



The Carbon Cycle and Climate! Year 9 Science at Home

You can help! Your child is learning about how carbon moves through the Earth system — and how human activities are disrupting this cycle and changing our climate. This is one of the most important science topics for your child's generation.

Why are we learning this? Carbon, climate and Country

Climate change has direct and serious impacts on remote northern Australia — more extreme wet seasons, more intense cyclones, longer dry seasons, and threats to coastal communities from sea level rise. First Nations peoples are at the forefront of climate response, with traditional fire management practices shown by science to reduce greenhouse gas emissions. Carbon farming (getting paid to store carbon on Country through good land management) is a growing economic opportunity for First Nations communities. Understanding the carbon cycle helps your family understand what climate change is, why it is happening, and what actions can actually make a difference.

My child will learn to:

✓ Understand the carbon cycle

Describe how carbon moves between the atmosphere, living things, soil, oceans and fossil fuels.

✓ Explain photosynthesis and respiration

Know that plants absorb carbon via photosynthesis, and all living things release it via respiration.

✓ Explain the greenhouse effect

Describe how CO₂ and other greenhouse gases trap heat in the atmosphere.

✓ Connect to human impacts

Explain how burning fossil fuels, deforestation and fire add carbon to the atmosphere — and what can reduce this.

Big ideas to know:

Carbon — the basis of life

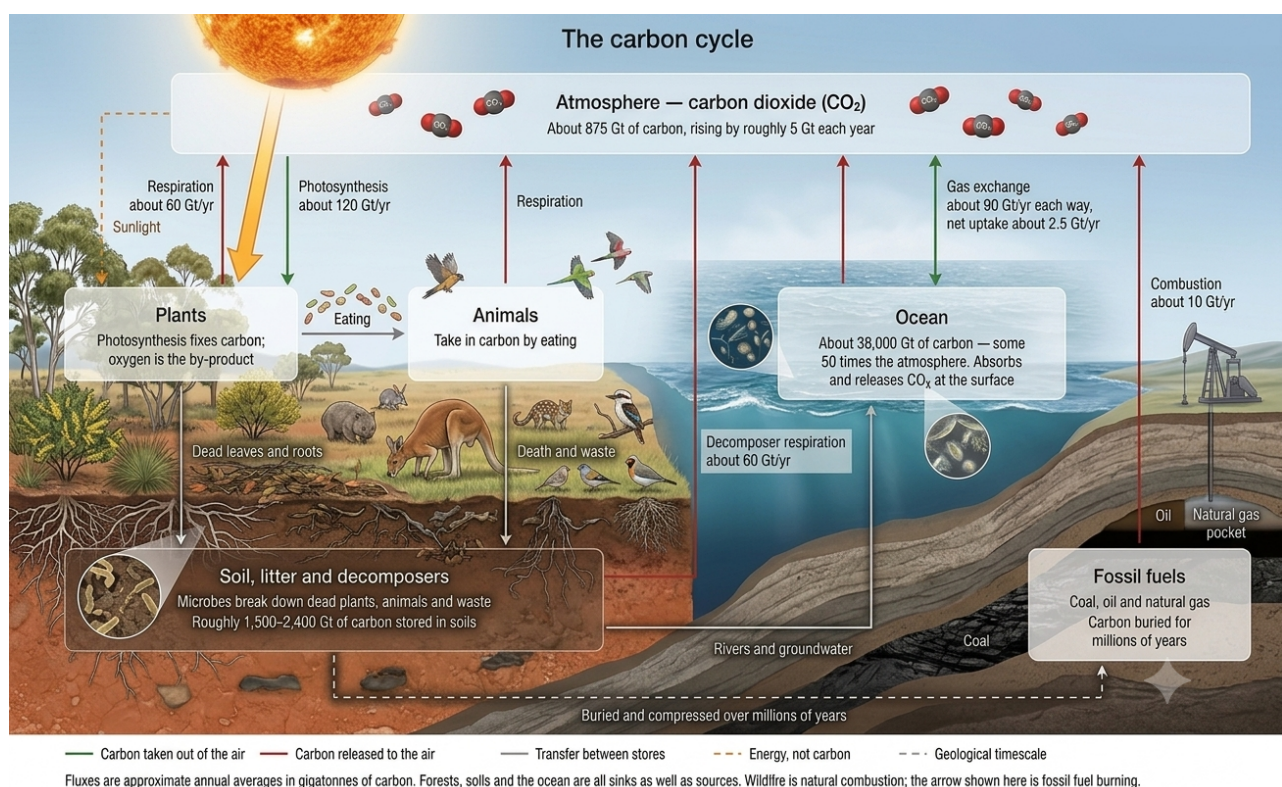
All living things are carbon-based. Carbon moves continuously through living things, the atmosphere, oceans and rocks in the carbon cycle. Plants absorb carbon dioxide from the air during photosynthesis and store it as sugars and wood. Animals eat plants and respire, releasing carbon dioxide back to the air. When living things die, decomposers break them down, releasing more CO₂.

