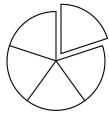
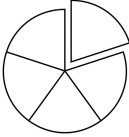


| H | 1                                                                                          | 2                                                       | 3                                                                                    | 4                                                                 | 5                                                                                   | 6                                                                                          |
|---|--------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|
| 1 | $O_2$<br> | Increased %<br>$O_2$ in the air                         | Photosynthesis                                                                       | Interaction of<br>short and long<br>wave radiation<br>with matter |  | IR                                                                                         |
| 2 | $Cl_2$ and water                                                                           | $CoCl_2$                                                | $S + O_2 \rightarrow SO_2$                                                           | P.M.                                                              | methane                                                                             |         |
| 3 | Hydrocarbon                                                                                | Ways in which<br>greenhouse<br>gases can be<br>reduced? | About 80%<br>of the<br>atmosphere                                                    | Rising sea                                                        | Formation of<br>fossil fuels                                                        | Increase in<br>average global<br>temperature                                               |
| 4 | Global<br>climate<br>change                                                                | Cause<br>respiratory<br>problems                        | $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$                                      | Complete<br>combustion                                            | Oxides of<br>Nitrogen                                                               | Causes acid<br>rain                                                                        |
| 5 | Solid particles<br>and unburned<br>hydrocarbons                                            | Greenhouse gases                                        | Toxic,<br>colourless and<br>odourless                                                | Catalytic<br>Converter                                            | $H_2O(g)$ ,<br>$CO_2(g)$ and<br>$CH_4(g)$                                           | Sacrificial<br>Anode                                                                       |
| 6 | Combustion of<br>fuels                                                                     | Sedimentation                                           |  | $C_2H_6 + O_2 \rightarrow CO_2 + H_2O + CO$                       |                                                                                     | Carbon dioxide, water<br>vapour, carbon<br>monoxide, sulfur dioxide<br>and nitrogen oxides |

| H | 1                                                                                          | 2                                                       | 3                                               | 4                                                                 | 5                                         | 6                                                                                   |
|---|--------------------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------|
| 1 | $O_2$<br> | Increased %<br>$O_2$ in the air                         | Photosynthesis                                  | Interaction of<br>short and long<br>wave radiation<br>with matter | ?                                         | Total amount of $CO_2$ &<br>other greenhouse gases                                  |
| 2 | Formation of                                                                               | ?                                                       | $S + O_2 \rightarrow SO_2$                      | Sources of<br>bias?                                               | 200 million<br>years                      |  |
| 3 | ?                                                                                          | Ways in which<br>greenhouse<br>gases can be<br>reduced? | About 80% of<br>the atmosphere                  | Importance of<br>peer review of<br>results                        | Formation of<br>fossil fuels              | Increase in<br>average global<br>temperature                                        |
| 4 | Global<br>climate<br>change                                                                | Cause<br>respiratory<br>problems                        | $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ | ?                                                                 | Algae                                     | Causes acid<br>rain                                                                 |
| 5 | Solid particles<br>and unburned                                                            | Greenhouse<br>gases                                     | ?                                               | Carbonates                                                        | $H_2O(g)$ ,<br>$CO_2(g)$ and<br>$CH_4(g)$ | Evolution of<br>plants                                                              |
| 6 | Combustion of<br>fuels                                                                     | Cause global dimming<br>and health problems             | Carbon<br>footprint                             | $C_2H_6 + O_2 \rightarrow CO_2 + H_2O + CO$                       |                                           | ?                                                                                   |

| F | 1                                                           | 2                                                     | 3                                                                                                    | 4                                                              | 5                                                                                                                | 6                                                                  |
|---|-------------------------------------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
| 1 | <b>20% O<sub>2</sub></b>                                    | <i>Increased oxygen % in the air</i>                  | Photosynthesis<br> | Global warming                                                 | <b>Atmospheres of Mars and Venus today</b>                                                                       | <i>Total amount of CO<sub>2</sub> &amp; other greenhouse gases</i> |
| 2 | <b>Formation of the oceans</b>                              | how long ago did the Earth form?                      | <b>Combustion of fuels and sulfur dioxide</b>                                                        | <b>SOURCES OF BLAS?</b>                                        | Current composition of the atmosphere                                                                            | Earth's early atmosphere                                           |
| 3 | <i>Hydrocarbon, e.g. C<sub>2</sub>H<sub>6</sub></i>         | <i>Ways in which greenhouse gases can be reduced?</i> | <b>About 80% of the atmosphere</b>                                                                   | <i>Importance of peer review of results</i>                    | <br><b>Formation on Algae</b> | <i>Increase in average global temperature</i>                      |
| 4 | <i>Effects of increasing global temperature on climate?</i> | atmospheric particulates                              | <i>Carbon dioxide + water → Glucose + oxygen</i>                                                     | <b>Formation of sedimentary rocks</b>                          |                               | <i>Causes acid rain</i>                                            |
| 5 | <b>Solid particles and unburned hydrocarbons</b>            | <b>Greenhouse gases</b>                               | <b>Toxic, colourless and odourless gas</b>                                                           | Atmospheric CO <sub>2</sub> and carbonates                     | <i>Water vapour, carbon dioxide and methane</i>                                                                  | <b>Evolution of plants</b>                                         |
| 6 | Combustion of fuels                                         | <i>Cause global dimming and health problems</i>       | <b>Carbon footprint</b>                                                                              | <i>Complete and incomplete combustion of hydrocarbon fuels</i> | <b>Carbon dioxide, water vapour, carbon monoxide, sulfur dioxide and nitrogen oxides</b>                         |                                                                    |

