

Human Geography Investigation Summer 2021



Globalisation

“Globalisation is undoubtedly a force for good”

To what extent do you agree with this statement?

Completing this booklet will enable you to answer the question above.. This work, along with the Physical booklet, will give you the best preparation imaginable for your Edexcel A Level course. These topics are central to the specification. You do not need to answer the question yet. Just build up your knowledge, understanding and opinions...

Globalisation is the word used to describe the growing interdependence of the world's economies, cultures, and populations, brought about by cross-border trade in goods and services, technology, and flows of investment, people, and information. Countries have built economic partnerships to facilitate these movements over many centuries, but the term gained popularity after the Cold War in the early 1990s.

Globalisation defines your everyday lives, it is relatable, current and topical. Consider this quote from the Martin Luther King Jnr:

*“Did you ever stop to think that you can’t leave for your job in the morning without being dependent upon most of the world? You get up in the morning and go to the bathroom and reach over for the sponge, and that’s handed you by a Pacific Islander. You reach for a bar of soap, and that’s given to you at the hands of a Frenchman. And then you go into the kitchen to drink your coffee for the morning and that is poured into your cup by a South American. And maybe you want tea: that’s poured into your cup by a Chinese. Or maybe you desire to have cocoa for breakfast, and that’s poured into your cup by a West African. And then you reach over for your toast, and that’s given you at the hands of an English-speaking farmer, not to mention the baker. **And before you finish eating breakfast in the morning, you’ve depended on more than half the world.** This is the way our universe is structured. It is its interrelated quality. We aren’t going to have peace on earth until we recognize this basic fact of the interrelated structure of all reality.”*

He wrote this back in 1967, the world is far more interconnected and interdependent 53 years on!



“Globalisation is undoubtedly a force for good”

To what extent do you agree with this statement?

Completing the tasks in this booklet will help you build answers to the following questions:

- ✓ What globalisation is.
- ✓ What drives globalisation.
- ✓ Who globalisation affects.
- ✓ How globalisation impacts you and others on the “local” level, both positively and negatively.
- ✓ How globalisation creates “winners and losers”.
- ✓ How globalisation can be a force for good socially, economically and environmentally.
- ✓ How globalisation has been detrimental to people and places socially, economically and environmentally.

“...globalisation is a powerful force that has influenced global growth and development. Driven by the mobility of goods, services, capital, labour and technology, it has brought a large array of new opportunities and benefits. Yet globalisation also has attendant challenges and risks, manifested by imbalances in the distribution of its benefits and costs”
UN Assistant Secretary-General S. Akhtar, 2013.



Globalisation Tasks Tracker

Task	Completed [tick]
This is Personal: Globalisation in my House	
This is Personal: iPhone flow chart	
Technology winners notes	
Technology losers notes	
Global Shift losers notes	
Outsourcing winners notes	

Need Help?

Whilst the intention of this work is to encourage independent thought and research, please ask for advice if you feel it will help. Email me from your school email account:
gcollman@raynespark.merton.sch.uk

Globalisation

This is personal...

Before you begin, you must first realise how globalisation affects YOU and those around you:

1) Making globalisation personal 1 (your house):

Take a 5 minute stroll around your house and your mission is to find items of all shapes/sizes/kinds/uses which originate outside of the UK. **Make this into a table** like this - I've begun it with the items around me.

Item	Country of origin	Importance to me
WD hard drive	Malaysia	Stores my documents and PowerPoints
Coffee (Nespresso Colombia)	Colombia, Switzerland	Keeps me awake and helps me concentrate

2) Making globalisation personal 2 (your devices):

Read this <https://www.wired.com/2016/04/iphones-500000-mile-journey-pocket/> and **make a flowchart** which follows the Iphone's journey right into your pocket in the UK! Mention every country which has involvement in the production.

This still applies even if you do not own an Apple device!

This is personal...

Globalisation in my House!

[illegible]

This is personal...

iPhone Flow chart!

“WINNERS & LOSERS”



Technology!



It took 1,000 years for the invention of paper to spread from China to Europe. Nowadays, in a world that has become more integrated, innovations spread faster and through many channels.

Globalisation is all about FLOWS, and the flows of ideas and technology are key:

1. Read: <https://blogs.imf.org/2018/04/09/globalization-helps-spread-knowledge-and-technology-across-borders/> and make notes on how the spread of technology has been beneficial.
2. This article covers 10 medical innovations which are saving lives across the world - <https://medicalfuturist.com/the-10-most-innovative-health-technologies-saving-millions-in-the-developing-world/>. Read the article, chose 3 and prove how globalisation can be a force for good!

A few examples
have been done
for you already...

CHALLENGE: Read about how Artificial Intelligence could help humanity:

<https://www.forbes.com/sites/forbestechcouncil/2018/08/23/ai-for-humanity-using-ai-to-make-a-positive-impact-in-developing-countries-2/#f5d94e71b08a>

Notes area (Winners from flows of technology)

Brief notes on what I found interesting:

Globalisation allows us to get hold of knowledge from other countries.

How this is evidence that globalisation is/is not a force for good:

Sharing information means all countries have the potential to benefit from each others ideas.

3D printing could be used to build prosthetic limbs.

3 key FFDN (facts/figures/dates/names):

1. Between 1995-2014 three quarters of innovations/inventions came from just 5 countries: USA, Japan, Germany, France, and the UK..

