

**OUR HOME: EARTH, A UNIQUE LIFE SUSTAINING PLANET**  
**Class 08 - Science (Curiosity)**

**Time Allowed: 1 hour and 30 minutes**

**Maximum Marks: 140**

1. What primary role does water play in the lives of plants? [1]
  - a) System enhancer
  - b) Structural support
  - c) Nutrient transporter
  - d) Photosynthesis blocker
2. In asexual reproduction, how many parents are involved? [1]
  - a) Four
  - b) One
  - c) Three
  - d) Two
3. Which natural process do plants use to prepare food using sunlight? [1]
  - a) Fermentation
  - b) Photosynthesis
  - c) Respiration
  - d) Glycolysis
4. Which of these is an example of geodiversity? [1]
  - a) Number of different types of fish in a pond.
  - b) Different landforms like mountains, valleys, and deserts.
  - c) Variety of bird chirping in a forest.
  - d) Changing weather during monsoons.
5. What is a major cause of the triple planetary crisis? [1]
  - a) Presence of ozone
  - b) Vegetative propagation
  - c) Earth's circular orbit
  - d) Burning fossil fuels
6. What substance allows scientists to describe Earth as the 'Blue Planet'? [1]
  - a) Forests
  - b) Ice
  - c) Atmosphere
  - d) Water
7. Which type of reproduction results in offspring that look different from their parents? [1]
  - a) Vegetative propagation
  - b) Sexual reproduction
  - c) Asexual reproduction
  - d) Cloning
8. How does genetic variation benefit a species? [1]
  - a) By preventing reproduction altogether
  - b) By increasing chances of survival in new environments
  - c) By making all offspring identical
  - d) By guaranteeing disease resistance
9. Which feature of Earth protects it from harmful cosmic rays and solar wind? [1]
  - a) Ozone layer
  - b) Liquid water
  - c) Magnetic field
  - d) Geosphere

10. What is one major reason Mars cannot currently support life like Earth? [1]  
a) It is too close to the Sun. b) Its magnetic field is too strong.  
c) It has too many volcanoes. d) It lacks a thick atmosphere and liquid water.
11. Which process is responsible for keeping Earth's temperature just high enough for water to remain in liquid form? [1]  
a) Photosynthesis b) Evaporation  
c) Condensation d) Greenhouse effect
12. What is the function of gametes in sexual reproduction? [1]  
a) To create identical offspring b) To clone parental traits  
c) To produce food for offspring d) To carry half of the parent's genetic material
13. How does the greenhouse effect help Earth's environment? [1]  
a) It increases atmospheric pressure. b) It regulates water flow in rivers.  
c) It maintains Earth's temperature. d) It keeps the atmosphere oxygen-rich.
14. Which planet is known for having a thick carbon dioxide atmosphere that causes a greenhouse effect? [1]  
a) Venus b) Earth  
c) Mars d) Jupiter
15. What gas mainly constitutes Venus's atmosphere? [1]  
a) Oxygen b) Methane  
c) Nitrogen d) Carbon Dioxide
16. **Assertion (A):** Earth is called the Blue Planet. [1]  
**Reason (R):** A significant portion of Earth is covered with water.  
a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.  
c) A is true but R is false. d) A is false but R is true.
17. **Assertion (A):** The Earth's magnetic field acts like a shield. [1]  
**Reason (R):** It protects Earth from harmful particles from space.  
a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.  
c) A is true but R is false. d) A is false but R is true.
18. **Assertion (A):** Pollen grains and ovules are involved in plant reproduction. [1]  
**Reason (R):** Pollen grains contain female gametes and ovules contain male gametes.  
a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.

