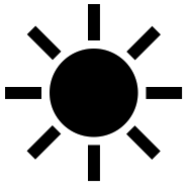
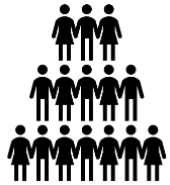
THE EARTH MUSEUM

Lesson 2: What causes climate change?

You will need access to the TEM Climate Change Explorer for this lesson

There's a lot we still don't know about the way our planet works including the details of how and why climate changes. But we know from the research by scientists where the clues are that we need to investigate:

Fossils	Ice	Sun	Volcanoes	Us
				

Exercise 1

Teacher notes: 15 minutes

	**Your answers**
Fossils of animal and plant life discovered in the ground can tell us a lot about how climate has changed in the past. On the Climate Change Explorer, search for **Smallest Antarctic Fossil** and read the story	
What is the name of the fossil discovered there?	Ostracod
What kind of environment do they like to live in?	Lake environments
Could the fossil have lived in that area now? If not, why not?	Present conditions in this Antarctic region show mean annual temperatures of minus 25 degrees C. These are far too cold to sustain a lake fauna with ostracods.

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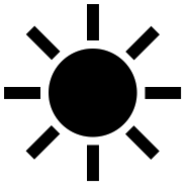
Exercise 2

Teacher notes: 15 minutes

	**Your answers**
There are also clues about climate change trapped in the ice of Greenland and Antarctica which scientists have revealed. On the Climate Change Explorer, search for **Time Capsules of Ice** and watch the films	
What does the graph produced from analysing the ice core tell us about climate change?	That over at least 400,000 years, the climate of planet Earth has changed on a regular cycle with temperature and CO2 going up and down. And that since the Industrial Revolution people have changed this natural cycle in a very significant way.

Exercise 3

Teacher notes: 15 minutes

	**Your answers**
We know that slight changes in how the Sun works and how the Earth orbits round the Sun are responsible for past regular changes in temperature and CO2 (ice ages). Scientists have sent high powered telescopes into space including one trained on the Sun, our closest star, which has been studying how the Sun works since 2010. On the Climate Change Explorer, search for **The Sun** and watch the film about NASA's project.	
What have you discovered about how the Sun works?	That the Sun is beautiful, it is constantly changing and releasing plasma and gas, that it involves magnetic forces, and that its activity follows a pattern of activity and inactivity taking place over an 11-year cycle. This does not explain the great increase in temperature experienced by planet Earth since the 1980s.

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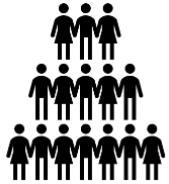
Exercise 4

Teacher notes: 15 minutes

	**Your answers**
We know that volcanoes and volcanic activity both on land and underwater release gases from deep within the Earth that naturally contribute CO2 into the atmosphere. There are about 1,500 potentially active volcanoes in the world today, and millions of volcanoes that have been active at some point in the Earth's past. Each time a volcano erupts it sends rock and gases from inside the Earth's crust (surface) out into the atmosphere. On the Climate Change Explorer, search for **Krakatoa** and watch the first film to find out more about the impact of this one major volcanic eruption on the Earth's weather systems.	
What have you discovered about the impact of volcanic eruptions on our weather?	That volcanoes are powerful natural forces that have been erupting throughout our planet's history releasing rock/ lava/ ash/ gasses into the atmosphere with the ability to change climate patterns temporarily.

Exercise 5

Teacher notes: 15 minutes

	**Your answers**
Since the Industrial Revolution began in the early C19th people across the world have been removing the Earth's natural carbon stores by mining and drilling – coal, gas and oil – burning them to create power for machinery, electricity, heat – and pumping the waste CO2 and other gases into the atmosphere.	

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On the Climate Change Explorer, search for **The First Factory** and find out how the actions of people over the last 250 years has tipped planet Earth into a scale of climate change now that is potentially disastrous for everything everywhere living on planet Earth, including you. Unless we do something URGENTLY about it.	
What have you discovered?	How the Earth naturally has cycles of warming and increased CO2 as a result of: • influences from the Sun in space • changes in the planet's orbit round the sun • volcanic activities from within the Earth And how human action, especially the burning of fossil fuels (coal, oil and gas), has drastically tipped the natural balance and accelerated climate change into unknown territory which is likely to be disastrous for every living thing on the planet unless we do something about it urgently.