



Air Quality and Climate Change Lesson Ideas



About the lesson Ideas sheet

This lesson ideas sheet relates to the Care for KentAir website which forms a main but not only resource for teachers or students to use. This could be linked with a lesson plan Unit 9G: Environmental chemistry: Pollution 1 found at: <https://www.tes.com/teaching-resource/unit-9g-environmental-chemistry-pollution-1-6076077#> and <https://www.tes.com/teaching-resource/unit-9g-environmental-chemistry-pollution-2-6076080>. There are also some good alternative resources including hands on activities relating to what air is, air pollution health and smog available at: <https://en.vmm.be/publications/joaquin-air-pollution-lesson-package>

In this Care for KentAir lesson plan pupils:

- consider the sources of pollutants
- consider how air quality is monitored and how individuals can affect emissions of pollutants
- distinguish between different environmental issues (air quality and climate change)
- undertake a short test of understanding which may also provide further discussion areas

In scientific enquiry pupils:

- consider how scientists work to monitor the environment
- decide on the suitability of secondary sources for providing information on a particular question
- consider how evidence for climate and environmental change needs careful interpretation
- evaluate the evidence obtained
- investigate environmental change using evidence from secondary sources

Where the lesson may fit in

The lesson ideas may provide a foundation for work on changes to the atmosphere and Earth. It also relates in some way to gas exchange systems and material cycles and energy in key stage 3 biology.

Expectations

At the end of this unit:

Most pupils will	Some pupils will
understand what air quality is	understand how weather affects air quality
understand what pollution is and be able to name a few pollutants and know at least a few sources of pollutants	understand well what can be done to prevent pollution
understand what climate change is	understand well what can be done to prevent climate change
understand the link between air quality and human health	

Prior learning

It is helpful if pupils:

- have a basic understanding of website navigation, a basic understanding of the environment and know what the term pollution means

Air quality - What is pollution, sources and how can we improve air quality?			
PUPILS SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES	NOTES/COMENTS
<p>What pollutants are, what potential sources are, how pollutants are measured and what people can do to reduce emission of pollutants.</p> <p>The relative difference in emissions per passenger from different vehicles.</p> <p>How pollutants can affect human health and specifically which individuals will be affected more by lower air quality.</p>	<p>Invite an adult responsible for environmental matters, <i>eg an environmental health officer from the local authority or an officer from the Environment Agency</i>, to talk about their work.</p> <p>Ask pupils to prepare questions to ask, eg about the way in which air quality are monitored, what is done to prevent pollution, how the information is made public, what actions may help reduce air pollution locally. The pupils could discuss if there are actions the school could take to reduce pollution.</p> <p>Discuss local sources of pollutants using the Care for KentAir's Pollutants –What you need to know page.</p> <p>Discuss how weather plays a part in air quality using the relevant Care for KentAir page.</p> <p>Using the information from the talk and other sources such as the Care for KentAir website, ask pupils to compile a summary sheet for each of the major pollutants and list actions which may prevent or reduce emissions of pollutants.</p> <p>Undertake a comparison of how pupils travel to school, then pupils could use the emissions calculator tool to gather their own information on emissions for their school trip and then the teacher could compile total emissions, take the mean of those taking public transport to those taking private transport. This should show pupils the emissions are lower for those taking public transport.</p> <p>Cards/photos of sources printed then students take turns in selecting a card to put against each of the main pollutants described in Care for KentAir.</p> <p>Plot graphs of data obtained from the KentAir website (http://www.kentair.org.uk/index) using a graphics package to seasonality (eg ozone) so pupils understand the link with hot sunny days.</p>	<p>Describe what likely sources of pollution are and what the local sources could be in their local area.</p> <p>Identify steps that could be taken to reduce pollution by individuals or organisations (eg the school).</p> <p>Understand the potential differences of emissions from different vehicles and how they compare per passenger.</p> <p>Identify and evaluate and summarise information on various subjects.</p>	<p>You may wish to discuss the historic smogs in the UK or air pollution in some cities in China as examples of poor air quality.</p> <p>Live air quality data could be presented from the KentAir website.</p> <p>More information on the relationship between air quality and health can be found at the World Health Organisation site at http://www.who.int/mediacentre/factsheets/fs313/en/</p>