- c) A is true but R is false. d) A is false but R is true.
19. **Assertion (A):** Earth is the only planet in the solar system known to support life. [1]  
**Reason (R):** Earth's position in the habitable zone allows liquid water to exist, essential for life.
- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.  
c) A is true but R is false. d) A is false but R is true.
20. **Assertion (A):** Sexual reproduction leads to variation in offspring. [1]  
**Reason (R):** Gametes from two parents combine to form a zygote with mixed genetic material.
- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.  
c) A is true but R is false. d) A is false but R is true.
21. Describe the main elements of Earth's natural systems that support life. [1]  
22. How does Earth's magnetic field contribute to the planet's ability to sustain life? [1]  
23. Explain the concept of vegetative propagation in plants. [1]  
24. What is the role of reproduction in the continuity of life on Earth? [1]  
25. Explain the concept of the 'Goldilocks zone' and its significance to Earth's habitability. [1]  
26. Identify the major environmental challenges currently endangering life on Earth. [1]  
27. What is pollination, and how does it relate to plant reproduction? [1]  
28. Identify the planet that is known as the hottest in the solar system and explain why it holds this distinction despite its position relative to the Sun. [1]  
29. Describe the role of gametes in sexual reproduction. [1]  
30. Describe what a 'Goldilocks zone' is and how it relates to the Earth's capacity to sustain life. [1]  
31. What role does the Earth's magnetic field play in sustaining life? [2]  
32. If a spaceship carried soil and water to Mars, could plants start growing there? [2]  
33. What efforts have been made globally to address environmental issues? [2]  
34. If there were no atmosphere on the Earth, would it affect life, temperature, and water on the planet? Explain. [2]  
35. Why do animals like fish and frogs lay hundreds or even thousands of eggs at a time, while other animals lay only a few? What might be the advantages and disadvantages of laying so many eggs? [2]  
36. Define the term 'habitable zone' and explain its significance for life on Earth. [2]  
37. Discuss five examples of vegetative propagation. [2]  
38. Explain what happens when greenhouse gases are released into the atmosphere. [2]  
39. Describe how asexual reproduction ensures continuity of genetic material, and provide an example. What are some advantages of this reproductive strategy? [2]  
40. What role does the atmosphere play in sustaining life on Earth? [2]  
41. Define genetic material and explain its role in the process of reproduction. [3]  
42. Explain the process of pollination and its significance in plant reproduction. [3]  
43. What role does vegetation play in maintaining the Earth's atmospheric oxygen levels? [3]  
44. Explain the role of Earth's magnetic field in protecting the planet. Why is it considered crucial for life? [3]

45. In what way does geodiversity contribute to biodiversity on our planet? [3]
46. Identify the types of gametes involved in sexual reproduction in animals and describe their roles. [3]
47. What is vegetative propagation and how does it differ from sexual reproduction in plants? [3]
48. Describe why the Earth's position within the solar system is optimal for supporting life. [3]
49. What is the hydrosphere, and how does it contribute to the sustenance of life on Earth? [3]
50. What is the main reason Venus has a higher average temperature than Mercury? Describe the mechanism involved. [3]

51. **Read the following text carefully and answer the questions that follow:** [4]

Reproduction ensures continuity of life by passing genetic instructions from parents to offspring. Genes guide the development of body parts and functions, making young ones resemble their parents. Asexual reproduction produces identical offspring from a single parent, while sexual reproduction combines genetic material from two parents, creating variation. This variation helps species adapt and survive in changing environments. Plants, animals, and microorganisms reproduce using specialized reproductive cells called gametes, ensuring diversity and survival.

**Questions:**

- Which type of reproduction produces offspring almost identical to the parent? Explain. (1)
- Why is reproduction important for the survival of species? (1)
- Differentiate between asexual and sexual reproduction. (2)

**OR**

Explain how genetic variation helps organisms survive better in their environment. (2)

52. **Read the following text carefully and answer the questions that follow:** [4]

Earth's habitability depends on more than distance from the Sun. Its right size allows it to hold an atmosphere that provides oxygen for breathing and an ozone layer that blocks harmful ultraviolet rays. If smaller, Earth would lose gases like Mars; if larger, gravity would be too strong. Additionally, Earth's magnetic field, generated by molten iron in its core, deflects harmful cosmic rays and solar wind, shielding life and preserving the atmosphere.

