

8 Winds, Storms and Cyclones

Lesson at a Glance

- **Wind:** The moving air is called the *wind*.
- **Anemometer:** The instrument that measures the wind speed is known as *anemometer*.
- We fill air into the bicycle tube to keep it tight. But when a bicycle tube overfilled with air it may burst. It shows that air exerts pressure. It is due to air pressure that the leaves of trees, banner or flags flutter when the wind is blowing.
- **Properties of Air:**
 - Air expands on heating and contracts on cooling.
 - Air around us exerts pressure.
 - Warm air rises up, whereas comparatively cooler air tends to move towards the earth's surface.
 - When warm air rises up, air pressure at that place is reduced and the cooler air moves to that place. The warm air is lighter than the cold air.
- Uneven heating of the earth is the main cause of wind movements. High speed winds are accompanied by reduced air pressure.
- (a) The region where the air rises, an area of low pressure is created.
(b) The region where the air sinks, an area of high pressure is created.
- **Monsoon winds:** In summer, around the equator the land warms up faster and most of the time the temperature of the land is higher than that of water in the oceans. The air over the land gets heated and rises. This causes the wind to flow from the oceans towards the land. These are called *monsoon winds*. The monsoon winds carry water and it rains.

- **Thunderstorm:** Thunderstorms develop in hot, humid tropical areas like India. The event in which there is swift movement of the falling water droplets alongwith the rising air creates lightning and sound, is known as *thunderstorm*.
- **Cyclone:** A *cyclone* is a small low pressure system with winds blowing anti-clockwise in the northern hemisphere and clockwise in the southern hemisphere. It usually originates when the sun's heat stirs up moist air over oceans, where the temperature is higher than 27°C.
- **Hurricane and Typhoon:** Tropical cyclones are known as *hurricane* in the American continent whereas in Philippines and Japan it is called a *typhoon*.
- **Tornado:** A tornado is a dark funnel shaped cloud that reaches from the sky to the ground.
- **Lightning.** A flash of bright light produced by an electric discharge between clouds or between clouds and the ground is called *lightning*.

A bolt of lightning travels at a speed of more than 400,000 km/h. It can heat the nearby air to more than 4 times the temperature of the sun.

- **Wind flow pattern.** At the poles the air is colder than that at latitude about 60 degrees. So, wind circulation is set up from the poles to the warmer latitudes. These winds blow from the north and the south towards the equator.

Near equator, the warm air rises up and the cold wind from the polar regions rushes in to take its place. Thus, wind circulation is set up from the poles to the warmer latitudes.

The wind would flow from north to south or from south to north. However, a change in direction is caused by the rotation of the earth.

TEXTBOOK QUESTIONS SOLVED

Q.1. Fill the missing word in the blank spaces in the following statements:

- (a) Wind is _____ air.
- (b) Winds are generated due to _____ heating on the earth.

- (c) Near the earth's surface _____ air rises up whereas _____ air comes down.
- (d) Air moves from a region of _____ pressure to a region of _____ pressure.

Ans. (a) moving (b) uneven
(c) warm, cooler (d) high, low

Q.2. Suggest two methods to find out wind direction at a given place.

Ans. (i) Take a piece of a paper in your hand. Allow it to fall from your hand. It will flow in the direction in which wind is blowing.

(ii) You can also use a wind-pane which helps us to know accurate wind direction.

Q.3. State two experiences that made you think that air exerts pressure.

Ans. (i) Balloons and balls can be used only when they are inflated with air. When balloon is overfilled with air it bursts due to excessive air pressure.

(ii) Compressed air is used in the brake system for stopping trains.

Q.4. You want to buy a house. Would you like to buy a house having windows but no ventilators? Explain your answer.

Ans. No, a house which has no ventilators is not a safe or healthy house to live in. The air circulation is not there in such a house. So, it has no fresh air. Because warm air rises up and goes out through ventilators and fresh air comes in through windows.

Q.5. Explain why holes are made in hanging banners and hoardings.

Ans. Air exerts pressure. Due to this pressure banners and hoarding flutter and torn when wind is blowing fast. Holes are made in banners and hoardings so that wind passes through the holes and they do not become loose and fall down.

Q.6. How will you help your neighbours in case cyclone approaches your village/town?

Ans. (i) I will make them aware of cyclone forecast and warning service.

- (ii) Rapid communication of warning to the government agencies and all the important places.
- (iii) Construction of cyclone shelters in the cyclone prone areas.
- (iv) Helping them to shift essential goods, domestic animals etc. to safer places.

Q.7. What planning is required in advance to deal with the situation created by a cyclone?

Ans. To deal with cyclone, it is important to follow the following points :

- (i) carefully listening the warnings transmitted on T.V. and radio.
- (ii) moving to the safer places.
- (iii) keeping an emergency kit ready.
- (iv) store food in waterproof bags.
- (v) not venturing into sea.
- (vi) keeping all the emergency numbers.

Q.8. Which one of the following places is unlikely to be affected by cyclone?

- (i) Chennai (ii) Mangalore
(iii) Amritsar (iv) Puri

Ans. (iv) Amritsar

Q.9. Which of the statements given below is correct?

