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**GCSE Combined Science**

**(and Chemistry)**

**Student Revision Booklet**

**Earth and Atmosphere**

**Contents:**

1. Student checklist and RAG sheet
2. Pre-revision Multiple Choice Quiz
3. Key Questions, 5 sentences, 5 words
4. Exam Question Practice
5. Progress checkpoint - Post-revision Multiple Choice Quiz
6. Student checklist and RAG sheet

**Student Checklist and RAG Sheet**

**Earth and Atmosphere**

**Read each statement below and colour the box that best describes your current understanding.**

**(R – red: low understanding, A – amber: some understanding, G - green: good understanding)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Checklist statement** | **R** | **A** | **G** |
| Describe the composition of gases in the Earth's atmosphere using percentages, fractions or ratios. |  |  |  |
| Describe how early intense volcanic activity may have helped form the early atmosphere and how the oceans formed. |  |  |  |
| Explain why the levels of carbon dioxide in the atmosphere changes as the oceans were formed. |  |  |  |
| State the approximate time in Earth's history when algae started producing oxygen and describe the effects of a gradually increasing oxygen level. |  |  |  |
| Explain the ways that atmospheric carbon dioxide levels decreased. |  |  |  |
| Name some greenhouse gases and describe how they cause an increase in Earth's temperature. |  |  |  |
| List some human activities that produce greenhouse gases. |  |  |  |
| Evaluate arguments for and against the idea that human activities cause a rise in temperature that results in global climate change. |  |  |  |
| State some potential side effects of global climate change, including discussing scale, risk and environmental implications. |  |  |  |
| Define the term carbon footprint and list some actions that could reduce the carbon footprint. |  |  |  |
| Describe the combustion of fuels as a major source of atmospheric pollutants and name the different gases that are released when a fuel is burned. |  |  |  |
| 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. |  |  |  |
| Describe the properties and effects of carbon monoxide, sulfur dioxide and particulates in the atmosphere. |  |  |  |
| Describe and explain the problems caused by increased amounts of these pollutants in the air. |  |  |  |
| Discuss the importance of water quality for human life, including defining potable water. |  |  |  |
| Describe methods to produce potable water, including desalination of salty water or sea water and the potential problems of desalination. |  |  |  |
| Required practical 13: analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. |  |  |  |
| Describe waste water as a product of urban lifestyles and industrial processes that includes organic matter, harmful microbes and harmful chemicals. |  |  |  |
| Describe the process of sewage treatment and compare the ease of obtaining potable water from waste water as opposed to ground or salt water. |  |  |  |

**Pre-Revision**

**Multiple Choice Questions**

**Earth and Atmosphere**

|  |
| --- |
| **INSTRUCTIONS Score: /20** |

* **Read the question carefully.**
* **Circle the correct letter.**
* **Answer all questions.**

