

Theme 1. Climate Change

Teacher guide - Ages 11-14

Preparation

Review the material and watch the videos. Do some preparation on the topic. For the Outdoor Experience some materials are required. Feel free to add any resources or materials you have available to enrich the lessons. Also check the *Introduction lesson Teacher guide* for useful tips and suggestions for preparing and giving the lessons within a theme.

Learning Goals

The students ...

- learn what climate change is.
- know there is a difference between natural climate change and climate change caused by human activity
- know the cause and the consequences of global warming
- learn about solutions to counteract climate change
- know what they can do to help prevent global warming
- are able to tell others what they learned.

Key Vocabulary

- climate change
- the environment
- desertification
- the carbon cycle
- the atmosphere
- greenhouse effect
- emission
- carbon dioxide
- pollute
- temperature rise

Introduction

[Slides 3-5]

Ask: Have you ever ordered anything online, together with your parents? What are the reasons to buy online instead of going to the store? Possibly share your own experiences about online



shopping here. Discuss what happens from the moment you click the order button to the moment the package is delivered. What route does a package take?

Complete exercise 1 together on the interactive whiteboard and discuss it. After this, discuss the learning goals of this theme.

Instruction

[Slides 6-8]

Issue

Ask the students what climate change is according to them.

Explain different causes of climate change:

- *climate change due to natural causes.*
- *climate change due to human activity.*

What activities are we talking about? Think about burning fossil fuels: oil, gas and coal. This causes more CO₂ emissions and therefore the global temperature rises. The increase of methane is caused partly by agriculture (for example cows and rice fields. People use more and more energy. Refer to the exercise you discussed during the introduction. (Think about excess packaging and also delivery vans for example.)

Discuss examples of consequences of climate change:

- *The global temperature rises.*
- *There is more extreme weather (extreme downpour, tropical storms, etc.).*
- *Dry areas become more dry. There is desertification, which causes problems for agriculture and water supply.*
- *Because of global warming, the sea levels are rising. This is caused firstly by melting ice sheets and glaciers, which releases more water in the oceans and the seas. Secondly, the sea levels rise because of the heat on Earth. This causes the water temperature to rise, which causes the water to 'expand'. Because of the rising sea levels, there are more severe floods.*

Complete exercise 2 and discuss it.

[slides 9- 14]

Discuss why the climate changes. Explain it and/or watch the video.

The climate changes because people disrupt the natural cycle of carbon. In everything we do - driving a car, buying clothes, having factories mass produce goods - we produce carbon dioxide.

There is carbon in carbon dioxide. Carbon can be found everywhere on Earth. Humans and animals breathe out carbon dioxide. Volcanoes are an example of natural sources that emit carbon dioxide when they erupt. Oceans don't just absorb water and warmth, they also absorb (and release) carbon dioxide and since they are spread all over the earth they act as a sort of climate controller. Plants and trees also absorb carbon dioxide. (And when trees are cut down, carbon dioxide is released). Because people need energy, we disrupt this cycle: we use fossil fuels from the Earth (like oil, gas, coal) and burn them to generate energy. A lot of carbon dioxide is being released. Too much carbon dioxide remains in the atmosphere.



Watch the film.

Complete exercise 3 and 4 and discuss them.

[Slides 15-21]

Discuss the term greenhouse effect and watch the video.

In the layer around the Earth (the atmosphere) there are greenhouse gases, like carbon dioxide. These gases absorb and hold the warmth on Earth. The atmosphere works like a greenhouse. We need greenhouse gases to be able to live on Earth (otherwise it would be too cold). But a surplus of greenhouse gases causes too much warmth to be held. The global temperature rises. Because we have been measuring temperature for more than a 100 years, we know that the global temperature rises, the oceans are warming up and the ice sheets are melting.

Complete exercise 5 together on the interactive whiteboard and discuss it.

The Earth's temperature has risen 1 degree Celsius in the past 100 years. It is important that the temperature of the earth does not rise more than 1.5 degrees. This can lead to extreme weather conditions.

Ask students if they are able to explain the illustration shown (of the greenhouse effect) and what is happening in the illustration.

[Slides 22-25]

A solution

What can we do to make a difference?

Explain the following solutions:

- *Emit less carbon dioxide (later on you will discuss how)*
- *Plant more trees*

Do the students know how trees and plants can help?

Trees take up carbon dioxide from the air. Specifically while growing, trees store extra carbon dioxide.

To counteract the greenhouse effect, we all have to reduce our carbon dioxide emissions.

Complete exercise 6.

[Slides 26-27]

What can you do?

Tell the students that they now know a lot about climate change and that they can also make a difference. For example they can share this information, but they can also change things in their lives (together with their parents) and create awareness. Watch the video together.

Complete exercise 7 and discuss it.

Suggested related themes

Theme 8 about trees relates to the solutions against the greenhouse effect.



Theme 2 about energy

Theme 7 about air, relate to subjects as CO₂ (emissions) and other gases.

Worksheet

[Slide 28]

Assign the worksheet. Discuss the exercises on the worksheet. If the students work together on exercise 2, the groups can present their answers. The drawing of exercise 3 can be made on a different sheet. Hang all the drawings together and discuss with your students which drawings represent the greenhouse effect best. Exercise 5 shows that some people deny the problem. What do the students think about this? What can be done against this? In exercise 6, you can discuss your own measures. Is there an electronic appliance in the classroom or at school that is not used regularly or not used at all? In exercise 7 you can discuss the rules. All the students can share their opinions.

Practical Assignment

[Slide 29]

Make a collage about climate change. With this collage you can tell others more about his subject.

Closing

[Slide 30]

Discuss the learning goals and make an appointment with the students about how and when they can continue their practical assignment (making a collage). Organise a moment where they can be presented/shown.

Outdoor experience

[Slides 31-33]

Do an experiment to measure the greenhouse effect using two (digital) thermometers and a glass container, like a jar. Go through the steps of the experiment. Discuss what you observe. What do you think will happen to the temperature when the thermometer is in the sealed glass jar in the sun? What happens in the shade?

Extras

[Slides 34-41]

Game: Hangman

Exercise 1

Let the students react to statements.

- It is still cold in the winter, so there is no such thing as global warming.



- There is no use in trying in our country if other countries and continents are not making any changes.
- Children can't do anything to stop climate change.

Exercise 2

Give the students the following exercise:

Take a look at the local weather forecast. Do some research and share your findings with your class.

- How is it possible that we can predict the weather so far in advance?
- Why is it important to be able to predict the weather so far in advance?
- What is the difference between 'weather' and 'climate'?

Exercise 3

Look for a film or series about the theme climate. Which titles can you find? Is there one that interests you? Choose one film or episode of a series that you could look at with your class or at home.

Extra films

Materials Required

For the collage: cardboard, pictures, images, A4-paper, pens, pencils, glue, scissors and adhesive tape.

For the outdoor experience: 2 digital thermometers, timer or stopwatch, 1 glass jar with lid.

Theme 1. Climate change

Answer Key - Ages 11-14

Exercise 2

- Example: Climate Change is normal. But the Earth warms up too much, because of too much greenhouse gas emissions. This influences our climate in a negative way.
- Example: Draught, flood, some animal species become extinct.
- Example: Less flying by plane, take a walk or use your bike (not the car), eat less meat.

Exercise 4

Flight shame:

To be ashamed to book a flight (because travelling by train is better for the environment, for example).

