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SOLUTIONS BOOK

CLASS 8

Science · Curiosity

CHAPTER 6

Pressure, Winds, Storms, and Cyclones

Complete Questions and Activities Solutions

In-text Questions | Keep the curiosity alive | Discover, design, and debate

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Every question is followed by its answer. Question numbers above are clickable and the PDF bookmarks panel lets you jump to any exercise set or question. Figures are reproduced from the NCERT textbook (© NCERT) for educational use.

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6.1

CLASS 8 SCIENCE · CHAPTER 6

In-text Questions

Solutions · 23 questions

Directions (Questions 1–23): These are the questions that appear inside the chapter (Probe and ponder, the questions asked in the text, the Table 6.1 activity and Activities 6.1 to 6.6), numbered in the order in which they appear. Model answers based on the chapter are given; activity observations show the expected result.

QUESTION 1 *Probe and ponder · p. 80*

Why are winds stronger on some days than on others?

ANSWER

Wind is air moving from a region of high pressure to a region of low pressure (Section 6.3).

- The larger the difference in air pressure between two regions, the faster the air moves, so the speed of the wind is higher.
- On a day when the pressure difference is small the wind is weak or calm; when it is large the wind blows strongly.
- If we could measure the speed of the escaping air in Activity 6.5, we would find that it is higher when the pressure difference is higher.

Therefore, winds are stronger on the days when the difference in air pressure is greater.

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QUESTION 2 *Probe and ponder · p. 80*

Why are water tanks usually placed at a height?

ANSWER

The pressure exerted by a liquid depends on the height of its column (Activity 6.1).

- A tank placed at a height gives a taller water column above the taps.
- So the pressure at the taps is increased, resulting in a good stream of water from the taps.

Therefore, water tanks are placed at a height to increase the pressure of water in the taps.

QUESTION 3 *Probe and ponder · p. 80*

Can air pressure really crush us?

ANSWER

The atmosphere exerts a very large pressure: the air column over an area 15 cm × 15 cm exerts a force of about 2250 N, equal to the weight of a 225 kg object.

a Why we are not crushed

- The pressure inside our bodies is also equal to the atmospheric pressure.
- This balances the pressure exerted from outside, so no net force crushes us.
- The pressure inside our body is caused by the movement of fluids and gases in the tissues and organs.

Therefore, air pressure is large, but it cannot crush us because it is balanced by the equal pressure inside our bodies.

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QUESTION 4 *Probe and ponder · p. 80*

What causes storms and cyclones? If the Earth stopped rotating, would cyclones still form?

ANSWER

Storms and cyclones are caused by warm, moist air rising and creating regions of low pressure.

a Cause of storms and cyclones

- Warm moist air rises, creating a low-pressure area, and cooler air rushes in to take its place.
- The rising air cools, its water vapour condenses and clouds and rain form. Over warm ocean waters, heat released on condensation warms the air further, so the pressure becomes even lower and a cyclone develops.

b If the Earth stopped rotating

The chapter states that the Earth's rotation causes the moving air to spin, and this spinning system with winds revolving around a very low-pressure area is a cyclone. Without the Earth's rotation the air would not be made to spin, so spinning cyclones would not form in the same way, although warm moist air could still rise and cause storms.

Therefore, rising warm moist air over warm waters, together with the Earth's rotation that makes the air spin, forms cyclones.

QUESTION 5 *Introduction · p. 81*

Have you ever wondered why fallen leaves rise in the air or trees sway or bend? Does the wind exert force on fallen leaves to make them rise or on trees to bend? … How does the force exerted by wind make this happen?

ANSWER

Yes, the wind exerts a force, and this force creates wind pressure.

- Moving air pushes on leaves, trees, doors, windows and clothes, since the force exerted by wind creates wind pressure.

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- Wind pressure makes the leaves rise or swirl, the trees sway or bend, the doors slam, the windows rattle and the clothes flutter.

Therefore, the force exerted by wind creates wind pressure, which causes these effects.

QUESTION 6 *Section 6.1 · p. 81*

Both our bags are equally heavy. Why does your bag hurt, and mine doesn't? … Can the shape or size of the straps really make a difference?

ANSWER

Both bags have the same weight, so the force on the shoulders is the same. What differs is the area over which the force acts.

Bag	Area of contact	Pressure on the shoulders
Narrow straps (Pawan)	Smaller area	Larger, so it hurts
Broad straps (Megha)	Larger area	Smaller, so it is comfortable

Pressure = Force / Area

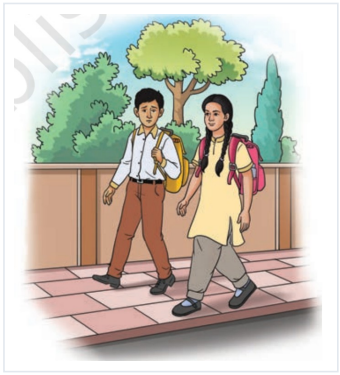


Fig. 6.1: Megha and Pawan carrying their bags

Therefore, yes, the size of the straps matters: broad straps spread the same weight over a larger area and reduce the pressure.