|  |  |  |
| --- | --- | --- |
| 1. | The gas needed for respiration is: | |
|  | a. | Carbon dioxide. |
|  | b. | Nitrogen. |
|  | c. | Water. |
|  | d. | Oxygen. |
| 2. | The process by which this gas is released into the atmosphere is: | |
|  | a. | Distillation. |
|  | b. | Evaporation. |
|  | c. | Combustion. |
|  | d. | Photosynthesis. |
| 3. | One type of organism that produces this gas is: | |
|  | a. | Humans. |
|  | b. | Animal. |
|  | c. | Green Plants. |
|  | d. | Anaerobic Bacteria. |
| 4. | The early atmosphere was primarily composed of: | |
|  | a. | Carbon dioxide and ammonia. |
|  | b. | Oxygen and carbon dioxide. |
|  | c. | Water and oxygen. |
|  | d. | Water and carbon dioxide. |
| 5. | The greenhouse effect is caused by the gases: | |
|  | a. | Carbon dioxide, water vapour and methane. |
|  | b. | Carbon dioxide and water only. |
|  | c. | Carbon dioxide only. |
|  | d. | Ozone. |
| 6. | Carbon dioxide is associated with this environmental problem: | |
|  | a. | Global dimming. |
|  | b. | Global warming. |
|  | c. | Acid rain. |
|  | d. | Suffocation. |
| 7. | Global dimming is caused by: | |
|  | a. | Carbon particles. |
|  | b. | Carbon dioxide. |
|  | c. | Sulfur dioxide. |
|  | d. | Nitrous oxides. |
| 8. | Acid rain is caused by: | |
|  | 1. Carbon particles. | |
|  | 1. Carbon dioxide. | |
|  | 1. Sulfur dioxide. | |
|  | 1. Nitrogen. | |
|  |  | |
| 9. | Global warming can cause: | |
|  | a. | Sea levels to rise. |
|  | b. | The world to get dimmer. |
|  | c. | Buildings to weather. |
|  | d. | The world to get colder. |
|  |  | |
| 10. | Acid rain can cause: | |
|  | a. | Sea levels to rise. | |
|  | b. | The world to get dimmer. | |
|  | c. | Buildings to weather. | |
|  | d. | The world to get colder. | |
|  |  |  | |
| 11. | Global warming can be caused by: | |
|  | a. | Using wind power. |
|  | b. | Burning nuclear uranium. |
|  | c. | Burning fossil fuels. |
|  | d. | Sulfur in fuel. |
|  |  | |
| 12. | The three types of fossil fuels are: | |
|  | a. | Coal, oil and gas. |
|  | b. | Coal, oil and wood. |
|  | c. | Wind, solar and water. |
|  | d. | Water, wind and biomass. |
|  |  | |
| 13. | Water can be purified using. | |
|  | a. | Chlorine. |
|  | b. | Bromine |
|  | c. | Fluorine. |
|  | d. | Iodine. |
|  |  | |
| 14. | The first step in water purification is: | |
|  | a. | Dissolving the halogen in the water. |
|  | b. | Evaporating the solution. |
|  | c. | Filtering the water. |
|  | d. | Condensing the gases. |
|  |  | |
| 15. | Salt water can be distilled by: | |
|  | a. | Evaporating the water. |
|  | b. | Filtering the water. |
|  | c. | Condensing the water. |
|  | d. | Fractional distillation of the water. |
|  |  | |
| 16. | Ground water can be obtained by: | |
|  | a. | Drilling the rock and pumping the water to the surface. |
|  | b. | Fracking. |
|  | c. | Fractional distillation. |
|  | d. | Carbon reduction. |
|  |  | |
| 17. | Distilled water is: | |
|  | a. | Bottled H2O. |
|  | b. | Pure H2O. |
|  | c. | Mineral H2O. |
|  | d. | H2O from the tap. |
|  |  | |
| 18. | Carbon dioxide was trapped in: | |
|  | a. | Oceans. |
|  | b. | Plants. |
|  | c. | Oceans and sedimentary rocks. |
|  | d. | The ozone layer. |
|  |  | |
| 19. | Which of the following do scientists believe is responsible for producing the early atmosphere? | |
|  | a. | The Earth being very hot. |
|  | b. | Green plants. |
|  | c. | Oceans heating up. |
|  | d. | Volcanic eruptions. |
|  |  | |
| 20. | The formula for carbon monoxide is: | |
|  | a. | CO2 |
|  | b. | CH2 |
|  | c. | CO. |
|  | d. | CH. |
|  |  | |

**Key questions, 5 sentences, 5 words**

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| --- |
| **INSTRUCTIONS** |

* **For each statement, use either the suggested website or your own text book to write a 5-point summary. In examinations, answers frequently require more than 1 key word for the mark, so aim to include a few key words.**
* **It is important to stick to 5 sentences. It is the process of selecting the most relevant information and summarizing it that will help you remember it.**
* **Write concisely and do not elaborate unnecessarily, it is harder to remember and revise facts from a big long paragraph.**
* **Finally, identify 5 key words that you may have difficulty remembering and include a brief definition. You might like to include a clip art style picture to help you remember it.**

