

Earth

3. Climate

CONCEPT 2

LESSON GUIDE

CARBON CYCLE

PRECISE LEARNING POINTS

KNOW

I know how carbon enters and leaves a food chain.

APPLY

I can apply my knowledge to describe the full carbon cycle.

EXTEND

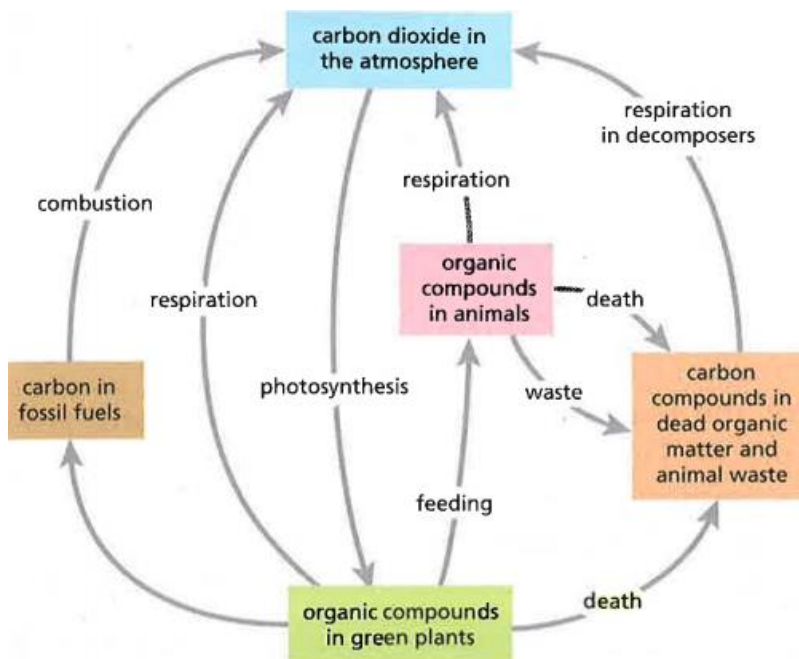
I can extend my knowledge to explain what a carbon sink is and why they are important.

NOTES

Natural recycling has been carried out by living organisms for millions of years. Decomposers (bacteria, fungi etc.) break down waste, as well as dead and decaying organisms. This releases chemical elements, such as carbon, making them available again for living organisms to use.

Carbon is found in all living things. Most of the chemicals inside our bodies contain carbon. Carbohydrates, proteins and fats all contain carbon.

The carbon cycle diagram shows how carbon moves between organisms and the processes that enable this to happen.



- Respiration by plants releases carbon dioxide into the atmosphere
- Respiration by animals releases carbon dioxide into the atmosphere
- When plants and animals die, they start to decay.
- Respiration by decomposers feeding on the dead or decaying matter releases carbon dioxide into the atmosphere
- Most carbon enters the food chain as carbon dioxide from the air. Photosynthesis by plants takes in carbon dioxide from the atmosphere
- Plants trap the carbon in compounds such as carbohydrates, such as glucose
- When plants are eaten the carbon passes up the food chain
- In certain conditions, decomposition may not happen, trapping the carbon in fossil fuels
- Combustion of fossil fuels releases carbon dioxide into the atmosphere

There is a fixed amount of carbon within the Earth and surrounding atmosphere. However, this carbon can be present in different forms. If there is more carbon present in the form of carbon dioxide, this can lead to the greenhouse effect and global warming. This is because carbon dioxide is a greenhouse gas.

Some forms of carbon do not add to the greenhouse effect. This includes carbon that is stored inside trees/plants, the oceans, as fossil fuels or in the soil.

Ways of storing carbon so that it isn't in the atmosphere are called **carbon sinks**. These carbon stores are natural, but scientists are interested in ways of increasing carbon storage. This could be via helping a natural process, such as planting more trees or changing the way land is farmed. However, there are also less natural ideas, such as injecting carbon dioxide into sea water, storing it underground or chemically combining it with minerals.

Exploring how humans affect the carbon cycle

(This may be set as a research task for homework if there is not time in lessons.)

Humans can affect the way that carbon is cycled.

Examples:

- Eating food and respiring. The food comes from plants or animals that ate the plants. This decreased the number of plants able to take in carbon dioxide. Respiration released extra carbon dioxide into the atmosphere.
- Going to a garage, filling up our car and going for a day out. The fuel is made from oil, which is a fossil fuel. The amount of oil underground (a carbon sink) is reduced. Combustion of this fuel whilst driving also added extra carbon dioxide into the atmosphere.

The carbon cycle existed long before humans evolved. However, in the last few hundred years humans have changed a lot of things that affect the carbon cycle.

- We have used up a huge amount of the available fossil fuels. We use fossil fuels for transport, generating electricity and making things. This has reduced this major carbon sink. Combustion of fossil fuels has released large amounts of carbon dioxide into the atmosphere.
- We have also cleared large areas of natural vegetation. The dense growth in these areas would have stored lots of carbon. The crops grown there now do not store as much. Reduced photosynthesis resulting from deforestation and conversion of areas of dense growth into farmland has led to much less carbon dioxide being taken in from the atmosphere and stored in this carbon sink.