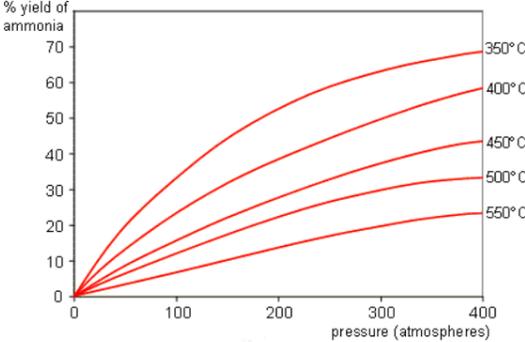
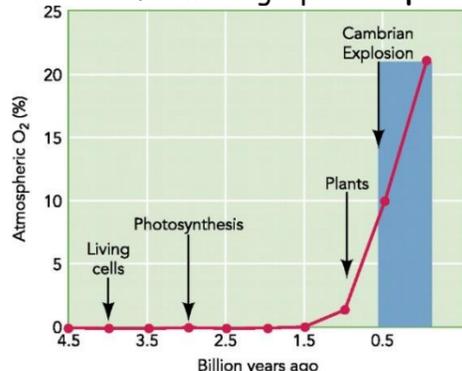
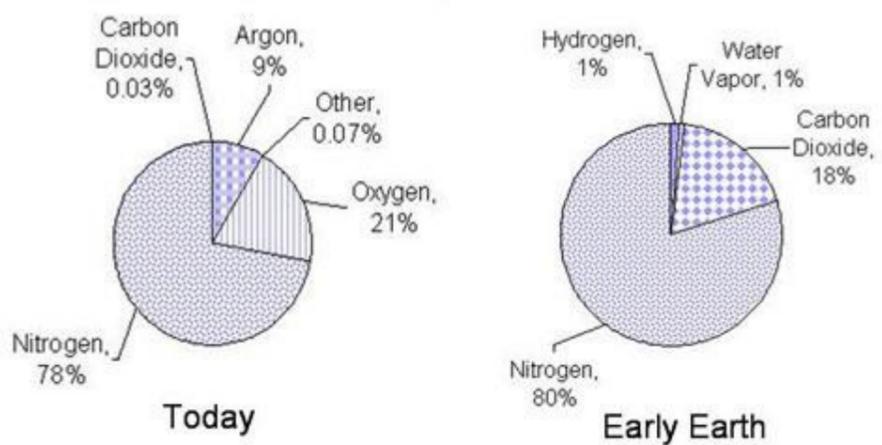
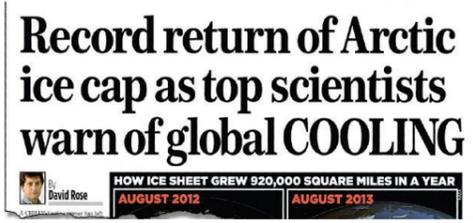
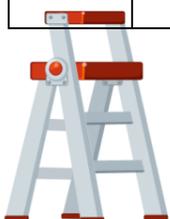


%	I can ...	Prove it!
	<p>Interpret graphs of reaction conditions versus rate (triple only)</p>	<p>1. Explain how this graph shows that the forwards reaction in the Haber process is exothermic.</p>  <p>2. Choose from the following words to explain what would happen in the Haber process in conditions a - e: exothermic, endothermic, temperature, pressure, catalyst, yield</p> <ol style="list-style-type: none"> high temperature low temperature high pressure low pressure. presence of a catalyst <p>3. Use data from the graph to explain the trend in oxygen levels.</p>  <p>4. Use the data in the pie chart to explain how carbon dioxide levels have changed over time.</p> 
<p>80%+</p>	<p>Apply the principals of dynamic equilibrium to the Haber process (triple only)</p> <p>Explain why oxygen levels increased and carbon dioxide levels decreased (linking to photosynthesis and sedimentation)</p> <p>Explain why it is difficult to model global warming and how this has led to simplification, speculation and biased opinions in the media</p>	<p>5. Imagine that you are a scientist and an oil company approaches you to carry out a piece of research to find out how the levels of carbon dioxide have affected the average global temperatures. Explain the problem with you carrying out this research on their behalf.</p> <p>6. For each headline, explain the possible impact that these could have on public opinion and behaviour:</p>  



Explain how peer review evidence have linked these activities to global climate change

Explain how phytomining and bioleaching and scrap iron and electrolysis can be used to extract copper from low grade ores

70%

Discuss the scale, risks and environmental implication of global climate change

Explain how some natural products are being replaced by some agricultural and synthetic products

Use data to carry out LCA for shopping bags made from plastic and paper

1. Explain what is meant by the term peer review and give three reasons why it is important that scientific research undergo this process.