**Questions:**

- What protects Earth from harmful solar wind particles? (1)
- Why is Earth's size important for supporting life? (1)
- How does the atmosphere help sustain life on Earth? (2)

**OR**

Why is Earth's magnetic field vital for life? (2)

53. **Read the following text carefully and answer the questions that follow:** [4]

Earth is a unique planet that supports life due to its habitable zone, suitable gravity, protective ozone layer, and magnetic field. However, human activities are disturbing this balance, causing the triple planetary crisis—climate change, biodiversity loss, and pollution. Burning fossil fuels, destroying habitats, and releasing waste disrupt natural systems. Global agreements like the Montreal Protocol and Paris Agreement aim to reduce these threats. Protecting biodiversity, using clean energy, and sustainable living are essential for Earth's future.

**Questions:**

- Which global agreement aims to limit global warming, and what is its goal? (1)
- Why is Earth considered a unique planet in the solar system? (1)

c. How does burning fossil fuels contribute to climate change? **(2)**

**OR**

Explain how biodiversity loss affects ecosystems. **(2)**

54. **Read the following text carefully and answer the questions that follow:** **[4]**

Planets receive energy from the Sun, but temperature depends not only on distance. Venus, despite being the second planet, is the hottest due to its thick carbon dioxide atmosphere, which traps heat through the greenhouse effect. On Earth too, greenhouse gases maintain suitable temperatures for life. Earth's position in the habitable or "Goldilocks zone" allows water to exist in liquid form, essential for sustaining plants, animals, and humans. This balance makes Earth uniquely life-supporting.

**Questions:**

- a. Why is Venus hotter than Mercury? **(1)**
- b. What is the greenhouse effect, and why is it important for Earth? **(1)**
- c. Why is Earth's position in the solar system ideal for life? **(2)**

**OR**

Compare the greenhouse effect on Venus and Earth. **(2)**

55. **Read the following text carefully and answer the questions that follow:** **[4]**

Life on Earth thrives because of the interaction between air, water, soil, sunlight, and living organisms. The atmosphere provides oxygen and regulates temperature through the greenhouse effect. Water sustains ecosystems, regulates body processes, and forms the hydrosphere. Soil and minerals from the geosphere provide nutrients and raw materials. The biosphere includes plants, animals, and microorganisms that depend on each other. Balance among these components keeps Earth habitable, making conservation of natural resources essential.

**Questions:**

- a. Name a component that does not belong to the geosphere. **(1)**
- b. Why is the balance between air, water, soil, and living beings important for Earth? **(1)**
- c. How do non-living components support life on Earth? **(2)**

**OR**

Explain with reasons why conservation of natural resources is essential for the future. **(2)**

56. **State whether the given statement is True or False:** **[5]**

- (a) Mangalyaan was India's first mission that explored the possibility of past water on Mars. **[1]**
- (b) Reproduction is essential for the survival of species on Earth. **[1]**
- (c) A zygote forms after male and female gametes come together in both plants and animals. **[1]**
- (d) Embryonic development in birds occurs within the body. **[1]**
- (e) The habitable zone is where conditions allow for liquid water to exist on a planet. **[1]**

57. What is the greenhouse effect, and how does it contribute to Venus being the hottest planet in our solar system? **[5]**

58. What is the role of greenhouse gases in climate change, and how do human activities exacerbate their effects on the Earth's climate? **[5]**

59. Identify and describe at least two major consequences of biodiversity loss on ecosystems. **[5]**

60. Describe the role of water as a solvent in the ecosystem. How does this property of water support life on Earth? [5]
61. Why is the distance of Earth from the Sun crucial for the existence of life, and how is this related to the concept of the 'Goldilocks zone'? [5]
62. **Fill in the blanks:** [10]
- (a) The release of greenhouse gases like carbon dioxide and methane causes \_\_\_\_\_. [1]
  - (b) Water covers about \_\_\_\_\_ percent of the Earth's surface. [1]
  - (c) All planets in the solar system get their energy from the \_\_\_\_\_. [1]
  - (d) During photosynthesis, plants release \_\_\_\_\_, which is used for respiration. [1]
  - (e) Earth's \_\_\_\_\_ covers about 70% of its surface, making it appear blue from space. [1]
  - (f) The Montreal Protocol was established in \_\_\_\_\_. [1]
  - (g) The effect that traps heat in the atmosphere to keep Earth warm is known as the \_\_\_\_\_ effect. [1]
  - (h) The process by which plants make food using sunlight, water, and carbon dioxide is called \_\_\_\_\_. [1]
  - (i) The Earth is often called the \_\_\_\_\_ Planet due to its vast amount of water. [1]
  - (j) In plants, \_\_\_\_\_ is the process where pollen is transferred to enable fertilization. [1]

