

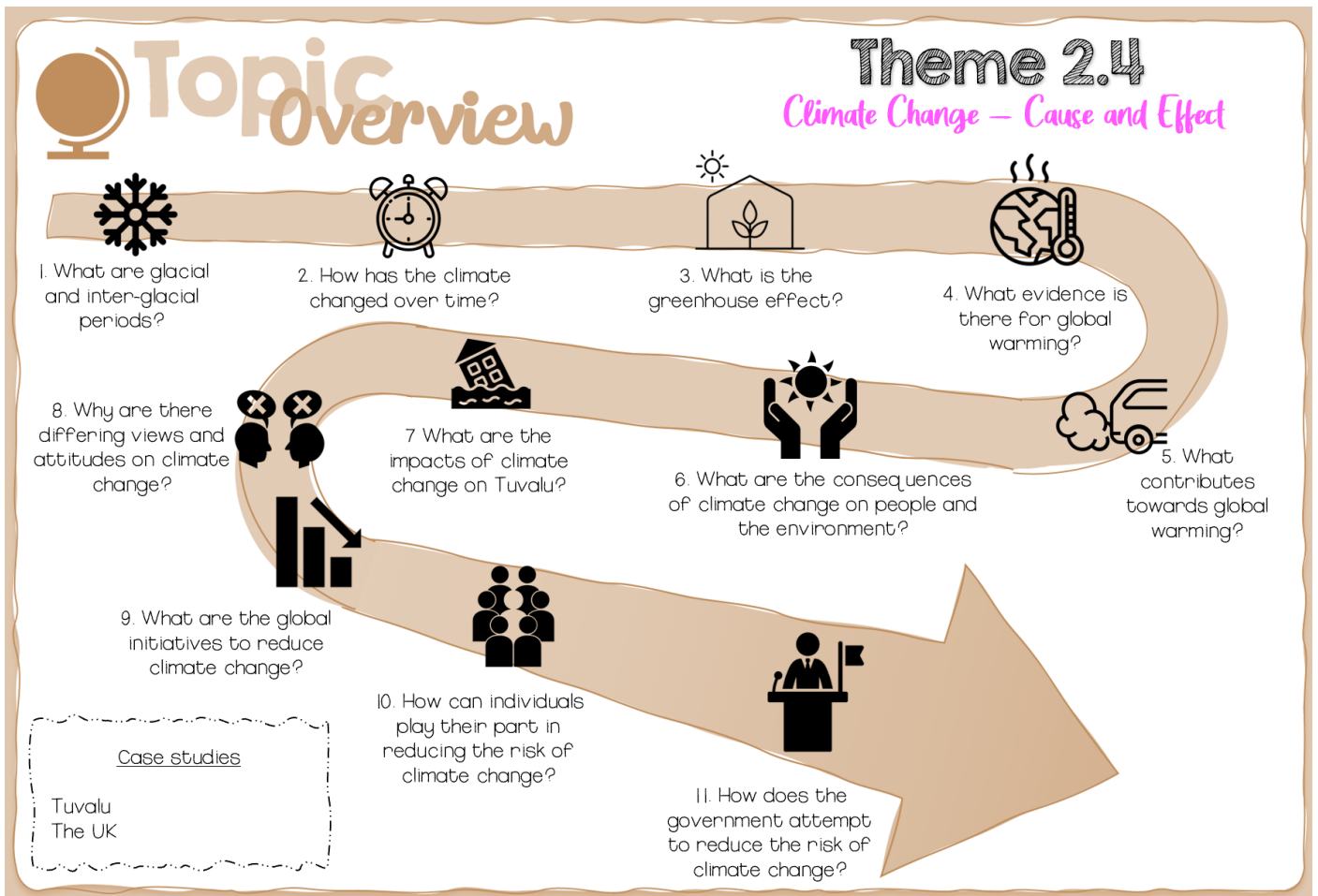
Climatete Change

Name _____

Class _____

Topic Overview

Theme 2.4 Climate Change – Cause and Effect



Past Paper Questions

What is climate change (2)

Suggest two natural causes of climate change (4)

Explain the consequences of climate change for an LIC that you have been studying. (6)

Climate change will have a greater impact on LICs than HICs, using locations that you have studied explain your reasoning (8)

