



The Sutton Academy

Knowledge Rich Curriculum Plan

SCIENCE- Chemistry Year 11

Lesson/Learning Sequence	Intended Knowledge: <i>Students will know that...</i>	Prior Knowledge: <i>In order to know this, students need to already know that...</i>	Working Scientifically	Tiered Vocabulary and Reading Activity	Assessment	Support
Lesson: Earth's Early Atmosphere	- Students will know that theories about what was in the Earth's early atmosphere and how the atmosphere was formed have changed and developed over time. - Students will know that the evidence for Earth's early	<i>Students need to already know that there are gases in Earth's atmosphere.</i>	<i>Interpreting data</i> To use ratios, fractions and percentages.	Tier 2 Atmosphere: the layer of gases surrounding a planet	What caused the high carbon dioxide levels in the earths early atmosphere. Why might certain people question	BBC Bitesize Tassomai Kay Science Knowledge organiser

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	atmosphere is limited because of the time scale of 4.6 billion years. - Students will know that one of the theories of Earth's early atmosphere is that during the first billion years of the Earth's existence there was intense volcanic activity, that released gases that formed the early atmosphere and water vapour that condensed to form the oceans. - Students will know that at the start of this period the Earth's atmosphere may have been like the atmosphere of Mars and Venus today, consisting of mainly carbon dioxide with little or no oxygen gas. - Students will know that volcanoes also produced nitrogen which gradually built up in the atmosphere and there may have been small proportions of methane and ammonia. Students will know how to interpret evidence and evaluate appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere				<i>the volcanic theory?</i> <i>What is meant by proxy evidence ?</i> <i>Why are there several theories regarding the earths early atmosphere?</i>	
Lesson: The Changing Atmosphere	- Students will know that the water vapour in Earth's atmosphere will have condensed when Earth's surface cooled down. - Students will know that when the oceans formed carbon dioxide dissolved in the water, and carbonates were precipitated producing sediments. This will have reduced the amount of carbon dioxide in the atmosphere - Students will know that primitive algae and plants will have photosynthesised, which will have increased the amount of oxygen in	<i>Students need to already know that Earth's current atmosphere contains little amount of carbon dioxide.</i>	<i>To use ratios, fractions and percentages.</i> <i>Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.</i>	<i>Tier 2</i> <i>Primitive: something in the early stage in the evolutionary/ historical development of something</i> <i>Tier 3</i> <i>Photosynthesis: the biological process where</i>	<i>What caused the decrease in carbon dioxide levels</i> <i>What impact did green plants and algae have on the earth's atmosphere</i> <i>Other than photosynthesis explain how carbon dioxide levels decreased</i>	<i>BBC Bitesize</i> <i>Tassomai</i> <i>Kay Science</i> <i>Knowledge organiser</i>

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	the atmosphere and decreased the amount of carbon dioxide in the atmosphere. - Students will know how to explain the changes of the atmosphere - Students will know how to explain the formation of deposits of limestone, coal, crude oil and natural gas. - Students will know that Earth's current atmosphere is made up of: -80% nitrogen -20% oxygen -small amounts of noble gases, water vapour and carbon dioxide			plants convert carbon dioxide and water into glucose and oxygen		
Lesson: Greenhouse gases and their sources	- Students will know that greenhouse gases in the atmosphere maintain temperatures on Earth high enough to support life. - Students will know that water vapour, carbon dioxide and methane are greenhouse gases. - Students will know that human activities increase the amounts of carbon dioxide and methane in the atmosphere. - Students will know that activities that increase the amount of each greenhouse gases include: - burning fossil fuels (carbon dioxide) - deforestation (carbon dioxide) - cattle farming/ rice farming (methane) Students will know how to evaluate the quality of evidence about global climate change	<i>Students need to already know that burning fuels releases carbon dioxide</i>	Evaluating skills Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.	Tier 2 Deforestation: removal of woodland Cattle: Referring to cows Tier 3 Greenhouse gas: gases within the atmosphere that can absorb and reemit infrared radiation towards Earth's surface	Give the names of 3 main greenhouse gases What human activities cause an increase in greenhouse gases. Why might people protest about the use of cars/ deforestation?	BBC Bitesize Tassomai Kay Science Knowledge organiser