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QUESTION 7 *Section 6.1 · p. 82*

If a force of 100 N is applied on a cardboard of area 2 m^2, then the pressure applied on the cardboard will be: …

ANSWER

Pressure is the force per unit area, and its SI unit is newton/metre^2 (N/m^2), also called pascal (Pa).

a **Solution**

Force = 100 N, Area = 2 m^2

Pressure = Force / Area = 100 N / 2 m^2 = 50 N/m^2

Therefore, the pressure applied on the cardboard is 50 N/m^2 (50 Pa).

QUESTION 8 *Table 6.1 · pp. 82–83*

Conduct the activities given in Table 6.1 and record your observations. Explain how pressure influences the mode of action undertaken for each activity.
What can you conclude from your observations in Table 6.1?

ANSWER

The activities are to be done under adult supervision. A model record of the observations is given.

a **Table 6.1: Record your observations**

Activity	Mode of action	Easy or difficult? Reason
Driving an iron nail	By the head of the nail	Difficult: the force acts over a larger area, so the pressure is less
	By the pointed end of the nail	Easy: the force acts over a very small area, so the pressure is high
Cutting an apple with a knife	Using the sharp edge	Easy: small area of the edge, so high pressure
	Using the blunt edge	Difficult: larger area, so lower pressure

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Activity	Modes of action		Easy or difficult to perform? Give reasons.
Driving an iron nail	 By the head of the nail	 By the pointed end of the nail	
Cutting an apple with a knife	 Using the sharp edge of the knife	 Using the blunt edge of the knife	

Table 6.1

b Conclusion

When the area over which a force is applied is smaller, the resulting pressure is higher, which makes it easier to do certain tasks. That is why it is easier to drive a nail with its pointed end and to cut an apple with the sharp edge of a knife.

Therefore, for the same force, a smaller area gives a higher pressure and makes the work easier.

QUESTION 9 *Section 6.1 · p. 83*

You must have seen overhead water tanks (Fig. 6.4) in your locality, or on the rooftops of houses used for water supply. Why are these tanks always placed at a height?

ANSWER

The pressure exerted by a liquid in a vessel depends on the height of its column (Activity 6.1).

- The higher the tank, the taller the column of water above the taps.
- A taller column gives more pressure at the tap, resulting in a good stream of water.

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Fig. 6.4: Overhead tank

Therefore, overhead tanks are placed at a height so that the pressure of water in the taps is increased.

QUESTION 10 *Activity 6.1 · p. 83*

Do liquids also exert pressure?
Observe what happens to the balloons. Do both balloons bulge? Do they bulge to the same extent? What can you infer from this activity?

ANSWER

Two pipes of the same length but different diameters, each closed with a balloon at the bottom, are filled with water up to the same level.

a Observation

Yes, both the balloons bulge, and they bulge to the same extent.

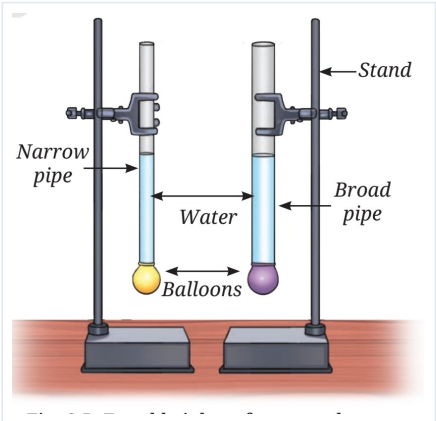


Fig. 6.5: Equal heights of water columns produce same bulge in balloons

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b **Inference**

- Because of the different diameters, the weight of water in the two pipes is different, yet the bulge is the same. So the weight of the water is not responsible for the bulge.
- The bulge is due to the pressure exerted by the water column. Equal water column heights produce equal bulges, despite different diameters.

Therefore, yes, liquids exert pressure, and the pressure depends on the height of the liquid column.

QUESTION 11 *Section 6.1 · p. 84*

What will happen to the bulge of the balloon if we increase the height of the water column?
Do you see any relation between the amount of bulge of the rubber balloon and the height of the water column in the pipe?

ANSWER

More water is poured into one of the pipes a few times and the bulge is noted each time.

- The bulge of the balloon increases as the height of the water column increases.
- So the pressure at the bottom of the pipe increases with the height of the column.

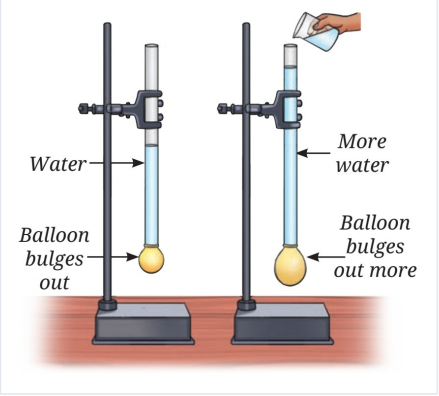


Fig. 6.6: Higher heights of water column produce bigger bulge of the balloon

Therefore, the balloon bulges more when the height of the water column is increased, i.e. the pressure of a liquid increases with the height of its column.

