



Master Lesson Plan

For

Air Around us

Board	Standard	Subject	Chapter	Language	Reference Link	Creation
CBSE	STD VI	Science	Air Around us	English	Air Around us	2020-10

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Air Around us

1. MS_Objectives_Air around us

Notes to the teacher: This asset lays down the proposed plan for transacting this chapter. It states the asset objectives of the MLP. This asset is for teacher's reference and need not be taught to the students:

Students will be able to...

- show air has weight
- explain about air
- demonstrate the effect of temperature on solubility of gases
- relate to the uses of air in daily life
- discover more on water vapour and condensation
- identify the presence of oxygen in soil and water
- explain about the layers of atmosphere
- imbibe the value of preserving nature.
- understand the importance of preserving nature
- imagine the formation of atmosphere
- answer the questions on gases
- assess themselves on the topic 'Air around us'.

Time to teach	Asset Type	Theme	SubTheme
2 Minutes	Main Script	Air around us	Components of air, Components of air

2. SA_Air has weight

[Note to the teacher: To make the students think and analyse, it is better not to reveal the AIM of the experiment prior to the demonstration]

Aim: To show air has weight.

Materials required:

- 1.5 litres empty plastic bottle.
- Cycle pump
- Cycle valve Pan
- balance



Class setting: Demonstration/ Whole class

Procedure:

- Take a 1.5-litre empty plastic bottle. Weigh the empty bottle on the pan balance. Note it down.
- Fit a nozzle to the cap and secure the cap to the bottle.
- Ensure that there is no leakage (airtight).
- Then fill air in this bottle with a cycle pump. Pump hard and fill as much air as you can. The bottle will become hard and taut.
- Reweigh the air-filled bottle on the pan balance.
- The difference before and after will be the weight of the air.



Observation: We observe that there is a difference in the weight of the empty and filled bottle.

Inference: This activity demonstrates that air has weight.

Discussion Questions- [Teachers must bring out the aim of the experiment from the students and not inform the AIM prior to the experiment]

Q.1- Why are we weighing the bottle before and after the experiment?

Ans. The difference in the weights will show that Air has weight.

Q.2 Can you think of any other object that can be used in the place of a bottle?

Answer: A deflated football and an inflated football can give the difference in weight.

Image source: <https://www.youtube.com/watch?v=8PMUjcgVMeo> (Attribution – Arvind Gupta)

[THE VIDEO HAS TWO EXPERIMENTS ON 'AIR HAS WEIGHT'. THE SECOND ONE IS WITH EASILY AVAILABLE MATERIALS]

Time to teach	Asset Type	Theme	SubTheme
20 Minutes	Suggested Activity	Air around us	Composition of air, Composition of air,

3. MS_Air- All I need

Properties of air

- Air is transparent. Air is a transparent medium which allows light to pass through it.

The objects are seen clearly through air.

- Air is colourless. It is not visible.

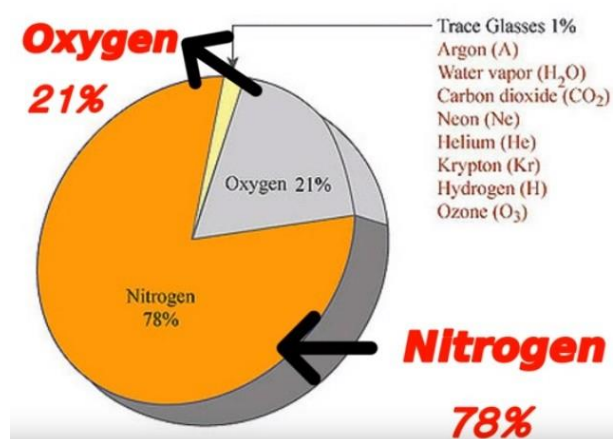
- Air can be felt when it moves fast. Moving air is called as wind.

- Air occupies space. Air is present everywhere. Air can be displaced by water.

