a-level exam questions & answers:

water & carbon cycles (section a) >

6-mark assorted questions (AO3)

References:

Need help? Check out our ultimate guide to A-Level Geography!

Access All The Mark Schemes Directly Here!

This document is available both as a pdf and editable word document – from the water and carbon cycles topic page - which can be printed.

what are ao3 only 6-mark questions?

At A-Level, you are likely to receive two types of 6 Mark Questions, involving one or multiple figures. Questions which require you to exclusively use and analyse these figures AND NO ADDITIONAL BACKGROUND KNOWLEDGE are AO3 only.

They will be referred to as 'analyse the data presented in figure xyz.'

Think of them as the kind of question a Non-Geographer could do relatively well in simply by observing and noting trends, patterns, anomalies etc. from the figures…

writing tips & tricks:

On AO3 only questions, you simply need to follow the OHLAD strategy (point out an overview from the figure trends – data highs – lows – anomalies – data manipulation) where applicable based on the data to garner 6 marks in total.

DO NOT ATTEMPT TO EXPLAIN ANY OF THESE OBSERVATIONS!!

What is important to do, which differentiates the good from best candidates is taking data presented where available and altering / manipulating it effectively to further your point.

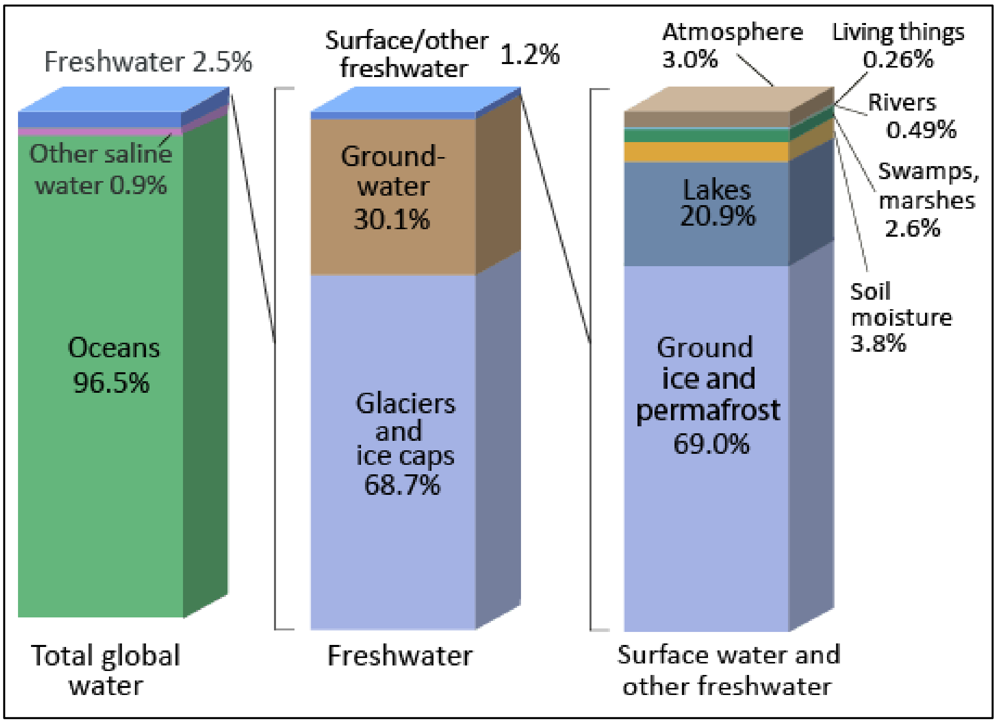
want to know more about how to answer 6-mark questions (and all the others for that matter) more effectively? have a look at our geography portal ULTIMATE GUIDE TO A-LEVEL GEOGRAPHY booklet here or by scanning the qr code to the right. It has loads of helpful information – and there's even one for gcse students also!

V1.3, last updated 5.10.21

1) Analyse the global distribution of stores in relation to the water cycle from figure 1.

Water & Carbon Cycles >> 3.1.1.2 >> Magnitude & Stores of Water

Figure 1 shows global percentages of Water stored in different areas broken down into component parts using detailed data compilation methods.