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Lesson: The Greenhouse Effect	- Students will know that the greenhouse effect is when the greenhouse gases absorb heat radiated from the Earth and then releases energy in all directions, which keeps the Earth warm - Students will know how the greenhouse effect works, as sequenced below: 1) Electromagnetic radiation at most wavelengths passes through the Earth's atmosphere 2) The Earth absorbs most of the radiation and warms up 3) The Earth radiates energy as infrared radiation 4) Some of the infrared radiation goes into space 5) Some of the infrared radiation is absorbed by greenhouse gases in the atmosphere 6) The lower atmosphere warms up	<i>Students need to already know that methane, carbon dioxide and water vapour are examples of greenhouse gases</i>	Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.	Tier 2 Tier 3 Electromagnetic radiation: radiation including radio waves, microwaves, infrared, visible light, ultraviolet, X-rays and gamma rays.	What are some of the effects of greenhouse gases? What type of energy is absorbed from the sun? What affect does green houses gases have on long wave radiation. Give examples of greenhouse gases Explain how Carbon dioxide helps to maintain temperatures on earth.	<i>BBC Bitesize</i> <i>Tassomai</i> <i>Kay Science</i> <i>Knowledge organiser</i>
Lesson: Climate Change	- Students will know that an increase in average global temperature is a major change of climate change - Students will know that there are several potential effects of global climate change, including: -loss of habitat -extremes in weather -rise in sea level -increase in diseases, such as malaria Students will know how to discuss the scale, risk and environmental implications of global climate change	<i>Students will already know that human activities increase the amount of greenhouse gases in the atmosphere</i>	Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.	Tier 2 Environmental: relating to the natural world and the human impact on its condition. Tier 3	What are the main causes of climate change? What might be the impact of global climate change?	<i>BBC Bitesize</i> <i>Tassomai</i> <i>Kay Science</i> <i>Knowledge organiser</i>

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Lesson: Carbon Footprint	- Students will know that the carbon footprint is the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event. - Students will know that the carbon footprint can be reduced by reducing emissions of carbon dioxide and methane. - Students will know how to describe actions that reduce emissions of carbon dioxide and emissions - Students will know how to explain why some actions in reducing carbon dioxide and methane may be limited	<i>Students need to already know that burning fuels releases carbon dioxide</i>	Appreciate the power and limitations of science and consider any ethical issues which may arise.	Tier 2 Tier 3 Carbon footprint: the total amount of carbon dioxide and other greenhouse gases emitted over the full life cycle of a product, service or event	Describe how someone might reduce their carbon footprint Describe how reducing carbon footprints may be difficult	<i>BBC Bitesize</i> <i>Tassomai</i> <i>Kay Science</i> <i>Knowledge organiser</i>
Lesson: Other Pollutants and Their Effects	- Students will know that most fuels contain carbon and/ or hydrogen, and may also contain some sulfur - Students will know that gases that are released into the atmosphere when a fuel is burned may include carbon dioxide, water vapour, carbon monoxide, sulfur dioxide and oxides of nitrogen. - Students will know that solid particles and unburned hydrocarbons can be released, and that these form particulates in the atmosphere. - Students will know how to predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used. - Students will know that carbon monoxide is a toxic gas. - Students will know that carbon monoxide is colourless and	Students will know that pollutants are released from the burning of fossil fuels.	<i>Use a variety of models such as representational, spatial, descriptive, computational and mathematical to solve problems, make predictions and to develop scientific explanations and understanding of familiar and unfamiliar facts.</i>	Tier 2 Pollutant: a substance that pollutes something Tier 3 Particulates: matter in the form of minute separate particles	How might the impurities in fuels contribute to pollution? How does incomplete combustion contribute to global dimming. What are the issues with a release of carbon monoxide from incomplete combustion.	<i>BBC Bitesize</i> <i>Tassomai</i> <i>Kay Science</i> <i>Knowledge organiser</i>

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	odourless, making it difficult to detect. - Students will know that sulfur dioxide and oxides of nitrogen can cause respiratory problems in humans and cause acid rain - Students will know that particulates cause global dimming and health problems for humans 2. Students will know how to explain the problems caused by increased amounts of these pollutants in the air.					