Theme 2: Changing Environments



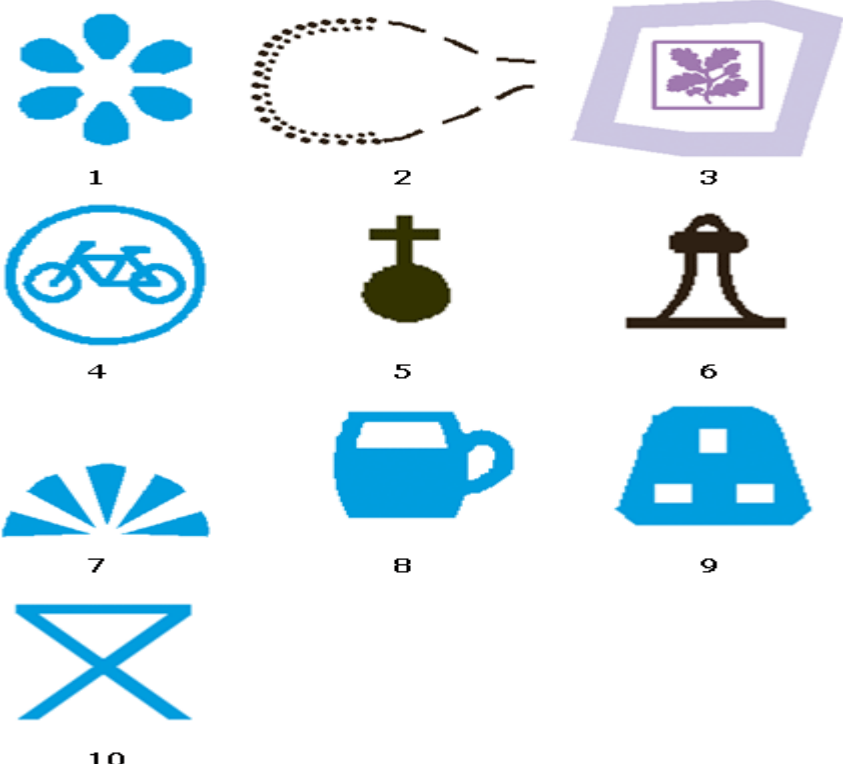
Key Idea 2.4 Climate Change – cause and effect

Keyword	Definition
Alternative Energy	Sources of energy that are not produced from the burning of fossil fuels e.g. HEP, solar, wind.
Atmosphere	A complex mass of gases, liquids and solids that surround the Earth.
Axial Tilt	The angle of the Earth's axis.
Carbon Sink	A natural environment that has an ability to absorb carbon dioxide from the atmosphere.
Climate Change	A long-term change in the Earth's climate.
Eccentricity	The path of the Earth as it orbits the sun.
Enhanced Greenhouse Effect	Increased effectiveness of the greenhouse effect – causing the atmosphere to retain heat energy.
Fossil Fuel	A natural fuel such as coal or gas formed from the remains of living organisms.
Global Warming	The increase in global temperatures
Greenhouse Effect	The trapping of the sun's warmth within the atmosphere – keeping the planet warm.
Interglacial Period	The periods between glacial periods where there are warmer temperatures (we are currently in one)
Milankovitch Cycle	The three distinct cycles of Earth's orbit around the sun which scientists believe affect the timings and seasons of Earth's climate.
Mitigation	Action taken to reduce the long-term risk from natural hazards e.g. international agreements to reduce greenhouse gas emissions.
Precession	The natural wobble of Earth's axis as it orbits around the sun.
Quaternary Period	The geological time period that covers the last 2.6 million years.
Renewable Energy	A resource that cannot be exhausted e.g. tidal, wind.
Sunspots	A dark patch that occasionally appears on the surface of the sun.
Volcanic Eruption	When volcanoes blast ash, gases and liquids onto the Earth's surface and atmosphere.

Lesson 1: How has our climate changed over time?

LO: To explain what climate change is and to describe how our climate changes over time.

Do Now: Geog Your Memory

Geographical Knowledge: What is the world's biggest river?	
Earlier this month: Describe the Savanna climate.	
Older than a month: What is desertification?	
Geographical skills: What are these OS map symbols? Which one of them is not real?	