- Air exerts pressure.

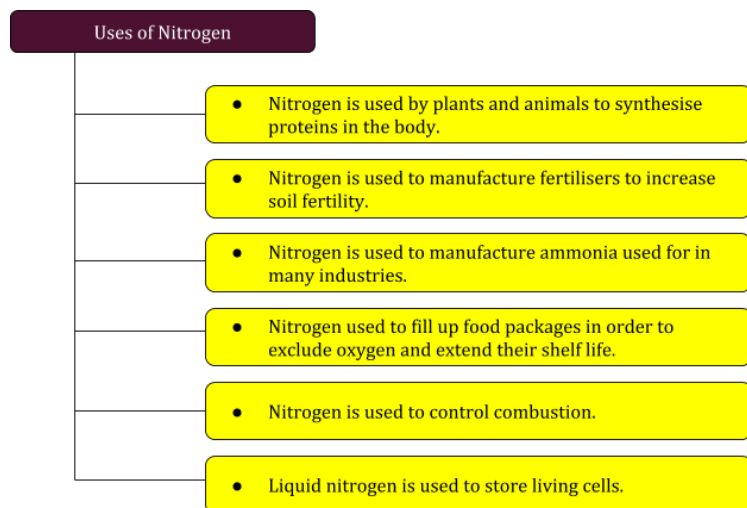
- Air can be compressed and filled into a container.

Composition of air



Air is a mixture of gases, including nitrogen, oxygen, carbon dioxide, water vapour and some other gases present in air. Nitrogen occupies 78% of the air. Oxygen occupies 21% of the air. 1% of the air is made up of carbon dioxide, other gases, water vapour, dust particles etc.

Nitrogen: It is a colourless, odourless gas. It generally occurs in its diatomic form N_2 . There is no simple test for nitrogen.



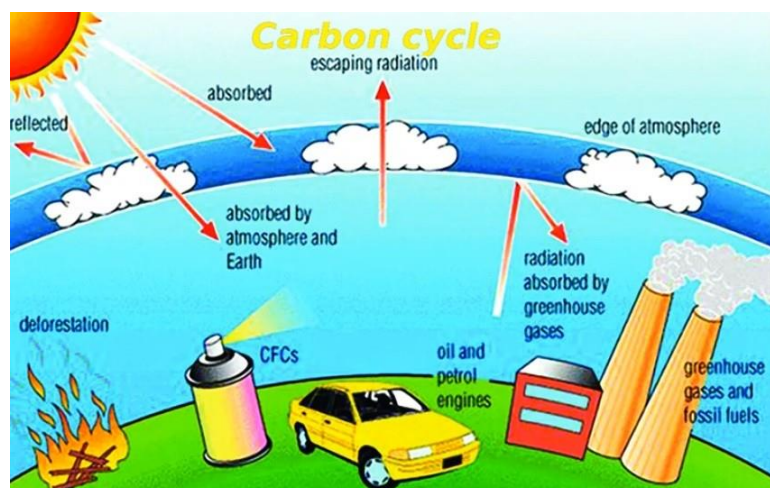
Oxygen:

It is a chemical element in the form of gas. Mostly it is diatomic, made up of two atoms. O_2 is the molecular oxygen, while O_3 is called ozone.

Uses of Oxygen:

- Oxygen is taken directly from the air by living organisms that live on land.
- Oxygen oxidises the food eaten by organisms to release energy.
- Aquatic organisms such as fishes, take in oxygen dissolved in water.
- Oxygen is required for burning.
- Oxygen in the form of ozone helps in protection of living organisms from dangerous UV rays coming out from the sun.
- Oxygen is used as a fuel in rockets.
- Oxygen stored in the cylinders is used to provide artificial respiration to patients in the hospital.

Carbon dioxide: It is the gas which is made up of one carbon atom combining with two atoms of oxygen.



