

Study points

- 15.1 Air exerts pressure
- 15.2 Effect of air velocity on air pressure
- 15.3 Non-uniform heating of earth
- 15.5 Thunderstorm
- 15.6 Cyclone
- 15.7 Tornado

You must have seen dry leaves, dust particles, sand etc. Flying away with strong wind. You must also have heard the sound of collision of windows of doors. Sometimes it starts raining, thunder and lightening along with fast flow of air. What are the reasons behind the natural phenomena? In this lesson we will discuss these phenomena with the help of various activities.

15.1 Air exerts pressure**Activity 1**

Take a plastic bottle. Fill it half with hot water. After some time vacate the bottle and immediately close the lid tightly. Now pour cold water over the bottle and observe it. Bottle gets squeezed. Why it happens?



Fig 15.1 Cool the bottle by pouring water

Some water vapors in the bottle get cool down and convert into water. Thus the air pressure inside the bottle becomes less compared to outside the bottle. This difference in pressure causes the bottle to squeeze.

What happens when we fill up excess air in the balloon? Why does a balloon burst? What does air do inside the balloon? Kite flies only when air blows, why? How is air helpful in flattening of flag, blowing of dust and leaves etc.

Flying kite, bursting of balloon, fluttering of flag, blowing of dust and leaves etc happens due to air pressure. All these activities prove that air exerts pressure.

Let us do some other activities related to air.

15.2 Effect of velocity of air on air pressure -

Activity 2

Take a empty bottle, Make a small ball by folding a piece of a paper and keep it inside the bottle near the mouth. Try to insert the ball inside the bottle by blowing through the month of bottle. Repeat the process with bottles of different size of mouth.

Why we face difficulty to enter the ball inside the bottle by blowing.

The velocity of air increases at mouth of the bottle by blowing. It causes low air pressure. The pressure inside the bottle is more in comparison to at mouth. Because of this air inside the bottle propels (Pushes) the ball outside.

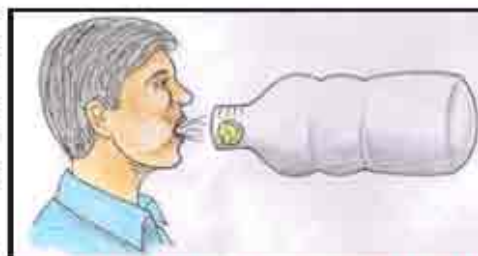


Fig 15.2 Blowing air in bottle

Activity 3

Take two balloons of same size. Fill them with little amount of water. Now blow the balloon to full and tie them with string. Suspend these balloons on a wooden stick and keep a distance of 10 cm between them. Blow air between balloons. What do you see? Why both balloon come near to each other?

Blowing air between balloons reduces air pressure between them. Higher pressure on the other side of the balloons pushes them towards each other.

What you have learnt from above two activities?



Fig 15.3 Blow between balloons

Increase in the velocity of air, reduces the air pressure

Can you tell why air blows? Let us know about it -

15.3 Non - uniform heating of earth

Heat energy is received by earth in more on equators. Due to this, air of this area gets hot. This hot air rises up and the cold air from the poles starts to flowing to take that place. The non-uniform heating in these areas causes flow of wind.

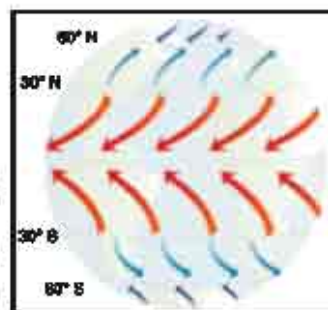


Fig 15.4 Non uniform heating of earth

15.4 Non uniform heating of land and water

In summer, the areas get heated in less time. Land remains at higher temperature compare to sea water. The air above the land gets heated and rises up. This vacated area replaced by cold air from sea water and wind starts flowing. It is also called as

"moving air is called breeze"

In winter air flows from land to sea. Why it happens? Think over it.



Fig 15.5 In summer monsoon from South - west direction



Fig 15.6 In winter monsoon from north - west direction

15.5 Thunder storm

In rainy season you might have seen heavy clouds in the sky with light & thunder.

Why lightning and thundering occurs?

Let us know about it.