**Example:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QUESTION:** | **Describe how an oxygen-rich atmosphere developed over time.** | | | | |
| **Sources:** | **Website –**  <http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel_pre_2011/oneearth/damagetotheenvironmentrev1.shtml>  <https://www.youtube.com/watch?v=6Db2WAG-VVs> | | | | |
| 1. **The early atmosphere was primarily carbon dioxide, methane, ammonia and water vapour.** 2. **The Earth cooled, and oceans formed and carbon dioxide dissolved into them.** 3. **Green plants evolved.** 4. **They took in carbon dioxide and released oxygen by the process of photosynthesis.** 5. **Oxygen rose to 21% of the atmosphere and human evolved.** | | | | | |
| **Carbon dioxide** | | **oxygen** | **Photosynthesis** | **Atmosphere** | **green** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QUESTION 1:** | **Compare the composition of the Earth’s early atmosphere with its current atmosphere and explain the way that carbon dioxide levels decreased.** | | | | |
| **Sources:** | **Website –**   1. <http://www.pearsonschoolsandfecolleges.co.uk/AssetsLibrary/SECTORS/Secondary/SUBJECT/Science/PDFs/EdexcelScienceRevision/ScienceRevisionGuide_foundation.pdf> 2. <http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/earth/earthsatmosphererev3.shtml> | | | | |
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|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **QUESTION 2:** | **Describe the greenhouse effect and state the gases that contribute to its effect.** | | | | |
| **Sources:** | **Website –**   1. <http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/energy_resources/global_warmingrev1.shtml> 2. <https://climatekids.nasa.gov/greenhouse-effect/> | | | | |
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| --- | --- | --- | --- | --- | --- |
| **QUESTION 3:** | **Describe the potential effects of increased levels of carbon dioxide and methane on the Earth’s climate and how reducing our carbon footprint could reduce this impact.** | | | | |
| **Sources:** | **Website –**   1. <https://science.howstuffworks.com/environmental/green-science/global-warming8.htm> 2. <https://www.youtube.com/watch?v=kA1gI2kedWI> | | | | |
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| --- | --- | --- | --- | --- | --- |
| **QUESTION 4:** | **Describe the main causes and problems associated with carbon monoxide, sulfur dioxide and carbon particles.** | | | | |
| **Sources:** | **Website –**   1. <http://www.bbc.co.uk/schools/gcsebitesize/science/21c_pre_2011/atmosphere/whathappenstopollutantsrev1.shtml> 2. <http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel/fuels/oil_refining_fuelsrev3.shtml> 3. <http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/carbon_chemistry/clean_airrev3.shtml> | | | | |
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| **QUESTION 5:** | **Explain the principles behind water purification.** | | | | |
| **Sources:** | **Website –**   1. <http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/water/purifying_water/revision/1/> 2. <https://www.youtube.com/watch?v=oX-imU_YxU0> | | | | |
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| **QUESTION 6:** | **Describe the process by which salt water becomes drinking water.** | | | | |
| **Sources:** | **Website –**   1. <https://www.wikihow.com/Turn-Salt-Water-Into-Drinking-Water> 2. <http://www.docbrown.info/page01/AqueousChem/AqueousChem1.htm> | | | | |
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| **QUESTION 7:** | **Describe the process of sewage treatment.** | | | | |
| **Sources:** | **Website –**   1. [https://www.youtube.com/watch?v=gxgpK1EUZns](https://www.youtube.com/watch?v=gxgpK1EUZns%20) | | | | |
|  | | | | | |
|  | |  |  |  |  |

**Earth and Atmosphere**

**Exam Practice**

**This question is about the Earth’s atmosphere:**

(a)     The amount of carbon dioxide in the Earth’s atmosphere decreased during the first billion years of the Earth’s existence.

Complete the sentences. Use words from the box.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **carbonates** | **dissolved** | **evaporated** | **melted** | **nitrates** | **sulfates** |

The amount of carbon dioxide in the Earth’s atmosphere decreased because

the carbon dioxide................................................................... in the oceans.

Sediments were formed when ..................................................... were produced.

Algae and plants use carbon dioxide and water to produce oxygen.

**(2)**

(b)     What is the name of this process?

Tick **one** box.

|  |  |  |
| --- | --- | --- |
|  | Carbon capture | https://app.doublestruck.eu/content/AG_SCC/HTML/Q/QSPTC2F01_files/img01.png |
|  | Combustion | https://app.doublestruck.eu/content/AG_SCC/HTML/Q/QSPTC2F01_files/img01.png |
|  | Photosynthesis | https://app.doublestruck.eu/content/AG_SCC/HTML/Q/QSPTC2F01_files/img01.png |
|  | Polymerisation | https://app.doublestruck.eu/content/AG_SCC/HTML/Q/QSPTC2F01_files/img01.png |

**(1)**

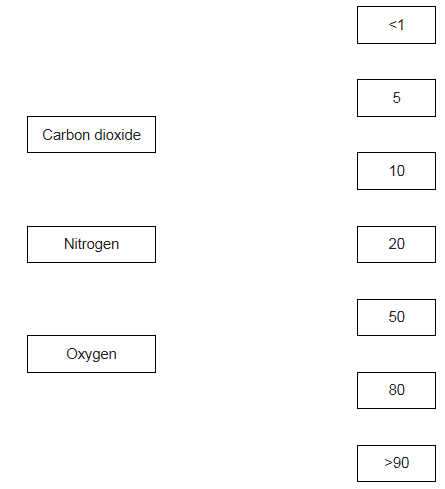
(c)     Complete the word equation for this process.

carbon dioxide   +   ..................................   →   glucose   +   ......................................

