# Exploring Climate Change Science Grades 9 & 10 Teacher Worksheet

## Teacher preparation

**Learning intentions:** Students will …

* … understand key terms and processes relating to climate change
* … recognise the key contributing factors to climate change
* … recognise the role of developing a question to guide scientific research

**Success criteria:** Students can …

* … work collaboratively and independently
* … participate in class and group discussions
* … select a science-based communication method suitable for their own work
* … formulate questions that can be answered through research and experiments or fieldwork
* … create and justify a plan for a scientific investigation

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**Teacher content information:**A 2018 study by [The University of Melbourne](https://education.unimelb.edu.au/__data/assets/pdf_file/0011/2887895/Most-important-issues-report-final-Sept-2018.pdf) 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](https://www.theeducatoronline.com/au/news/youth-reveal-their-top-concern-in-national-survey/255130)). The report indicates that young people have a serious mistrust in 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 C02 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](https://thatsugarmovement.com/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 and shifted them into the mainstream.

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](https://madmanfilms.com.au/2040film/). 2040 will only be available in cinemas for the first part of 2019 and you can make a group booking for your class at your local cinema during the film’s theatrical release which starts on May 23. These lessons have been designed with a media library to support teachers. The film will be available on video-on-demand and DVD later in 2019.

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](https://whatsyour2040.com/).

**Watch the 2040 trailer:**

[A person riding a horse

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<https://youtu.be/sR51ZDNSRFQ>

Cool Australia, GoodThing Productions and Regen Pictures would like to acknowledge the generous contributions of [Good Pitch Australia](https://goodpitch2australia.com.au/), [Shark Island Institute](https://sharkisland.com.au/shark-island-institute/), [Documentary Australia Foundation](https://www.documentaryaustralia.com.au/), [The Caledonia Foundation](https://www.caledoniafoundation.com.au/) and our philanthropic partners in the development of these teaching resources.

## Teaching sequence

**Work through this resource material in the following sequence:**

20 minutes – Part A: Activating Prior Knowledge  
20 minutes – Part B: Understanding the Factors Contributing to Climate Change   
25 minutes – Part C: Designing a Proposal for Future Research  
5 minutes – Reflection

### **Part A: Activating Prior Knowledge**

**Preparation:** Print one copy of the [AGREE/DISAGREE signs](https://prod-media.coolaustralia.org/wp-content/uploads/2018/10/21192017/2040_AgreeDisagreeSigns.pdf) or create your own.

**Step 1.** Begin by explaining to students that in this lesson they will be exploring the relationship between our energy choices and climate change. In the first part of the lesson, students will look at climate change by participating in a barometer activity to assess their prior knowledge of climate change and to provide an opportunity to explore some of the key facts and issues around climate change.

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Read the following statements to students, one at a time. Use the suggested responses to clarify key points with students:

* I know what the weather is.  
  Suggested response: Weather is the hourly, daily or weekly events such as temperature, cloud cover, wind, heat waves, storms or precipitation.
* I know what the climate is.  
  Suggested response: Climate is the long-term changes in patterns of weather over a long period of time, such as 20 years.
* I know what climate change is.  
  Suggested response: Climate change is a change in the pattern of weather, and related changes in oceans, land surfaces and ice sheets, occurring over time scales of decades or longer.
* I know what the greenhouse effect is.  
  Suggested response: The greenhouse effect has been around since the formation of the planet. Naturally occurring gases – such as methane and carbon dioxide – forms a blanket around the Earth, trapping heat from the sun in our atmosphere and keeping the Earth at a steady temperature where life can thrive. However, in recent years human activities – such as burning fossil fuels and deforestation – have seen an increase in the amounts of these heat-trapping gases (greenhouse gases) entering the atmosphere. This has meant that more heat from the sun is being trapped in our atmosphere. This is the greenhouse effect.
* I know what global warming is.  
  Suggested response: As more heat is trapped in our atmosphere, the temperature rises. This is known as global warming.

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**Step 2.** Once complete, explain to students that they will now watch a clip from the 2040 documentary. As they watch, invite students to record anything they find interesting or important:

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[2040 – Global Challenges](https://vimeo.com/showcase/6167669/video/336498352)   
**Password: 2040\_EDU**   
(https://vimeo.com/showcase/6167669/video/336498352)

* What did you see in this clip?
* What did you find interesting or important about this clip?
* What human activities identified in this clip have caused the most amount of carbon to be released into our atmosphere?  
  Suggested answers: Burning fossil fuels for energy (including for transport), landscape changes including farming and land clearing.
* What do you already know about reducing emissions? What actions can we take?  
  Suggested answers: Use renewable energy (such as wind or solar), choose more sustainable forms of transport like public transport, ride-sharing, cycling or walking and try to stick to a plant-based diet.
* What questions do you still have about the content in this clip or about climate change?