- CO₂ is used by plants in synthesising their food by the process of photosynthesis.
- CO₂ is used in fire extinguishers.
- CO₂ is used in making aerated soft drinks.

Inert gases: These are also called as noble gases. They occupy a negligible percentage in air.

- Argon is used to fill the bulbs to prevent the filament from burning out.
- Liquid helium is used to provide low temperatures.
- Neon is used to fill special bulbs called as neon signs.
- Radon is used in treating cancer patients.

Water vapour: It is a form of water present as gas in the air.



- Amount of water vapour in the air varies with the availability of water in the region and the temperature in that area.

- Higher temperature would evaporate more amount of water and convert it into water vapour.
- It condenses in the upper layer of atmosphere to form the clouds which later can come down as rain.

Dust and smoke:



Air contains some amount of dust and smoke in it.

- Dust and smoke are contributed by vehicles and industries releasing them. These are
- harmful to human beings and can cause many respiratory diseases.

Image source:

Composition of air, Carbon dioxide, Dust and Smoke: Image source: https://www.youtube.com/watch?v=YauPG7JW_V4(Attribution - Krishna RaoDoddapaneni)

Water Vapour: <https://www.maxpixel.net/Water-Water-Vapor-Fitting-Drop-Of-Water-Drip-Steam-2930485>

Time to teach	Asset Type	Theme	SubTheme
15 Minutes	Main Script	Air around us	Components of air, Components of air

4. SA_Gases dissolve in water!

ACTIVITY I.

Aim : To show how temperature affects the solubility of gases in water.

Materials required:

- Carbonated water in 2 clear plastic cups
- Hot water (about 50 °C)
- Cold water (about 5 °C)
- 2 plastic containers (that cups easily fit in)

Procedure

1. Fill one empty plastic container about $\frac{1}{3}$ of the way with ice cold water and another about $\frac{1}{3}$ of the way with hot tap water.
2. Pour carbonated water in two cups.
3. Place each of the cups of carbonated water into the cold and hot water.

Observation: More bubbles will form and rise to the surface in the soda placed in hot water.

Inference: This activity will help the students to understand that the solubility of the gases in water depends on the temperature.

Questions to ponder over:**1. What is Carbonated water?**

Suggested Answer: Carbon-dioxide dissolved water is Carbonated Water. It is also known as Soda water.

2. Does carbon dioxide stay dissolved better in hot water or in cold water?

Suggested Answer: Carbon dioxide stays dissolved better in cold water.

3. What happens to the Carbonated water kept in hot water?

Suggested Answer: More gas escapes from the soda placed in hot water.

4. Based on what you observed in this experiment, why do you think people store soda pop that has been opened in the refrigerator?

Suggested Answer: Since less carbon dioxide escapes when soda is colder, keeping soda in the refrigerator prevents the soda from going flat.

Alternate activity with similar principle

Aim: To investigate the solubility of gases in liquid.

Materials required:

- Dark coloured soda - 3
- One holed stopper test tubes - 3
- Beakers - 3
- Ice cold water
- Hot water
- Room temperature water

Procedure:

1. Fill the three beakers with water, having different temperatures (ice cold water - normal water - hot water)
2. Fill the test tubes with water, without spilling.
3. Close the mouth of the test tube with stopper.
4. Place the finger over the stopper and invert the test tube beneath the surface of the water in the beaker all the way to the bottom of the beaker.

5. Leave all the beakers, untouched for 5 minutes. Observe the top of the inverted test tubes.

Observations: We observe the soda in the beaker containing hot water, escaping out of the test tube faster. The level inside the test tube moves lower and lower.

Conclusion: From this activity it is clear that the cold water can hold more oxygen than warm water.

- Safety: Be sure you and the students wear properly fitting goggles.
- Use caution when handling hot water

Time to teach	Asset Type	Theme	SubTheme
20 Minutes	Suggested Activity	Air around us	

5. DD_Uses of Air

Air is used to rotate wind mills, which can lift water, generate electricity and other uses.



