

1. Composition of the Earth

The Earth's crust, its atmosphere and the oceans are the only sources of natural resources for human life!

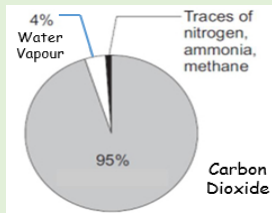


The Earth has four layers:

- Crust (thin and rocky)
- Mantle (properties of solid but flows easily)
- Outer core (made from nickel and iron)
- Inner core (made from nickel and iron)

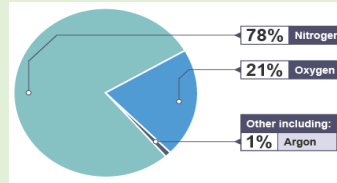
2. Composition of the Early Atmosphere

The Earth's early atmosphere was composed of 95% carbon dioxide, 4% water vapour and 1% of trace gases which included Nitrogen, Ammonia and Methane.



4. Composition of the Today's Atmosphere

Nitrogen is the most abundant gas in today's atmosphere at 78%. Today's atmosphere contains 21% Oxygen and 1% Argon.



5. Fossil Fuels

About three-quarters of the electricity generated in the UK comes from power stations fuelled by fossil fuels. Energy from the burning fuel is used to boil water. The steam turns turbines, and these turn electrical generators.

3. Evolution of Atmosphere

In the 4.5 billion years since the Earth formed its atmosphere has changed considerably. This has happened in three main stages:

Stage 1 – Volcanoes:

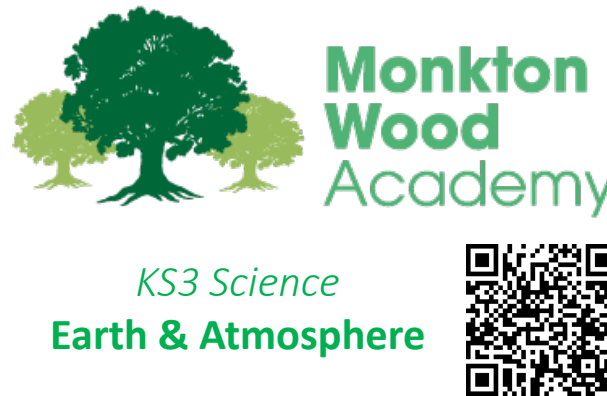
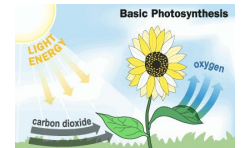
The majority of the early atmosphere was carbon dioxide and water vapour. This was produced by volcanoes. After a time the water vapour condensed and formed the oceans.

Stage 2 – Green plants:

Green plants and algae evolved and used the carbon dioxide for photosynthesis. They also produced oxygen. Basic organisms evolved that were able to use the oxygen.

Stage 3– Complex animals:

The oxygen allowed more complex organisms to form. The ozone layer formed and this allowed further evolution of complex organisms.



6. Generating Electricity

Crude oil, coal and gas are fossil fuels. They were formed over millions of years from the remains of dead organisms. Coal was formed from dead trees and plant matter. Crude oil and gas were formed from dead marine organisms.



7. Non Renewable Energy Sources

Non renewable energy sources include fossil fuels such as coal, oil and natural gas. These sources are a finite resource, which means when they have been used up, they cannot be replaced. Worryingly, humans are using them faster than they are forming!



8. Renewable Energy Sources

Scientists are trying to find alternative methods of generating electricity using renewable energy sources.

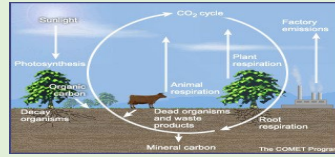
These are energy sources that will not run out or produce carbon dioxide and other greenhouse gases. They are 'cleaner' and more sustainable although they do come with advantages and disadvantages.

9. Renewable Energy Resources

Resource	Adv.	Disadv.
Wind	no CO ₂	Unsuitable, not always windy
Solar	No CO ₂	Expensive, not always sunny
Hydroelectric	No CO ₂	Destroys habitat
Geothermal	No CO ₂	Specific locations

10. Carbon Cycle

All cells - whether animal, plant or bacteria - contain carbon. Carbon is passed from the atmosphere (as carbon dioxide) to living things, passed from one organism to the next and returned to the atmosphere as carbon dioxide again. This is known as the carbon cycle.