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QUESTION 12 *Section 6.1 · p. 84*

Suppose you are living on the second floor of a three-storeyed building and an overhead water tank is placed on the top floor. Will you or your friend on the first floor receive a more powerful stream of tap water? Give reasons.

ANSWER

The pressure of water at a tap depends on the height of the water column above it, measured from the tank.

- The first-floor tap is lower than the second-floor tap, so the water column above it is taller.
- A taller water column means more pressure at the tap.

Therefore, the friend on the first floor will receive the more powerful stream of water.

QUESTION 13 *Activity 6.2 · pp. 84–85*

Do liquids also exert pressure on the walls of the container? … What do you observe?

ANSWER

Four small holes are made at the same height near the bottom of a plastic bottle, sealed with tape, and the bottle is filled with water. The tape is then removed from all the holes together.

a Observation

Water flows out through all the holes on the sides of the bottle.

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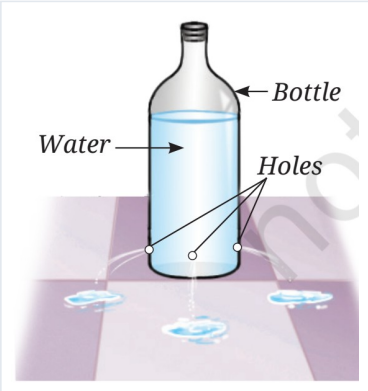


Fig. 6.7: Liquid exerts pressure on the wall of the container

b Inference

It indicates that water also exerts pressure on the sides of a container. In fact, liquids exert pressure in all directions, not only at the bottom.

Therefore, a liquid exerts pressure on the walls of its container as well as at the bottom.

QUESTION 14 *Section 6.1 · p. 85*

You must have seen water spurting out like a fountain from leaking joints or holes in water pipes. Can you explain why this happens? Is it due to the pressure exerted by water on the walls of the pipes?

ANSWER

Yes, it is due to the pressure of the water on the walls of the pipes.

- Liquids exert pressure on the walls of the container in all directions.
- Where there is a hole or a leaking joint, the water pushes out through it, and it spurts like a fountain.

Therefore, water spurts out of leaking pipes because of the pressure exerted by the water on the walls of the pipe.

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QUESTION 15 *Activity 6.3 · pp. 85–86*

Observe how much effort is needed to lift it.
In which case is the lifting easier, with the folded or the unfolded chart paper covering the paper plate?

ANSWER

An inverted paper plate on a table is covered first with a folded sheet of chart paper and then with an unfolded sheet, and lifted using a stick.

a Observation

Covering sheet	Area of the sheet	Effort to lift
Folded chart paper	Smaller	Less effort (easier)
Unfolded chart paper	Larger	More effort (more difficult)

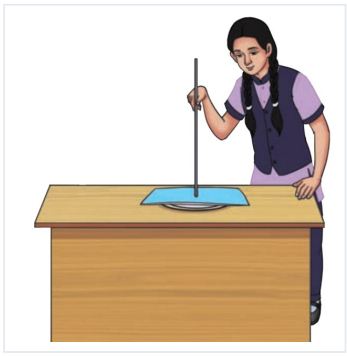
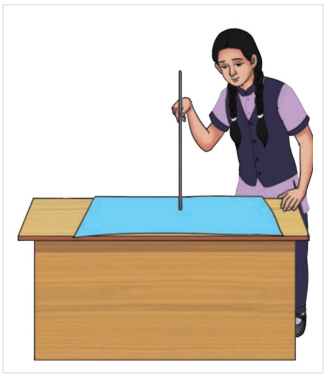


Fig. 6.9: (b) with two folds of chart paper



(c) with unfolded chart paper

b Explanation

- The weight of the covering sheet has not changed, yet more effort is needed with the larger sheet.
- So air exerts a force on the sheet, and this force increases as the area of the sheet increases. Force per unit area is pressure, so air exerts pressure.

Therefore, lifting is easier with the folded chart paper; air exerts pressure, called atmospheric pressure, on all objects.

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QUESTION 16 *Section 6.2 · p. 86*

What happens when an inflated balloon is kept without closing its mouth? The air escapes from the balloon. Why does the air escape from the balloon?

ANSWER

The air inside a blown-up balloon exerts pressure on its walls, in all directions, so the balloon expands (Fig. 6.10).

- The air pressure inside the inflated balloon is higher than the pressure of the air outside.
- When the mouth is open, air moves from the region of high pressure inside to the region of low pressure outside, so it escapes.

