

## SCIENCE (086): CLASS IX

## THEME—I CLEAN AIR- A SHARED CONCERN

Answer the following		Each question carries one mark
1	Name the conditions of the atmosphere that provides excellent conditions to support and sustain life.	
A	The atmosphere comprising of mainly Nitrogen, Oxygen, Carbon dioxide and water vapour provides excellent conditions to support and sustain life.	
2	What are pollutants?	
A	The undesired components which contaminate air are called pollutants.	
3	Name the gas that is necessary for the survival of life on earth.	
A	Carbon dioxide is necessary for the survival of life on earth.	
4	Name the phenomenon that is essential to maintain and keep the earth's atmosphere warm.	
A	Photosynthesis	
5	What is the cause for the depletion of ozone layer?	
A	The use of refrigerators and air conditioners, fire extinguishers, aerosol sprays like deodorants etc. results in release of CFCs and N <sub>2</sub> O in the atmosphere which is responsible for depletion of ozone layer	
6	Give the consequences of depletion of ozone layer	
A	UV radiations enter into the atmosphere causing damage to all kinds of life on earth.	
7	What is NAMP?	
A	NAMP stands for National Air Quality Monitoring Programmer.	
8	What is the significance of PM <sub>10</sub> ?	
A	PM <sub>10</sub> is the term used to describe tiny particles in the air, made up of a complex mixture of soot, organic and inorganic materials having particle size less than or equal to 10 microns diameter(10 microns is equal to one hundredth part of a millimeter)	
9	What do PTI and IST stand for?	
A	Press Trust of India, and Indian Standard Time	
10	What is the place of Air pollution in taking lives of people in India?	
A	Air pollution is the fifth largest killer in India taking 6.2 lakh lives per year.	

Answer the following      Each question carries 2 marks	
1	Name the five most critically polluted regions in the country.
A	Delhi, Ghaziabad, Gwalior, West Singhbhum district in Jharkhand and Raipur are the five most critically polluted regions in the country.
2	How acid rain is is formed?
A	The oxides of sulphur, carbon, and nitrogen released into the atmosphere from chimneys of Industries and exhaust of vehicles react with water of the rains and oxygen from air to form acids. Dissolved acids make the rain acidic in nature.
3	What is the affect of acid rains on the environment?
A	Acid rains are very harmful for both, living and nonliving things. Acid rains damage crops, pollute soil and water, ruin the harvest, damage aquatic life and erode buildings.
4	Name the undesirable components which contaminate and cause air pollution
A	The harmful Ozone in the lower atmosphere, Carbon monoxide, Nitrogen dioxide, Solid or liquid matter that is suspended in the air, Sulfur dioxide, Lead, Arsenic, asbestos, benzene and dioxin, Green House gasses Carbon dioxide methane and nitrous oxide are the components which cause air pollution.
5	What is the effect of carbon monoxide on the life on earth?
A	<ul style="list-style-type: none"> <li>• It makes the body parts hard to get the necessary oxygen</li> <li>• More exposure makes people feel dizzy and tired</li> <li>• High concentrations is fatal</li> </ul> <p>People suffering from heart disease are hospitalized more often.</p>

6	What is the importance of Earth Day? When is it celebrated
A	To give awareness to the people towards keeping the planet Earth non polluted, Earth Day is celebrated on April 22 every year.
7	What is Global warming?
A	Increase in the levels of CO <sub>2</sub> due to excessive burning of fossil fuels and other carbon containing fuels which results in excessive heating of the earth's surface is called Global Warming.
8	What are the greenhouse gases present in the earth's atmosphere in their order of abundance in the atmosphere
A	Water vapour, Carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons.
9	What made the Governments of different nations take up the problem of air pollution to a central stage?
A	Smog which surrounded the city of London in the year 1952 resulted in the loss of about 4000 human lives and many others suffering from serious breathing problems . This made Governments of different nations to take-up the problem of air pollution to a central stage.
10	Visibility is very low during winters. Why?
A	Smog is a mixture of smoke dust particles and fog. The smoke emitted from the exhaust of the vehicles settles over fog in winter and reduces the visibility
11	What is the effect of Air toxics on the Human beings?
A	Air toxics can impair lung function and neurodevelopment, or aggravate existing conditions, such as asthma. Infants who were born premature or growth-retarded may be particularly vulnerable to additional environmental affects..
12	From picture no. 5 name the diseases affecting children of 0 to 5 years.
A	Diseases affecting children in the age from 0 to 5 years are High respiratory rate, Respiratory death cough bronchitis wheeze and ear infections
13	From picture no 5 name the diseases affecting children of 6 to 12 years.
A	Chronic cough and bronchitis, Reduced lung function, wheezing and asthma attacks,.