2. South Korea and China are 2 other countries which have become increasingly connected to global flows of knowledge.

3.

Keywords & their definitions:

Technology: equipment developed from applying science

Emerging Markets: Countries which are making rapid transition from LIC to HIC

Prosthetic: artificial body parts



“WINNERS & LOSERS”



Technology!



Whilst the spread of technology undoubtedly brings with it great rewards, it is not without its disadvantages...

1. <https://thriveglobal.com/stories/why-developing-countries-will-be-left-behind-by-automation/>
2. <https://www.weforum.org/agenda/2016/11/in-the-developing-world-two-thirds-of-jobs-could-be-lost-to-robots>
3. <https://www.bbc.co.uk/news/business-47852589>
4. <https://www.weforum.org/agenda/2018/07/robots-robots-everywhere-what-does-it-mean-for-developing-countries>
5. <https://www.bloomberg.com/opinion/articles/2018-09-17/artificial-intelligence-threatens-jobs-in-developing-world>

Pick any **two** of the above articles and consider the following questions as you make notes on the next page:

- Why does the spread of technology threaten developing countries?
- What solutions can be used to combat this?
- Why is the manufacturing industry so important to developing countries?
- On balance, do new technologies present more advantages or more disadvantages to developing countries?

Notes area (Losers from flows of technology)

Brief notes on what I found interesting:

How this is evidence that globalisation is/is not a force for good:

3 key FFDN (facts/figures/dates/names):

1.

2.

3.

Keywords & their definitions:



AN ASIDE...

What is fascinating about globalisation is how it is part and parcel of OUR everyday lives. Take this, an extract from “A Very Short Introduction to Globalisation” on the football used in the 2016 FIFA World Cup in Brazil:

The official World Cup match-ball, too, was an impressive example of the glocal dynamics constituting globalization. Supplied by Adidas, a successful TNC headquartered in Germany, the football received the name ‘Brazuca’ from the majority of over a million Brazilian fans voting in a naming contest via social media. Brazuca means ‘our fellow’ in Portuguese and is used by Brazilians to describe their national pride in their national way of life. In spite of their apparent local and national identity, however, the Brazucas were manufactured by low-wage workers at the Forward Spots

factory in the Pakistani town of Sialkot (replica balls were made in China). Designed to have a more accurate and repeatable flight path, the prototype Brazucas were thoroughly tested in locations covering all sorts of climates and altitudes in ten countries on three continents. These trials took nearly three years and involved 600 international players to make sure that the Brazuca worked for all positions of the game. Finally, the football contains chemical compounds produced in several countries and plastics generated from petroleum imported from the Middle East and Norway. South Korean-built supersized container ships carried the transnationally assembled Brazucas to football fans around the world.

HOW DOES THIS PROVE HOW GLOBALISATION IS SO RELEVANT TO YOU AND YOUR FAMILIES?

(..even if you don’t watch football!)

ANOTHER ASIDE...

As a momentary distraction - take a look at this anecdote which people use to illustrate globalisation - it concerns the death of Princess Diana, Dodi Fayed and their driver in 1997:

“An English princess with an Egyptian boyfriend crashes in a French tunnel, riding in a German car with a Dutch engine, driven by a Belgian who was (allegedly) drunk on Scottish whisky, followed closely by Italian paparazzi riding Japanese motorcycles. Then treated by an American doctor, using Brazilian medicines. This is sent to you by an Englishman, using Bill Gates' (American) technology, and you're probably reading this on your computer that uses Taiwanese chips and a Korean monitor, assembled by Bangladeshi workers in a Singapore plant, transported by Eastern European lorry-drivers...”

**WHY IS THIS A GOOD ILLUSTRATION OF
WHAT GLOBALISATION IS?**

“WINNERS & LOSERS”



Global shift!



The ‘global shift’ is a consequence of globalisation and the increase of foreign direct investment by TNCs in newly industrialising countries (NEEs - these include the Asian Tigers - South Korea, Taiwan, Singapore and Hong Kong, which started industrialising in the 1960s - and China and India) and recently industrialising countries (these include the Philippines, Indonesia and Cambodia; countries which began industrialising in the 1980s).

Global shift means an increase in proportion of global manufacturing carried out in NEEs in the last 30 years. The majority of this is happening in Asia. Global shift has led to deindustrialisation in key industrial areas in the UK (South Wales, for example) and combined with outsourcing (when a company hires another individual to perform tasks) has led to huge job losses in developed countries.

Use **four** of the following links and your own research to look into the global shift and outsourcing and its negative economic impacts worldwide:

1. <https://www.thebalance.com/how-outsourcing-jobs-affects-the-u-s-economy-3306279>
2. <https://www.irishtimes.com/culture/books/the-dark-side-of-globalisation-1.3516550>
3. <https://www.bbc.co.uk/news/business-38600270>
4. <https://ftalphaville.ft.com/2016/12/06/2180771/how-many-us-manufacturing-jobs-were-lost-to-globalisation/>
5. <https://www.epi.org/publication/china-trade-outsourcing-and-jobs/>
6. <https://www.theguardian.com/world/2009/nov/01/detroit-michigan-economy-recession-unemployment>
7. <https://www.governing.com/commentary/gov-legacy-city-struggling-cities.html>
8. <https://www.ft.com/content/b2751878-c10d-11e5-846f-79b0e3d20eaf>
9. <https://www.theguardian.com/business/2019/may/29/redcar-how-the-end-of-steel-left-a-tragic-legacy-in-a-proud-town>
10. <https://www.economicshelp.org/blog/27657/unemployment/structural-unemployment/>

Notes area (Global Shift)

Brief notes on what I found
interesting:

How this is evidence that globalisation is/is
not a force for good:

3 key FFDN
(facts/figures/dates/names):

1.