Therefore, the air escapes because air moves from the high pressure inside the balloon to the lower pressure outside.

QUESTION 17 *Activity 6.4 · p. 87*

Do you realise that it sticks to the surface? Now, try to pull it off. Do you find it difficult to pull it off?

ANSWER

A rubber sucker is pressed firmly against a smooth, flat surface.

a Observation and explanation

- Yes, it sticks, and it is difficult to pull it off.
- Pressing pushes out most of the air between the cup and the surface, so the air pressure inside is reduced.
- The pressure of the air outside is higher than the pressure inside, so the outside air pushes the sucker on to the surface.
- To pull it off, the force applied must overcome the pressure difference between outside and inside the sucker.

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Fig. 6.11: A sucker

Therefore, a sucker sticks because the air pressure outside it is higher than the air pressure inside it.

QUESTION 18 *Section 6.2 · p. 87*

Have you ever wondered how large the atmospheric pressure is? Do you know how large the atmospheric pressure is?

ANSWER

The chapter gives the force of the atmospheric air column over a small area; the pressure can be found from it.

a **Solution**

Area = 15 cm × 15 cm = 0.15 m × 0.15 m = 0.0225 m^2

Force = weight of 225 kg = 2250 N (as given in the chapter)

Pressure = Force / Area = 2250 N / 0.0225 m^2 = 100 000 N/m^2 = 100 000 Pa

In practical units, 100 000 Pa = 1000 hPa = 1000 mb (1 mb = 100 Pa)

So the atmospheric pressure is about 100 000 Pa, a very large pressure. We are not crushed because the pressure inside our bodies is also equal to it.

Therefore, the atmospheric pressure is about 100 000 Pa (1000 mb).

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QUESTION 19 *Section 6.3 · p. 87*

You must have seen that when an inflated balloon is kept without closing its mouth, the air from the balloon escapes. Recall that when there is a puncture in the bicycle tube, the air escapes and the tube collapses. In both of these cases, does air move from a high pressure region to a low pressure region?

ANSWER

Yes, in both cases the pressure of the air inside is higher than the pressure outside.

Case	High pressure	Low pressure	What happens
Open balloon	Inside the balloon	Outside air	Air escapes, balloon shrinks
Punctured cycle tube	Inside the tube	Outside air	Air escapes, tube collapses

Therefore, in both the cases air moves from a region of high pressure to a region of low pressure.

QUESTION 20 *Activity 6.5 · p. 88*

How do winds form? Does the difference in air pressure have anything to do with the formation of winds?
Predict what would happen to the balloons. Observe what happens to both the balloons. Did it happen as predicted? Do you observe any change in the size of the balloons? Write down your observations.

ANSWER

A straw joins an inflated balloon to an uninflated balloon (Fig. 6.12). The air pressure in the inflated balloon is higher than in the uninflated one.

a Prediction and observation

- Prediction: air will move through the straw from the inflated balloon to the uninflated balloon.
- Observation: the inflated balloon becomes smaller and the uninflated balloon becomes bigger, so the prediction is correct.
- After some time both balloons attain almost the same size.

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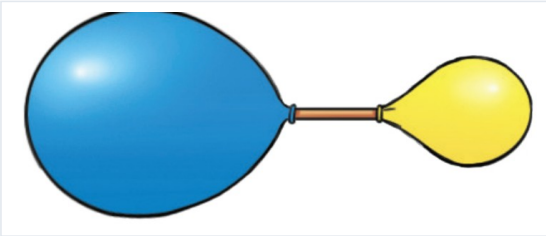


Fig. 6.12: Air moves from a high pressure region to a low pressure region

b Formation of winds

Air moves from a region of high air pressure to a region of low air pressure. So the difference in air pressure causes winds to blow. For example, during the day the air over the land is warmer and lighter, rises and creates a low pressure area, and the air from the sea blows in as a sea breeze; at night the wind blows from the land to the sea as a land breeze.

Therefore, winds are formed by differences in air pressure, as air flows from high pressure to low pressure regions.

QUESTION 21 *Activity 6.5 · p. 88*

Do you notice that after some time both the balloons attain almost the same size and the flow of air stops? Why does the air flow stop?

ANSWER

Air flows only as long as there is a pressure difference between the two balloons.

- The flow continues as long as the pressure in the inflated balloon is higher than that in the uninflated balloon.
- The flow stops when the pressure in both balloons becomes equal, and the two balloons are then of almost the same size.

Therefore, the air flow stops when the air pressure in both the balloons becomes equal.

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QUESTION 22 *Activity 6.6 · p. 89*

Now, blow air into the narrow space between the balloons. What happens to the balloons? Note down your observations. Now blow harder and observe.

ANSWER

Two balloons of the same size are hung from a stick with a gap of 6–10 cm, and air is blown between them.

a Observation

- The balloons move towards each other, and blowing harder makes them approach each other faster.