The greenhouse effect

The atmosphere contains greenhouse gases — CO₂, methane, water vapour and others — that act like a blanket around Earth. They absorb heat from the sun that has been re-radiated from Earth's surface and stop it escaping to space. Without any greenhouse effect, Earth would be about -18 degrees C — too cold for life. But too much greenhouse gas (from burning fossil fuels) causes extra warming — this is human-caused climate change.

Fossil fuels and the imbalance

Coal, oil and gas are fossil fuels — they are carbon that was stored underground millions of years ago from dead plants and marine organisms. When we burn them, we release that stored carbon back into the atmosphere very quickly. The carbon cycle cannot absorb it fast enough. This is why CO₂ levels in the atmosphere are rising and temperatures are increasing.





The Carbon Cycle and Climate! Year 9 Science at Home

Human impacts on the carbon cycle

Activity	Impact on carbon cycle	Scale of impact
Burning fossil fuels (coal, oil, gas)	Releases carbon stored for millions of years into the atmosphere as CO ₂	Biggest contributor — ~70% of human CO ₂ emissions
Deforestation (clearing trees)	Removes CO ₂ absorbers; releasing stored carbon when trees die or burn	~10% of human CO ₂ emissions worldwide
Livestock farming (cattle)	Produces methane (a stronger greenhouse gas than CO ₂) through digestion	Significant contributor to methane levels
Traditional fire management	Cool, controlled burns release less carbon than wildfires; promotes new growth that absorbs CO ₂	Can be carbon-neutral or even negative!
Reforestation / carbon farming	Growing trees and restoring vegetation absorbs CO ₂ from the atmosphere	Critical part of climate solutions

Think Like a Scientist — Carbon Footprint

Calculate your family's rough carbon footprint for one week. Consider: transport (how much driving or flights?), electricity (solar or grid?), food (beef and lamb produce much more carbon than vegetables), and waste. What is the biggest source? What one change would reduce it most?

Ask: "If everyone in our community made the same change, how much carbon do you think that would save? Is that a big or small amount?" This is how scientists and policymakers think about climate solutions!

Carbon footprint sources to consider:

1. Transport — every litre of petrol burned releases about 2.3 kg of CO₂
2. Electricity — coal power: ~0.9 kg CO₂ per kWh; solar power: almost none!
3. Food — 1 kg of beef produces about 27 kg CO₂; 1 kg of vegetables about 2 kg
4. Waste — organic waste in landfill produces methane; recycling saves energy
5. Land — trees on Country store carbon; clearing releases it

Questions to ask your child

1. What is the greenhouse effect and why is some greenhouse effect actually important for life on Earth?
2. How is the carbon in fossil fuels connected to ancient living things?
3. Why does burning fossil fuels cause more greenhouse warming than burning wood?
4. How do traditional First Nations fire management practices help reduce carbon emissions?
5. What is carbon farming and how can it benefit First Nations communities?
6. If we planted enough trees to absorb all the CO₂ we produce, would that solve climate change? What are the limits?
7. How does the carbon in the food you eat end up in the air you breathe out?

Carbon footprint calculators are available free online — try searching "Australia carbon footprint calculator." Working through one together is a great way to see which daily activities have the biggest impact and where your family can most easily make a difference.

Key words to know:

Carbon cycle	The continuous movement of carbon through the atmosphere, living things, soil, oceans and rock
Photosynthesis	The process by which plants use sunlight, CO ₂ and water to produce sugars and oxygen
Respiration	The process by which living things release energy from food — releasing CO ₂ as a by-product
Greenhouse effect	The trapping of heat in the atmosphere by greenhouse gases like CO ₂ , methane and water vapour
Fossil fuels	Coal, oil and gas — formed from ancient organic matter; release stored carbon when burned
Carbon sequestration	The absorption and storage of atmospheric CO ₂ — by trees, soil, oceans and other carbon stores
Carbon footprint	The total amount of greenhouse gas emissions caused by an individual, event or organisation

Key words to look up

Carbon cycle · Photosynthesis · Respiration · Greenhouse effect · Fossil fuels · Carbon sequestration · Carbon footprint

What school will check

By the end of Year 9, your child needs to represent the carbon cycle and explain how key processes including combustion, photosynthesis and respiration interact with Earth's spheres.

Try it at home!

Look at your electricity bill or solar system display. How much electricity does your home use each day? If your community used solar power instead of a diesel generator, how much CO₂ would be saved per year? Work it out together!