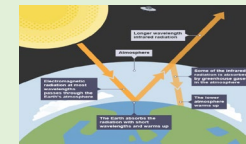
12. Carbon Cycle

Step 3: Passing carbon from one organism to next
 When an animal eats a plant, carbon from the plant becomes part of the fats and proteins in the animal. Microorganisms and some animals feed on waste material from animals, and the remains of dead animals and plants. The carbon then becomes part of these microorganisms and detritus feeders.

Step 4: Returning carbon dioxide to the atmosphere
 When fossil fuels are burned (combustion) in factories or transportation, carbon is released into the atmosphere as carbon dioxide gas.

13. Greenhouse Effect

The greenhouse effect is when greenhouse gases (carbon dioxide, methane and water vapour) in the Earth's atmosphere trap radiation from the sun and heat up the planet. Without the greenhouse effect the Earth would be too cold for us to survive on it.



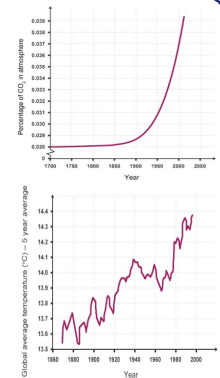
11. Carbon Cycle

Step 1: Removing carbon dioxide from atmosphere
 Green plants remove carbon dioxide from the atmosphere by photosynthesis. The carbon becomes part of complex molecules such as proteins, fats and carbohydrates in the plants.

Step 2: Returning carbon dioxide to atmosphere
 Organisms return carbon dioxide to the atmosphere by respiration. It is not just animals that respire. Plants and microorganisms do, too.

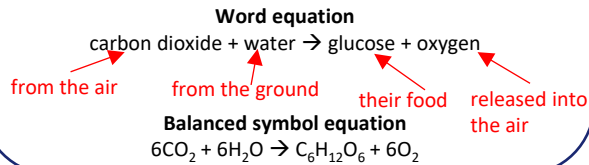
14. Global Warming

The extra greenhouse gases released by human activity lead to the enhanced greenhouse effect. More heat is trapped by the atmosphere, causing the planet to become warmer than it would be naturally. The increase in global temperature this causes is called global warming.



1. Photosynthesis in Plants

Animals need to eat food to get their energy. But green plants and algae do not. Instead they make their own food in a process called **photosynthesis**. Almost all life on Earth depends upon this process. Photosynthesis is also important in maintaining the levels of oxygen and carbon dioxide in the atmosphere.



2. Location of photosynthesis in plants

Photosynthesis takes place inside the **chloroplasts** of the plant cells, these contain a green pigment, **chlorophyll**. This absorbs the light energy needed to make photosynthesis happen. The leaf is a plant organ adapted to carry out photosynthesis. The table describes some of its adaptations:

Thin	a short distance for CO ₂ to move by diffusion
Chlorophyll	Absorbs light
Stomata	Allows CO ₂ to move in by diffusion
Guard cells	open and close the stomata depending on the conditions
Tubes	To transport water (xylem) and glucose (phloem)

3. Measuring the effect of light intensity on photosynthesis

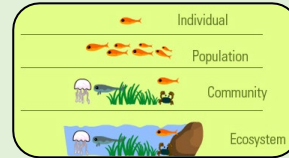
Method:

1. Leave for five minutes for the pondweed to acclimatise to the new
2. Count the number of bubbles given off in one minute.
3. Move the light 10 cm further back.
4. Leave for five minutes for the pondweed to acclimatise again.
5. Count the number of bubbles given off in one minute.
6. Repeat by moving the lamp away by 10 cm intervals until 50 cm is reached.



4. Habitats and Ecosystems

An **ecosystem** consists of **communities** of different living things, in single species **populations** living in their habitats. Examples of these include habitats include coral reefs, marshes and lakes. All the living things (**biotic factors**) and non-living things (**abiotic factors**) in an ecosystem depend upon each other for survival. This interdependence includes through feeding, pollination.



Monkton Wood Academy

KS3 Science

Photosynthesis and Ecosystems

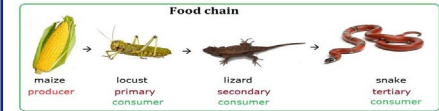
5. Sampling Techniques

Sampling is done to look at the organisms in a population within an ecosystem in a practical way as counting each one individually is not always feasible. This is usually done using quadrats which marks off small areas to then use to estimate the population. A quadrat is usually a square made of wire. It may contain further wires to mark off smaller areas inside, such as 5 × 5 squares or 10 × 10 squares. The organisms underneath, usually plants, can be identified and counted. Quadrats may also be used for slow-moving animals, eg slugs and snails.