2.

3.

Keywords & their definitions:



“WINNERS & LOSERS”



Outsourcing!



The outsourcing of jobs is a contentious issue - whilst it does “take” from end of the world, it does then “give” to another. A job in software engineering “lost” to an American worker is “gained” by an Indian worker.

Use **four** of the following links and your own research to look into the outsourcing and its positive economic impacts worldwide:

1. <https://outsourcingangel.com/how-does-outsourcing-help-developing-countries/>
2. <https://www.dailysabah.com/opinion/2014/06/17/is-outsourcing-a-chance-for-developing-countries>
3. <https://www.forbes.com/sites/morganhartley/2012/12/16/the-culture-shock-of-indias-call-centers/#1f84953972f5> - India’s call centre workers, who massively benefit from outsourcing.
4. <https://www.theguardian.com/sustainable-business/2014/jun/19/outsourcing-extreme-poverty-africa-south-asia-call-centres-ddd>
5. http://college.cengage.com/polisci/duncan/world_politics_sce/1e/assets/students/case/duncan_1e_case_ch13.pdf
6. <http://www.outsourcingportal.eu/en/how-can-outsourcing-drive-economic-growth>

Notes area (Outsourcing)

Brief notes on what I found interesting:

How this is evidence that globalisation is/is not a force for good:

3 key FFDN
(facts/figures/dates/names):

1.

2.

3.

Keywords & their definitions:





Physical Geography Investigation

Summer 2021

The Water Cycle and The Carbon Cycle

A-level Physical Geography

An Introduction:

- What is physical geography A-level?

Physical geography at A-level dives deeper into the world's natural processes which occur on various scales, enlightening you into the more complex nature of the natural world around you. You will then investigate how these natural phenomenon come to shape the lives of humans.

Why should you study the topic?

The relevance of the topics which you study for A-level geography to your daily lives is startling. Whether walking to school and seeing the carbon and water cycle in action, understanding the impact of our changing climate on some of our most fragile ecosystems, or understanding the role of governments in protecting people from hazards, what you learn can be applied to every day conversations.

Completing this work before you begin Year 12 will give you an outstanding start to the Edexcel A Level Geography course. You'll be on your way to achieving great things over the next 2 years.

I hope you enjoy your journey into the world of Physical Geography!

The Water Cycle

topics tracker

Topic focus	Page number	Completed [tick when complete]
Key words	4	
The water cycle in action video task	7	
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How The Water Cycle Works	10	
Positive and Negative Feedback	13	

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Key words

Key words form the basis of physical geography. Without them, you are not speaking the language of geography. No matter how well you understand a process or concept, you cannot explain it clearly without using key words.

Task: Using the table on the following page, match up the key words with the definitions. To save you drawing lines and it looking messy, each key word has been given a number which you can write next to the correct definition. The first one has been done for you.

Once you have completed this, check your answers on the next page.

Key word	Definition
1. Water cycle	The way water is stored and moves on different scales 1
2 Open system	Places where water can be held in the water cycle
3 Closed system	The loss of water from a plant cell due to heat
4. Precipitation	The cooling of water vapour to form liquid water (in cloud form)
5. Interception	The movement of water over the ground surface, straight into the river channel. This is the fastest flow of water into a river channel
6 Infiltration	When matter (such as water) can enter or exit an area (the system), meaning the mass of water held in the area can increase or decrease
7. Percolation	The downwards movement of water from the soil layer into the rock layer below it
8. Throughflow	When soil has absorbed as much water as possible and cannot allow any more to infiltrate
9. Groundwater flow	Water which has percolated into rock will move horizontally through the rock layer towards the river channel (usually down a slope due to gravity)
10.Surface runoff	When vegetation (plants) store and hold onto water which has been precipitated
11. Soil saturation	Water which has infiltrated into soil will move horizontally through the soil layer towards the river channel (usually down a slope due to gravity)
12. Evaporation	Water falling from the sky as rain, snow, sleet or hail
13. Condensation	The heating of liquid water on the ground surface, creating water vapour
14. Transpiration	The movement of water from one store to another
14. Store	The downwards movement of water from the ground surface into the top soil layer through absorption
15. Transfer	When matter (such as water) cannot enter or exit an area, so the mass of water never changes

Key words – correct definitions

Key word	Definition
1. Water cycle	The way water is stored and moves on different scales
2 Open system	When matter (such as water) can enter or exit an area (the system), meaning the mass of water held in the area can increase or decrease
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14. Store	Places where water can be held in the water cycle
15. Transfer	The movement of water from one store to another