2. Complete the following table:

Alternative methods of extracting metals			
Method	Product	Description	Advantages
electrolysis			
phytomining			
bioleaching			

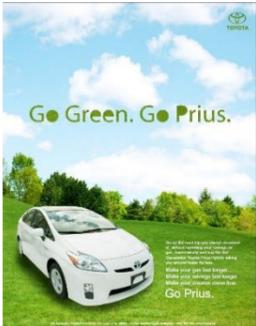
3. Create a mind map to show how each of the following effects of climate change could impact on the earth:

- a rise in sea level
- more frequent and severe storms
- increased number of heatwaves
- more droughts
- changes to the distribution of plants and animals
- food shortages

4. Explain why a family in 1200 AC could survive on using only resources from their local forest, whereas a family in 2017 could not.

5. Use the data in this table to decide which bag is more sustainable:



%	I can ...	Prove it!																
 60%	<p>Explain why large amounts of waste water are produced (urban life styles and industrial processes)</p> <p>Explain what needs to be removed from sewage and agricultural waste in comparison with industrial waste water</p> <p>Explain that water resources, energy and waste production can be easily quantified whereas pollutant effects are hard to quantify</p> <p>Explain how glass is produced</p> <p>Explain how these conditions are manipulated to produce optimum quantities of the desired products (triple only)</p> <p>Discuss the environmental impact of using metal, glass, building materials, clay ceramics and plastics linking to the use of these limited resources and the energy used to extract and process them.</p> <p>Evaluate the methods to produce potable water (linking to location and potential water supply)</p> <p>Explain how the ammonia is removed and the hydrogen and nitrogen are recycled (triple only)</p> <p>Describe how simplified life cycle assessments can be used in a biased manner to support advertising claims in the media</p>	<p>1. Draw a flow chart to show how water is recycled from homes back to drinkable water again. Use these words: waste water, organic matter, microorganisms, toxic chemicals, screening, grit removal, sedimentation, anaerobic digestion, aerobic biological treatment.</p> <p>2. Complete the table to show the difference between what substances need to be removed from sewage compared to agricultural waste:</p> <table border="1" data-bbox="890 706 1946 1020"> <thead> <tr> <th>Sewage</th> <th>Agricultural waste</th> </tr> </thead> <tbody> <tr> <td style="height: 100px;"></td> <td></td> </tr> </tbody> </table> <p>3. Explain why it is difficult to quantify the effects of pollutants using an example to help illustrate your explanation.</p> <p>4. Draw a flow chart to show how glass is produced.</p> <p>5. Complete the table to show the chosen reaction conditions in the Haber process:</p> <table border="1" data-bbox="890 1329 1978 1486"> <thead> <tr> <th>Factor</th> <th>Condition</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>temperature</td> <td></td> <td></td> </tr> <tr> <td>pressure</td> <td></td> <td></td> </tr> <tr> <td>catalyst</td> <td></td> <td></td> </tr> </tbody> </table> <p>6. Draw a mind map to show how each of the following impact on the environment: metal, glass, building materials, clay, ceramics, and plastics. Make sure you include information on what they are used for, how limited they are on earth and how much energy is used to extract them.</p> <p>7. Write a paragraph evaluating both desalination and sterilisation of water.</p> <p>8. Complete the following paragraph: fractional distillation, liquefies, Haber, natural gas, nitrogen, nitrogen, ammonia, hydrogen In the _____ process, the raw materials are _____ and hydrogen and the product is _____. Purified nitrogen is obtained from the _____ of air. Hydrogen is obtained from _____ or steam. The reaction is reversible, which means that some of the ammonia will break back down into the reactants _____ and _____. These are then recycled. The ammonia will cool down and turn back into a _____ and can be removed.</p> <p>9. This advert used a shortened version of the real LCA. Give one reason why a company would use this shortened version rather than the full one.</p> 	Sewage	Agricultural waste			Factor	Condition	Reason	temperature			pressure			catalyst		
Sewage	Agricultural waste																	
Factor	Condition	Reason																
temperature																		
pressure																		
catalyst																		



I can ...

Prove it!

Draw links between the early Earth's atmosphere and that of other planets (Mars and Venus)

Evaluate different theories regarding the Earth's early atmosphere

Explain how we can reduce our use of limited resources (reduce, reuse, recycle)

Explain how to produce clay ceramics

Compare low density and high density poly(ethane)

Compare and contrast thermosetting and thermosoftening polymers explaining the differences

Explain what 'composites' are and give some examples

Explain ways that we can reduce this environmental impact

Describe the 'greenhouse effect' linking to the wavelength of radiation

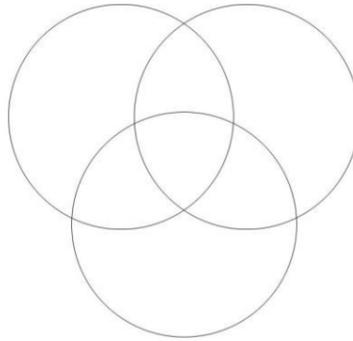
Describe actions to reduce our carbon footprint and explain why these actions may have limited impact

Describe the properties of potable water (is safe to drink) linking to purity, salt and microbe levels

Describe the different sources of drinking water in the UK and the process that it must undergo before it is potable

Describe the process of desalination (distillation or reverse osmosis)

1. Complete the Venn diagram to show the similarities and differences between Earth's early atmosphere and that of Mars and Venus.