6. Food Chains/Biomass

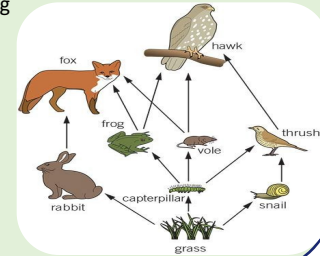
A food chain shows the different species of an organism in an ecosystem, and what eats what. Organisms at each level have different terms:



The population of each organism in a food chain can be shown in a bar chart called a pyramid of numbers or a pyramid of biomass where the bars are drawn to scale. Energy is lost to the surroundings as we go from one level to the next, so there are usually fewer organisms at each level in this food chain.

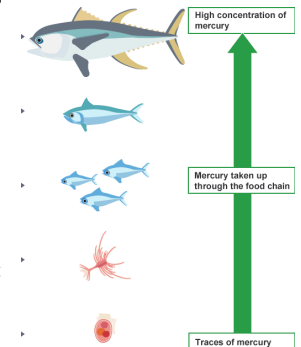
7. Food Webs

When all the food chains in an ecosystem are joined up together, they form a **food web**. Although it looks complex, it is just several food chains joined together. This leads to some interesting effects if the population in the food web decreases. Some animals can just eat more of another organism if food is in short supply, while others may starve and die. This in turn can affect the populations of other organisms in the food web.



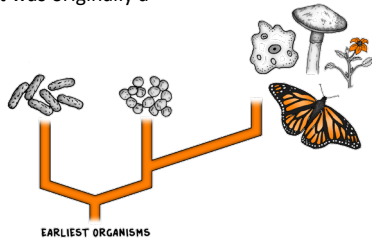
8. Pollution and Pesticides

Some pollutants (including pesticides) quickly break down in the environment whilst others do not. These bio-accumulate in the food chain and damage the organisms in it. The predators at the end of the chain are most effected because compounds cannot be excreted and travel up the food chain.



1. Universal common ancestor

- All life today is directly descended from a **universal common ancestor** that was originally a **single-celled organism**.

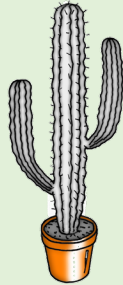


4. Competition and survival

- Later generations will contain **more** of the **better adapted** individuals.
- This only applies to **mutations** in the reproductive cells e.g. sperm and eggs. Mutations in other cells are not passed on to the offspring.

2. Adaptation

- Living things are found in certain environments because they have features that enable them to survive there. They have **adapted** to suit the environment.
- This adaptation has happened because of the small differences between individuals in a species; **variation**.



Monkton
Wood
Academy

KS3 science
Evolution and
extinction

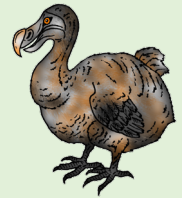


6. Natural selection over time

- **Natural selection** has been taking place for billions of years.
- The first form of life appeared on Earth about 3.5 billion years ago.
- Some of these remained as **single-celled species**. Others evolved into **multi-cellular organisms** about 2 billion years ago. These multi-cellular organisms eventually evolved into today's large animals, plants and fungi.

7. Extinction

- There are many kinds of animals in the world today and many who once lived, but are now **extinct**.
- A species becomes **extinct** when all the organisms of that species have died.
- We know about many of these extinct animals and plants because of **fossils**.



3. Competition and survival to reproduce

- Organisms within a **species compete** for the same resources e.g. food or a mate.
- Those who are better **adapted** to the **environment** are more likely to **survive** and may pass on their **adaptation** to their **offspring**. They have a **selective advantage**.
- Those less suited to the environment are more likely to die before they **reproduce**.



5. Natural selection

- **Charles Darwin's** theory of **natural selection** explains how **evolution** happens:
 - There is **variation** in a population
 - Some individuals are **better adapted** to changes in the environment, they have a **selective advantage**
 - These individuals are **more likely to survive** and pass on their **genes**.
 - Over **many generations** this leads to **evolution**.

8. Evolution

- Change of species over time is called **evolution**.
- Analysing closely-related species or fossils can show us how species have changed over long periods of time.