The Water Cycle in Action

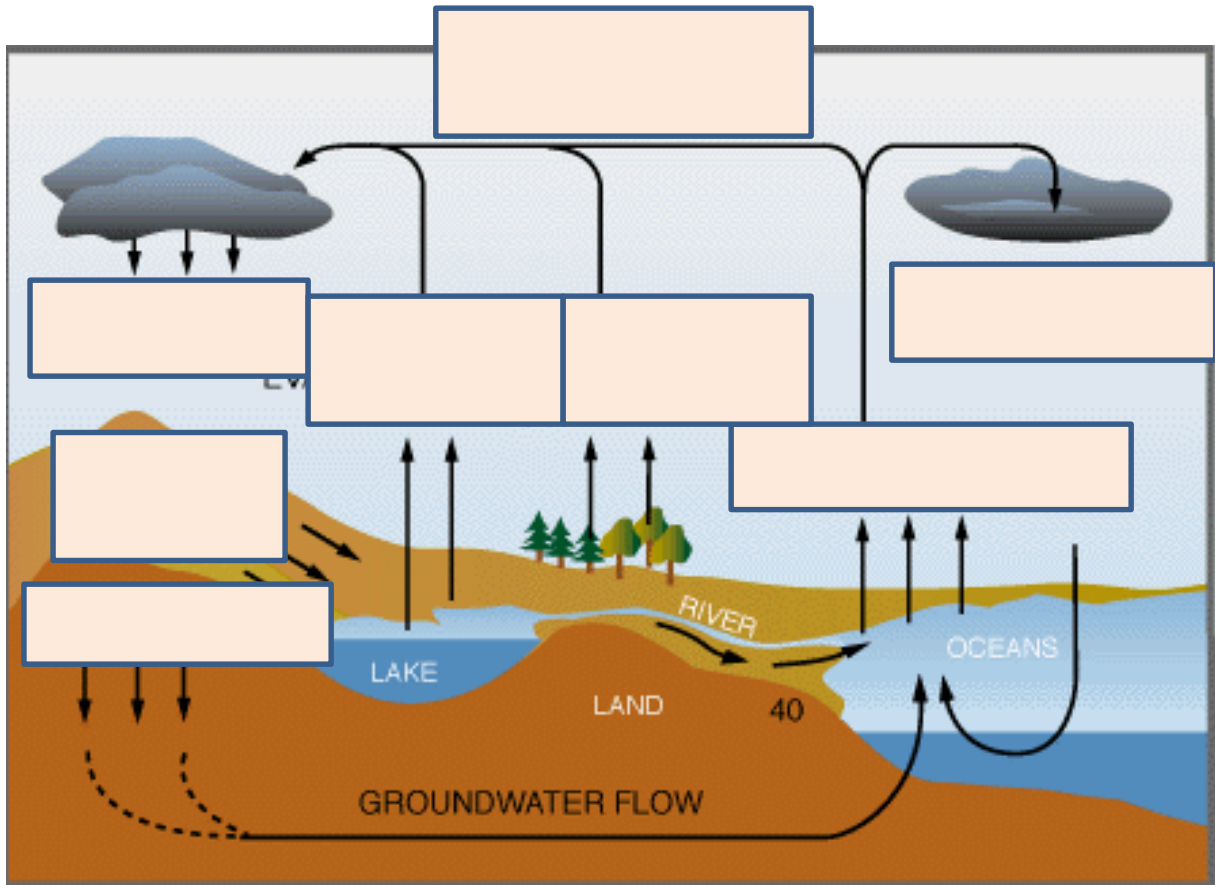
<https://www.youtube.com/watch?v=al-do-HGulk>

Watch the video and complete the questions below.

1. Has the amount of water on Earth changed over millions of years?
2. List 3 ways water moves (is transferred) across the world (between stores)
3. In order to form clouds, water has to...
4. Where is 70% of all the water on Earth stored?
Think, why is this water not useful to humans?
5. Where is two thirds of all freshwater stored?
6. Where else can freshwater be stored? Aim for 6 different stores.
7. Why are the stores of water always changing?
8. What is precipitation? Give as many examples as possible (you should already know from the task before)
9. What is rain which falls onto land called and why might this cause flooding?
10. What is meant by interception?
11. Name the layers below the Earth surface.
12. What is evaporation? Is this a store or transfer of water?
13. What is transpiration?
14. What is evapotranspiration?
15. What is condensation and what does it lead to occurring?

Large and Local scale water cycles

Large scale water cycles are so special that only one exists on the whole planet. This is known as the “Global Water Cycle”. This is the circulating of water around Earth, a closed system where no water is ever lost or gained, but simply moved about. **Your task: Put the key words in the boxes into the correct place on the diagram. Precipitation and evaporation have been used twice.**