USP

**Solution**  
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1.  
**(c) Nutrient transporter**  
**Explanation:**  
Water transports nutrients from the soil to various parts of the plant.
2.  
**(b) One**  
**Explanation:**  
Asexual reproduction involves a single parent.
3.  
**(b) Photosynthesis**  
**Explanation:**  
Photosynthesis involves using sunlight to convert carbon dioxide and water into glucose.
4.  
**(b) Different landforms like mountains, valleys, and deserts.**  
**Explanation:**  
Geodiversity is the variety of rocks, soils, and landforms that create unique habitats, supporting different plants and animals.
5.  
**(d) Burning fossil fuels**  
**Explanation:**  
The triple planetary crisis (climate change, biodiversity loss, and pollution) is mainly caused by burning fossil fuels, which releases greenhouse gases and pollutants into the atmosphere.
6.  
**(d) Water**  
**Explanation:**  
Water coverage gives Earth its 'Blue Planet' appearance.
7.  
**(b) Sexual reproduction**  
**Explanation:**  
Sexual reproduction leads to offspring with variations due to mixing of genetic material.
8.  
**(b) By increasing chances of survival in new environments**  
**Explanation:**  
Genetic variation can lead to adaptations that enhance survival in changing environments.
9.  
**(c) Magnetic field**  
**Explanation:**  
Earth is protected from harmful solar wind and cosmic rays by its magnetic field, which deflects these charged particles away from the planet.

10. **(d)** It lacks a thick atmosphere and liquid water.  
**Explanation:**  
Mars is at the edge of the habitable zone, but its thin atmosphere can't trap heat or hold liquid water, making it too cold and dry for most life.
11. **(d)** Greenhouse effect  
**Explanation:**  
The greenhouse effect traps heat, preventing it from escaping into space, maintaining a suitable temperature.
12. **(d)** To carry half of the parent's genetic material  
**Explanation:**  
Gametes carry half of the parent's genetic material and combine during fertilization.
13. **(c)** It maintains Earth's temperature.  
**Explanation:**  
The greenhouse effect retains heat, ensuring suitable temperatures for life.
14. **(a)** Venus  
**Explanation:**  
Venus's thick atmosphere of carbon dioxide is known to cause a greenhouse effect.
15. **(d)** Carbon Dioxide  
**Explanation:**  
Venus's atmosphere is primarily made of carbon dioxide.
16. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Earth's appearance from space is blue due to its water bodies.
17. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
The Earth's magnetic field deflects many harmful particles.
18. **(c)** A is true but R is false.  
**Explanation:**  
Pollen grains contain male gametes, not female.
19. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Earth supports life because it lies in the habitable zone where temperatures allow liquid water to exist. This is the main reason Earth is known to support life.
20. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Sexual reproduction leads to variation because gametes from two parents fuse to form a zygote with mixed genetic material, resulting in offspring with different traits.
21. Earth's natural systems include the atmosphere (air), hydrosphere (water), geosphere (land), and biosphere (life). These interact seamlessly, maintaining a balance essential for the support and