Fig. 6.13: Blowing between two balloons

b Explanation

- Blowing air between the balloons creates a low pressure area between them.
- The higher air pressure on the outer sides pushes the balloons towards each other.

Therefore, high-speed winds are accompanied by a reduced air pressure.

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QUESTION 23 *Section 6.4 · pp. 89–90*

I have read that high-speed winds can blow off roofs. I wonder how?

ANSWER

This follows from the result of Activity 6.6.

- High-speed wind blowing over a house creates a low pressure area above the roof.
- The air pressure above the roof is then lower than the pressure below it. If the pressure difference is large and the roof is weak, the roof is blown away (Fig. 6.14a).
- It is safer to keep the doors and windows open during a storm: the wind then also moves through the house, the pressure difference between the inside and the top of the roof is reduced to a large extent, and the roof is not blown off (Fig. 6.14b).



Fig. 6.14: (a) Roof of a house blown away



(b) Roof of a house intact

Therefore, high-speed winds lower the pressure above the roof, and the higher pressure below can blow the roof off.

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6.2

CLASS 8 SCIENCE · CHAPTER 6

Keep the curiosity alive

Solutions · 13 questions

Directions (Questions 1–13): These are the end-of-chapter questions of Keep the curiosity alive (pages 94–96). Multiple-choice and true-false questions are answered with reasons, and every calculation is shown step by step.

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QUESTION 1

Choose the correct statement.

(i) Look at Fig. 6.21 carefully. Vessel R is filled with water. When pouring of water is stopped, the level of water will be _____.
(a) the highest in vessel P (b) the highest in vessel Q (c) the highest in vessel R (d) equal in all three vessels
(ii) A rubber sucker (M) is pressed on a flat smooth surface and an identical sucker (N) is pressed on a rough surface: (a) Both M and N will stick to their surfaces. (b) Both M and N will not stick to their surfaces. (c) M will stick but N will not stick. (d) M will not stick but N will stick.
(iii) A water tank is placed on the roof of a building at a height 'H'. To get water with more pressure on the ground floor, one has to (a) increase the height 'H' at which the tank is placed. (b) decrease the height 'H' at which the tank is placed. (c) replace the tank with another tank of the same height that can hold more water. (d) replace the tank with another tank of the same height that can hold less water.
(iv) Two vessels, A and B contain water up to the same level as shown in Fig. 6.22. P_A and P_B is the pressure at the bottom of the vessels. F_A and F_B is the force exerted by the water at the bottom of the vessels A and B. (a) $P_A = P_B$, $F_A = F_B$ (b) $P_A = P_B$, $F_A < F_B$ (c) $P_A < P_B$, $F_A = F_B$ (d) $P_A > P_B$, $F_A > F_B$

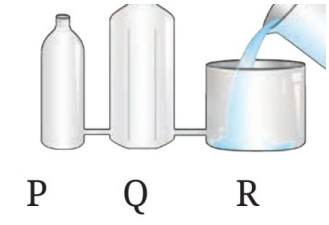


Fig. 6.21

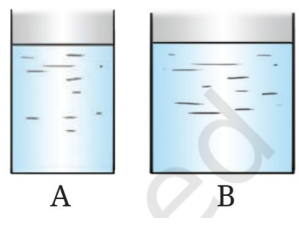


Fig. 6.22

ANSWER

Each part is answered with its reason.

a (i) Vessels P, Q and R

The three vessels are connected at the bottom, so the water can flow between them. The pressure of a liquid depends on the height of its column, so the water settles till the pressure is the same and the level is the same in all three vessels. Answer: (d) equal in all three vessels.

b (ii) Suckers M and N

On a smooth surface the sucker fits closely and most of the air under it is pushed out, so the outside air pressure holds it. On a rough surface air leaks under the cup and the pressure inside does not stay low. Answer: (c) M will stick but N will not stick.

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c **(iii) Water tank**

The pressure of a liquid depends on the height of its column, so the height of the tank must be increased. The quantity of water in the tank does not change the pressure at the same height. Answer: (a) increase the height 'H'.

d **(iv) Vessels A and B**

Same height of water ⇒ $P_A = P_B$

Force = pressure × area; the base area of B is larger than that of A, so $F_B > F_A$

Answer: (b) $P_A = P_B$, $F_A < F_B$.

Therefore, the correct statements are (i) d, (ii) c, (iii) a and (iv) b.

QUESTION 2

State whether the following statements are True [T] or False [F].

(i) Air flows from a region of higher pressure to a region of lower pressure. [ ]
(ii) Liquids exert pressure only at the bottom of a container. [ ]
(iii) Weather is stormy at the eye of a cyclone. [ ]
(iv) During a thunderstorm, it is safer to be in a car. [ ]

ANSWER

Each statement is checked against the chapter.

