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St Marys Catholic School

Water and Carbon Cycles Lesson Preparation Sheets

All topics are covered extensively at http://coolgeography.co.uk/advanced/water\_carbon\_cycles.php



**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: SYSTEMS THEORY | **Water and Carbon Cycle** |
| Reading: <http://coolgeography.co.uk/advanced/Systems_water_carbon_cycles.php>  |
| Glossary:Hydrospheric system - Flow/transfer – Input – Store/component – System – System boundary – Isolated systems – Open systems – Closed systems – Dynamic equilibrium – Positive feedback – Negative feedback – Cascading system –  |
| Notes |
| Key learning points: | Diagrams or maps: (2 diagrams, positive and negative feedbacks) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
 |
| Case studies or examples (explain an example system - such as a river system) |
| Teachers Initials |  |

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| Topic: Water Cycle – Stores in the water cycle. | **Water and Carbon Cycle** |
| Reading: <http://coolgeography.co.uk/advanced/Major_Stores_Water.php>  |
| Glossary:Atmospheric water – Cryospheric water – Hydrosphere –Oceanic water – Terrestrial water –Sea ice – Ice shelves – Ice sheets – Ice caps – Alpine glaciers – Permafrost –Surface water – Wetlands – Groundwater – Soil water – Biological water –  |
| Notes |
| Key learning points: | Diagrams or maps: (Distribution of the world’s water Pie chart) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
 |
| Case studies or examples (any examples of each store) |
| Teachers Initials |  |

**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Water Cycle – Processes | **Water and Carbon Cycle** |
| Reading: <http://coolgeography.co.uk/advanced/Water_Cycle_Processes.php> OR“AQA A-level Geography” Skinner et al. P9 to 13 |
| Glossary:Evaporation,Condensation,Cloud formation,Causes of precipitation andCryospheric processesEvapotranspiration – Residence TimeMeltingFreezingVaporisationSublimationDepositionHumidityRelative humidity  |
| Notes |
| Key learning points: | Diagrams or maps: A sketch of the Water Cycle; |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
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| Topic: Water Cycle – The Drainage Basin | **Water and Carbon Cycle** |
| Reading: <http://coolgeography.co.uk/advanced/Drainage_Basins.php>  |
| Glossary: Drainage basin – Evaporation – Groundwater flow – Infiltration – Infiltration rate –Interception storage – Overland flow – Percolation – Run-off – Saturated – Stemflow – Storm and rainfall event – Throughfall – Throughflow – Transpiration –Soil storage – Vegetation storage – Channel flow – |
| Notes |
| Key learning points: | Diagrams or maps: (Sketch a diagram of how water moves through the drainage basin system) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
 |
| Case studies or examples (any examples of a drainage basin system with some background factual evidence – such as the Tyne Basin, or the Amazon) |
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**THE SHEETS FROM THIS POINT ON WILL BE USED ONCE YOU START THE COURSE, THERE IS NO NEED TO FILL THEM OUT**