**(1)**

(d)     Draw **one** line from each gas to the approximate percentage of the gas in the Earth’s atmosphere today.





**(3)**

(e)     Carbon dioxide is a greenhouse gas.

Why does increasing the amount of carbon dioxide change the global climate?

........................................................................................................................

**(1)**

(f)     How can countries reduce carbon dioxide emissions?

Tick **one** box.

|  |  |  |
| --- | --- | --- |
|  | only burn methane | https://app.doublestruck.eu/content/AG_SCC/HTML/Q/QSPTC2F01_files/img01.png |
|  | use renewable energy supplies | https://app.doublestruck.eu/content/AG_SCC/HTML/Q/QSPTC2F01_files/img01.png |
|  | use waste plastic bags as fuel | https://app.doublestruck.eu/content/AG_SCC/HTML/Q/QSPTC2F01_files/img01.png |

**(1)**

(g)     Give **one** reason why it is difficult for countries to reduce emissions of carbon dioxide.

........................................................................................................................

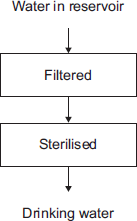
........................................................................................................................

**(1)**

**(Total 10 marks)**

**This question is about potable water:**

(a)     The flow diagram below shows how water is made suitable for drinking.



(i)      What is removed when the water is filtered?

|  |  |  |
| --- | --- | --- |
|  | Tick (https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img03.png) **one** box. | |
|  | Gases | https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img02.png |
|  | Liquids | https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img02.png |
|  | Solids | https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img02.png |

**(1)**

(ii)     What is used to sterilise the water?

|  |  |  |
| --- | --- | --- |
|  | Tick (https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img03.png) **one** box. | |
|  | Carbon | https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img02.png |
|  | Chlorine | https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img02.png |
|  | Sodium chloride | https://app.doublestruck.eu/content/AG_CHM/HTML/Q/Q15S3F01_files/img02.png |

**(1)**

(iii)    Why is the water sterilised?

...............................................................................................................

...............................................................................................................

**(1)**

(b)     Water can be purified by distillation.

Drinking water is **not** usually purified by distillation because distillation is expensive.

Complete the sentence.

Distillation is expensive because it requires a lot of

........................................................................................................................

**(1)**

(c)     Why do some water companies add fluoride to drinking water?

........................................................................................................................

........................................................................................................................

**(1)**

**(Total 5 marks)**

**Post-Revision**

**Multiple Choice Questions**

**Earth and Atmosphere**

|  |
| --- |
| **INSTRUCTIONS Score: /20** |

* **Read the question carefully.**
* **Circle the correct letter.**
* **Answer all questions.**

