9. AIR AND ATMOSPHERE

TEACHING TASK (Page No:32)

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. How does air exert pressure?
   A) By being invisible
   B) Through the movement of air molecules
   C) By occupying space
   D) By being a mixture

Key: B
Explanation: Air molecules are constantly moving and colliding with surfaces, creating pressure.

2. What phenomenon demonstrates that air can hold water vapor?
   A) Sound travel B) Balloon inflation
   C) Humidity on a hot day D) Weight of air

Key: C
Explanation: Humidity shows that water vapor mixes with air, affecting comfort and weather.

3. What happens to air when it is compressed?
   A) It becomes heavier B) It expands indefinitely
   C) It takes up a smaller volume D) It becomes visible

Key: C
Explanation: Compression reduces the volume of air while increasing its pressure.

4. Which property of air helps explain why insulated bottles keep drinks at temperature?
   A) Air is a good conductor B) Air is a good insulator
   C) Air is compressible D) Air exerts pressure

Key: B
Explanation: Air is a poor conductor of heat, so it acts as an insulator.

5. What can be heard across a room due to the property of air?
   A) Light B) Heat C) Sound D) Water vapor

Key: C
Explanation: Sound travels through air as vibrations of particles.

ADVANCED LEVEL

More than One Answer Type

6. What roles do the following gases play in air?

A) Nitrogen B) Argon C) Carbon Dioxide D) Helium

Key: A, C

Explanation: Nitrogen is the main gas in air and dilutes oxygen. Carbon dioxide is used by plants for photosynthesis.

7. What are some examples of how air behaves in everyday situations?

A) A balloon filled with air weighs more than an empty one
B) A straw works by creating a vacuum
C) Sound travels through water faster than air
D) Insulated bottles keep drinks hot or cold

Key: A, B, D

Explanation: These examples show that air has weight (mass), exerts pressure, and is a good insulator.

Fill In the Blanks

8. Sound travels through air as waves created by _____ particles.

Key: vibrating

Explanation: Sound waves are made when an object vibrates, causing air particles to vibrate and carry the sound.

9. Oxygen is essential for _____ in animals and humans, and it is also required for combustion.

Key: respiration

Explanation: Living things use oxygen to release energy from food (respiration). Oxygen also supports burning (combustion).

Matching Type

10. Match each property of air with its description.

Column A	Column B
1. Air Exerts Pressure	A. Cannot be seen, but effects can be observed
2. Air is Compressible	B. Takes up space and has weight
3. Air is Invisible	C. Allows sound to travel through it
4. Air Can Hold Water Vapor	D. Changes volume under pres sure

Key: 1–B, 2–D, 3–A, 4–C

Answer the Following Questions

11. How does air exert pressure?

Answer: Air exerts pressure because its constantly moving molecules collide with surfaces.
The force of countless air molecules bumping into things creates air pressure all around us.

12. What role does water vapor play in the atmosphere?
Answer: Water vapor is important for forming clouds, rain, and other weather. It also affects how hot or cold the air feels.
It is the gas form of water and is a key part of the water cycle and weather patterns.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. What is air primarily composed of?
   A) Water vapor and dust
   B) A mixture of gases
   C) Only oxygen
   D) Only nitrogen

Key: B

Explanation: Air is not a single substance; it is a mixture of several gases like nitrogen, oxygen, and others.

2. What percentage of air is made up of nitrogen?
   A) About 21%
   B) About 78%
   C) About 0.04%
   D) About 0.93%

Key: B

Explanation: Nitrogen is the most common gas in the air, making up about 78% of it.

3. Which gas is essential for respiration in animals and humans?
   A) Argon B) Carbon Dioxide C) Oxygen D) Methane

Key: C

Explanation: Our bodies need oxygen to break down food and produce energy, which is called respiration.

4. What role does carbon dioxide play in the environment?
   A) It is primarily used in welding
   B) It is essential for photosynthesis in plants
   C) It is a major component of air
   D) It has no significant role

Key: B

Explanation: Plants use carbon dioxide, along with sunlight and water, to make their own food (photosynthesis).

5. What property of air explains why a balloon filled with air weighs more than an empty one?
   A) Air is invisible
   B) Air has mass
   C) Air is compressible
   D) Air exerts pressure

Key: B

Explanation: Air is made of matter, and matter has mass. More air inside the balloon means more mass, so it weighs more.