14	From the bar graph find out in which city there are more number of ill health children and less number of ill health children and give your conclusions.
A	In Nagpur there are more number of unhealthy children because Nagpur is more polluted and in, Hyderabad there are less number of unhealthy children because Hyderabad is comparatively less polluted. There are more number of unhealthy children in Nagpur than the other cities. The city does not have large industries and hence the high SPM levels are mainly due to demolition of buildings, construction activity, and excavation of roads
15	What is PM10? Give the unit of measurement of PM10?
A	PM10 is particulate matter. The unit of measurement of PM10 is microgram per cubic metre or $\mu\text{gm}/\text{m}^3$
16	From the table showing the Ambient Air quality factor of different cities, find the cities which are high in pollution and why?
A	From the table Gwalior and Raipur are the cities which are more polluted because in those places PM 10 311 and 310 which is 1.5 times more than the National standards.
17	What are the national standards of Ambient Air Quality for Residential, Industrial, and other areas?
	National Ambient Air Quality standard for Residential Rural and other areas(Annual average) for $\text{SO}_2$ = 50 microgram per cubic metre , $\text{NO}_2$ = $\mu\text{gm}/\text{m}^3$ PM 10=60 $\mu\text{gm}/\text{m}^3$
18	State two uses of Carbon dioxide.
	Carbon dioxide is an essential raw material for <ul style="list-style-type: none"> <li>i. Photosynthesis</li> <li>ii. Green house effect</li> </ul>

Answer the following      Each question carries 3 marks	
1	Give the effect of Ozone on life on earth
A	Ozone can lead to more frequent asthma attacks in people who have asthma and can cause sore throats, coughs, and breathing difficulty. It may even lead to premature death. It can also hurt plants and crops.
2	What is the effect of Air Pollution on Taj Mahal? Give reasons for the same.
A	Taj Mahal is turning yellow because of air pollution. Glass factories, rubber industries, Mathura Oil refinery and other industries of the neighbouring towns which burn fossil fuels are responsible for this. These industries release soot particles and gases into the atmosphere. The soot particles turn the colour of the marble to yellow and gases react with water to form acid rain which corrodes the marble of the monument
3	What are the steps taken by the Govt to protect the Taj Mahal?
A	<p>Steps taken by the Government in protecting the monument are</p> <ul style="list-style-type: none"> <li>○ Government has put a ban on driving near the Taj Mahal.</li> <li>○ All cars and buses are parked roughly 1km away.</li> <li>○ Battery run buses or horse-drawn carriages have been set up for visitors to reach the monument.</li> <li>○ Industries in neighbouring towns are being persuaded to use cleaner fuels like CNG and LPG instead of coke in their furnaces.</li> </ul>
4	What is marble cancer?
A	Taj Mahal is turning yellow because of air pollution. Glass factories, rubber industries, Mathura Oil refinery and other industries of the neighbouring towns which burn fossil fuels are responsible for this. These industries release soot particles and gases into the atmosphere. The soot particles turn the colour of the marble to yellow and gases react with water to form acid rain which corrodes the marble of the monument.