Evaporation

Transpiration

Evaporation

Precipitation

Infiltration

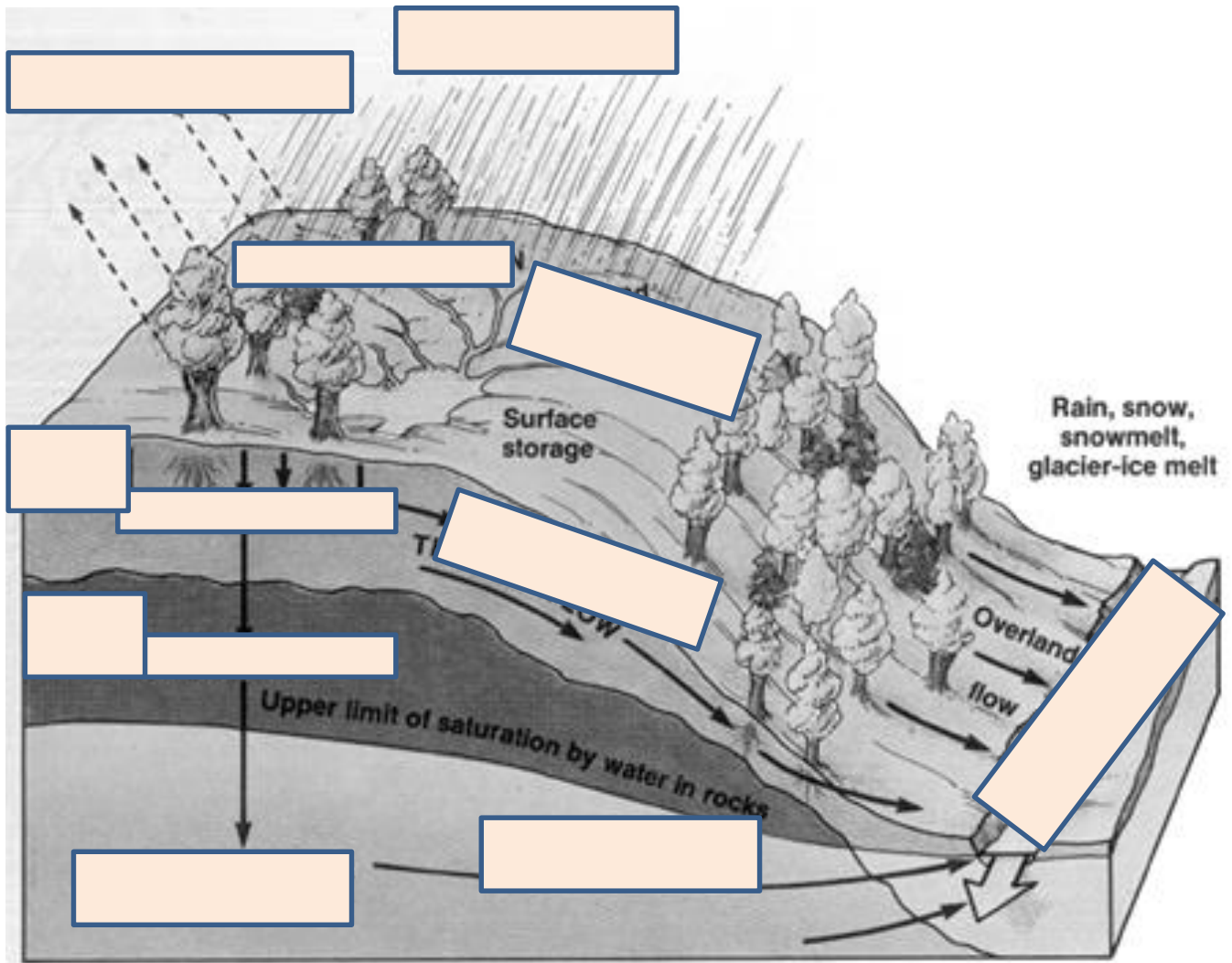
Water vapour
movement

Precipitation

Surface
runoff

Large and Local scale water cycles

Local, or smaller scale water cycles are called “subsystems”, and will usually be open systems, where water can move in and out of the system. A good example of a small scale water cycle or subsystem is a river channel on a hillslope or a drainage basin. **Your task: Put the key words in the boxes into the correct place on the diagram of the hillslope.**



Throughflow

Overland flow
/surface
runoff

Groundwater

Evaporation

SOIL

Channel flow

Precipitation

Percolation

Interception

Rock

Groundwater
flow

Infiltration

Reading time – How The Water Cycle Works

Task 1: Read through the paragraph below and circle the letter which best answers the questions on the next page. The first one has been done for you.

Before we look at the water cycle and how water moves around the Earth on different scales, it is important to know what a “cycle” is. In A-level geography we use the word “system” to explain the complicated, always changing water cycle, you will see why the term is used in a minute. A system can be defined as, “*a collection of parts which work together to create something which works*”. In this way, the water cycle has many “parts” known as stores, and there are many specific interactions between the stores. These interactions are better known as transfers. It is worth noting here that “processes” (things which are happening) such as evaporation, condensation and precipitation, are all examples of transfers of water.

For example, a store of water is a river, and the transfers interacting with the river could be evaporation and precipitation. As water moves into the system via precipitation, the store of water (the river) gets larger. This movement of water into the river is called an, “input”, and evaporation, where water leaves the store is called an “output”. Both precipitation and evaporation show movement of water, either to or from the river. In this way, precipitation and evaporation are known as “transfers”. The greater the amount of transfers which a store receives as inputs, the greater the store of water in the river channel will grow. However, at the same time, transfers which leave the store, or outputs, will see a decrease in the size of the water store.

The amount of water stored globally (in the entire world) never changes, so the global water cycle never sees inputs and outputs. This means that no water ever leaves or enters Earth, so the mass of water on Earth stays the same. However, there are smaller scale water systems which operate within the global water cycle. An example of a small-scale water system could be a river channel which flows down a hill slope. The mass of the water stored in the river channel will change constantly. During certain time periods, evaporation may be higher (more water output) and precipitation may be lower, (less water input). This means that the mass of water in the river channel will be lower in this particular river. However, just because the water has been lost from this particular river channel, does not mean that the water has disappeared from Earth. The water which has been evaporated from this river channel, will likely turn into clouds and be stored in the sky, later on, it might enter another river channel through precipitation.

Question time

Circle the letter which best answers the question using the passage on the previous page. The first one has been done for you.