ADVANCED LEVEL

More than One Answer Type

6. Which of the following are effects of air being able to hold water vapor?
   A) It influences weather patterns
   B) It can make air feel heavy on humid days
   C) It creates a vacuum
   D) It affects temperature regulation

Key: A, B

Explanation: Water vapor forms clouds and rain (weather). High vapor (humidity) makes air feel heavy and warm.

7. Which of the following statements about air are true?
   A) Air is a mixture of gases
   B) Air can be seen under certain conditions
   C) Air conducts sound
   D) Air has a fixed volume

Key: A, C

Explanation: Air is a mixture of gases. Sound waves need a medium like air to travel through, so air conducts sound.

Fill In the Blanks

8. Air is primarily composed of several gases, with nitrogen making up about _____% of its composition.

Key: 78

Explanation: Nitrogen is the most abundant gas in Earth's atmosphere.

9. The amount of _____ vapor in the air can vary widely and is important for weather patterns.

Key: water

Explanation: Water vapor is invisible gas. Its amount (humidity) changes and is crucial for cloud and rain formation.

Matching Type

10. Match each component of air with its role.

Column A	Column B
1. Nitrogen (N_2)	A. Essential for respiration and com bustion
2. Oxygen (O_2)	B. Used in light bulbs and welding
3. Argon (Ar)	C. Crucial for plant protein synthesis
4. Carbon Dioxide (CO_2)	D. Produced by respiration and neces sary for photosynthesis

Key: 1–C, 2–A, 3–B, 4–D

Answer the Following Questions

11. What is the primary component of air, and what percentage does it make up?
Answer: Nitrogen is the primary component, making up about 78%.
Nitrogen gas (N2) is the most abundant, making the air safe for breathing by diluting oxygen.

12. Why is oxygen essential for living organisms?
Answer: Oxygen is essential for respiration, the process that releases energy from food for all life activities.
Animals and humans breathe in oxygen to help convert food into usable energy inside their cells.

ATMOSPHERE

TEACHING TASK (Page No:36)

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. What phenomenon occurs in the thermosphere?
A) Clouds forming
B) The burning of meteoroids
C) Auroras
D) Weather systems

Key: C

Explanation: The thermosphere is where solar particles hit gases, creating beautiful light shows called auroras.

2. Which layer of the atmosphere is where satellites orbit?
A) Troposphere
B) Stratosphere

C) Mesosphere D) Exosphere

Key: D

Explanation: The exosphere is the outermost layer with very thin air, which is where most satellites orbit Earth.

3. What happens to temperature as altitude increases in the troposphere?
   A) It increases B) It decreases
   C) It remains constant D) It fluctuates

Key: B

Explanation: In the troposphere, the air gets colder as you go higher because you are farther from Earth's warm surface.

4. What is a key characteristic of the exosphere?
   A) It has high air pressure.
   B) It contains dense clouds.
   C) It has very thin air with sparse particles.
   D) It supports weather phenomena.

Key: C

Explanation: The exosphere has extremely low density; gas particles are very far apart and can escape into space.

5. What is the coldest layer of the atmosphere?
   A) Troposphere B) Stratosphere
   C) Mesosphere D) Thermosphere

Key: C

Explanation: The mesosphere is the coldest layer. Temperatures can drop below -90°C.

ADVANCED LEVEL

More than One Answer Type

6. Which statements about the thermosphere are accurate?
   A) It contains the ionosphere.
   B) Temperature decreases significantly with altitude.
   C) Auroras occur in this layer.
   D) It extends to about 600 kilometers.

Key: A, C, D

Explanation: The thermosphere is very hot, contains the ionosphere (helps radio waves), and is where auroras happen.

7. Which of the following are true regarding the exosphere?
   A) It is where satellites orbit the Earth.
   B) It has very dense air.
   C) It gradually fades into outer space.
   D) It is the highest layer of the atmosphere.

Key: A, C, D

Explanation: The exosphere is the top layer, with air so thin it merges with space, making it ideal for satellites.

Fill In the Blanks

8. The _____ layer contains the ozone layer, which absorbs and scatters ultraviolet (UV) solar radiation.
Key: stratosphere

Explanation: The ozone layer in the stratosphere acts as a shield, protecting us from the sun's harmful UV rays.

9. The _____ is the coldest layer of the atmosphere, where meteoroids burn up before reaching the Earth's surface.
Key: mesosphere

Explanation: In the cold mesosphere, most space rocks (meteoroids) burn up from friction, creating shooting stars.