Statement	T / F	Reason
(i)	True [T]	Air moves from high pressure to low pressure (Activity 6.5).
(ii)	False [F]	Liquids exert pressure at the bottom, on the sides and in all directions.
(iii)	False [F]	At the eye of the cyclone the wind is calm; the surrounding region has strong winds and heavy rain.
(iv)	True [T]	Inside a bus or a car one is comparatively safer from lightning.

Therefore, the answers are (i) T, (ii) F, (iii) F and (iv) T.

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QUESTION 3

Fig. 6.23a shows a boy lying horizontally, and Fig. 6.23b shows the boy standing vertically on a loose sand bed. In which case does the boy sink more in sand? Give reasons.



Fig. 6.23 (a)



Fig. 6.23 (b)

ANSWER

The weight of the boy, which is the force on the sand, is the same in both cases. The area of contact is different.

Case	Area of contact	Pressure on sand
Lying horizontally (a)	Large	Small
Standing vertically (b)	Small (only the feet)	Large

Pressure = Force / Area. The smaller the area, the greater the pressure, and the more the sand sinks.

Therefore, the boy sinks more in the sand when he is standing (Fig. 6.23b), because the same weight acts over a smaller area, giving a higher pressure.

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QUESTION 4

An elephant stands on four feet. If the area covered by one foot is 0.25 m^2, calculate the pressure exerted by the elephant on the ground if its weight is 20000 N.

ANSWER

The elephant's weight acts on the ground through all four feet, so the total area of contact is that of four feet.

a **Solution**

Force = weight = 20 000 N

Total area = 4 × 0.25 m^2 = 1 m^2

Pressure = Force / Area = 20 000 N / 1 m^2 = 20 000 N/m^2

Therefore, the pressure exerted by the elephant on the ground is 20 000 N/m^2 (20 000 Pa).

QUESTION 5

There are two boats, A and B. Boat A has a base area of 7 m^2, and 5 persons are seated in it. Boat B has a base area of 3.5 m^2, and 3 persons are seating in it. If each person has a weight of 700 N, find out which boat will experience more pressure on its base and by how much?

ANSWER

The force on the base of each boat is the weight of the persons in it (the weight of the boats themselves is not given and is not considered).

a **Boat A**

Force = 5 × 700 N = 3500 N

Pressure = 3500 N / 7 m^2 = 500 N/m^2

b **Boat B**

Force = 3 × 700 N = 2100 N

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Pressure = 2100 N / 3.5 m^2 = 600 N/m^2

Difference = 600 − 500 = 100 N/m^2

Therefore, boat B experiences more pressure, by 100 N/m^2 (100 Pa).

QUESTION 6

Would lightning occur if air and clouds were good conductors of electricity? Give reasons for your answer.

ANSWER

Lightning needs a large build-up of opposite charges, which are kept apart because air is an insulator.

- Charges are separated in clouds and on the ground, and normally air does not let the opposite charges meet.
- Lightning is the sudden flow of charge when the insulating property of air breaks down after a very large build-up of charges.
- If air and clouds were good conductors, the charges would flow and neutralise as soon as they are produced, so a large charge would never build up.

Therefore, lightning would not occur if air and clouds were good conductors of electricity.

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QUESTION 7

What will happen to the two identical balloons A and B as shown in Fig. 6.24 when water is filled into the bottle up to a certain height. Will both the balloons bulge? If yes, will they bulge equally? Explain your answer.



Fig. 6.24

ANSWER

The two identical balloons are attached to the openings at the bottom of the bottle, at the same height.

- Water exerts pressure on the walls of the container in all directions, so both the balloons will bulge.
- The pressure of a liquid depends on the height of its column, and both balloons are at the same depth below the water level, so the pressure on them is the same.
- The balloons are identical, so they will bulge equally.

Therefore, both the balloons will bulge, and they will bulge equally.

NCERT ARCHIVE

QUESTION 8

Explain how a storm becomes a cyclone.

ANSWER

A storm is the strong wind that comes with rain; a cyclone is a much larger spinning storm over a warm ocean.

a **Steps**

- Under certain conditions the warm and moist air over warm ocean water rises, and the water vapour condenses to form raindrops.
- During condensation, heat is released into the atmosphere. This warms the ascending air further, so it rises even higher and creates an even lower pressure.
- Air from the surrounding regions rushes in and also starts rising. The Earth's rotation makes the moving air spin.
- The cycle repeats, creating a very low-pressure area with high-speed winds revolving around it. This spinning system of clouds, winds and rain is a cyclone, with the calm eye at the centre.