- Wind energy is a renewable form of energy.
- Air is also used to rotate windmills which can generate electrical energy by aero generators.

Air is used in sail boats.



Air is used to fly 'hot air balloons'.



Air is used in floats that help a person to swim or stay afloat in water.



Compressed air is in the tyres of cars, bicycles, and planes used in flight mode.



Air is used for burning



Fruits and vegetables will change rust coloured or brown due to the moisture and oxygen in the air.



Bread and cakes are filled with air holes. Due to these holes, they are light and fluffy.



Image source:

Wind Energy: <https://pixabay.com/photos/windmills-electricity-farm-3933313/>

Sail boat: <https://pixabay.com/photos/sail-boat-boat-sailing-sail-91943/>

Hot air balloon: <https://pixabay.com/photos/hot-air-balloon-balloon-colorful-4761/>

Swim: <https://www.pexels.com/photo/child-swim-swimming-pool-water-261216/>

Tires: <https://www.maxpixel.net/Tire-Service-Auto-Mature-Winter-Tires-Tyres-2861853>

Fire Burning: <https://www.maxpixel.net/Heat-Fire-Campfire-Burning-Hot-Bonfire-Burn-3473024>

Apple and Pears: <https://pixabay.com/photos/apple-pears-fruit-fruit-slices-2740821/>

Bread and cakes: <http://www.freestockphotos.biz/stockphoto/17053>

Time to teach	Asset Type	Theme	SubTheme
4 Minutes	Day-to-day Relevance	Air around us	Components of air,

6. IQ_ Water vapour and condensation

[Notes to the teacher - Teacher may enable the students to think and come out with as many answers as possible before giving out the right answer/ answers]

1. During early winter mornings we can see water droplets on glass windows. Can you tell, how do these droplets of water appear?

Answer: During winter season all the objects become cold due to low temperature. When air comes in contact with the cold glass, the water vapour in the air condenses to form water droplets.



<https://pixabay.com/photos/rain-drops-rainy-wet-droplets-455120/>

2.How will a dew form?

Answer: Dew is formed by a process called as condensation. Air contains water in the form of water vapour. When the temperature drops down, the warm moist air passes over the cool surface and gets cooled. The cold air condense to form small drops and hold on to the cool surface.

3.Can you think and tell why dew drops are formed more in humid weather conditions than in cold conditions?

Answer. Warm, humid air has lots of moisture. It condenses during cool nights, so dew is formed more in humid weather conditions.

Time to teach	Asset Type	Theme	SubTheme
6 Minutes	Inquisitive Questions	Air around us	Components of air, Components of air

7. MS_Oxygen in soil and water

Air in soil

Let's take some soil and add water to it. We observe bubbles coming from it. Have you ever wondered why bubbles come out?

It is because soil has air in it.



Plants roots and all the organisms that live in the soil make use of this air to breathe. They respire the oxygen present in the soil. They do not have to come to the surface to breathe. They give out carbon dioxide. The carbon dioxide finally escapes into the atmosphere.

Burrowing animals such as rats, rabbits, helps air to move easily in the soil.

Turning the soil over or stirring the soil helps in the circulation of Oxygen. Plants grow well in a well aerated soil.

Have you ever wondered what happens when water enters soil?

When we water our garden, we see a few worms coming to the surface of the soil. This is because, as soon as water enters the soil, it takes the space of the air present in the soil. So the organisms that live in the soil come out to breathe.



Air for organisms that live underwater

- We all know that there are many organisms that live underwater.
- These creatures breathe in the oxygen that is dissolved in water.
- Many aquatic organisms such as fish, use gills to absorb oxygen from water.