1. Which of the following is the best definition of a system?

- a) Movement of matter such as water out of a place
- ☒ b) A collection of parts which change as they are affected by processes
- c) Transferring of many different materials to the same place

2. Which of the following is the best definition of a store?

- a) Part of a system where water is gained
- b) Part of a system where water is lost
- c) Part of a system where water is held

3. Which of the list below outlines examples of stores of water?

- a) Precipitation, evaporation, river channel, surface water
- b) Surface water, cloud, evaporation, flooding
- c) Puddle, river channel, cloud, soil

4. Circle the best definition of a transfer of water

- a) The carrying of water in a constant cycle between two stores
- b) The movement of water from one store to another via inputs and outputs
- c) The output of water from a store

5. Which of the list below outlines examples of transfers of water?

- a) Precipitation, clouds, soil, river channel
- b) Precipitation, infiltration, surface runoff
- c) Precipitation, evaporation, clouds

6. Which of the following factors will increase evaporation?
- a) More sunlight
 - b) More rain
 - c) More clouds
7. Which of the following is the correct definition of an input?
- a) Transfer of water from a store, decreasing the mass of water held in that store
 - b) The store of water, such as a cloud or a puddle
 - c) Transfer of water into a store, increasing the mass of water held in that store
8. Which of the following is the best definition of a closed system?
- a) When inputs and outputs are equal
 - b) When there are many inputs and outputs to and from a system
 - c) When a system has no inputs or outputs, so the mass of matter (such as water) doesn't change
9. Which of the following is the correct definition of an input?
- a) Transfer of water into a store, increasing the mass of water held in that store
 - b) Transfer of water from a store, decreasing the mass of water held in that store
 - c) The store of water, such as a cloud or a puddle
10. Which of the following statements is **not** correct?
- a) The Earth is an example of a closed water system, here there is never a net loss or gain of water
 - b) The Earth is an example of a closed water system, water is always being lost and gained from this system
 - c) The Earth has no inputs or outputs of water to or from it, but the smaller water systems within Earth do change in water mass due to inputs and outputs
11. Which of the following best defines the word "process"?
- a) A store of something where matter is held
 - b) An action which can occur, leading to a transfer of matter.
 - c) A transfer

Positive and Negative Feedback in Systems

Systems always naturally try to maintain their own balance. This happens in all systems, no matter how big or small, from the global scale water cycle of evaporation, condensation and precipitation, to a small river with the same processes occurring,

This means that, if evaporation increases, the ocean does not dry up, in fact, because of increased evaporation, condensation also increases, and therefore so does precipitation, causing rain to fill up the oceans again. This balancing effect is known as a negative feedback system, which reacts to a process which is happening (evaporation) by increasing processes to reverse its effects (thereby increasing condensation and precipitation). Because of this negative feedback, a system will usually stay in balance or what is known as a dynamic equilibrium. If we pick these words apart, we see that the system is in balance (equilibrium), but that this system is always changing (it is dynamic) due to inputs (such as precipitation) and outputs (such as evaporation).

Read through the following definitions of positive and negative feedback and decide if the examples in the boxes on the next page are examples of positive or negative feedback.

Positive feedback – when a process occurs in a system, creating a change, this then creates another change which amplifies (increases) the original change. When this happens, a system will be out of balance as one process is not cancelling out or balancing the other.

Negative feedback – when a process occurs in a system, creating a change, this change then causes another process to occur, which nullifies (cancels out) the original process, meaning the system is always in balance due to negative feedback.

Dynamic Equilibrium – the ever changing balance which systems achieve through negative feedback systems.

Positive or Negative Feedback in the water cycle?

Temperatures increase, increasing evaporation rates, increasing water vapour in the air, increasing condensation, increasing precipitation, causing cooling and a drop in temperature.

Temperatures increase due to the Greenhouse Effect, this increases the rate of evaporation, increasing water vapour in the atmosphere. Water vapour is a greenhouse gas, which absorbs heat which is trying to leave the atmosphere. More heat is trapped, temperatures increase.

Temperatures increase, increasing evaporation rates, increasing water vapour in the air, increasing condensation, increasing cloud cover, reducing the amount of heat from the sun which reaches the surface of the Earth, causing a decrease in temperature.

Sea temperatures rise due to higher atmospheric temps, ice melts, fewer heat reflective surfaces (ice) and more heat absorbent surfaces (ocean water which is dark blue). More heat absorbed by oceans, ocean temperatures rise.

In a tropical rainforest, heavy precipitation potentially leads to flooding. Flooding can occur when precipitation is high due to higher temperatures, more plant growth due to high sunlight and high rainfall, meaning a lot of vegetation cover and therefore a lot of interception, therefore a lower likelihood of flooding.

The Carbon Cycle

Topics tracker

Topic focus	Page number	Completed [tick when complete]
Key words	24	
The different forms of carbon	26	
The carbon cycle in action video task	28	



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Key words

Just as with the water cycle, the carbon cycle comes with its own set of specific key words.
Task: Match up the key words with the definitions. Check your answers overleaf.

