NCERT Solutions Class 8 Science (Curiosity)

Chapter 13 Our Home: Earth, A Unique Life Sustaining Planet

Question Answer (InText)

Question 1. I wonder what makes the Earth unique for living beings to grow and survive! (Page 212)

Answer: Earth's uniqueness for supporting life stems from a rare combination of factors. Its distance from the Sun, about 93 million miles, places it in the habitable zone where temperatures (-88°C to 58°C) allow liquid water, essential for life. The atmosphere, rich in nitrogen and oxygen, supports breathing, regulates climate, and shields against harmful radiation via the ozone layer. A strong magnetic field protects the atmosphere from solar wind erosion. Plate tectonics and volcanic activity recycle nutrients and stabilize the climate, while Earth's size and gravity retain a breathable atmosphere without crushing organisms. The Moon stabilizes axial tilt, ensuring predictable seasons, and the planet's chemical composition provides life's building blocks, carbon, hydrogen, and more. This delicate balance, unlike conditions on Mars or Venus, creates diverse ecosystems where life thrives.

Question 2. Is the temperature or distance from the sun the only factor that makes the Earth habitable? (Page 215)

Answer: Earth's habitability isn't solely due to its temperature or distance from the Sun, though its position in the habitable zone is crucial for liquid water. Other key factors include a protective atmosphere, a magnetic field shielding against solar wind, active geology like plate tectonics, and a stable rotation and tilt influenced by the Moon. Earth's size, gravity, and chemical composition also provide the essential elements and conditions for life, creating a delicate balance that makes our planet uniquely suited for diverse ecosystems.

Question 3. What would happen if the size of the Earth were too small or too big? (Page 215)

Answer: If Earth were significantly smaller or larger, its habitability would be compromised due to changes in gravity, atmosphere, and geological processes. A smaller Earth, with weaker gravity, would struggle to retain a dense atmosphere, leading to insufficient pressure for liquid water and poor protection from solar radiation, much like Mars. It might also lack the mass to sustain plate tectonics, limiting nutrient cycling and climate regulation. Conversely, a larger Earth with stronger gravity could trap a thick, oppressive atmosphere, like Venus, potentially causing extreme temperatures and pressure that crush life. Increased geological activity might lead to excessive volcanism, disrupting stable climates. Both scenarios would likely prevent the delicate balance of conditions, liquid water, breathable air, and stable ecosystems required for life as we know it.

Question Answer (Exercise)

Keep the Curiosity Alive (Pages 226-227)

Question 1. What is one major reason Mars cannot currently support life like Earth?
(i) It has too many volcanoes.
(ii) It is too close to the Sun.
(iii) It lacks a thick atmosphere and liquid water.
(iv) Its magnetic field is too strong.
Answer: (ii) It lacks a thick atmosphere and liquid water.

Question 2. Which of these is an example of geodiversity?
(i) A variety of birds chirping in a forest.
(ii) Different landforms like mountains, valleys, and deserts.
(iii) Changing weather during monsoons.
(iv) Number of different types of fish in a pond.
Answer: (ii) Different landforms like mountains, valleys, and deserts.

Question 3. If the Earth were smaller with the same density, what might happen to its atmosphere?
(i) It would become thicker and hotter.
(ii) It would escape into space due to weaker gravity.
(iii) It would become frozen.
(iv) It would cause stronger winds.
Answer: (ii) It would escape into space due to weaker gravity.

Question 4. In sexual reproduction, why are offspring different from their parents?
(i) They grow in different climates.
(ii) They eat different food.
(iii) They acquire new instructions after birth.
(iv) They get mixed instructions (genes) from both parents.
Answer: (iv) They get mixed instructions (genes) from both parents.

Question 5. You notice tiny green plants growing in cracks on your school wall after the monsoon. Where do you think the seeds came from? What conditions helped these plants grow there?
Answer: The seeds likely came from nearby plants, carried by wind, birds, or insects. For example, a bird eating a fruit may have dropped or excreted the seed into the crack. The monsoon provided water, which is essential for seed germination. The crack in the wall likely trapped some soil or organic matter, offering nutrients. Sunlight and air, available in the outdoor environment, support photosynthesis and respiration. The moist, sheltered crack created a microhabitat suitable for growth.

Question 6. A city has recently cut down a large patch of forest to build new roads and buildings. Discuss the possible effects this could have on the local climate and biodiversity. How might this affect water availability or quality in the area?
Answer:

- Effects on Local Climate: Deforestation reduces trees that absorb carbon dioxide, potentially increasing local temperatures due to less shade and a weakened greenhouse gas balance. It may also disrupt rainfall patterns, as trees contribute to water vapour for cloud formation.
- Effects on Biodiversity: Loss of forest habitat threatens plants and animals, reducing biodiversity. For example, animals like deer or predators like tigers may lose food sources or habitats, disrupting ecosystems. Deforestation can reduce water availability by disrupting the water cycle, as trees help retain soil moisture and contribute to rainfall. Soil erosion from cleared land can pollute nearby water bodies with sediment, affecting water quality.