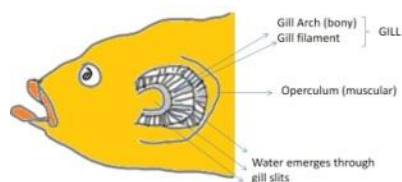


Image source:

Soil – SSSVV Gallery
 Watering – SSSVV Gallery
 Gills – SSSVV Gallery
 Plant roots – SSSVV Gallery

Time to teach	Asset Type	Theme	SubTheme
7 Minutes	Main Script	Air around us	Oxygen for terrestrial, aquatic animals, Oxygen for terrestrial and animals

8. VC_Preservation of Resources

Learning Domain- Classroom

Teacher: Children, which is the most essential component of nature without which we cannot survive at all? Students: Is it water?

Teacher: No, because, without water we can still survive for a few days.

Students: Is it food?

Teacher: No, we can survive without food for many more days than we can survive without water.

Students: Is it air?

Teacher: Yes, you are correct, children.

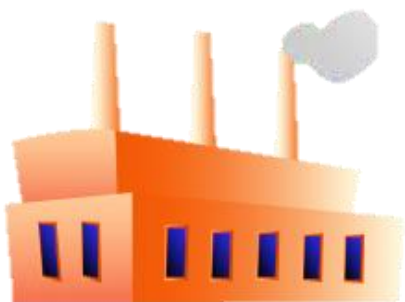
Since we all now know that air is one of the most basic needs of human life, we need to conserve and preserve the environment and in turn the quality of air around us.

Group Activity

Procedure:

1. Form four groups.
2. Select a Group Leader.
3. Distribute a picture to each of the group.
4. Each group will :-
 - Identify from the pictures given to them, how air is being polluted
 - Discuss the ill effects of pollution
 - Suggest methods to prevent it

1. After discussion, each group leader will summarise and present the answers
2. At the end, the teacher will summarise and list solutions to reduce the pollution of the environment.



1. Industrial pollution



2. Vehicular pollution



3. Discharge of wastes in water



4. Burning of wastes



4 . Less Rainfall



5. Garbage dump

Notes to the teacher

(industrial waste and vehicle pollution)

Cause

1. Smoke from the factories and motor vehicles cause high levels of air pollution
2. When industrial waste is discharged into water bodies without being treated, it affects the flora and fauna of the water
3. The marine plants produce nearly eighty percentage of the oxygen in the atmosphere.

Effects

1. Acid rains
2. Ill effects on the general health of the people

Prevention

Proper management of industrial waste

Minimise vehicles on the road by promoting vehicle pooling and usage of public transport and other alternate methods-E.g. - cycle, and electric cars.

Cause -Burning of leaves, plastic and other harmful materials

Effect- Increased carbon emissions

Prevention - Segregate them as bio degradable and non-degradable

3. Less rainfall

Cause - Felling of trees

Effects - increased global warming and thus affecting the ozone layer

Prevention - Protecting the trees and planting new ones

4. Landfill [garbage dumping ground]

Cause -Land fill

Effects - emissions of toxic gases which is a health hazard

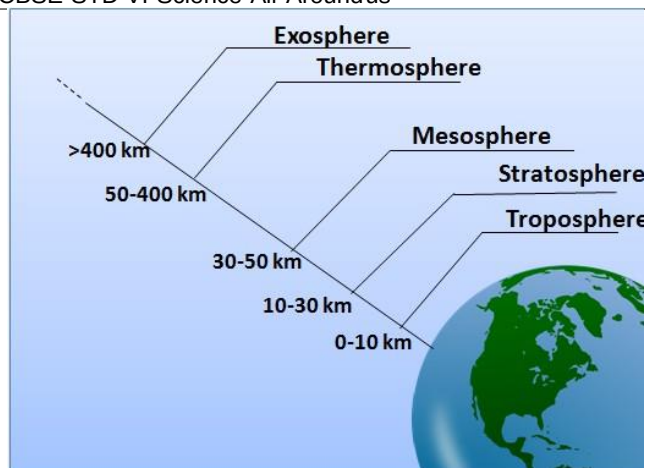
Prevention -Reduce Reuse Recycle.