Key word	Definition
Carbon	 An element (C) which joins with others to form compounds that make up life forms and parts of the Earth such as its outer layer.
Carbon cycle	The intake of CO ₂ by plants, this can be done using energy from the sun and also requires water to take place. CO ₂ is converted to carbohydrates () in the plants, resulting in plant growth.
Open system	The carbon which is stored within living matter, predominantly plants on land or in humans and animals
Closed system	Stopping something from happening, in this case, the increase of CO ₂ into the atmosphere
Sphere	 A large scale store of carbon. Examples of spheres include the biosphere (carbon stored in living matter) and the atmosphere (carbon stored in the air)
Biosphere	When carbon (in its various forms) can enter or exit an area (the system), meaning the mass of carbon held in the area can increase or decrease eg a forest
Atmosphere	The carbon which is stored within the air, usually as carbon dioxide (CO ₂) or methane (CH ₄)
Lithosphere	The movement of carbon from one store to another due to processes such as photosynthesis (atmosphere to biosphere)
Hydrosphere	The storage of carbon either naturally (via photosynthesis) or by humans (via carbon capture)
Photosynthesis	The movement of carbon from one store to another due to processes such as photosynthesis (atmosphere to biosphere)
Carbon sequestration	Carbon which is held in oceans (sea plants are counted here, not in the biosphere)
Mitigation	When carbon (in its various forms) cannot enter or exit an area, so the mass of carbon never changes, there are very few examples of closed carbon cycles
Greenhouse gas	Places where carbon can be held in the carbon cycle. Either on a small scale (a tree) or on a large scale (the biosphere).
Store	Gases which are released into the atmosphere, these gases absorb heat and keep it in the atmosphere, making Earth warmer
Transfer	The movement and storage of carbon around the Earth

Key words

Just as with the water cycle, the carbon cycle comes with its own set of specific key words.
Task: Match up the key words with the definitions. Check your answers overleaf.

Key word	Definition
Carbon	 An element (C) which joins with others to form compounds that make up life forms and parts of the Earth such as its outer layer.
Carbon cycle	The movement and storage of carbon around the Earth
Open system	When carbon (in its various forms) can enter or exit an area (the system), meaning the mass of carbon held in the area can increase or decrease eg a forest
Closed system	When carbon (in its various forms) cannot enter or exit an area, so the mass of carbon never changes, there are very few examples of closed carbon cycles
Sphere	 A large scale store of carbon. Examples of spheres include the biosphere (carbon stored in living matter) and the atmosphere (carbon stored in the air)
Biosphere	The carbon which is stored within living matter, predominantly plants on land or in humans and animals
Atmosphere	The carbon which is stored within the air, usually as carbon dioxide (CO ₂) or methane (CH ₄)
Lithosphere	The carbon which is stored within the outer layers of the Earth (in rocks)
Hydrosphere	Carbon which is held in oceans (sea plants are counted here, not in the biosphere)
Photosynthesis	The intake of CO ₂ by plants, this can be done using energy from the sun and also requires water to take place. CO ₂ is converted to carbohydrates (C ₆ H ₁₂ O ₆) in the plants, resulting in plant growth.
Carbon sequestration	The storage of carbon either naturally (via photosynthesis) or by humans (via carbon capture)
Mitigation	Stopping something from happening, in this case, the increase of CO ₂ into the atmosphere
Greenhouse gas	Gases which are released into the atmosphere, these gases absorb heat and keep it in the atmosphere, making Earth warmer.
Store	Places where carbon can be held in the carbon cycle. Either on a small scale (a tree) or on a large scale (the biosphere).
Transfer	The movement of carbon from one store to another due to processes such as photosynthesis (atmosphere to biosphere).

The different forms of carbon

Read the passage below and answer the questions in full sentences

Carbon is an amazing element which is often described as versatile. This means that it goes with anything, rather like a white t-shirt (which if you broke it down, would contain carbon). Carbon in its element form has the chemical symbol, "C" but we rarely discuss carbon by itself, more often when it is combined with something to form a compound (when elements have joined together), for example when it combines with oxygen to form carbon dioxide (CO_2). Over the course of this topic, we look at carbon, the various forms which it can take, and what this means for our planet, especially when too much carbon ends up in one place.

A side note: If you are starting to worry that this is starting to sound too much like a science lesson, then do not worry. You just need to know how carbon combines with other elements/compounds and what the names and symbols are for these new forms of carbon compound. You do not need to worry too much about what the little two and big twos are doing scattered about all over the place. However, if you are a science lover, then this will be right up your street and you will probably want to do some of your own research into the different compounds that comprise of carbon (apparently there are more than 10 million different carbon compounds). Today, we are just going to look at the most important carbon compounds,

The most heard of carbon compound is (CO_2) which is a gas and is found in the atmosphere. (CO_2) is an example of a greenhouse gas, and when it is in our atmosphere, it absorbs the heat which is trying to escape from the Earth's atmosphere and keeps it there, this leads to our climate becoming warmer. (CO_2) is mainly released by factories which burn fossil fuels and deforestation, as well as transport. Hydrocarbons are other forms of carbon compound, and there are many different types. Hydrocarbons are solids, liquids and gases which are found in the Earth's outer layer (held in the air spaces between rocks). When hydrocarbons are burned and extracted, they release (CO_2) into the atmosphere, thereby converting a hydrocarbon into CO_2 . Notice here that carbon (or C) is always present, but it has changed the compound which it is held in. Another form of carbon is carbohydrates (CH_2O), these are usually found in plants. These carbohydrates have formed and creating new plant matter due to photosynthesis which uses CO_2 and energy from the sun to make the new CH_2O . Methane (CH_4) is an example of another greenhouse gas which contains carbon, often released as a result of the digestion process in cows. Finally, rocks themselves not only contain hydrocarbons in the air spaces between them but they themselves contain carbon in the form of calcium carbonates (CaCO_3). You are probably asking yourself, am I made of carbon? And the answer to that is yes, in our simplest form, we are just a walking, talking carbohydrate breathing out carbon dioxide.