Is climate change, what are the impacts and what can be done to prevent it?			
PUPILS SHOULD LEARN	POSSIBLE TEACHING ACTIVITIES	LEARNING OUTCOMES	NOTES/COMENTS
<p>What climate change is and what causes it, what are greenhouse gases (GHGs), how the greenhouse effect works, potential sources of the GHGs are and what people can do to reduce emission of GHGs.</p>	<p>Use the information on the Care for KentAir website to summarise the potential impacts of climate change and list actions that individuals or the school could take which may help limit further climate change.</p> <p>Use a suitable video that describes the greenhouse effect and the ozone layer. Use this to also highlight the difference between ground level ozone that can have health effects and the ozone layer which is beneficial.</p> <p>Two groups of pupils could be shown two different videos that support and do not support the view that climate change is happening. Then the two groups could discuss the evidence presented. They could then watch the other video and then the class could discuss whether there is enough evidence to convince all pupils.</p>	<p>Describe what the sources of greenhouse gases and what the impacts are.</p> <p>Identify steps that could be taken to reduce climate change by individuals or organisations (eg the school).</p> <p>Understand the potential differences of emissions from different vehicles and how they compare per passenger.</p> <p>Identify and evaluate and summarise information on various subjects.</p>	<p>There are videos online or other electronic media that offer information about climate change from a variety of perspectives. An introduction to climate change can be found at http://www.grida.no/climate/vital/intro.htm. Pupils may confuse ground level ozone contributing to reduced air quality and the ozone layer which protects the earth from harmful radiation. It may be helpful to provide them with a simplified explanation of how the ozone layer works and informing them of the health effects of ozone. Useful information relating to the ozone layer that may be suitable for teachers available at: http://www.grida.no/files/publications/vital_ozone_graphics_2/ozonell_updt.pdf</p> <p>Pupils may have heard of global warming, this term has been replaced by climate change as the effects of climate change are not limited to higher temperatures. There are also likely to be more droughts, weather events which are more frequent and severe, melting of glaciers and ice sheets/caps and rising sea levels.</p> <p>There may be confusion between GHGs and pollutants. GHGs lead to the Green House effect whereas pollutants at ground level are a health concern.</p>

Reviewing work

- Provide pupils with summary fact sheets available from Care for KentAir and ask them to check their understanding
- Consolidate key points with pupils and those questions that were not answered correctly

Health and safety

Although there are no hazardous activities specifically detailed in this lesson plan, if external links with activities detailed with them suitable risk assessments should be carried out and signed off appropriately. Each school will have specific risk assessments required.

Language for learning

Through the activities in this unit, pupils will be able to understand, use and spell correctly words and phrases:

- relating to air quality and climate change
- with a more precise meaning in scientific contexts, *e.g. pollutants such as nitrogen dioxide and ozone and terms such as air quality, pollutants and climate change*

Through the activities pupils could:

- appraise texts quickly and pick out specific point of interest
- discuss and evaluate conflicting evidence to arrive at a considered viewpoint (through viewing and evaluating two opposing videos relating to climate change)

Resources

Resources could include:

- Care for KentAir website
- KentAir website (<http://www.kentair.org.uk/index>)
- unit 9G lesson plan: Environmental chemistry: Pollution 1 (<https://www.tes.com/teaching-resource/unit-9g-environmental-chemistry-pollution-1-6076077#>)
- lesson package including hands on activities <https://en.vmm.be/publications/joaquin-air-pollution-lesson-package>
- useful information relating to the ozone layer that may be suitable for teachers available at: http://www.grida.no/files/publications/vital_ozone_graphics_2/ozonell_updt.pdf
- introduction to climate change for teachers can be found at <http://www.grida.no/climate/vital/intro.htm>
- photographs of images relating to air quality such as vehicles
- images of the structure of various pollutants
- selected data from KentAir website to enable graphs to be prepared showing trends, seasonality of pollution (eg ozone at ground level)
- evidence indicative of air pollution at a particular time in the past, eg pictures of the smogs in London in mid 1900's, information and quotes from health organisations on air quality
- simplified accounts, eg *video information about climate change*, the greenhouse effect and about pollution and sources