Image source

<https://pixabay.com/vectors/factory-building-smoke-industry-48781/>
<https://pixabay.com/illustrations/pollution-trash-degradation-1603644/>
<https://pixabay.com/photos/desert-drought-dehydrated-arid-279862/>
<https://pixabay.com/vectors/barrel-dipper-dump-dumper-ecology-158714/>
<https://pixabay.com/vectors/car-red-air-pollution-160622/>
<https://pixabay.com/vectors/match-burning-fire-lit-flame-159212/>
<https://pixabay.com/illustrations/dried-leaf-plant-natural-leaves-774823/>

Time to teach	Value Type	Value Sub Type	Value Attribute
10 Minutes	Right Action		Group Activities

9. MS_Layers of atmosphere



The atmosphere is divided into five layers based on the variations in temperature and composition in different regions at different altitudes, from the surface of the earth.

1. Troposphere:

- The layer of atmosphere which is in contact with the earth's surface is called as the troposphere.
- The troposphere extends from 6 to 20 kms above the earth's surface.
- We can find clouds and weather in the troposphere.
- In this layer, the atmospheric pressure and the temperature decrease with altitude (height).

2. Stratosphere:

- The layer of atmosphere above the troposphere is called the stratosphere.
- This layer extends up to 50 kms from the surface of the earth.
- In this region of the atmosphere is the ozone layer, which absorbs most of the harmful ultraviolet radiations from the sun.
- The temperature increases slightly with altitude in the stratosphere.

3. Mesosphere:

- The layer that is present above the stratosphere is the mesosphere.
- It lies between 50 kms to 80 kms above the surface of the earth.
- In this layer, the range of temperature is lower than that of the layers below it.

4. Thermosphere:

- The layer above the mesosphere is thermosphere.
- It starts at about 55 kilometres.
- The temperature is quite hot in this layer.
- All the high energy ultraviolet and x-ray radiations that come from the sun are absorbed by the molecules in this layer as a result the temperature in this layer is hot.
- This layer is also called as the ionosphere because the air is ionised(converted into ions) by the sun's ultraviolet light. These ionised layers cause disturbance in the transmission and reflection of radio waves.

5. Exosphere:

- This is the outermost layer of the atmosphere.
- It extends from the top of the thermosphere to 10,000 km above the earth.
- In this layer, atoms and molecules escape into space.
- The satellites orbit the earth in this layer.

Note to the teacher:**Please play the video:**

<https://www.youtube.com/watch?v=WcE36Ha3PtQ>

The video is 4 minutes 34 seconds and it is attached. Teacher may play till 2 minutes 02 seconds.

Category: Education

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Image source: <https://pixabay.com/vectors/earth-globe-planet-world-147591/>

Time to teach	Asset Type	Theme	SubTheme
8 Minutes	Main Script	Air around us	Replacement of oxygen in t Replacement of oxygen in t

10. IA_ Formation of the Atmosphere of the Earth

We know that all the other planets and moons have atmosphere, but none of them can support life like our atmosphere i.e. atmosphere of the earth.

So how did our atmosphere get to be so special? And how did it form?

Scientists assumed the evolution of atmosphere might have taken place in 3 stages.

The first atmosphere of the earth might have contained hydrogen and helium only. This made the atmosphere of the earth very hot. As the temperature was hot, the molecules of both hydrogen and helium must have moved very fast against the gravity and went into space.

The Second atmosphere must have formed in the earth only. Earth had lots of volcanoes that released carbon dioxide. When carbon dioxide must have dissolved in water, it must have led to the development of simple bacteria. Bacteria must have survived with the help of energy from the sun and carbon dioxide in the water and released oxygen as a waste product.

Thus, oxygen must have begun to build up in the atmosphere and the level of carbon dioxide levels dropped. At the same time, sunlight must have broken down ammonia molecules in the atmosphere, leaving nitrogen and hydrogen. As hydrogen is very light, it must have raised to the top of the atmosphere and eventually drifted off into space.

