

2040 - The Maths of Carbon



Name _____

Class _____

Teacher Preparation

Learning intentions:

Students will...

- ... understand that carbon dioxide is a gas that naturally exists, although in very small proportions, as a component of Earth's atmosphere
- ... learn how atmospheric gases (such as CO₂) are measured in 'parts per million' and also how to convert parts per million into a percentage measurement
- ... learn how to construct and interpret a time series graph and use appropriate vocabulary to explain the changes in a given quantity or phenomena over time

Success criteria:

Students can...

- ... identify several key gases in the Earth's atmosphere and describe the way they are measured in 'parts per million'
- ... convert parts per million into a percentage measurement
- ... construct a time series graph from a simple data set



Make the learning intentions and success criteria visible to students throughout this lesson.

Teacher content information: A 2018 study by The University of Melbourne on the thoughts and concerns of young people from Generations X and Y found the number one concern across both groups was lack of action around climate change. In particular, "Generation X worries what climate change will mean for their own children, while Generation Y is concerned about the impact on future generations" ([The Educator](#)). The report indicates that young people seriously mistrust the Government's ability or willingness to tackle climate change.

Tackling climate change requires large-scale, systemic changes across all aspects of society. Simply aiming to reduce our CO₂ emissions is not enough: we need to rapidly decarbonise our planet. While this might sound challenging, the good news is we already have the knowledge and tools to do it.

2040 is an innovative feature documentary that looks to the future, while focusing on what is happening now. Award-winning director Damon Gameau (director of [That Sugar Film](#)) embarks on a journey to explore what the future could look like by the year 2040 if we simply embraced the best solutions already available to us to improve our planet.

The film will demonstrate to your students that we already have the solutions to climate change; we just need to take action to bring them rapidly into the mainstream. The 2040 documentary and curriculum package will support your students in turning this knowledge into positive action for a better future.

Find out how to see the film [here](#). These lessons have been designed with a media library to support teachers. The film is available on video-on-demand and DVD.

The film is the entry point to a global impact campaign that seeks to mobilise audiences to learn about, contribute to, advocate for and invest in regenerative solutions that improve the wellbeing of the planet, all people and all living systems.

To join the Regeneration and share your vision for 2040, see the [website](#).

Watch the 2040 trailer:



[2040 - Official Trailer](#) Password: 2040_EDU

Cool.org, GoodThing Productions and Regen Pictures would like to acknowledge the generous contributions of [Good Pitch Australia](#), [Shark Island Institute](#), [Documentary Australia Foundation](#), [The Caledonia Foundation](#) and our philanthropic partners in the development of these teaching resources.

Addressing misconceptions: Students often hear about the issue of global warming in the media, at home and at school. However, there are two striking observations we can make about the way in which young people hear about, and process, messages about this pressing global environmental issue.

- What is happening to our planet is almost always couched in terms of 'doom and gloom'. Accompanying the discourse surrounding this issue is the sense that a rapidly warming climate is both inevitable and irreversible, therefore there is nothing we can do about it other than lie back and accept a cataclysmic fate.
- There seems to be a fundamental misunderstanding about what has actually caused global warming – in particular, the role of carbon dioxide and its human-induced increase in the atmosphere. Young people often perceive CO₂ as a nasty, unstoppable pollutant choking up the atmosphere, quite unaware that CO₂ is actually a small but highly sensitive and naturally occurring component of Earth's atmosphere. They are also generally unaware that if humans were to take immediate action, it is possible to draw down much of the human contribution to atmospheric CO₂ and so ameliorate its detrimental impact on our climate, oceans and surface temperatures on Earth.

The overall message for students in this lesson (and its optional follow-up lesson, [2040 - Reducing Our Carbon Footprint - 5 & 6](#)), is that mathematics, combined with technological application and determined environmental action, can change our planet's fortune and turn around the outlook for current and future generations. As much as anything, success with our strategies for effective environmental solutions are an exercise in mathematical problem-solving. After all, it is hard to argue with the maths!

The IPCC

The [Intergovernmental Panel on Climate Change \(IPCC\)](#) is the United Nations body for assessing the science related to climate change. It was created to:

- provide policymakers (governments) with regular scientific updates about climate change;
- highlight the impact climate change will have on the planet in the future; and,
- offer some ideas about how to tackle the challenges of climate change's potential effects on the planet.

In 2021-22, the IPCC released their [sixth assessment report](#). This is the most up-to-date physical understanding of the climate system and climate change.

The report makes a number of important points:

- It is unequivocal that human influence has warmed the atmosphere, ocean and land.
- Global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO₂ and other greenhouse gas emissions occur in the coming decades (B1). The report describes five possible climate futures, where #1 is not great and #5 is extremely bad. If we want to keep global warming at less than two degrees, which the IPCC says is the best-case scenario, we need to reduce our CO₂ and greenhouse gas emissions significantly and start right away.

'Net zero' or 'carbon neutral' are terms that refer to achieving an overall balance between greenhouse gas emissions produced and greenhouse gas emissions taken out of the atmosphere. Getting to net zero means we can still produce some emissions, so long as we're doing something else to reduce the greenhouse gases already in the atmosphere at the same time, kind of like balancing a set of scales ([more info](#)).

Psychological safety. The IPCC Report sets a hard challenge. While this real-world issue is essential for students to understand, there is no doubt it can make them feel sad or anxious about the future is becoming darker and scarier by the day.

So, reassure students that we can have a hopeful and optimistic outlook on this report, rather than one of doom and gloom. Explain that optimism involves looking objectively at a situation and making a conscious decision to focus on the good ([more info](#)), and that hope is the belief that you **can** make an impact ([more info](#)). Explain to students that you are going to look ahead, identify what needs to be improved, and then work on the skills and confidence so that they can go out and do it.

If you're interested in learning more about how to approach challenging topics around climate change and sustainability in your classroom through a Hope and Optimism lens, consider [our PD course.](#)

These lessons have been created in partnership with

2040, Good Thing Productions