Question 7. A friend says, "The Earth has always had climate changes in the past, so today's global warming is nothing new." How would you respond using what you've learnt in this and other chapters of your science book?
Answer: While Earth has experienced natural climate changes in the past (e.g., ice ages), today's global warming is different because it is primarily driven by human activities, such as burning fossil fuels, which release large amounts of greenhouse gases like carbon dioxide and methane. These gases intensify the greenhouse effect, causing rapid warming, melting ice caps, rising sea levels, and extreme weather, unlike slower natural changes. The triple planetary crisis (climate change, biodiversity loss, pollution) shows how human actions are disrupting Earth's balance, threatening life. Unlike past changes, current warming requires urgent action, like using renewable energy, to protect ecosystems.

Question 8. Imagine Earth's magnetic field suddenly disappeared. What kinds of problems could arise for life on Earth? Explain.
Answer: Without Earth's magnetic field, high-energy particles like cosmic rays and solar wind would directly hit the atmosphere, potentially depleting the ozone layer and allowing harmful UV rays to reach the surface. This could damage living cells, increasing risks like skin cancer in humans and harming plants and animals. The atmosphere might erode over time, reducing oxygen levels and altering the climate, making Earth less habitable. Satellites and communication systems could also be disrupted by unshielded particles, affecting human technology.

Question 9. You are tasked with designing a new settlement for humans on Mars. Name three things you would need to recreate from Earth to support human life there. Which of these do you think is the hardest to replicate, and why?
Answer: Three Things Needed:

- Liquid Water: Essential for drinking, growing crops, and supporting life processes.

- Breathable Atmosphere: An oxygen-rich atmosphere for respiration, protected from Mars' thin, carbon dioxide-heavy atmosphere.
- Temperature Control: A system to maintain Earth-like temperatures, as Mars' average temperature is around -60°C.
- Hardest to' Replicate: Creating a breathable atmosphere is likely the hardest. Mars' atmosphere is 100 times thinner than Earth's and is mostly carbon dioxide, requiring complex systems to produce and maintain oxygen at the right pressure for humans. Generating enough oxygen for a settlement, shielding it from radiation, and preventing leaks in a harsh environment is technologically challenging compared to providing water (which can be transported or extracted) or temperature control (achievable with insulated habitats).

Question 10. In a village, the temperature has been increasing, and rainfall has become unpredictable over the past few years. What could be causing this change? Suggest two ways the village could adapt to these new conditions.
Answer: Causes: The changes are likely due to climate change, driven by increased greenhouse gases from burning fossil fuels, leading to global warming and altered weather patterns. Deforestation or local land use changes could also reduce moisture and affect rainfall.
Adaptation Strategies:

- Water Conservation: Implement rainwater harvesting and efficient irrigation systems to store water during unpredictable rainfall.
- Sustainable Farming: Use drought-resistant crops and sustainable farming practices to cope with higher temperatures and reduced water availability.

Question 11. If there were no atmosphere on the Earth, would it affect life, temperature, and water on the planet? Explain.
Answer: Without an atmosphere:

- Life: Life would struggle to survive, as most organisms require oxygen for respiration. The absence of the ozone layer would allow harmful UV rays to damage cells, affecting plants, animals, and humans.
- Temperature: Earth would lose heat to space without the greenhouse effect, becoming extremely cold, similar to the Moon. Daytime temperatures could soar due to unfiltered sunlight, and nights would be freezing.
- Water: Liquid water would evaporate or freeze due to extreme temperature swings and low pressure, making it unavailable for life processes. The water cycle (rainfall, clouds) would cease without atmospheric water vapour.

Question 12. Discuss five examples of vegetative propagation.
Answer: Vegetative propagation is asexual reproduction where plant parts like stems, roots, or leaves grow into new plants.

Five examples:

- Money Plant: A stem cutting with a node grows roots when placed in water or soil, forming a new plant.
- Potato: The “eyes” (buds) on a sprouted potato can be planted to grow a new potato plant.
- Ginger: A piece of ginger rhizome with a bud, when planted in soil, develops into a new plant.
- Sugarcane: Stem cuttings with nodes are planted to produce new sugarcane plants, as sugarcane rarely produces seeds.
- Bamboo: Sections of bamboo stems or rhizomes can be planted to grow new bamboo plants, relying on vegetative propagation.

Question Answer (Activities)

Activity 13.2: Let us find out (Page 213)

Collect information about the temperature and size of the planets in the solar system, and check if they have an atmosphere.
You may collect this information from books in your school library, trusted websites, or discuss it with your teachers.

Fill out the missing information in the Table.

Table : Planets in our solar system

S.No.	Planet	Average temperature (°C)	Radius, compared to the Earth	Has an atmosphere?
1.	Mercury	170		No
2.	Venus	450	0.95	Yes
3.	Earth	15	1	Yes
4.				
5.			11	
6.				
7.				
8.		–200	4	

Answer:

Table : Planets in our Solar System.

S.No.	Planet	Average Temperature (°C)	Radius (Compared to Earth)	Has an Atmosphere?
1.	Mercury	170	0.38	No
2.	Venus	450	0.95	Yes
3.	Earth	15	1	Yes
4.	Mars	-60	0.53	Yes
5.	Jupiter	-110	11	Yes
6.	Saturn	-140	9.4	Yes
7.	Uranus	-195	4	Yes
8.	Neptune	-200	3.9	Yes