In this way the third atmosphere of the earth, in which we all live must have been formed. It contains enough oxygen for animals and humans, to breathe.

So plants take in carbon dioxide and give off oxygen during Photosynthesis, both plants and animals take in oxygen and give off carbon-dioxide. Thus the atmosphere upon which life depends was created by life itself.

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Interesting Asides	Air around us	Replacement of oxygen in the atmosphere Replacement of oxygen in the atmosphere

11. IQ Gas Exchange

1. How is oxygen available in nature?

Suggested Answer: It is available as free oxygen. (molecular)

2. What about the oxygen present in water?

Suggested Answer: It is dissolved oxygen.

3. Have you ever wondered how do the animals that live under water and soil take in oxygen?

Suggested Answer: The organisms that live in the soil make burrows and holes inside the soil. These holes make space for the air to move in and out of the soil. The organisms that live in water absorb the dissolved oxygen present in water.

4. How is the oxygen and carbon dioxide in the atmosphere replaced?

Suggested Answer: Oxygen and carbon dioxide levels in the air are maintained by different processes like respiration and photosynthesis.

- Respiration involves utilisation of oxygen from air by living organisms and releasing carbon dioxide into air. It occurs in all living organisms.
- Photosynthesis involves utilisation of carbon dioxide from air and release of oxygen into the air.
- Carbon dioxide is replenished by the process of respiration and oxygen is replenished by the process of photosynthesis.

Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Inquisitive Questions	Air around us	Replacement of oxygen Replacement of oxygen

12. QA_Air Around Us - My Understanding

I. Give one word

1. Water vapour present in air.
2. The gas that is used for combustion.
3. A process of preparation of food by plants.
4. A component of air that turns lime water milky.
5. A gas that absorbs UV rays coming from sun.

Suggested Answers:

1. Humidity 2. Oxygen 3. Photosynthesis 4. Carbon dioxide 5. Ozone gas

II. Correct the statement:

- 1) Air is a mixture of many stones.

Suggested Answer: Air is a mixture of gases.

- 2) Burning can occur only in the presence of carbon.

Suggested Answer: Burning can occur only in the presence of oxygen.

- 3) The major part of air is hydrogen.

Suggested Answer: The major part of air is nitrogen.

- 4) The envelope of the air which surrounds our earth is called hemisphere.

Suggested Answer: The envelope of the air which surrounds our earth is called atmosphere.

- 5) Fast moving air is breeze.

Suggested Answer: Fast moving air is wind.

- 6) Nitrogen present in air is useful for making grains.

Suggested Answer: Nitrogen present in air is useful for storing grains.

- 7) Carbon occupies around 78% of air.

Suggested Answer: Nitrogen occupies around 78% of air.

III. Fill in the blanks:

1. Gas is produced on burning of fossil fuels.
2. _____ makes the windmill to rotate.
3. A weathercock shows the _____ in which the wind is blowing.
4. Mountaineers carry oxygen _____ with them while climbing mountains.
5. The nose and mouth of traffic police is covered with _____.
6. The presence of air around can be proved by _____.
7. _____ gas commonly is used for welding.
8. The active part of air is _____.

Suggested Answer:

1. Carbon Dioxide 2. Wind 3. Direction 4. Cylinder 5. Mask 6. Feeling when it moves 7. Carbon dioxide
8. Nitrogen

IV. Match the following:

A	B
Dissolved oxygen	Electric bulb
Air cannot be seen	Ammonia
argon	Aquatic organisms
Oxygen is required for	Transparent
Nitrogen is used to prepare	combustion

Suggested Answer:

A	B
Dissolved oxygen	Aquatic organisms
Air cannot be seen	Transparent
argon	Electric bulb
Oxygen is required for	Combustion
Nitrogen is used to prepare	Ammonia