|  |  |  |
| --- | --- | --- |
| 1. | The gas needed for respiration is: | |
|  | a. | Carbon dioxide. |
|  | b. | Nitrogen. |
|  | c. | Water. |
|  | d. | Oxygen. |
| 2. | The process by which this gas is released into the atmosphere is: | |
|  | a. | Distillation. |
|  | b. | Evaporation. |
|  | c. | Combustion. |
|  | d. | Photosynthesis. |
| 3. | One type of organism that produces this gas is: | |
|  | a. | Humans. |
|  | b. | Animal. |
|  | c. | Green Plants. |
|  | d. | Anaerobic Bacteria. |
| 4. | The early atmosphere was primarily composed of: | |
|  | a. | Carbon dioxide and ammonia. |
|  | b. | Oxygen and carbon dioxide. |
|  | c. | Water and oxygen. |
|  | d. | Water and carbon dioxide. |
| 5. | The greenhouse effect is caused by the gases: | |
|  | a. | Carbon dioxide, water vapour and methane. |
|  | b. | Carbon dioxide and water only. |
|  | c. | Carbon dioxide only. |
|  | d. | Ozone. |
| 6. | Carbon dioxide is associated with this environmental problem: | |
|  | a. | Global dimming. |
|  | b. | Global warming. |
|  | c. | Acid rain. |
|  | d. | Suffocation. |
| 7. | Global dimming is caused by: | |
|  | a. | Carbon particles. |
|  | b. | Carbon dioxide. |
|  | c. | Sulfur dioxide. |
|  | d. | Nitrous oxides. |
| 8. | Acid rain is caused by: | |
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|  | 1. Carbon dioxide. | |
|  | 1. Sulfur dioxide. | |
|  | 1. Nitrogen. | |
|  |  | |
| 9. | Global warming can cause: | |
|  | a. | Sea levels to rise. |
|  | b. | The world to get dimmer. |
|  | c. | Buildings to weather. |
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|  |  |  | |
| 11. | Global warming can be caused by: | |
|  | a. | Using wind power. |
|  | b. | Burning nuclear uranium. |
|  | c. | Burning fossil fuels. |
|  | d. | Sulfur in fuel. |
|  |  | |
| 12. | The three types of fossil fuels are: | |
|  | a. | Coal, oil and gas. |
|  | b. | Coal, oil and wood. |
|  | c. | Wind, solar and water. |
|  | d. | Water, wind and biomass. |
|  |  | |
| 13. | Water can be purified using. | |
|  | a. | Chlorine. |
|  | b. | Bromine |
|  | c. | Fluorine. |
|  | d. | Iodine. |
|  |  | |
| 14. | The first step in water purification is: | |
|  | a. | Dissolving the halogen in the water. |
|  | b. | Evaporating the solution. |
|  | c. | Filtering the water. |
|  | d. | Condensing the gases. |
|  |  | |
| 15. | Salt water can be distilled by: | |
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| 16. | Ground water can be obtained by: | |
|  | a. | Drilling the rock and pumping the water to the surface. |
|  | b. | Fracking. |
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|  | d. | Carbon reduction. |
|  |  | |
| 17. | Distilled water is: | |
|  | a. | Bottled H2O. |
|  | b. | Pure H2O. |
|  | c. | Mineral H2O. |
|  | d. | H2O from the tap. |
|  |  | |
| 18. | Carbon dioxide was trapped in: | |
|  | a. | Oceans. |
|  | b. | Plants. |
|  | c. | Oceans and sedimentary rocks. |
|  | d. | The ozone layer. |
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| 19. | Which of the following do scientists believe is responsible for producing the early atmosphere? | |
|  | a. | The Earth being very hot. |
|  | b. | Green plants. |
|  | c. | Oceans heating up. |
|  | d. | Volcanic eruptions. |
|  |  | |
| 20. | The formula for carbon monoxide is: | |
|  | a. | CO2 |
|  | b. | CH2 |
|  | c. | CO. |
|  | d. | CH. |

**Student Checklist and RAG Sheet**

**Earth and Atmosphere**

**Read each statement below and colour the box that best describes your current understanding.**

**(R – red: low understanding, A – amber: some understanding, G - green: good understanding)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Checklist statement** | **R** | **A** | **G** |
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| Describe how early intense volcanic activity may have helped form the early atmosphere and how the oceans formed. |  |  |  |
| Explain why the levels of carbon dioxide in the atmosphere changes as the oceans were formed. |  |  |  |
| State the approximate time in Earth's history when algae started producing oxygen and describe the effects of a gradually increasing oxygen level. |  |  |  |
| Explain the ways that atmospheric carbon dioxide levels decreased. |  |  |  |
| Name some greenhouse gases and describe how they cause an increase in Earth's temperature. |  |  |  |
| List some human activities that produce greenhouse gases. |  |  |  |
| Evaluate arguments for and against the idea that human activities cause a rise in temperature that results in global climate change. |  |  |  |
| State some potential side effects of global climate change, including discussing scale, risk and environmental implications. |  |  |  |
| Define the term carbon footprint and list some actions that could reduce the carbon footprint. |  |  |  |
| Describe the combustion of fuels as a major source of atmospheric pollutants and name the different gases that are released when a fuel is burned. |  |  |  |
| 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. |  |  |  |
| Describe the properties and effects of carbon monoxide, sulfur dioxide and particulates in the atmosphere. |  |  |  |
| Describe and explain the problems caused by increased amounts of these pollutants in the air. |  |  |  |
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| Describe methods to produce potable water, including desalination of salty water or sea water and the potential problems of desalination. |  |  |  |
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| Describe waste water as a product of urban lifestyles and industrial processes that includes organic matter, harmful microbes and harmful chemicals. |  |  |  |
| Describe the process of sewage treatment and compare the ease of obtaining potable water from waste water as opposed to ground or salt water. |  |  |  |