2. List examples of how we can carry out the following:

Reduce	Reuse	Recycle

3. Draw a flow chart to show the stages in making clay ceramics.

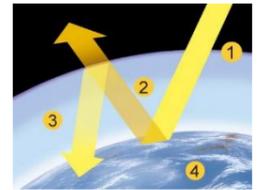
4. Complete the table to show the comparison between thermosetting and thermosoftening plastics.

	Thermosoftening polymers	Thermosetting polymers
Structure description		
Structure diagram		
Type of forces		
Properties		

5. Write a definition of a composite material and give two examples.

6. Complete the diagram to show how the greenhouse effect is created using these labels.

- A. Infrared radiation is reflected back from the Earth's surface.
 B. The Earth becomes hotter as a result
 C. Infrared radiation from the Sun enters the Earth's atmosphere
 D. Infrared radiation is absorbed by greenhouse gases and as a result becomes trapped in the Earth's atmosphere



7. There are many things we can do to reduce our carbon footprint. Write a description for each action:

Action	Description
Using alternative energy resources	
Wasting less energy	
Carbon Capture and Storage (CCS)	
Carbon taxes and licenses	
Carbon off-setting	
Carbon-neutral products	

8. Explain some of the problems with reducing our carbon footprint (6 marks)

9. Write a description of potable water and include information about its purity, salt levels and the number of microorganisms it contains.

10. Create cycle to show each of the following processes:

- A. producing potable water
 B. Desalination



I can ...

Prove it!

Describe the composition of the atmosphere and how long this has been the case

Describe the development from early atmosphere to present day

Describe the term 'greenhouse gases' and give three examples (water vapour, carbon dioxide and methane)

Describe the effect of human activities on the levels of greenhouse gases, recalling two that affect methane and two that affect carbon dioxide

Describe 4 potential effects of global climate change

Describe what is meant by the term 'carbon footprint'

Describe combustion as a major source of atmospheric pollution

Name gases release when fuels such as coal are burnt (carbon dioxide, water vapour, carbon monoxide, sulphur dioxide and nitrogen oxides) and predict which of these would be produced from a given fuel composition

Describe 'particulates'

Describe issues arising from carbon dioxide, sulphur dioxide, nitrogen oxides and particulates

Recalls that humans use the Earth's resources to provide; warmth, shelter, food, transport (through timber, clothing, fuels/energy and other materials)

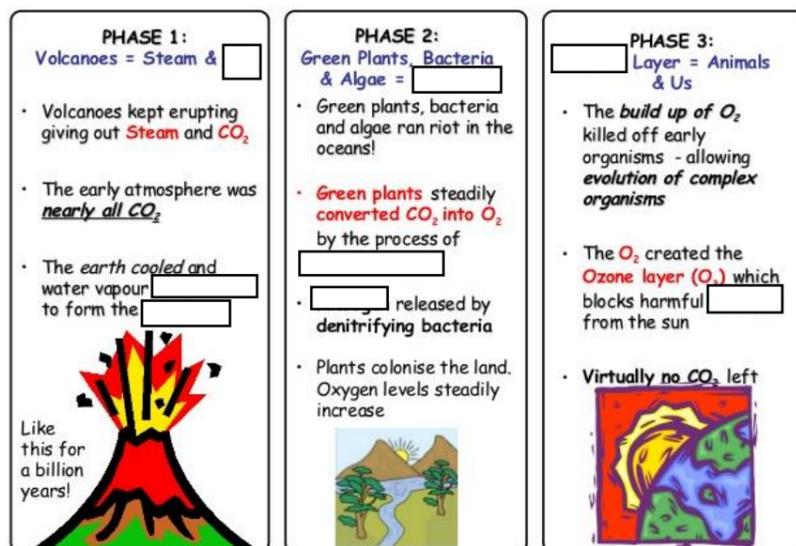
Define what is meant by the term 'finite resource'

Define what is meant by the term 'sustainable development' and explain the role that chemistry plays in developing agricultural and industrial processes