I. State True or False Give reason if it is false

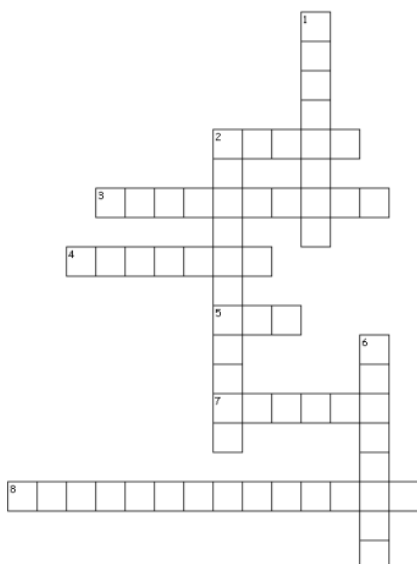
- (a) Carbon dioxide supports burning of a candle
(b) Dust particles are not present in air
(c) Water vapour present in air supports the water cycle
(d) Birds fly because of the air
(e) Plants absorb carbon dioxide to prepare the food
(f) Air is primarily made of hydrogen and helium

Suggested Answer:

- a. False-Oxygen supports the burning of a candle.
- b. False- Dust particles are always present in air.
- c. True
- d. True
- e. True
- f. Air is primarily made of 78% Nitrogen and 21% Oxygen. Rest of the air is made of other gases.

V. Solve the crossword

Solve the below crossword

**Suggested Answer:****Across**

2. gas used for treating cancer patient
3. The blanket of gases that surrounds the earth
4. These animals use air dissolved in water for respiration
5. colourless and odourless
7. It helps in combustion
8. This process involves utilisation of carbon dioxide from air and release of oxygen into the air.

Down

1. The major part in air
2. Air is used by animals for this process
6. The device used to convert wind energy into electrical energy

Suggested Answer:

1. Nitrogen
2. Radon, respiration
3. Atmosphere
4. Aquatic
5. Air
6. Windmill
7. Oxygen
8. Photosynthesis

VI. Answer the following questions:

1. What are the uses of air?

Suggested Answer:

- To fly To
- sail To
- burn

2. Why do we feel suffocated in a closed room?

Suggested Answer:

We feel suffocated in a closed room because there is no ventilation and the concentration of oxygen decreases and concentration of carbon dioxide increases.

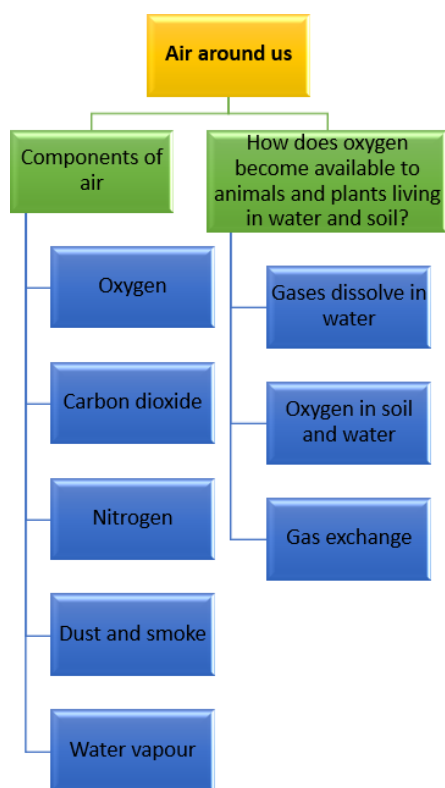
3. What is the use of hair inside our nostrils?

Suggested Answer:

Filters the dust particles.

Time to teach	Asset Type	Theme	SubTheme
20 Minutes	Assessments	Air around us	Components of air

13. MS_Summary_Air around us



Time to teach	Asset Type	Theme	SubTheme
5 Minutes	Main Script	Air around us	Components of air, Compon