Matching Type

10. Match each atmospheric layer with its importance.

Column A	Column B
1. Troposphere	A. Supports stable flying conditions for aircraft
2. Stratosphere	B. Contains satellites and the International Space Station
3. Thermosphere	C. Provides oxygen for breathing and weather formation
4. Exosphere	D. Essential for radio communications and GPS signals

Key: 1–C, 2–A, 3–D, 4–B

Answer the Following Questions

11. What significant process happens in the stratosphere that protects living organisms from solar radiation, and how does this process affect temperature in that layer?
Answer: The ozone layer in the stratosphere absorbs harmful UV radiation. This absorption causes temperature to increase with altitude in this layer.
The ozone layer protects us. As it absorbs UV energy, it heats up, making the stratosphere warmer higher up.

12. Why might commercial airplanes prefer to fly in the lower stratosphere rather than the troposphere?
Answer: The lower stratosphere has less turbulence and more stable weather, providing a smoother and safer flight.
Most weather occurs in the troposphere. Flying above it (in the stratosphere) avoids storms and strong winds.

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

Multiple Choice Questions

1. What is the primary role of the atmosphere?
   A) To provide food for life
   B) To protect the Earth from solar radiation
   C) To create water bodies
   D) To generate energy

Key: B

Explanation: The atmosphere acts like a shield, blocking harmful radiation from the sun and space.

2. Which layer of the atmosphere contains the majority of the atmosphere's mass?
   A) Stratosphere
   B) Mesosphere
   C) Troposphere
   D) Thermosphere

Key: C

Explanation: The troposphere is the densest layer, closest to Earth, and holds about 75-80% of the air's total mass.

3. What significant feature is found in the stratosphere?
   A) Weather phenomena
   B) Ozone layer
   C) Auroras
   D) Satellites

Key: B

Explanation: The stratosphere contains the important ozone layer, which filters out dangerous ultraviolet rays.

4. At which altitude does the mesosphere extend?
   A) Up to 50 kilometers
   B) Up to 85 kilometers
   C) Up to 600 kilometers
   D) Up to 10,000 kilometers

Key: B

Explanation: The mesosphere starts about 50 km above Earth and goes up to around 85 km.

5. Why is the thermosphere important for communication?
   A) It is where most weather occurs.
   B) It contains the ionosphere, which aids radio signals.
   C) It has the highest density of air particles.

D) It absorbs UV radiation.

Key: B

Explanation: The ionosphere (part of the thermosphere) reflects radio waves, allowing long-distance communication.

ADVANCED LEVEL

More than One Answer Type

6. Which layers of the atmosphere are involved in protecting the Earth from harmful solar radiation?

A) Troposphere
B) Stratosphere
C) Mesosphere
D) Thermosphere

Key: B, D

Explanation: The stratosphere (ozone layer) absorbs UV rays. The thermosphere (ionosphere) absorbs X-rays and gamma rays.

7. What roles does the mesosphere play in the atmosphere?

A) It burns up meteoroids.
B) It is the warmest layer of the atmosphere.
C) It is where bright trails of meteors occur.
D) It supports weather phenomena.

Key: A, C

Explanation: The mesosphere protects Earth by burning up most meteoroids. We see this as bright meteor streaks.

Fill In the Blanks

8. The atmosphere is the layer of gases surrounding the Earth, held in place by _____.

Key: gravity

Explanation: Earth's gravity pulls the gases towards the planet, preventing them from floating away into space.

9. The _____ is the layer where most weather occurs and contains about 75% of the atmosphere's mass.

Key: troposphere

Explanation: All weather like rain, clouds, and storms happens in the troposphere, the lowest atmospheric layer.

Matching Type

10. Match each atmospheric layer with its main characteristic.

Column A	Column B
1. Troposphere	A. Contains the ozone layer
2. Stratosphere	B. Burns up meteoroids
3. Mesosphere	C. Where most weather occurs
4. Thermosphere	D. Home to the auroras

Key: 1–C, 2–A, 3–B, 4–D

Answer the Following Questions

11. In which atmospheric layer does most weather occur, and why is this layer crucial for life on Earth?

Answer: Most weather occurs in the troposphere. It is crucial because it contains the air we breathe and the water cycle that provides fresh water.
All life exists in the troposphere. It has the right mix of gases and conditions for weather, which supplies water and oxygen.

12. What happens to meteoroids as they enter the mesosphere, and why is this phenomenon important?

Answer: Meteoroids burn up in the mesosphere due to friction with air particles. This is important because it protects Earth's surface from impacts.
The mesosphere acts as a shield. Most space rocks disintegrate there, preventing them from hitting the ground.