	This phenomenon is called 'Marble Cancer'.
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5	Match the following																
A	<table> <tr> <th>GROUP-A</th><th>GROUP-B</th></tr> <tr> <td>a. April 22</td><td>1. Tiny particles in the atmosphere</td></tr> <tr> <td>b. Greenhouse gas</td><td>2. Chlorofluorocarbons</td></tr> <tr> <td>c. Refrigeration</td><td>3. pollution free place</td></tr> <tr> <td>d. Malappuram</td><td>4. Highly polluted city</td></tr> <tr> <td>e. Gwalior</td><td>5. Continuous Development</td></tr> <tr> <td>f. PM 10</td><td>6. carbon dioxide</td></tr> <tr> <td></td><td>7. Earth Day</td></tr> </table>	GROUP-A	GROUP-B	a. April 22	1. Tiny particles in the atmosphere	b. Greenhouse gas	2. Chlorofluorocarbons	c. Refrigeration	3. pollution free place	d. Malappuram	4. Highly polluted city	e. Gwalior	5. Continuous Development	f. PM 10	6. carbon dioxide		7. Earth Day
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6	State whether the following statements re TRUE or FALSE.																
	<ul style="list-style-type: none"> <li>a. TajMahal is suffering from Marble Cancer.</li> <li>b. Air Toxics can affect lung function and neuro development.</li> <li>c. Greenhouse gases Keep the room cool</li> <li>d. Refrigeration causes the release of Chlorofluoro carbons</li> <li>e. Taj Mahal is polluted by its surrounding Industries .</li> </ul>																
7	What is PM10?																
	<p>Particulate matter (PM10) pollution consists of very small liquid and solid particles floating in the air. Of greatest concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. These particles are less than 10 microns in diameter – about 1/7th the thickness of the human hair – and are known as PM10. This includes fine particulate matter known as PM2.5.</p> <p style="text-align: center;">(Or)</p> <p>PM10 is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals. Particulate matter also forms when gases emitted from motor vehicles and industry undergoes chemical reactions in the atmosphere.</p>																
8	<b>What are the sources of PM10?</b>																
	<p>There are sources of PM10 in both urban and rural areas, major sources include:</p> <ul style="list-style-type: none"> <li>a. Motor vehicles.</li> </ul>																

	<ul style="list-style-type: none"> <li>b. Wood burning stoves and fireplaces.</li> <li>c. Dust from construction, landfills, and agriculture.</li> <li>d. Wildfires and brush/waste burning.</li> <li>e. Industrial sources.</li> <li>f. Windblown dust from open lands.</li> </ul>
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9	What is NAMP? What are the objectives of NAMP?
A	<p>NAMP is National Air quality Monitoring Programme.</p> <p>The objectives of NAMP are</p> <p>To determine status and trends of ambient air quality;</p> <ul style="list-style-type: none"> <li>○ To ascertain whether the prescribed ambient air quality standards are violated, to identify Non-attainment cities.</li> <li>○ To obtain the knowledge and understanding necessary for developing preventive and corrective measures;</li> </ul> <p>To understand the natural cleaning process undergoing in the environment through pollution, dilution, dispersion, wind based movement, dry deposition, precipitation and chemical transformation of pollutants generated.</p>
10	How does Air pollution affects you?
	<p>PM10 is among the most harmful of all air pollutants. When inhaled these particles evade the respiratory system's natural defenses and lodge deep in the lungs.</p> <p>Health problems begin as the body reacts to these foreign particles. PM10 can increase the number and severity of asthma attacks, cause or aggravate bronchitis and other lung diseases, and reduce the body's ability to fight infections.</p> <p>Although particulate matter can cause health problems for everyone, certain people are especially vulnerable to PM10's adverse health effects. These "sensitive populations" include children, the elderly, exercising adults, and those suffering from asthma or bronchitis.</p> <p>Of greatest concern are recent studies that link PM10 exposure to the premature death</p>


	of people who already have heart and lung disease, especially the elderly
11	What steps do you take to control Air Pollution at your level?
	<p>OZONE (O<sub>3</sub>): Ozone can lead to more frequent asthma attacks in people who have asthma and can cause sore throats, coughs, and breathing difficulty. It may even lead to premature death..</p> <p>Carbon Monoxide (CO): Carbon monoxide makes it hard for body parts to get the oxygen they need to run correctly. Exposure to carbon monoxide makes people feel dizzy and tired and gives them headaches. In high concentrations it is fatal. Elderly people with heart disease are hospitalized more often when they are exposed to higher amounts of carbon monoxide.</p> <p>Particulate Matter (PM): Particulate matter that is small enough can enter the lungs and cause health problems. Some of these problems include more frequent asthma attacks, respiratory problems, and premature death.</p>
12	Malappuram in Kerala state is considered to be pollution free. Justify your answer
	The status of Ambient Air Quality in Malappuram is below the actual standards of National Ambient Air quality i. e., SO <sub>2</sub> = 2µgm/m <sup>3</sup> , NO <sub>2</sub> = 52µgm/m <sup>3</sup> , PM 10 = 30µgm/m <sup>3</sup> . Since these values are very much below the national standards the city is considered to be pollution free
13	What steps do you take to control Air Pollution at your level?
	<ul style="list-style-type: none"> <li>* Hang dry some–or all–of the laundry. Walk, ride your bike or take a bus to work.</li> <li>* Share a ride with a friend or co-worker.</li> <li>* Turn out the lights in empty rooms and when away from home.</li> <li>* Avoid burning trash or leaves</li> <li>* Hang dry some–or all–of the laundry.</li> <li>* Reduce the number of trips you make in your car.</li> <li>* Avoid the use of air conditioners altogether.</li> <li>* Take the train or bus on long trips.</li> </ul>
14	As a student what all actions can you take to make your environment clean
A	<ol style="list-style-type: none"> <li>a. Conserve energy in your home, office and automobile.</li> <li>b. Purchase clean electric power.</li> <li>c. Manage your heating and cooling. (Turn your thermostat down in the winter and up in the summer whenever you are at work,</li> </ol>