- continuation of life.
22. Earth's magnetic field shields the planet from harmful cosmic rays and solar winds by deflecting these energetic particles. This protection maintains the atmosphere and ozone layer, preventing increased exposure to harmful solar ultraviolet rays.
  23. Vegetative propagation is a type of asexual reproduction where new plants grow from parts of an existing plant, such as leaves, stems, or roots, independently of seeds, allowing rapid plant multiplication.
  24. Reproduction ensures that each type of organism continues to thrive, maintaining life's continuity by producing offspring that carry the parent's genetic information, thus preventing the extinction of any species.
  25. The 'Goldilocks zone' refers to the optimal distance from a star, like the Sun, where a planet can maintain temperatures conducive to liquid water, neither too hot nor too cold.
  26. The major environmental challenges are climate change, biodiversity loss, and pollution. Collectively, they are termed as the triple planetary crisis, threatening the delicate balance necessary for sustaining life on Earth.
  27. Pollination is the transfer of pollen from the male anther of a flower to the female stigma. This process is crucial for fertilization, allowing the formation of seeds, essential for sexual reproduction in plants.
  28. Venus is the hottest planet in the solar system because it has a thick atmosphere rich in carbon dioxide, which causes a significant greenhouse effect, trapping heat.
  29. Gametes, which are specialized reproductive cells (sperm and eggs), contain half the genetic material of the parent. When they combine during fertilization, they form a zygote, resulting in a new organism with a complete genetic set.
  30. A 'Goldilocks zone' is the range of distances from a star where conditions are just right for liquid water to exist. Earth's position within this zone supports its ability to hold liquid water, crucial for sustaining life.
  31. The Earth's magnetic field acts as a protective shield against high-energy particles from the sun that could strip away the atmosphere and harm living organisms. It deflects solar wind and cosmic rays, maintaining the atmosphere and safeguarding life from harmful radiation.
  32. Maybe simple plants or microbes could grow if we add the right conditions, like protection from Mars' thin atmosphere, extreme cold, and radiation. But most Earth plants would struggle without enough air pressure, liquid water stability, or Earth's magnetic shield. Experiments show some bacteria survive, but full growth needs more, like a greenhouse dome.
  33. Global efforts to address environmental issues include international agreements like the Montreal Protocol, the Earth Summit, the Kyoto Protocol, and the Paris Agreement. These initiatives aim to reduce harmful emissions, protect the ozone layer, and curb climate change, emphasizing cooperative efforts to manage the global environmental crisis effectively.
  34. Yes, without atmosphere, temperatures would swing wildly (hot days, freezing nights), water would evaporate or freeze easily, and no air means no breathing or wind. Harmful rays would reach the surface, killing most life. Atmosphere traps heat, holds water vapor, and shields us.
  35. Fish and frogs lay many eggs because most get eaten by predators or don't survive in water- it's a numbers game to ensure some hatch. Advantages: Increases survival chances without parental care. Disadvantages: Wastes energy if most fail, and no protection means high loss. Birds lay fewer but care for them, improving each egg's odds!
  36. The 'habitable zone', also known as the Goldilocks zone, is the region around a star where conditions are just right for liquid water to exist on a planet's surface. This is vital for life on Earth because water is essential for life as we know it. Earth's position in this zone ensures that its surface temperature allows for water to exist in liquid form, supporting life.
  37. Potato: Eyes on tubers grow into new plants.  
Ginger: Rhizomes (underground stems) sprout roots and shoots.  
Money plant: Stem cuttings in water or soil grow roots.  
Onion: Bulbs divide and form new plants.  
Bryophyllum: Leaves with tiny plantlets fall and grow independently.