| F | 1                                                    | 2                                              | 3                                                                                                    | 4                                                       | 5                                                                                                      | 6                                                                                 |
|---|------------------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| 1 | ?                                                    | Increased oxygen % in the air                  | Photosynthesis<br> | Global warming                                          | Atmospheres of Mars and Venus today                                                                    | Total amount of CO <sub>2</sub> & other greenhouse gases                          |
| 2 | Formation of                                         | ?                                              | Combustion of fuels and sulfur dioxide                                                               | Sources of bias?                                        | Current composition of the atmosphere                                                                  | Earth's early atmosphere                                                          |
| 3 | Hydrocarbon, e.g. C <sub>2</sub> H <sub>6</sub>      | Ways in which greenhouse gases can be reduced? | About 80% of the atmosphere                                                                          | ?                                                       |  Formation on Algae | Increase in average global temperature                                            |
| 4 | Effects of increasing global temperature on climate? | atmospheric particulates                       | Carbon dioxide + water → Glucose + oxygen                                                            | Formation of sedimentary rocks                          |                     | ?                                                                                 |
| 5 | Solid particles and unburned                         | Greenhouse gases                               | Toxic, colourless and odourless gas                                                                  | Atmospheric CO <sub>2</sub> and carbonates              | ?                                                                                                      | Evolution of plants                                                               |
| 6 | Combustion of fuels                                  | ?                                              | Carbon footprint                                                                                     | Complete and incomplete combustion of hydrocarbon fuels |                                                                                                        | Carbon dioxide, water vapour, carbon monoxide, sulfur dioxide and nitrogen oxides |

#### 4.9.1 The Composition and Evolution of the Earth's Atmosphere Revision Checklist

| Can you...                                                                                                              |  |  |  |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| a) state the gases that make up the Earth's atmosphere and give their approximate percentages                           |                                                                                     |                                                                                     |                                                                                     |
| b) given appropriate information, interpret evidence and evaluate different theories about the Earth's early atmosphere |                                                                                     |                                                                                     |                                                                                     |
| c) explain how oxygen levels increased in the atmosphere over time                                                      |                                                                                     |                                                                                     |                                                                                     |
| d) describe the main changes in the atmosphere over time and some of the likely causes of these changes                 |                                                                                     |                                                                                     |                                                                                     |
| e) describe and explain the formation of deposits of limestone, coal, crude oil and natural gas                         |                                                                                     |                                                                                     |                                                                                     |
| f) say how the greenhouse effect works in terms of the interaction of short and long wavelength radiation with matter   |                                                                                     |                                                                                     |                                                                                     |
| g) recall two human activities that increase the amounts of each of the greenhouse gases carbon dioxide and methane     |                                                                                     |                                                                                     |                                                                                     |
| h) evaluate the quality of evidence in a report about global climate change given appropriate information               |                                                                                     |                                                                                     |                                                                                     |
| i) describe uncertainties in the evidence base                                                                          |                                                                                     |                                                                                     |                                                                                     |
| j) recognise the importance of peer review of results and of communicating results to a wide range of audiences         |                                                                                     |                                                                                     |                                                                                     |
| k) describe briefly four potential effects of global climate change                                                     |                                                                                     |                                                                                     |                                                                                     |
| l) discuss the scale, risk and environmental implications of global climate change                                      |                                                                                     |                                                                                     |                                                                                     |
| m) describe actions to reduce emissions of carbon dioxide and methane                                                   |                                                                                     |                                                                                     |                                                                                     |
| n) give reasons why actions may be limited                                                                              |                                                                                     |                                                                                     |                                                                                     |
| o) describe how carbon monoxide, soot (carbon particles), sulfur dioxide and oxides of nitrogen                         |                                                                                     |                                                                                     |                                                                                     |

|                                                                                                                                                         |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| are produced by burning fuels                                                                                                                           |  |
| p) 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. |  |
| q) describe and explain the problems caused by increased amounts of these pollutants in the air                                                         |  |