to buy some cloth. He asked for three-and-a-half arms length of cloth. The shopkeeper measured three arm lengths of cloth and then added approximately another half-arm length.

The man felt that the shopkeeper had cheated him. So he measured the cloth with his arms and found that the cloth was not even three arm lengths. He told the shopkeeper that the length of the cloth was less than three-and-a-half arms when he measured with his own arm. The shop keeper replied that his own arm was the standard for measuring. They both argued about whose arm was to be taken as standard

measure. In those days, people arguing over measuring the length of fields, ropes, and hundreds of other things must have been a familiar sight. How should one measure a half or a quarter arm length?

Finally, some sensible people got together and decided to have a scale of a fixed length. In order to measure subunits, they marked this scale with several smaller but equal divisions. They then decided that everyone would measure lengths with this scale. They used wood and metal to make scales of the same length.

At one place, people decided to use the distance between the nose and the tip of the middle finger of their king as a measure (Fig. 5). They called this distance **one yard**. They used wood and metal to make scales of this length

and called this distance one **yard**. This yard was divided into three equal parts and each part was called a foot. They then divided each foot into twelve equal parts called inches. They even divided each inch into smaller segments!



Fig. 5

Other countries in the world also made their own scales. Because each country had its own scale which differed from others, it led to a lot of problems in trade and commerce. There was always a chance of quarrels breaking out.

Finally in France, it was decided that a certain length of rod made of a special material (Platinum-Iridium) would be called a meter. The meter was divided into 100 equal parts and these parts were called centimeter. Each centimeter was further divided into ten equal parts called millimeter. Now we are using this as a standard measurement for length throughout the world. This original scale is preserved in a museum in France.

The story explains the need of standard instruments to measure lengths. The meter scale is internationally accepted instrument for measuring lengths.

One meter is a standard unit of length.

We use meter as a unit of length and subsequently, centimeters and millimeters as smaller units of length.



Fig. 6

1 meter = 100 centimeters
1 centimeter = 10 millimeters

or

1 m = 100 cm
1 cm = 10 mm

In our daily life, we use different instruments like plain tape, rolled tape, centimeter scale of different sizes, made up of wood, metal or plastic.

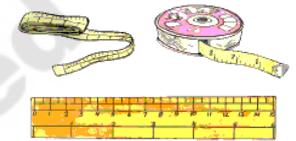


Fig. 7

- How do you select a suitable instrument to measure length?

In 1590 Zaccharias Janssen and his son Hans invented micro scope.

The Danyang-Kunshan Grand Bridge is the world's longest bridge. It is a 164.8 kilometres (102.4 mi) long

If you want to measure the thickness of an eraser, which of the instruments shown in Fig. 7 is more suitable and why?

Sometimes we may need to measure long distances like length and breadth of school play ground or agricultural fields or distance between our house to school, distance between one town to another town, and even longer distances such as those between one country and another country.

- Can we measure these lengths using the instruments shown in Fig. 7?
- If not, how are these distances measured?
- What instrument are used?
- Is there any other way to measure very large distances?

Discuss with your friends, parents, and teachers to know the answer.

Meter is not a convenient unit for measuring large distances. We need to define a larger unit to measure larger distances. We use kilometer as a larger unit of length. One kilometer is 1000 times longer than a meter.

1 kilometer = 1000 meters
1 Km = 1000 m

Activity-2: How do we measure?

- How do you measure the height of your classmate using a meter scale?

Ask your classmate to stand with his/her back against a wall. Make a mark on the wall exactly above his/her head.

Now measure the distance, from the floor to this mark on the wall, with a scale. Let all other students measure this length in a similar way. Record your observations in your notebook.

Study carefully the measurements reported by different students.

Do you all have the same readings of measurements? If not, what could be the reason for the differences?



Fig. 8

In the above activity, though the measurement was done using a standard scale, results may be close to each other but not exactly equal.

The difference in reading is due to some errors in measurement. For example :

- Not marking the point exactly at the top of the head.
- Not using the meter scale in a proper manner.

The simple protractor in your compass box looks like a semicircular disk marked with degrees, from 0° to 180°.