	<p>sleeping or on vacation.)</p> <p>d. Cut back on the amount of packaging you purchase and the amount of household waste you produce (by composting).</p> <p>e. Reduce the amount of time you spend in the car. (Carpool or use public transportation whenever you can)</p> <p>f. Improve your fuel economy. Avoid accelerating quickly, braking hard and driving at high speeds, particularly when in heavy traffic. Remove excess weight from your car and remove unused roof racks or bike carriers, which cause drag.</p>
16	Study picture 5 and answer the following question. How do the pollutants affect the children?
A	Early childhood is a critical period for the continued development and maturation of several biological systems such as the brain, lungs, and immune system. Air toxins can impair lung function and neurodevelopment, or aggravate existing conditions, such as chronic cough, bronchitis, reduced lung function, wheezing and asthma. Infants who were born premature or growth-retarded may be particularly vulnerable to additional environmental insults.

Answer the following		Each question carries 5marks
1	<p>'Carbon dioxide is necessary for the survival of life on Earth as it is an essential raw material for the process of photosynthesis and greenhouse effect. This effect is essential to maintain and keep the earth's atmosphere warm to sustain life. But due to excessive burning of fossil fuels and other carbon containing fuels, there has been an excessive release of CO<sub>2</sub> in the atmosphere. The increasing CO<sub>2</sub> levels in the atmosphere lead to excessive heating in the earth's surface. The heating results into a new phenomenon called <b>Global Warming</b>.'</p> <p><i>Answer the following questions:</i></p> <p>a. What is the function of greenhouse gas?</p> <p>b. Give any two uses of the gas that is released in the process of photosynthesis.</p> <p>c. What are the greenhouse gases?</p>	
A	a. The functions of greenhouse gases are to absorb heat from sunlight and	

	<p>trap it in the atmosphere to warm the Earth and melt the ice caps.</p> <p>b. Carbon dioxide gas is involved in the production of refrigeration systems, welding systems, water treatment processes (to stabilize the pH of water) and carbonated beverages.</p> <p>c. Water vapour, Carbon dioxide, methane, nitrous oxide, ozone, chlorofluorocarbons</p>
2	<p>What are the effects of Acid rain on Environment?</p> <p><b>Effects on vegetation.</b> Acid rain corrodes the protective covering of leaves of the plants, which affect the photosynthesis of the plants. Due to lack of nutrition, plants become vulnerable to disease. Another cause of lack of nutrition for trees may be due to acid rain getting absorbed by the soil. The harmful acids can have hazardous effects on the roots of the trees</p> <p><b>Effects on soil.</b> the soil has abundant various metals and minerals. When these metals come in contact with acid rain there can be some harmful chemical reactions. These reactions can lead to soil erosion. Acid rains are known to reduce the fertility of the soil, leaving the land barren. Harmful acids can also reduce the amount of soil microorganisms which perform important job of breaking down the dead and decayed plants and other beings.</p> <p><b>Effects on Aquatic Flora and Fauna.</b> Acid rain can directly affect the aquatic life, as the high amount of sulphuric acid and nitric acid levels in acid rains are directly consumed by aquatic plants and animals. The harmful acids affects the ability of fish to take in nutrients, salt, and oxygen. Aquatic animal's intake oxygen from the water through their gills, but harmful acids leads to mucus formation in the gills, which hinders their ability to respire. Acid rains affect the pH level of water which reduce the absorption capacity of essential nutrients of the aquatic life.</p> <p><b>Effects on Human Health.</b> As acid rain affects the soil making it poisonous, the food which is grown on this soil is also contaminated. This food can seriously hamper our entire body system and may cause death. The release of various gases in the atmosphere leads to lung problems</p>
3	<p>Identify from the pictures and data given in the text, the diseases which occur in children of age group 6 to 12 and 0 to 5 due to air pollution. Analyse the given data and draw conclusion about health of children and pollution levels of various cities in India. What are the steps taken by the authorities and communities to check the same?</p>
	<p>Diseases which occur in children of age group 6 to 12: due to air pollution</p> <p>➤ Increase in lung volume</p>