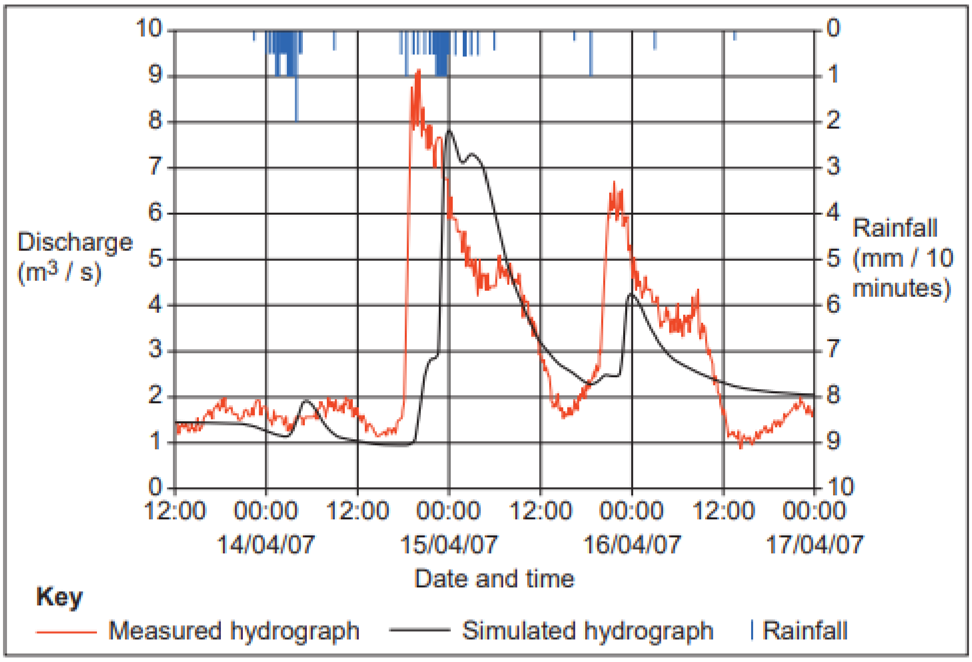


2) Analyse the data presented in figure 2.

Water & Carbon Cycles >> 3.1.1.2 >> The Hydrological Cycle

AQA

Figure 2 shows rainfall data, a measured hydrograph and a simulated hydrograph for Taguibo Watershed in Mindanao Island, southern Philippines. The data were collected from 13 to 17 April 2007. The simulated hydrograph is a computer generated prediction of discharge.



3) Using Figure 3, analyse projected rainfall change in Africa.
Water & Carbon Cycles >> 3.1.1.2 >> Flows & Transfers of Carbon over time