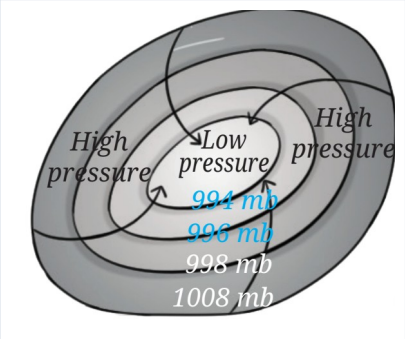


Fig. 6.19: Winds blowing from high pressure areas to low pressure areas

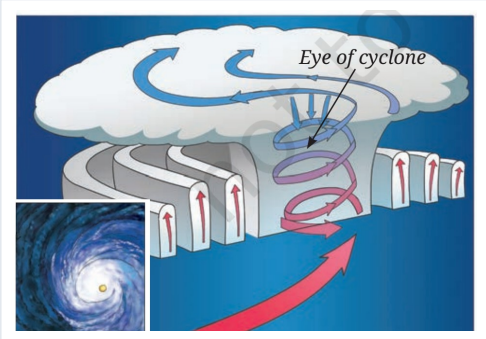


Fig. 6.20: A cyclone

Therefore, a storm develops into a cyclone when the cycle of rising, condensing and inrushing air over warm ocean water repeats and the Earth's rotation makes it spin.

NCERT ARCHIVE

QUESTION 9

Fig. 6.25 shows trees along the sea coast in a summer afternoon. Identify which side is land — A or B. Explain your answer.



Fig. 6.25

ANSWER

The trees show the direction in which the wind is blowing.

- In the figure the trees are bent towards A, so the wind blows from B towards A.
- In a summer afternoon the land gets heated faster than the sea, so the air above the land becomes warmer and lighter and rises, creating a low pressure area over the land.
- The air from the high-pressure region over the sea blows to the land. This is a sea breeze, so the wind blows from the sea to the land.

Therefore, side A is the land (and B is the sea), since the wind blows from B to A.

NCERT ARCHIVE

QUESTION 10

Describe an activity to show that air flows from a region of high pressure to a region of low pressure.

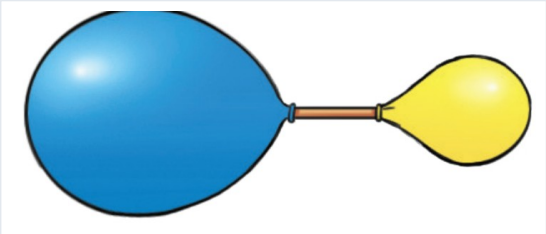


Fig. 6.12: Air moves from a high pressure region to a low pressure region

ANSWER

This is Activity 6.5 with two balloons and a straw.

a Materials and steps

- Take two similar thin rubber balloons and a drinking straw.
- Tie one end of the straw into one (uninflated) balloon with a rubber band or thread.
- Inflate the second balloon, hold its mouth with the fingers and tie the free end of the straw into its neck, without letting the air leak.

b Observation and conclusion

- Some air moves from the inflated balloon into the uninflated balloon: the first becomes smaller and the second bigger.
- After some time both are almost of the same size and the flow stops, because the pressure in both balloons has become equal.

Therefore, the activity shows that air moves from a region of high air pressure to a region of low air pressure.

NCERT ARCHIVE

QUESTION 11

What is a thunderstorm? Explain the process of its formation.

ANSWER

A storm accompanied by lightning and thunder is called a thunderstorm.

a Process of formation

- The land gets heated. The warm, moist air, being lighter, rises, creating a low pressure area. Cooler air from the surrounding high-pressure areas flows in to take its place, which results in continuous wind circulation.
- The rising air expands and cools, and its moisture condenses into water droplets that form clouds. The droplets merge into heavier drops that fall as rain, hail or snow. This strong wind with rain is a storm.
- In some conditions the warm air rises to great heights where the low temperature turns water droplets into ice particles.
- Strong winds blowing upwards and downwards make the water droplets and ice particles rub and charges develop in the clouds. Lightning follows, with thunder, so the storm becomes a thunderstorm.

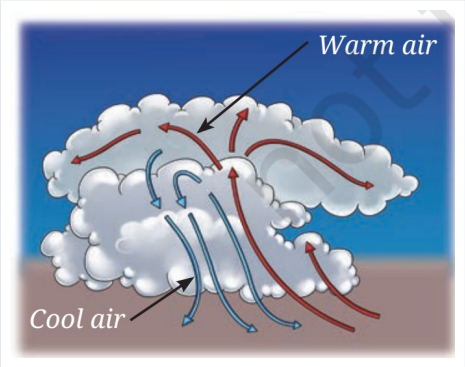


Fig. 6.15: Strong winds going up and down

The requirements for the formation of thunderstorms are moisture and strong winds.

Therefore, a thunderstorm is a storm with lightning and thunder, formed when moist warm air rises, cools into clouds and strong up-and-down winds produce charges in the clouds.

NCERT ARCHIVE

QUESTION 12

Explain the process that causes lightning.

ANSWER

Lightning is a bright flash of light produced by a sudden flow of electric charges.

a Process

- Strong winds blowing upwards and downwards cause rubbing between water droplets and ice particles, and static electric charges develop in the clouds.
- The lighter, positively charged ice particles move up to the upper part of the cloud, and the heavier, negatively charged water droplets occupy the lower part: this is charge separation.
- The negatively charged lower part of the cloud makes the ground and nearby objects like trees and buildings positively charged.
- Air is normally an insulator and does not let the opposite charges meet. When the build-up of charges becomes very large, the insulating property of air breaks down and a sudden flow of charges takes place, producing a bright flash called lightning.