	<ul style="list-style-type: none"> <li>➤ Chronic cough and bronchitis</li> <li>➤ Reduced lung function</li> <li>➤ Wheezing and asthma attacks</li> <li>➤ Respiratory problems</li> </ul> <p>Diseases which occur in children of age group 0 to 5 due to air pollution</p> <ul style="list-style-type: none"> <li>✓ Alveolar development</li> <li>✓ Respiratory death</li> <li>✓ Cough , bronchitis wheezing, ear infections and illness</li> </ul> <p>There are more number of unhealthy children in Nagpur than the other cities. The city does not have large industries and hence the high SPM levels are mainly due to demolition of buildings, construction activity, and excavation of roads.</p> <p><b>STEPS TAKEN BY THE Govt TO CHECK AIR POLLUTION :</b></p> <ol style="list-style-type: none"> <li>1. Proper care needs to be taken during demolition and excavation to ensure that dust does not settle in air</li> <li>2. Planting more trees</li> <li>3. Proper disposal of bio- medical waste.</li> </ol>
4	<p>Air pollution-fifth largest killer in India</p>  <ol style="list-style-type: none"> <li>i. What are the effects of burning agricultural waste?</li> <li>ii. What are the health effects of Carbon Monoxide?</li> <li>iii. How can pollution prevention be achieved?</li> </ol>
A	<ol style="list-style-type: none"> <li>i. Burning agricultural waste is a source of particulate matter and other pollutants. It can greatly affect the regional air quality, visibility and ground level zero potential.</li> </ol>

	<p>ii. When we breathe air containing CO it is absorbed through the bloodstream where it displaces oxygen and bonds with the hemoglobin in your blood. Carbon monoxide has a greater affinity to hemoglobin than oxygen; CO bonds to hemoglobin about 250 times better than oxygen. Without oxygen, vital organs, your heart and brain become deprived and will begin to deteriorate. To compensate, your heart rate increases, breathing may become difficult and in the most serious circumstances cardiac trauma, brain damage, coma and even death will result.</p> <p>iii. Pollution may be prevented by many types of approaches.</p> <ol style="list-style-type: none"> <li>Reduction of pollutants can be achieved by using raw materials, energy, and water more efficiently.</li> <li>Conserving and protecting natural resources can also reduce the amount of waste produced.</li> <li>Actions which may prevent and reduce pollution include: product redesign substitution of raw materials process or equipment modifications improvements in maintenance, training, inventory control and housekeeping.</li> </ol>
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Answer the following		Higher Order thinking questions.
1	A farmer plants the crop in the field. After some days he finds the plants to be dead. He plants the crop once again and finds the same result. What may be the cause for this . Give your answer.	
A	The Plants die due to the effect of acid rain. Acid rain does not affect the trees directly, Instead it weakens them by damaging their leaves and roots or poisoning them with toxic substances. Nutrients present in the soil are destroyed by the acidity. Useful microorganisms which release nutrients from decaying organic matter, into the soil are killed off, resulting in less nutrients being available for the plants	
2	<p>In an accident in a chemicals and fertilizers industry there was release of CO<sub>2</sub> gas into the atmosphere. During the next rain Sudha got wet. Red rashes followed by itching were formed on her body.</p> <ol style="list-style-type: none"> <li>What could be the cause of this?</li> <li>Suggest some methods to reduce this effect.</li> </ol>	
A	<ol style="list-style-type: none"> <li>This could be caused due to acid rains. The first shower of rainfall contains acid H<sub>2</sub>CO<sub>3</sub>. When water containing acid comes in contact</li> </ol>	