AQA

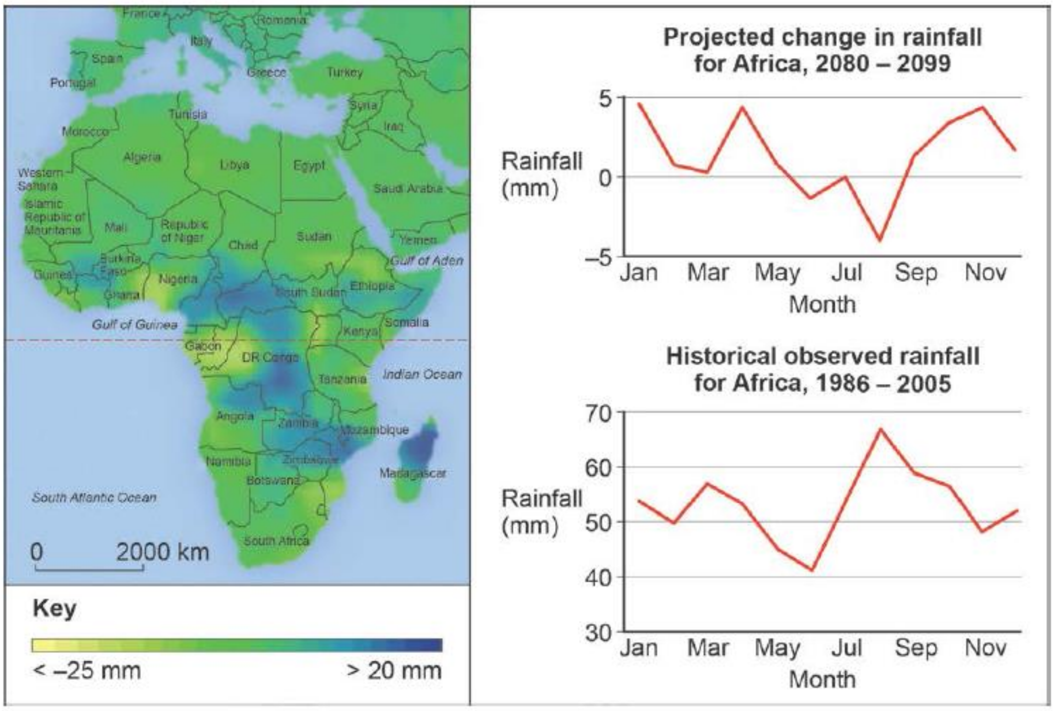


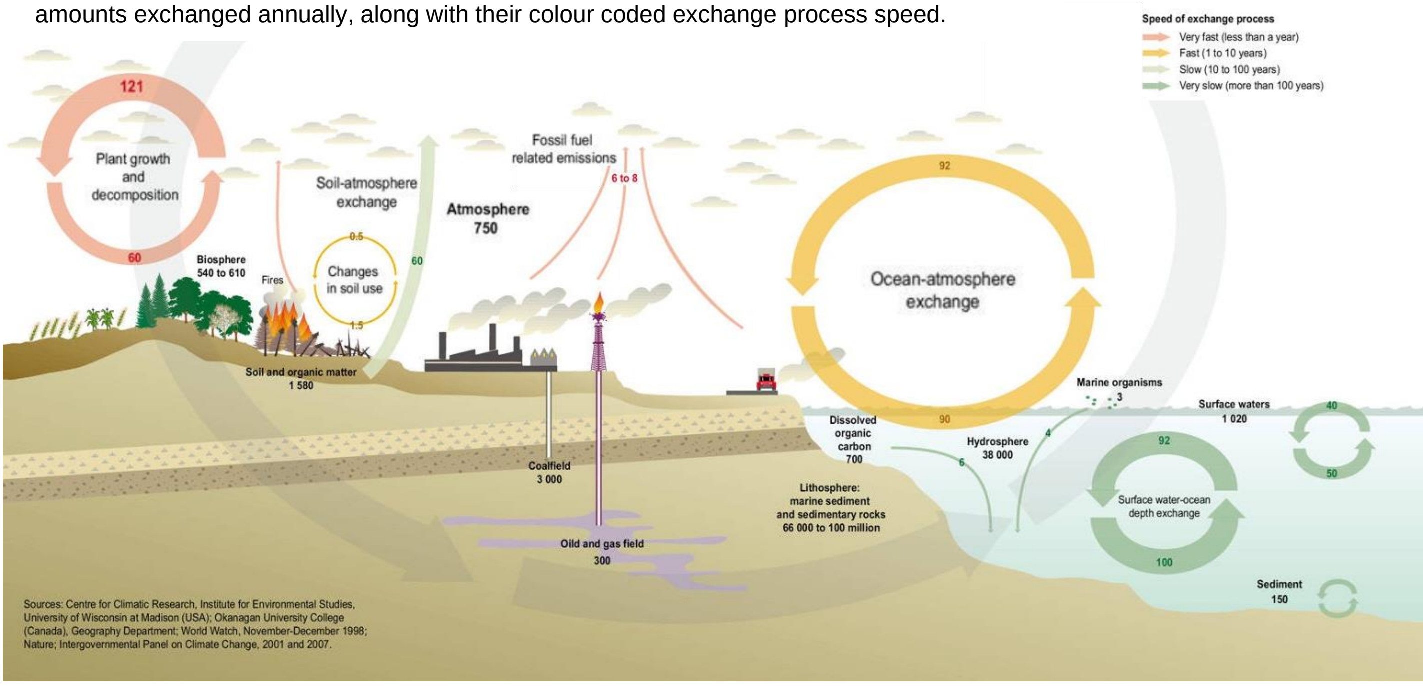
Figure 3 represents data from a climate model for Africa. The map shows how rainfall totals are expected to change by 2099 compared with 1986-2005 averages.

