

CLASS 9

SCIENCE

NCERT SOLUTIONS

NCERT Solutions for Class 9 Science Chapter 13: Earth as a System: Energy, Matter and Life – Free PDF Download

Chapter 13 of Class 9 Science Exploration is Earth as a System: Energy, Matter and Life — a new addition under the NCF-2023 framework. It presents Earth as an interconnected system of five spheres, driven by solar energy, and cycled through biogeochemical processes that sustain life. These Class 9 Science Chapter ...

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- The Five Spheres of Earth
- Solar Radiation and the Electromagnetic Spectrum
- Differential Heating and Wind Patterns
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Chapter 13 of Class 9 Science *Exploration* is Earth as a System: Energy, Matter and Life — a new addition under the NCF-2023 framework. It presents Earth as an interconnected system of five spheres, driven by solar energy, and cycled through biogeochemical processes that sustain life. These Class 9 Science Chapter 13 solutions are also useful as quick revision notes before exams.

The Five Spheres of Earth

Geosphere — the solid Earth: rocks, minerals, and landforms.

Hydrosphere — all of Earth's water: oceans, rivers, lakes, groundwater.

Atmosphere — the layer of gases surrounding Earth.

Cryosphere — frozen water: ice caps, glaciers, permafrost, snow.

Biosphere — all living organisms and the regions of Earth that support life.

These spheres constantly interact — e.g. water moves between the hydrosphere, cryosphere, and atmosphere, while living organisms (biosphere) depend on and affect all the others.

Solar Radiation and the Electromagnetic Spectrum

The Sun emits energy across the **electromagnetic spectrum** (including visible light, infrared, and ultraviolet radiation). This solar radiation is the primary energy source driving Earth's weather, climate, and virtually all life through photosynthesis.

Differential Heating and Wind Patterns

Earth's surface heats unevenly (**differential heating**) because of its curved shape, tilt, and the different heat-absorbing properties of land, water, and ice. This uneven heating creates pressure differences in the atmosphere, driving **wind patterns** as air moves from high-pressure to low-pressure regions.

Biogeochemical Cycles

Matter is continuously recycled through Earth's spheres via biogeochemical cycles:

Water cycle — evaporation, condensation, precipitation, collection, repeating continuously between hydrosphere, atmosphere, and geosphere/cryosphere.

Carbon cycle — carbon moves between the atmosphere (as CO₂), living organisms (via photosynthesis/respiration), oceans, and geological deposits (fossil fuels, rocks).

Nitrogen cycle — nitrogen moves between the atmosphere (as N₂ gas), soil (via nitrogen-fixing bacteria), living organisms, and back to the atmosphere via decomposition and denitrification.

Oxygen cycle — oxygen is released by photosynthesis and consumed by respiration and combustion, cycling between the atmosphere, biosphere, and hydrosphere.

Human Impact on Earth's Systems

Human activities — burning fossil fuels, deforestation, pollution — disrupt these natural cycles, for example by adding excess CO₂ to the carbon cycle (contributing to climate change) or disturbing the nitrogen cycle through excessive fertiliser use.

Class 9 Science Chapter 13 – Notes and Extra Questions

Along with these NCERT Solutions, students can also use the [Class 9 Science Chapter 13 Extra Questions](#) and [Class 9 Science Chapter 13 Revision Notes](#) for quick revision and extra practice.

See also: [Chapter 1](#) | [Chapter 2](#) | [Chapter 3](#) | [Chapter 4](#) | [Chapter 5](#) | [Chapter 6](#) | [Chapter 7](#) | [Chapter 8](#) | [Chapter 9](#) | [Chapter 10](#) | [Chapter 11](#) | [Chapter 12](#)

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