When temperature increases, air becomes hot and rises up rapidly. This wind also carries water vapors which present in the air. Where the temperature is less, water vapors condense into water and starts falling down. Falling drops of water and rapidly rising air interacts and produces lighting and thundering. These phenomena we call it as thunder-storm. We will read "thunder-storm" in higher classes in detail.

Safety measure of thunderstorm

1. Do not stay in open place; go inside the building at the time of thunderstorm.
2. Do not come out from your houses.
3. Don't do any water related work like Bathing, rinsing utensils, washing cloths Etc.
4. It is safer to take shelter in bus or car.
5. Do not stay under high and isolated trees.
6. Do not lay down on open lands.



Fig 15.7 Thunder storm

15.6 Cyclone

At 09.00 PM on 12 October 2013 rotating winds collide at sea coast of Odisha with the speed of 220 km per hour with heavy rain. High water waves arise

in the sea. Sea water entered in the coastal area. These strong winds and water heavily damaged houses and lakes of hectare agriculture land flooded with water, crops were destroyed, electric poles were uprooted. There were darkness everywhere, many people lost their lives. This natural phenomena is called as "CYCLONE"



Fig 15.8 Tides colliding with sea coast

In American continent it is called as "Hurricane" and in Japan it is called as "Typhoon".

How does cyclone form-

Water gains heat from atmosphere and converted into water vapour. When these water vapour reconvert into water droplets, heat is released in the atmosphere. Surrounding air becomes hot due to this released heat. This warm air rises upwards which lowers the air pressure. This vacated area is replaced by high velocity air flow towards it. This cycle repeats. This repetition ends with the formation of low pressure area. Around this lower pressure area different layers of air rotate with high speed. This situation of weather is called cyclone. The centre of cyclone is calm zone known as eye.



Fig 15.9 Formation of cyclone

Safety measures at government or social level.

1. Forecasts and warnings about the cyclone are issued by meteorological department.
2. Rapid communication facilities to provide information promptly and in time to the fisherman, water boats, government agencies, sea shores and public etc.
3. Rapid transportation to relocate the people in safe place.

Work to be done public -

1. We should not ignore the warnings issued by the meteorological department on radio, television, or public news papers, etc.
2. We should manage to relocate the essential house items, domestic animals, vehicles, etc into safe zone.
3. To avoid riding the vehicle on flooded road.
4. We should keep the telephone numbers of emergency services like police, fire alarming station, hospital etc

The residents of cyclone prone area should keep following precautions.

1. Store water for odd situations.
2. Do not touch the wet switches, loose and fallen electric wires.
3. Cooperate our neighbours, friends and provide help to them as much possible.

15.7 Tornado

Tornado is dark coloured and funnel type clouds and seem as coming from sky towards the earth. Tornado have wind speeds less than 180 km/h. They are weak in nature. The eastern costal part of India is more prone to cyclones. Tornadoes are rare in our country.



Fig 15.10 Tornado

What have you learnt

- Moving air is called breeze.
- When air velocity increases, Air pressure reduces.
- Non uniform heating of sky and non uniform heating of land and water are due to flow of air.
- Tornado is called hurricane in America (USA) and typhoon in Japan.
- The main reason for air currents flow is the non uniform heating at equatorial and polar regions.
- When hot air moves upwards then air pressure reduced at that place. The cold air at high pressure moves towards that place.
- Tornado is dark colored and funnel type clouds and seem as coming from sky towards the earth.

Exercises

Choose the correct answer.

1. With the increase in velocity of air, air pressure -.
(A) Increases (B) Decreases
(C) No change (D) Become double ()
2. What will happen if air blows in between two balloons hanged on wooden stick separated by 10 cm distance -
(A) Balloons come near to each other
(B) Balloons goes away from each other
(C) Balloons burst
(D) No change ()
3. Centre of cyclone in a clam area. It is called-
(A) Centre (B) Eye
(C) Head (D) Tail ()

Fill in the blanks with suitable words.

1. Tornado is dark coloured and funnel type.....
2. The air flows from.....pressure area to pressure area.
3. Breeze produces due toheating of earth.
4. Air in motion is called.....

Short answer questions

1. How does cyclone formed?
2. What type of planning is needed to overcome the cyclone?
3. Describe an activity to explain air pressure.
4. What are the safety measures against the lightning thunder?

Long answer questions:

1. What are the reasons of lightning thunder?
2. Explain, what are the reasons to flow of air?