The graphs show predictions for rainfall change by month between 2080 and 2099, compared with between 1986 and 2005.

4) Analyse the data given in figure 4.

Water & Carbon Cycles >> 3.1.1.3 >> Flows & Transfers of Carbon

Figure 4 shows both stores and flows of carbon expressed in Gigatons Carbon (GtC) – 1000 million tonnes. The arrows are proportionate to volume of carbon and figures for flows express amounts exchanged annually, along with their colour coded exchange process speed.



a-level exam questions & answers:

water & carbon cycles (section a) >

mark scheme | 6-mark assorted questions (AO3)

version stage v1.2, last updated 5.10.21

Q.:	Sp. Ref.:	Information For Markers:	B'down:	Marks:
1	3.1.1.2	**1) Analyse the global distribution of stores in relation to the water cycle from figure 1.** **AO3 –** There should be a clear analysis of the patterns and trends, ideally involving more advanced data manipulation or calculation, relating different stores and locations of water on earth. **Mark scheme** Level 2 (4–6 marks) AO3 – Clear analysis of the quantitative evidence provided, which makes appropriate use of data in support. Clear connection(s) between different aspects of the data and evidence. Level 1 (1–3 marks) AO3 – Basic analysis of the quantitative evidence provided, which makes limited use of data and evidence in support. Basic connection(s) between different aspects of the data and evidence. **Notes for answers** • The left split column graph suggests that the vast majority of stores of water on earth (over 96%) are held in saltwater / saline areas, overwhelmingly in oceans (99% of this figure) around the world. • (Students may continue on to the middle graph) In comparison, freshwater stores (such as glaciers, rivers and lakes) only comprise 2.5% of global water stores. • Of this amount of freshwater, however, around 2/3 (68.7%) is held within the cryosphere / glaciers / ice sheets and caps, whilst just under 1/3 (30.1%) is terrestrially held in the ground (groundwater.) • Barely 1% of freshwater (itself only 2.5% of total global water – therefore 0.025% of global water) is held on the surface / in the biosphere… • Around 70% (69%) of this is itself is within permafrost or ground ice (also cryosphere) – whilst 20% is in lakes, 3.8% as soil moisture … , etc , … 0.49% in rivers. • (Students may infer that this means that / suggests) relative to total water globally, only around 0.0001% is within rivers, for example – a tiny fraction.	AO3= 6	6

		For full marks, reference to all three subgraphs must be complete, ideally with advanced analysis involving manipulation or calculations of some description, beyond just the values given. No credit given for simply copying or rephrasing the graph caption.		
2	3.1. 1.2	**2) Analyse the data presented in figure 2** **AO3** – There should be clear analysis of the relationships between rainfall in the drainage basin and its impact upon the simulated hydrograph. There should also be data manipulation to support the analysis. The relationship between the simulation and actual hydrograph should also be analysed. **Mark scheme** Level 2 (4–6 marks) AO3 – Clear analysis of the quantitative evidence provided, which makes appropriate use of data in support. Clear connection(s) between different aspects of the data and evidence. Level 1 (1–3 marks) AO3 – Basic analysis of the quantitative evidence provided, which makes limited use of data and evidence in support. Basic connection(s) between different aspects of the data and evidence. **Notes for answers** • Level 1 responses are likely to simply describe the data without clear attempt to analyse, for instance by manipulating data, identifying relationships and/or spotting trends. • The first round of rainfall appears to make little impact on either the measured or simulated discharge. Rainfall peaks at 2 mm and the event appears to last around 4–5 hours. • Discharge remains at between 1–2 m3 /sec. The simulated discharge appears to show some response to the event with a sharp rise and quick return to below normal baseflow within 4–5 hours. • It is the measured flow which shows very little response to the event. • However, by around 6 pm on 14.04.07 there is a very strong and almost immediate increase in discharge. Discharge increases by almost 7 m3 /sec with virtually no build up prior to this. The simulated data shows more of a lag – around 3–4 hours, a sharp increase but a lower peak perhaps up to 1 m3 /sec less. Some may question the reliability of the simulation in predicting the impact of the first event. • The second event appears to start around 6pm on 14.04.07 and last around 10 hours. The lag time is longer for both the measured and simulated discharge. The peak is also lower at around 6.6 m3 /sec. The simulation is even less accurate following the second event. The peak is lower than the measured flow by over 2 m3 /sec and the return to base flow is less pronounced. • Credit any other valid analysis.		

