AQA (Trilogy) Combined Science GCSE **Student Progress Sheet**

Name: Target:

Unit 5.9 – Chemistry of the Atmosphere

5.9.1. The Composition and Evolution of the Earth's Atmosphere

5.9.1.1. The Proportions of Different Gases in the Atmosphere

a	I know that, for 200 million years, the proportions of different gases in the atmosphere have been much the same as they are today: approximately 80% nitrogen, 20% oxygen and small proportions of various other gases, including carbon dioxide, water vapour and noble gases.				

5.9.1.2. The Earth's Early Atmosphere

a	I know that theories about what was in the Earth's early atmosphere and how the atmosphere was formed have changed and developed over time.				
b	I know that evidence for the early atmosphere is limited because of the time scale of 4.6 billion years.				
c	I know that one theory suggests 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 and that at the start of this period, the Earth's atmosphere may have been like the atmospheres of Mars and Venus today, consisting of mainly carbon dioxide with little or no oxygen gas.				
d	I know that volcanoes also produced nitrogen, which gradually built up in the atmosphere, and there may have been small proportions of methane and ammonia.				
e	I know that when the oceans formed, carbon dioxide dissolved in the water and carbonates were precipitated producing sediments, reducing the amount of carbon dioxide in the atmosphere.				
f	I can interpret evidence and evaluate different theories about the Earth's early atmosphere.				

5.9.1.3. How Oxygen Increased

a	I know that algae and plants produced the oxygen that is now in the atmosphere by photosynthesis, which can be represented by the equation: $$6CO_2 + 6H_2O \xrightarrow{\text{light}} C_6H_{12}O_6 + 6O_2$$ carbon dioxide + water $\xrightarrow{\text{light}}$ glucose + oxygen				
b	Algae first produced oxygen about 2.7 billion years ago and soon after this oxygen appeared in the atmosphere.				
c	I can describe how, over the next billion years, plants evolved and the percentage of oxygen gradually increased to a level that enabled animals to evolve.				

5.9.1.4. How Carbon Dioxide Decreased

a	I know that algae and plants decreased the percentage of carbon dioxide in the atmosphere by photosynthesis.				
b	I know that atmospheric carbon dioxide was also decreased by the formation of sedimentary rocks and fossil fuels that contain carbon.				
c	I can describe the main changes in the atmosphere over time and some of the likely causes of these changes.				
d	I can describe and explain the formation of deposits of limestone, coal, crude oil and natural gas.				

5.9.2. Carbon Dioxide and Methane as Greenhouse Gases

5.9.2.1 Greenhouse Gases

a	I know that greenhouse gases in the atmosphere maintain temperatures on Earth high enough to support life. Water vapour, carbon dioxide and methane are greenhouse gases.			
b	I can describe the greenhouse effect in terms of the interaction of short and long wavelength radiation with matter.			

5.9.2.2 Human Activities Which Contribute to an Increase in Greenhouse Gases in the Atmosphere

a	I can state some human activities that increase the amounts of greenhouse gases in the atmosphere, including carbon dioxide and methane.			
b	I know that many scientists believe that human activities will cause the temperature of the Earth's atmosphere to increase at the surface and that this will result in global climate change (based on peer-reviewed evidence).			
c	I know that it is difficult to model such complex systems as global climate change and that this leads to simplified models, speculation and opinions presented in the media that may be based on only parts of the evidence and which may be biased.			
d	I can evaluate the quality of evidence in a report about global climate change (given appropriate information).			
e	I can describe uncertainties in the evidence base.			
f	I can recognise the importance of peer review of results and of communicating results to a wide range of audiences.			

5.9.2.3 Global Climate Change

a	I know that an increase in average global temperature is a major cause of climate change.			
b	I can describe briefly four potential effects of global climate change.			
c	I can discuss the scale, risk and environmental implications of global climate change.			

5.9.2.4 The Carbon Footprint and its Reduction

a	I 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.			
b	I know that the carbon footprint can be reduced by reducing emissions of carbon dioxide and methane.			
c	I can describe actions to reduce emissions of carbon dioxide and methane.			
d	I can give reasons why actions may be limited.			

5.9.3. Common Atmospheric Pollutants and their Sources

5.9.3.1 Atmospheric Pollutants from Fuels

a	I know that most fuels, including coal, contain carbon and/or hydrogen and may also contain some sulfur and that the combustion of fuels is a major source of atmospheric pollutants.				
b	I know that the gases released into the atmosphere when a fuel is burned may include carbon dioxide, water vapour, carbon monoxide, sulfur dioxide and oxides of nitrogen and that solid particles and unburned hydrocarbons may also be released that form particulates in the atmosphere.				
c	I can describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen are produced by burning fuels.				
d	I can 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.				

5.9.3.2 Properties and Effects of Atmospheric Pollutants

a	I know that carbon monoxide is a toxic gas. It is colourless and odourless and so is not easily detected.				
b	I know that sulfur dioxide and oxides of nitrogen cause respiratory problems in humans and cause acid rain.				
c	I know that particulates cause global dimming and health problems for humans.				
d	I can describe and explain the problems caused by increased amounts of these pollutants in the air.				