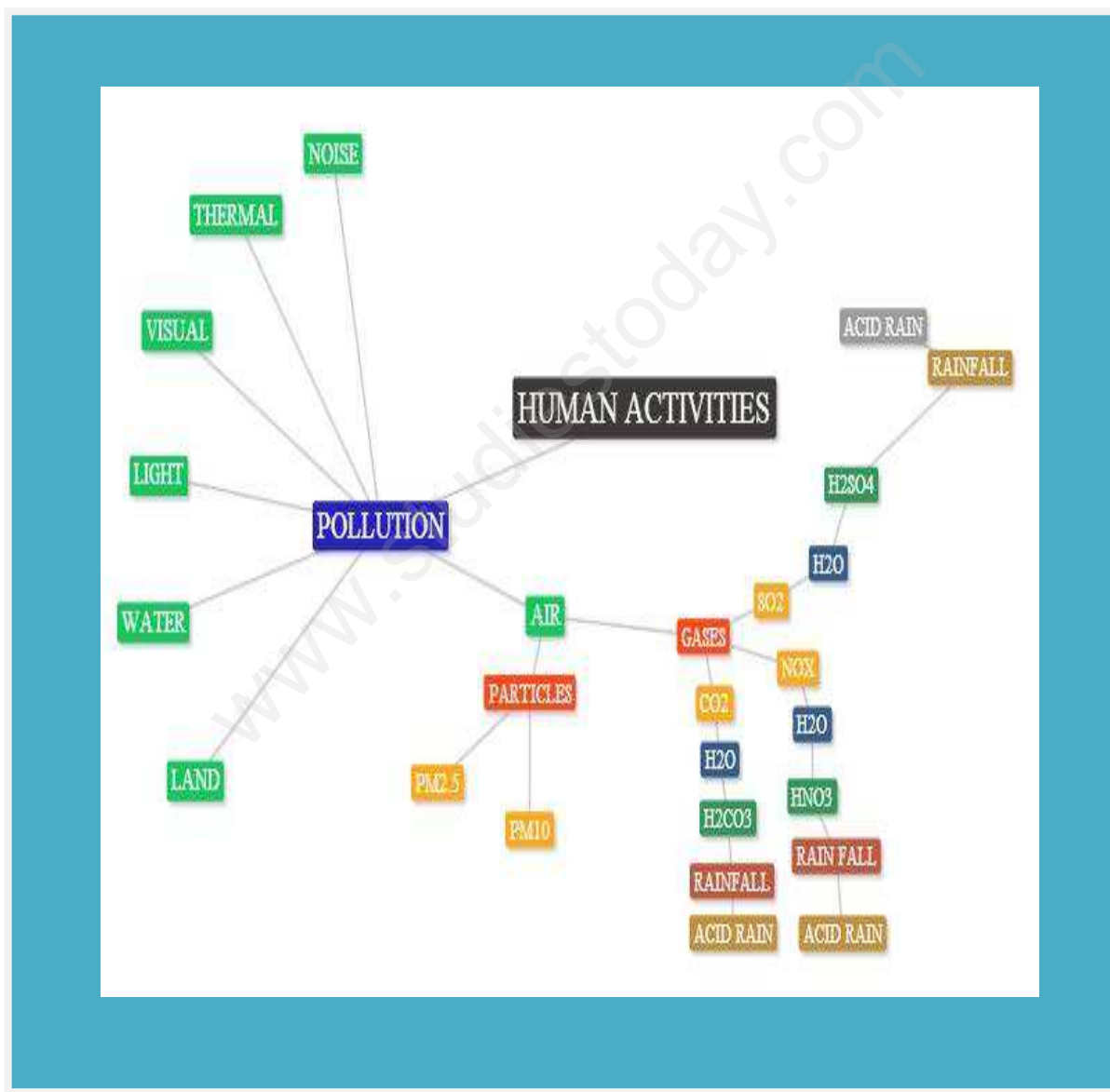
	<p>with the skin, denaturation of proteins occurs.</p> <p>ii. Many precautions can be taken to minimize such pollutions by spreading awareness and educating people.</p> <p>a. Factories can be closed down if they do not adhere to the standards prescribed by the pollution control board.</p> <p>b. Monitoring of the gases such as Carbon dioxide, sulphur dioxide and other gases that are released from the factories</p> <p>c. Using efficient fuels where ever fuel is required</p> <p>d. By planting trees in the surroundings</p>	
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**Answer the following questions . Teachers are requested to make the children answer these questions by the way of group work**

1	Think of a Model which can give signals when the pollution coming out of the factory or appliance exceeds beyond the prescribed levels	
2.	Suppose that a place is highly polluted and filled with gases of CO <sub>2</sub> , SO <sub>2</sub> , PM etc. Think of the ways that gases will not mix or minimise the amount that they mix with rain water to form acids and fall on the ground.	
3	How to protect the the monuments from the pollution.	

## 1. Theme–Clean Air–A shared Concern

### CONCEPT MAP – 1



## CONCEPT MAP -2