3	3.1.1.2 AQA	3) **Using Figure 3, analyse projected rainfall change in Africa** **AO3** – There are a variety of ways of approaching this unseen material. Students are required to analyse rainfall variation and change of over time. Responses should use the resources effectively and appropriately showing understanding of the link between the two graphs. Expect to see analysis of patterns and identification of anomalies on both the graphs and map. **Mark scheme** Level 2 (4–6 marks) AO3 – Clear analysis of the quantitative evidence provided, which makes appropriate use of data in support. Clear connection(s) between different aspects of the data and evidence. Level 1 (1–3 marks) AO3 – Basic analysis of the quantitative evidence provided, which makes limited use of data and evidence in support. Basic connection(s) between different aspects of the data and evidence. **Notes for answers** • Analysis shows that overall Africa is expected to see an increase in the amount of rainfall for most months. The biggest increases appear to be in January, April and November (around 4 mm). • However, from May to September, this model suggests that rainfall will be lower than the 1986–2005 average by as much as 4 mm in August. • Some students may calculate this as a reduction from 67 to 63 mm. For many months, February, March, May and September, there is little change expected. • The map gives further information about how the changes identified may affect rainfall spatially across Africa. The north of Africa is broadly expected to experience little change. • A large group of countries stretching from Chad to Botswana in the south are set to experience an increase in rainfall of up to 20 mm. • Some may point to anomalies where rainfall is set to fall such as south-west Nigeria which is expected to experience up to a 25 mm reduction in rainfall. • Credit any other valid observations.		
4	3.1.1.3	**4) Analyse the data given in figure 4** **AO3 –** there are a few ways of going about analysing this data, but high level students were expected to include reference in both a temporal (time) and spatial (scale) sense. Data should be effectively included into all analysis and ideally manipulated to at least some extent, though this is less prevalent than in other 6 mark responses. **Mark scheme**		

		Level 2 (4–6 marks) AO3 – Clear analysis of the quantitative evidence provided, which makes appropriate use of data in support. Clear connection(s) between different aspects of the data and evidence. Level 1 (1–3 marks) AO3 – Basic analysis of the quantitative evidence provided, which makes limited use of data and evidence in support. Basic connection(s) between different aspects of the data and evidence. **Notes for answers** • Students should aim to link speed and scale of processes acting within the carbon cycle in the atmosphere, lithosphere, biosphere and hydrosphere. • Simple mention of the values in stores such as atmosphere (750 GtC) and hydrosphere (36000 GtC) should be credited but not overused. • The most dominant rapid processes at work are plant growth and decomposition (up to 121GtC), ocean-atmosphere exchange (up to 92GtC.) These processes act over less than 10 year periods and are therefore part of the fast carbon cycle. • There are many much comparatively smaller processes such as changes in soil use (less than 1GtC per year), which act cyclically, as well as some (particularly anthropogenic / human) flows which act monodirectional, such as fossil fuel related emissions (6-8 GtC per year.) This is obviously part of the very fast carbon cycle. • In some processes such as plant growth and decomposition the rate of exchange is very unequal, with over twice the carbon being transferred into the biosphere than is uptaken per year (121 vs. 60 GtC.) • Reference may be made to processes within the ocean exclusively occurring as part of the (very) slow carbon cycle – periods over 100 years being common, whilst those in the atmosphere tend to run faster. • Credit any other valid examples or analysis from the figure provided.		