38. When greenhouse gases like carbon dioxide and methane are released into the atmosphere, they trap heat, leading to the warming of the planet. This rise in global temperature results in melting ice caps, rising sea levels, extreme weather, and changes in ecosystems, impacting both plants and animals.
39. Asexual reproduction involves a single parent producing offspring that are genetically identical to itself, ensuring the continuity of its genetic material. An example is vegetative propagation in plants, where parts such as leaves, stems, or roots grow into new plants. This method allows for quick population growth since it doesn't require a mate, ensuring rapid adaptation to the environment.
40. The atmosphere contains oxygen, which is vital for respiration in humans, animals, and plants. It also traps the sun's heat due to the greenhouse effect, maintaining a temperature conducive to liquid water. This intricate balance allows various life forms to thrive, highlighting the atmosphere's crucial role in making Earth habitable.
41. Genetic material, commonly known as DNA, contains the instructions needed for the development, function, growth, and reproduction of all living organisms. In reproduction, genetic material ensures continuity by passing traits from parents to offspring. It encodes the information required to make proteins, which are vital for constructing and regulating the organism's body. In asexual reproduction, offspring inherit an exact copy of the parent's genetic code, while in sexual reproduction, the genetic material from two parents combines, introducing variability in the offspring.
42. Pollination is the transfer of pollen grains from the male part of a flower, or anther, to the female part, or stigma. This can occur through wind, insects, or animals, facilitating fertilization by allowing male gametes to reach the female ovules. Pollination is crucial for sexual reproduction in flowering plants, leading to the formation of seeds and fruit. It enhances genetic diversity and aids in the spread and survival of plant species across different environments.
43. Vegetation plays a crucial role in maintaining the Earth's atmospheric oxygen levels through the process of photosynthesis. During photosynthesis, plants absorb carbon dioxide from the atmosphere and water from the soil, using sunlight as energy to convert these into glucose and release oxygen as a byproduct. This oxygen is essential for the respiration of humans, animals, and other organisms, thereby maintaining the balance of gases in the atmosphere.
44. Earth's magnetic field acts as a protective shield, repelling high-energy cosmic rays and solar wind particles. These particles can damage the atmosphere and degrade the ozone layer, permitting harmful UV rays to reach the surface. The magnetic field's deflection of these particles is crucial; it preserves the atmosphere's integrity, prevents excessive UV radiation, and maintains conditions conducive to life. Without this magnetic shield, Earth's environment might become hostile to life as we know it.
45. Geodiversity refers to the variety of landforms, rocks, soils, and natural processes that shape the Earth's surface. It creates diverse habitats and ecosystems, providing different conditions for a wide range of plant and animal species to evolve and thrive. The unique combination of geological features influences microclimates, soil composition, water availability, and nutrient cycling, thus supporting rich biodiversity by enabling species to adapt and flourish in their respective environments.
46. In animals, sexual reproduction involves two types of gametes: sperm (male) and eggs (female). The sperm, produced by male individuals, is responsible for delivering genetic material to the female gamete, or egg, during fertilization. The egg contains the maternal genetic information required to develop a new organism. When a sperm fertilizes an egg, their genetic material combines to form a zygote, which then grows and develops into a new individual, ensuring genetic variation and diversity.
47. Vegetative propagation is a form of asexual reproduction where a new plant grows from a fragment of the parent plant, such as a leaf, stem, or root. This method does not involve gametes or fertilization, leading to offspring genetically identical to the parent. In contrast, sexual reproduction in plants involves the fusion of male and female gametes, resulting in the formation of a zygote with combined genetic information from two parents, creating genetic diversity among offspring.
48. Earth is positioned in the solar system's habitable zone or 'Goldilocks zone,' which allows liquid water to exist—a vital factor for life. If Earth were nearer the Sun, all water would evaporate; if farther, water would freeze. This position enables a favorable climate supporting diverse life forms. The equilibrium between distance and solar energy receipt renders the Earth neither too hot nor too cold, promoting conditions under which complex systems and ecosystems can sustain and develop.