- (i) In winter the winds flow from the land to the ocean.
- (ii) In summer the winds flow from the land towards the ocean.
- (iii) A cyclone is formed by a very high-pressure system with very high-speed winds revolving around it.
- (iv) The coastline of India is not vulnerable to cyclones.

Ans. (i) In winter the winds flow from the land to the ocean.

EXTENDED LEARNING — ACTIVITIES AND PROJECTS

Q.1. You can perform the Activity 8.5 in the chapter slight differently at home. Use two plastic bottles of the same size. Stretch one balloon on the neck of each bottle. Keep one bottle in the sun and the other in the shade. Record your observations. Compare these observations and the result with those of Activity 8.5.

Ans. Do it yourself with the help of the activity 8.5.

Q.2. You can make your own anemometer.

Collect the following items:

4 small paper cups (used ice cream cups), 2 strips of cardboard (20 cm long and 2 cm wide), gum, stapler, a sketch pen and a sharpened pencil with eraser at one end.

Take a scale; draw crosses on the cardboard strips as shown in the Fig. 8.1. This will give you the centres of the strips.

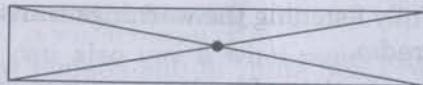


Fig. 8.1 Finding centre of the strips.

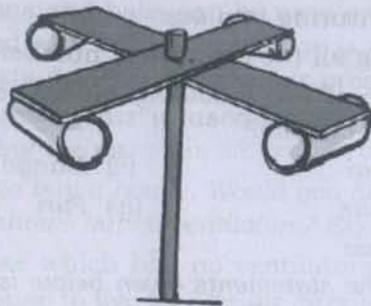


Fig. 8.2 A model of an anemometer.

Fix the strips at the centre, putting one over the other so that they make a plus (+) sign. Now fix the cups at the ends of the strips. Colour the outer surface of one cup with a marker or a sketch pen. All the 4 cups should face in the same direction.

Push a pin through the centre of the strips and attach the strips and the cups to the eraser of the pencil. Check that the strips rotate freely when you blow air on the cups. Your anemometer is ready. Counting the number of rotations per minute will give you an estimate of the speed of the wind. To observe the changes in the wind speed, use it at different places and at different times of the day.

If you do not have a pencil with attached eraser you can use the tip of a ball pen. The only condition is that the strips should rotate freely.

Remember that this anemometer will indicate only speed changes. It will not give you the actual wind speed.

Ans. Do it yourself with the help of the process suggested in the question.

Q.3. Collect articles and photographs from newspapers and magazines about storms and cyclones. Make a story on the basis of what you learnt in this chapter and the matter collected by you.

Ans. On the basis of our experiences, articles from newspapers and study of this chapter we can say that the cyclone and storms are very harmful and destructive.

Cyclone is called hurricane in American continent. It is called typhoon in Philippines and Japan.

Q.4. Suppose you are a member of a committee, which is responsible for creating development plan of a coastal state. Prepare a short speech indicating the measures to be taken to reduce the suffering of the people caused by cyclones.

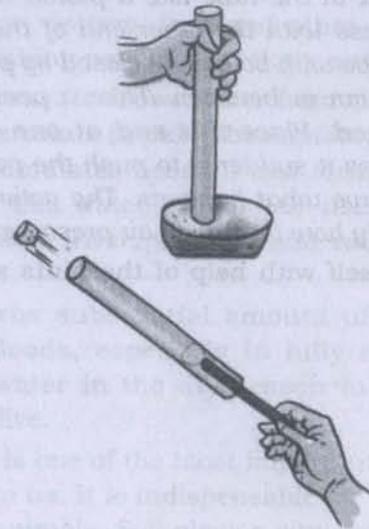


Fig. 8.3

Ans. As a member of development plan committee, I will suggest that we should make arrangements to get prior information of cyclone through satellites and radars.

The *cyclone warning* should be issued 24 hours in advance when cyclone is nearer the coast. The people living in the affected area should be educated through TV, radio and newspaper to shift the essential household goods, domestic animals and vehicles etc. to safer places. They should be requested to keep ready the phone numbers of emergency services like police, fire brigade, and medical centres.

In addition to this, construction of *cyclone shelters* in the cyclone prone areas, and administrative arrangements for moving people fast for safer places should be made.

Q.5. Interview eyewitness to collect the actual experience of people affected by a cyclone.

Ans. Do it yourself.

Q.6. Take an aluminium tube about 15 cm long and 1 to 1.5 cm in diameter. Cut slice of a medium-sized potato about 2 cm thick. Insert the tube in the slice, press it, and rotate it 2-3 times. Remove the tube. You will find a piece of potato fixed in the tube like a piston head. Repeat the same process with the other end of the tube. Now you have the tube with both ends closed by potato pieces with an air column in between. Take a pencil with one end unsharpened. Place this end at one of the pieces of potato. Press it suddenly to push the potato piece in the tube. Observe what happens. The activity shows rather dramatically how increased air pressure can push things.

Ans. Do it yourself with help of the hints suggested in the question.