Fig. 6.16: Lightning

Lightning heats the air rapidly, and the air expands and produces the loud sound known as thunder. It can occur within a cloud, between clouds, or between a cloud and the ground.

Therefore, lightning is caused by the sudden flow of charges when a very large charge build-up breaks down the insulating property of air.

NCERT ARCHIVE

QUESTION 13

Explain why holes are made in banners and hoardings.

ANSWER

A large flat banner or hoarding stands in the path of strong winds.

- High-speed wind blowing over a banner creates a low pressure area in front of it, as high-speed winds are accompanied by reduced pressure, so the pressure difference between its two sides can become large and blow it away.
- With holes in the banner, the wind can pass through, and this reduces the pressure difference between the two sides of the banner.
- This is similar to keeping the doors and windows open during a storm so that the roof is not blown off.

Therefore, holes are made in banners and hoardings to reduce the pressure difference caused by strong winds, so that they are not blown away.

NCERT ARCHIVE

6.3

CLASS 8 SCIENCE · CHAPTER 6

Discover, design, and debate

Solutions · 3 questions

Directions (Questions 1–3): These are the project-type questions of Discover, design, and debate (page 97). Model answers and formats are given; fill in your own observations and data where an activity or a survey is involved.

QUESTION 1 *Discover, design, and debate · p. 97*

Hold a strip of paper, 18 cm long and 2 cm wide, between your thumb and forefinger so that it hangs freely. Predict what you will observe if you blow over the paper. Perform the activity now. Note down your observations and interpret your results.

ANSWER

This is a hands-on activity; a model record is given.

a Prediction, observation and interpretation

- Prediction: when we blow over the strip, it moves upwards.
- Observation: the strip rises and flutters upwards (it does not move down).
- Interpretation: blowing makes the air above the strip move fast, and high-speed air has a reduced pressure. The pressure above the strip becomes less than the pressure below it, so the higher pressure of the still air below pushes the strip up. This is like the balloons coming together in Activity 6.6.

Therefore, the strip rises, because high-speed air above it lowers the pressure there.

NCERT ARCHIVE

QUESTION 2 *Discover, design, and debate · p. 97*

List three major cyclones which have occured in India in the last 20 years. List two major destruction caused by each of the cyclones. What measures were taken by the local government and communities to reduce the loss of life and destruction of property? Mention two suggestions you would like to propose to the local government.

ANSWER

This is a research question. A model answer is given from commonly reported facts (the chapter gives the peak wind speed of Amphan in 2020 as 270 km/h); check the details from newspaper or IMD reports.

Cyclone	Two major destructions
Phailin (2013, Odisha and Andhra Pradesh coast)	Damage to houses and crops; power and communication lines disrupted
Amphan (2020, West Bengal and Odisha)	Coastal flooding by the surge of seawater; thousands of trees and houses damaged, with power cuts for days
Fani (2019, Odisha)	Large damage to houses and standing crops; uprooted trees and broken power lines

a Measures taken

- Warnings and alerts from the India Meteorological Department (IMD), which tracks cyclones and predicts their path with weather monitoring satellites.
- Moving people from coastal areas to designated cyclone shelters, and keeping emergency kits ready.

b Two suggestions to the local government

- Build and maintain more cyclone shelters and keep the roads clear so that help reaches the affected areas quickly.
- Conduct regular awareness programmes and drills for the communities on alerts and safety, and protect the electric supply and drinking water sources from damage by seawater.

Therefore, early warning, evacuation to shelters and community preparedness reduce the loss of life and property in cyclones.

NCERT ARCHIVE

QUESTION 3 *Discover, design, and debate · p. 97*

Collect data on the strength of thunderstorms for various regions of India. Compare your findings and identify which regions are more prone to thunderstorms. Can you give reasons for your findings?

ANSWER

This is a data-collection project. Use the weather reports of the IMD or newspapers, and organise the data as shown.

Step	What to do
Collect	Number of thunderstorm days and their strength for each region over some years
Compare	Draw a table or bar graph for the regions
Identify	The regions having the most thunderstorms

a Reasoning

- The requirements for thunderstorms are moisture and strong winds, and storms are more frequent in hot, humid and tropical regions like India.
- So the regions with warm, moist air and strong heating of the land, such as the regions near the sea, are expected to be more prone. Local thunderstorms are known in several regions: Kalboishakhi in West Bengal, Bihar and Jharkhand, Bordoisila in Assam, and mango showers in Kerala, Karnataka and Tamil Nadu.

Therefore, the regions which have warm moist air and strong winds are more prone to thunderstorms, and your own data will show which these are.

NCERT ARCHIVE