49. The hydrosphere encompasses all the water bodies on Earth, including oceans, rivers, lakes, and underground water sources. It covers about 70% of the Earth's surface, making it vital for sustaining life. Water acts as a solvent for nutrients, allows the transport of these nutrients in plants, maintains body temperature in animals, and facilitates digestion. Thus, it forms a crucial part of the water cycle, impacting weather patterns and providing habitats for aquatic organisms.
50. Venus has a higher average temperature than Mercury due to its thick atmosphere primarily composed of carbon dioxide. This atmosphere traps heat through the greenhouse effect, preventing the escape of thermal radiation. Although Venus is the second planet from the Sun, the trapped heat results in the planet reaching higher temperatures than Mercury, which is closer to the Sun but lacks an atmospheric barrier to retain heat.
51. a. Asexual reproduction produces offspring that are almost identical to the parent because it involves only one parent and no mixing of genetic material. Examples include vegetative propagation in plants and binary fission in bacteria.
- b. Reproduction is essential because it ensures continuity of species by creating new individuals. It also passes genetic instructions from parents to offspring and allows variation, which helps organisms adapt and survive in changing environments.
- c. In asexual reproduction, a single parent produces offspring that are genetically identical, like in vegetative propagation. In sexual reproduction, two parents contribute gametes, combining genetic material to form offspring with similarities and differences. This variation provides adaptability, making sexual reproduction more advantageous for survival in diverse and changing environments.
- OR**
- Genetic variation introduces small differences among individuals, such as in color, size, or resistance to diseases. These differences may help some organisms survive in harsh conditions, like camels storing fat in humps or bacteria developing antibiotic resistance. Over generations, variations support adaptation, ensuring species continue to thrive despite environmental changes.
52. a. Earth is protected from harmful solar wind particles by its magnetic field, which deflects cosmic rays and solar radiation, preventing them from stripping away the atmosphere or harming living organisms.
- b. Earth's size gives it the right gravitational pull to retain its atmosphere. If smaller, gases would escape into space; if larger, gravity would be too strong. This balance helps maintain oxygen, ozone, and life-supporting conditions.
- c. Earth's atmosphere provides oxygen for breathing and supports diverse life forms. It also contains the ozone layer, which protects organisms from harmful ultraviolet rays. Without this atmosphere, Earth would resemble Mars or Mercury, where either gases escaped or never formed, making them uninhabitable.
- OR**
- The magnetic field, created by molten iron in Earth's core, shields the planet from cosmic rays and solar wind. These particles could strip away the atmosphere and increase harmful UV radiation. By deflecting them, the magnetic field preserves the atmosphere and safeguards living organisms, ensuring Earth remains habitable.
53. a. The Paris Agreement aims to limit global warming below 1.5 °C. It encourages countries to reduce greenhouse gas emissions, transition to clean energy, and implement policies to prevent further climate change.
- b. Earth is unique because it lies in the habitable zone, has suitable gravity, liquid water, protective ozone, and a magnetic field. These features together allow life to exist and flourish, unlike any other known planet.
- c. Burning coal, oil, and gas releases greenhouse gases like carbon dioxide and methane, which trap heat in the atmosphere. Normally, plants and oceans absorb CO<sub>2</sub>, but excess emissions create imbalance. This leads to global warming, melting ice caps, rising sea levels, and extreme weather, threatening ecosystems and human survival.
- OR**
- Biodiversity ensures balance in ecosystems as every species has a role. If grasses disappear, herbivores like deer struggle, and predators like tigers lose food. Such chain reactions weaken

ecosystems, making them less resilient to change. Loss of biodiversity reduces nature's ability to support life, disturbing food webs and ecological stability.

54. a. Venus is hotter than Mercury because its thick carbon dioxide atmosphere traps heat, creating a strong greenhouse effect, unlike Mercury, which lacks a substantial atmosphere to retain heat.  
b. The greenhouse effect is the trapping of heat by gases like carbon dioxide in Earth's atmosphere. It prevents excessive cooling and helps maintain a moderate temperature essential for water to remain liquid and life to thrive.  
c. Earth lies at the right distance from the Sun, within the habitable zone, where water exists in liquid form. If Earth were closer, water would evaporate; if farther, it would freeze. This balance, along with greenhouse regulation, creates conditions suitable for sustaining diverse life forms, including plants, animals, and humans.

**OR**

On Venus, the greenhouse effect is extreme due to its thick carbon dioxide atmosphere, trapping excessive heat and making it the hottest planet. On Earth, greenhouse gases maintain moderate warmth, enabling life. However, increasing human-made greenhouse gases could disturb this balance, showing the importance of regulation for survival.

55. a. Oxygen is not part of the geosphere. The geosphere includes rocks, soil, and minerals, which form the solid foundation of Earth, while oxygen is part of the atmosphere.  
b. Balance among air, water, soil, and living organisms ensures stable ecosystems. Disturbances, like deforestation or pollution, disrupt rainfall, soil fertility, and air quality, threatening biodiversity and the survival of life on Earth.  
c. Non-living components like air, water, soil, and minerals provide the foundation for ecosystems. Air supplies oxygen and carbon dioxide, water sustains organisms and regulates temperature, soil provides nutrients for plants, and minerals offer raw materials. Together, these form a base for food chains and life processes, ensuring survival.