1. Complete the diagram to show the stages in the evolution of the earth's atmosphere:

Words to use:

photosynthesis, Ozone, CO₂, condensed, nitrogen, oceans, UV rays, oxygen



2. Write a definition of a greenhouse gas and give three examples.

3. Complete the table:

Greenhouse gas	Human activity, which increases this gas.	Effects on the Earth
Methane		
Methane		
Carbon dioxide		
Carbon dioxide		

4. Make a mind map to show four effects of global warming.

5. Complete the following sentence:
'Carbon footprint is...'

6. Complete the word and symbol equations for combustion:

Complete combustion
word:
symbol:

Incomplete combustion
word:
symbol:

7. Complete the following:

Most fuels are made of _____ and _____ (hydrocarbons) but many also contain _____. During _____ (burning) of hydrocarbons, both carbon and hydrogen are oxidised and _____ is released. Carbon dioxide and water _____ are released into the atmosphere. If there is not enough oxygen then _____ combustion takes place and carbon _____ and solid _____ are released. Carbon monoxide is a colourless and odourless gas, which is _____. Global _____ can be caused by solid particulates building up in the atmosphere. They can also damage our _____. _____ in the air can also react with oxygen to form nitrogen oxides. These gases can cause respiratory problems and react with rainwater to form _____. This can damage _____ and buildings. _____ can also be released from fuels and react with rainwater to produce acid rain.

Words: nitrogen, combustion, incomplete, monoxide, plants, carbon, acid rain, hydrogen, sulphur, vapour, dimming, energy, toxic, lungs, sulphur, particulates

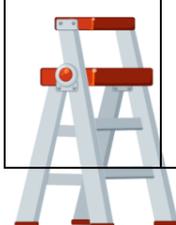
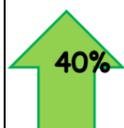
7. Put each of these uses into the correct resource:

Animals	Plants	Trees	Fossil fuels

clothing, food, warmth, energy, fuels, shelter

8. Write a definition for the term 'finite resource'.

9. Complete the following sentence:
'Sustainable development is....'



The Earth and The Atmosphere

Required practical 8:

Analyse and purify water samples from different sources, including pH, dissolved solids and distillation

Describe the 4 steps of sewage treatment

Compare the relative ease of obtaining potable water from waste, the ground and salt water

Describe what is meant by the term 'life cycle assessment'

Describe the 4 stages of a life cycle assessment

Describe what factors affect the properties of polymers

Compare the composition and melting points of soda-lime glass and borosilicate glass

State what is produced in the Haber process and explain how ammonia produced from this process is used (triple only)

List the raw materials for the Haber process and where they are sourced from (triple only)

Recall the conditions required for the Haber process to take place (triple only)

Recall the word and symbol equation for the Haber process (triple only)
Describe what NPK fertilisers are (triple only)

Describe how NPK fertilisers are produced industrially (triple only)

Describe how sources of NPK are produced/found (ammonium salts, nitric acid and potassium chloride and phosphate rock) (triple only)

10. Describe one industrial process improved by our understanding of chemistry and explain your choice.

11. Put these stages in sewage treatment into the correct order:

- A. Aerobic digestion of sewage sludge
- B. Sedimentation to produce sewage sludge and effluent
- C. Screening and grit removal
- D. Aerobic biological treatment of effluent

12. a) What does the following acronym stand for: LCA?

- b) Write a definition for what LCA means.
- c) Write down the four stages of an LCA.

13. True or false:

- Thermosoftening polymers have strong intermolecular forces between polymer chains.
- Thermosoftening polymers include poly(ethane).
- Thermosetting polymers have strong intermolecular forces between polymer chains called cross-links.
- Thermosetting polymers include melamine.
- Thermosoftening polymers will soften on heating.
- Thermosetting polymers will soften on heating.

14. Complete the following table to compare soda-lime and borosilicate:

	Made up of...	Melting point	Uses
soda-lime glass			
borosilicate			

15. Write a word and symbol equation for the Haber process.

16. Give two uses of the ammonia produced in the Haber process.

17. Give the following conditions for the Haber process:

- a) Temperature
- b) Pressure
- c) catalyst

18. What does NPK stand for and what are they used for?

19. Draw a flow chart to show how NPK fertilisers are made.

20. Describe how each of the following are produced/found.

- a) ammonium salts
- b) nitric acid
- c) phosphorous rock
- d) potassium chloride

Key Words:

atmosphere, algae, locked up, limestone, sedimentary rocks, fossil fuels, crude oil, natural gas, coal, carbonates, infrared radiation, greenhouse gases, carbon dioxide, water vapour, methane (CH₄), biased, climate change, greenhouse effect, carbon footprint, distillation, sewage, phytomining, bioleaching, CCS, sustainable development, agriculture, potable, desalination, ceramics, composites, borosilicate glass (Pyrex), soda-lime, LCA, Haber process, reversible reaction, catalyst, NPK fertilisers, phosphate rock