Take a few minutes to clarify any questions or concerns students still have about climate change. Further information about climate change can be found here: [Bill Nye Climate 101](https://youtu.be/EtW2rrLHs08), [Climate Council](https://www.climatecouncil.org.au/), [Department of Environment and Energy](https://www.environment.gov.au/climate-change) and [Climate Change Factsheet](https://prod-media.coolaustralia.org/wp-content/uploads/2019/02/19152044/2040_ClimateChangeFactsheetv1.pdf). Alternatively, these questions can be used to guide further inquiry in another lesson or through homework.

### **Part B: Understanding The Factors Contributing To Climate Change**

**Step 1.** Invite students to return to the AGREE/DISAGREE signs and to respond to the following statement:

* I know what the relationship between energy and climate change is.
* I know what the relationship between food and climate change is.
* I know what the relationship between transport and climate change is.

Invite students to explain their position along the line and to share anything they already know about the relationship between these three factors and climate change.

Explain to students that they will now investigate this further as a class.

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**Step 2.** Break the class into a number of groups that can be divisible by three (e.g. 3, 6 or 9 groups). Give each group a number from 1 to 3. Explain to students that each group will be investigating one of the following factors contributing to climate change, based on the number they have been assigned:

* Energy
* Food
* Transport

Each group needs to work to formulate two questions around the factor they have been assigned. For the first question, students need to formulate a question that could be answered through research. You may find it useful to provide students with the [Generating Questions Factsheet](https://prod-media.coolaustralia.org/wp-content/uploads/2019/05/23154623/2040_GeneratingQuestionsFactsheet_FINAL.pdf).

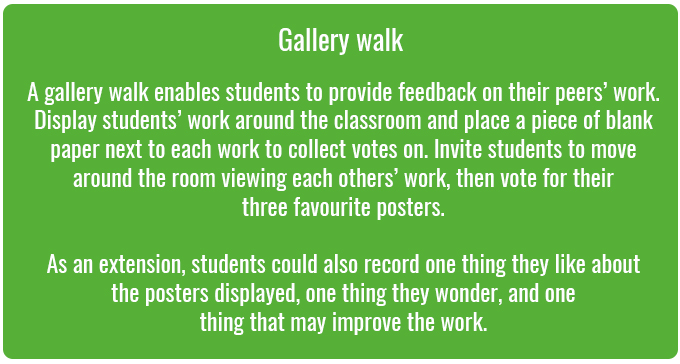
Explain that each group should aim to create at least five questions that they think they could answer through online research and record these on the Student Worksheet.

Once complete, invite each group to select what they think is the most interesting question their group generated, making sure this is a question they think they could answer. Each group should write this question down on a sticky note or small piece of paper and give it to the teacher. The teacher can then redistribute these questions to groups, with one question for each group. Each group then needs to take their question and conduct research in order to answer this question (remind students of the [Search Strategies for Googling](https://prod-media.coolaustralia.org/wp-content/uploads/2017/07/06163937/Search-strategies-for-Googling.pdf) when conducting research online).

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**Step 3.** When groups have conducted their research, they should find a visual way to present their information (e.g. poster, slide show). Conduct a Gallery Walk, so students can view each other’s work, pose questions and share thoughts.



### **Part C: Designing a Proposal For Further Research**

**Step 1.** Explain to students that now they have conducted research into their assigned factor, they can think about an experiment or field work activity that would help them understand the factor they researched in more detail.

**Step 2.** Assist groups to formulate an aim (or research question) that could be answered through their chosen method of research and develop a plan around how this research could be conducted. They will also need to consider what resources/equipment they would need to conduct this research.

**Step 3:** Provide groups with the [Experiment Proposal Template](https://prod-media.coolaustralia.org/wp-content/uploads/2019/05/23154900/2040_ExperimentProposalTemplate_FINAL.pdf) to assist their planning. Each group needs to:

* Develop a hypothesis
* Suggest resources that would be required
* Develop a plan for research (what would happen and why this approach has been chosen)
* Think about how much data they would need for this research
* Consider confounding variables and explain how these could be controlled.

**Step 4.** Once the template is completed, you could either:

* Invite groups to share their ideas with the class; or
* Invite groups looking at the same factor to share their ideas; or
* Invite students to submit their ideas to the teacher.

**Step 5. OPTIONAL –** Where feasible, students could conduct their experiments/fieldwork.

## Reflection

Ask students to reflect on their learning throughout the lesson by completing the following sentence stems on the Student Worksheet. Encourage students to provide detail and examples to support their change in thinking.

* I used to think…
* Now I think…

## Take It Further

To expand on student’s learning in this activity, consider following up with this lesson; [*2040 Vision For Your Community*](https://www.coolaustralia.org/activity/2040-a-2040-vision-for-your-community-years-7-to-10/).

## Teacher Reflection

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## What’s Your 2040?

Record your students’ work in their communities with the hashtag #whatsyour2040 and share their visions in the ‘2040: [The Regeneration’ Facebook Group](https://www.facebook.com/groups/2040TheRegeneration/).

The 2040 crew would love to see your class’ work.