**OR**

Conservation is essential because clean air, fertile soil, fresh water, and biodiversity are limited and interdependent. Overuse or destruction leads to imbalance, harming ecosystems and human survival. Protecting these resources ensures sustainable agriculture, stable climate, and healthy ecosystems, making Earth habitable for future generations.

56. State whether the given statement is True or False:

- (a) **(a)** True

**Explanation:**

Mangalyaan carried tools to study Mars' atmosphere, surface, and signs of past water.

- (b) **(a)** True

**Explanation:**

True

- (c) **(a)** True

**Explanation:**

True

- (d) **(b)** False

**Explanation:**

False

- (e) **(a)** True

**Explanation:**

The habitable zone is the range where a planet can maintain liquid water, crucial for life.

57. The greenhouse effect refers to the process by which certain gases in a planet's atmosphere trap heat, preventing it from escaping back into space. In the case of Venus, the atmosphere consists predominantly of carbon dioxide, which is very effective at this heat trapping. This leads to a significant increase in the planet's surface temperature, maintaining it much hotter than would otherwise be expected. Despite being the second planet from the Sun, Venus is actually hotter than Mercury, the

closest planet to the Sun, largely due to this greenhouse effect. On Venus, the thick carbon dioxide-rich atmosphere creates a natural greenhouse that locks in heat and leads to surface temperatures that exceed 450°C.

58. Greenhouse gases are crucial in regulating the Earth's temperature by trapping heat in the atmosphere. This natural phenomenon is called the greenhouse effect, which makes the Earth warm enough to support life. Human activities, such as burning fossil fuels (coal, oil, and natural gas), have increased the concentration of these gases, particularly carbon dioxide and methane, leading to an enhanced greenhouse effect. This results in global warming, where the Earth's average temperature rises, causing climate changes. Consequences include melting ice caps, rising sea levels, and extreme weather events. The imbalance caused by human actions leads to ecosystem disturbances and biodiversity loss, further threatening the ability of Earth to sustain life.
59. Biodiversity loss can have severe consequences on ecosystems. Firstly, it disrupts ecological balance. Species within an ecosystem depend on each other for survival. When a species is lost, it can lead to a chain reaction affecting food chains and food webs. For example, the disappearance of a plant species can affect herbivores, leading to a shortage of prey for carnivores. Secondly, it reduces resilience. Diverse ecosystems are more robust against environmental changes. A decrease in biodiversity means ecosystems are less able to adapt to changes and recover from disruptions, such as climate change or natural disasters, ultimately making them more susceptible to collapse.
60. Water as a solvent is vital in supporting life on Earth by transporting nutrients and facilitating biochemical reactions. Its property as a solvent means it can dissolve a wide range of substances, making it the medium through which minerals and nutrients are transported in biological systems. In plants, water dissolves nutrients in the soil and carries them up through roots to leaves, supporting growth and photosynthesis. In animals, water aids in digestion and nutrient absorption. Additionally, water acts as a medium for chemical reactions necessary for metabolism and energy production. This versatile solvent capability of water underpins many essential life processes, ensuring organisms receive what they need to thrive and maintain homeostasis.
61. Earth's distance from the Sun is essential in sustaining life because it falls within the 'Goldilocks zone' or the habitable zone. This is an area where the temperature is just right — not too hot and not too cold — for water to exist in liquid form. Liquid water is crucial for all known forms of life. If Earth were too close to the Sun, water would evaporate; if it were too far, water would freeze. This zone permits Earth's oceans, supporting diverse life forms. The concept of the Goldilocks zone highlights this unique positioning, crucial for maintaining the delicate balance needed for life to thrive.
62. Fill in the blanks:
- (a) global warming
  - (b) 70
  - (c) Sun
  - (d) oxygen
  - (e) Hydrosphere
  - (f) 1987
  - (g) greenhouse
  - (h) photosynthesis
  - (i) Blue
  - (j) Pollination