**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic:Water Cycle - The water balance and soil moisture budgets. | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P13 to 14“Geography in Focus” Cook et al, page 380  |
| **Glossary:**Water Balance/budget – River regime – Soil moisture budget – Storage – Transfers – Discharge – Potential evapotranspiration – Soil moisture surplus – Soil moisture utilization – Soil moisture recharge –Soil moisture surplus – |
| **Notes** |
| **Key learning points:** | **Diagrams or maps:** (Figure 1.18 Soil water budget graph) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
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| **Case studies or examples** (Younde and Navrongo) |
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Water Cycles - River regime and storm hydrographs | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P14 to 19[**http://coolgeography.co.uk/advanced/Hydrographs\_Regimes.php**](http://coolgeography.co.uk/advanced/Hydrographs_Regimes.php) |
| Glossary:Discharge – Base flow – Storm hydrograph – River regime - Bankfull discharge - Rising limb - Falling limb – Antecedent flow rate – Lag time –Storm Flow –Drainage density – Geology – |
| **Notes** |
| **Key learning points:** (focus on hydrographs and what affects them) | **Diagrams or maps:** (Figure 1.26 A storm hydrograph) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
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| **Case studies or examples** (make notes on river regimes and these examples) |
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Water Cycles – Changes in water cycle over time-human impact | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P19 to 24<http://coolgeography.co.uk/advanced/Human_Influences_Water_Cycle.php>  |
| Glossary: (you will have to do research on the internet for most of these definitions)Deforestation – Forest degradation – Biodiversity – Soil drainage – ‘Tiles’ (to do with soil drainage) – Aeration of soil – Eutrophication – Denitrification – Water abstraction – Water table – Saline intrusion – Desalination plants – Irrigation –  |
| **Notes** |
| **Key learning points:** (cover deforestation, soil drainage and water abstraction, put them as subtitles) | **Diagrams or maps:** (Figure 1.33 effects of soil drainage – draw horizontally) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
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| **Case studies or examples** (Water abstraction of southern England and the London Basin P22-24) |
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Carbon Cycle – Global distribution and size of carbon stores | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P24 to 27<http://coolgeography.co.uk/advanced/Stores_of_Carbon.php>  |
| Glossary:Carbon – Carbon dioxide CO­­2 – Methane CH4 – Calcium Carbonate CaCO3 – Hydrocarbons – Bio-molecules – Anthropogenic CO2 – Biosphere – Carbon sequestration – Carbon sink – Greenhouse gases – Lithosphere – Weathering –  |
| **Notes** |
| **Diagrams or maps:** (Figure 1.36 Terrestrial carbon stores) |
| **Key learning points:** (make notes on carbon origin and the major stores) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Carbon Cycle – Movement of carbon (driving changes in magnitude of stores) | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P27 to 30 (up to volcanic activity)<http://coolgeography.co.uk/advanced/Change_Stores_of_Carbon.php>  |
| Glossary:Carbon sink – Carbon source – Weathering – Carbonic acid – Photosynthesis – Phytoplankton – Respiration – Decomposition – Oxidation – Biological pump – Vertical deep mixing (in oceans) – Combustion – Biomass combustion – Volcanic activity –  |
| **Diagrams or maps:** (Figure 1.39 The carbon cycle) |
| **Key learning points:** |
| **The Geological component:** | **Photosynthesis and Respiration:** |
| **Decomposition:** | **Oceanic carbon pumps:** |
| **Combustion:** | **Volcanic activity:** |
| **Carbon sequestration** (include Figure 1.47)**:** |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Carbon Cycle – Changes in the carbon cycle over time | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P30 to 33<http://coolgeography.co.uk/advanced/Carbon_Cycle_Over_Time.php>  |
| Glossary:Fossil fuels – Enteric fermentation – Greenhouse gases – Deforestation – FAO (United Nations) – Urbanisation –  |
| **Notes** |
| **Key learning points:** (include examples)Natural variations (wild fires and volcanic activity):Human impact (hydrocarbon fuel extraction and burning, farming practices, land use changes (deforestation and urban growth)) |
| **Diagrams or maps:** (Figure 1.45 effects of deforestation on the carbon cycle) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Carbon Cycle – The carbon budget and the impact of the carbon cycle upon land, ocean and atmosphere. | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P34 to 39<http://coolgeography.co.uk/advanced/Carbon_Budget.php>  |
| Glossary: Carbon BudgetOcean acidification – Ocean salinity – Thermohaline circulation – Thermal expansion – Enhanced greenhouse effect – Geo-sequestration – Radiative forcing – Soil organic carbon (SOC) –  |
| **Notes** |
| **Key learning points:** (you may want to put subtitles for land, ocean and atmosphere.) |
| **Diagrams or maps:** (Figure 1.50 positive feedback of oceanic warming) |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
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| **Case studies or examples** (research the Younger Dryas event, how the shutdown of the North Atlantic “Conveyor” caused it and the effect it had on climate) |
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Carbon Cycles – Water, carbon, climate and life on Earth | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P40 to 44http://coolgeography.co.uk/advanced/Carbon\_water\_cycles\_Life\_Earth.php |
| Glossary:Mitigation – Carbon Capture Storage (CCS) –  |
| **Diagrams or maps:** (Figure 1.57 Management of climate change) |
| **Key learning points:** |
| **Carbon Capture Sequestration (CCS):** |
| **Changing rural land use:** |
| **Improved aviation practices:** |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Carbon Cycles – Case study of a tropical rainforest | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P44 to 46<http://coolgeography.co.uk/advanced/Tropical_rainforest_casestudy.php>  |
| Background to the Amazon including a map (Figure 1.63):  |
| **Key learning points:** |
| **Diagram (Figure 1.65 – strategies to reduce effects of environmental change in Amazonia):** |
| Questions EITHER to ask at the start of next lesson OR that you could be asked by an examiner* Low level (Name, List, define, Recall, relate, Describe)
* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
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**Lesson Preparation Sheet – Water and the Carbon Cycle**

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| Topic: Carbon Cycles – Case study of a river catchment at a local scale | **Water and Carbon Cycle** |
| **Reading:** “AQA A-level Geography” Skinner et al. P47 to 49<http://coolgeography.co.uk/advanced/River_Catchment_casestudy.php>  |
| Background to the River Brock including a location map (research this):  |
| **Key learning points:** |
| **Diagram (Sketch Figure 1.67 and 1.68):** |
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* Medium Level (Explain, Compare, Classify, Justify, Apply)
* Hard level (Speculate, Interpret, Analyse, Sequence, Summarize, Develop, Synthesise, Adapt, Judge, Rank, Evaluate, Prove)
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