The different forms of carbon

Using the passage in the previous page, answer the questions in full sentences:

- 1. What is the best adjective to describe carbon and why?*
- 2. What is the chemical symbol for carbon as a simple element?*
- 3. What is a compound?*
- 4. How many different types of carbon compound are there on Earth?*
- 5. Write out the chemical symbol for each of these different carbon compounds and state where they are found (you do not need to find a chemical symbol for hydrocarbons):*
 - 1. Carbon dioxide*
 - 2. Carbohydrates*
 - 3. Hydrocarbons*
 - 4. Methane*
 - 5. Calcium carbonate*

The Carbon Cycle in Action

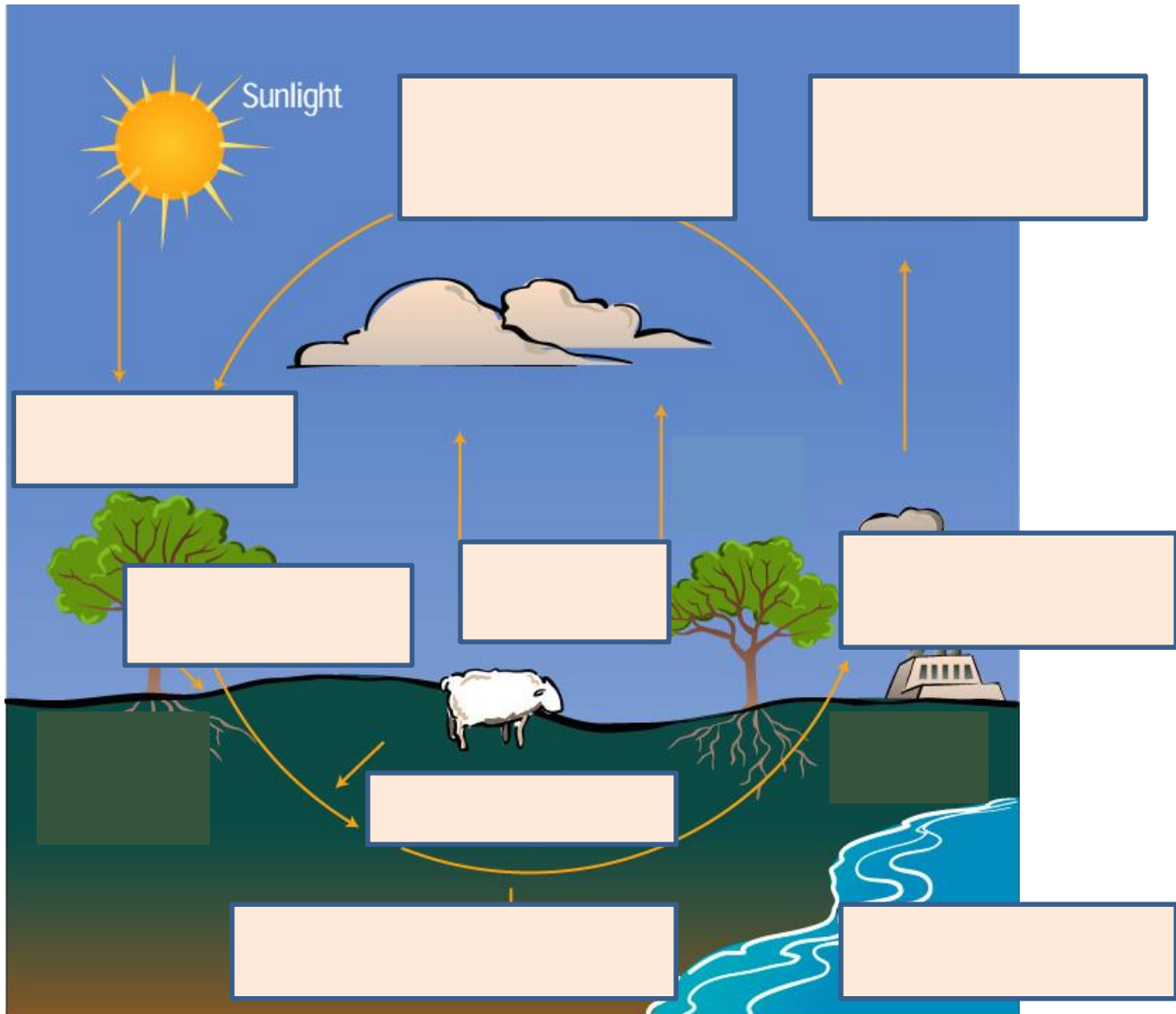
<https://www.youtube.com/watch?v=A4cPmHGegKI>

Watch the video and draw out your own version of the carbon cycle as you go, don't worry if it is messy, this is just to give you an idea before you see the carbon cycle in full.

The Carbon Cycle, by:

The Carbon Cycle

Task: Put the key words in the boxes into the correct place on the diagram. Shade the boxes which are transfers of carbon using one colour and the boxes which are stores of carbon in another colour.



Respiration

The
atmosphere

Photosynthesis

Decomposition

The
biosphere

Carbon dioxide

Hydrocarbon
Extraction and
combustion

Lithosphere
containing
hydrocarbons

The hydrosphere

Congratulations!

You have completed your Physical
Geography Project.