What is climate change? <https://www.youtube.com/watch?v=OqVyRa1iuMc>

What evidence is there for climate change? <https://www.youtube.com/watch?v=SQ7bzR99iJ4>

What is global warming?

What is a glacial period?

What is an interglacial period?

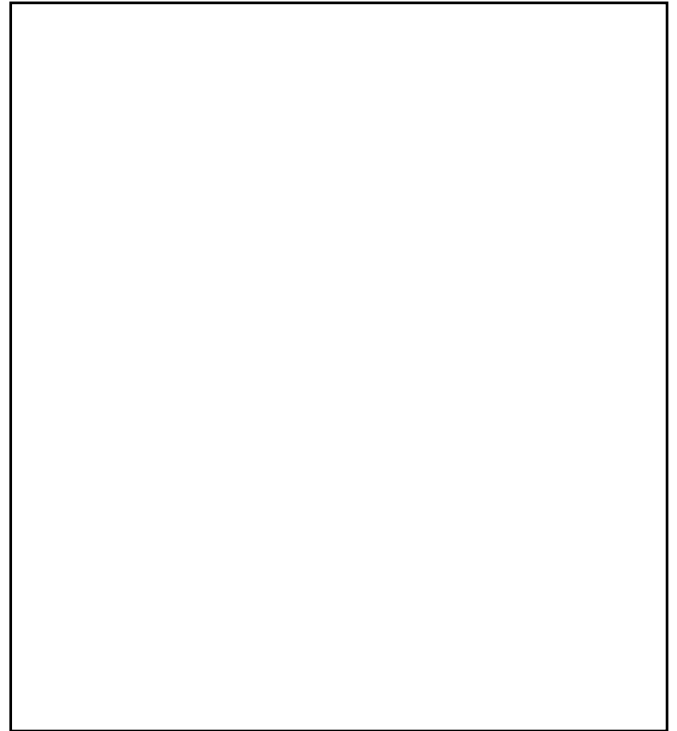
What does fluctuate mean?



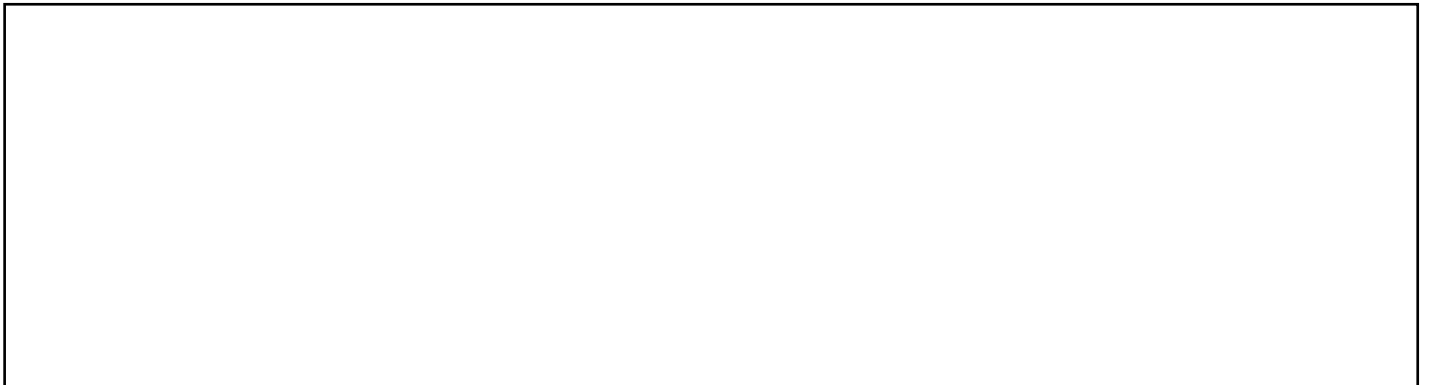
Era	Period	Epoch	Age
Cenozoic	Quaternary	Holocene	0.01 Ma
		Pleistocene	1.8 Ma
	Tertiary	Pliocene	5 Ma
		Miocene	24 Ma
		Oligocene	34 Ma
		Eocene	55 Ma
		Paleocene	65 Ma
		Mesozoic	Cretaceous
Early	144 Ma		
Jurassic	Late		159 Ma
	Middle		180 Ma
	Early		206 Ma

Ma: Million years before present

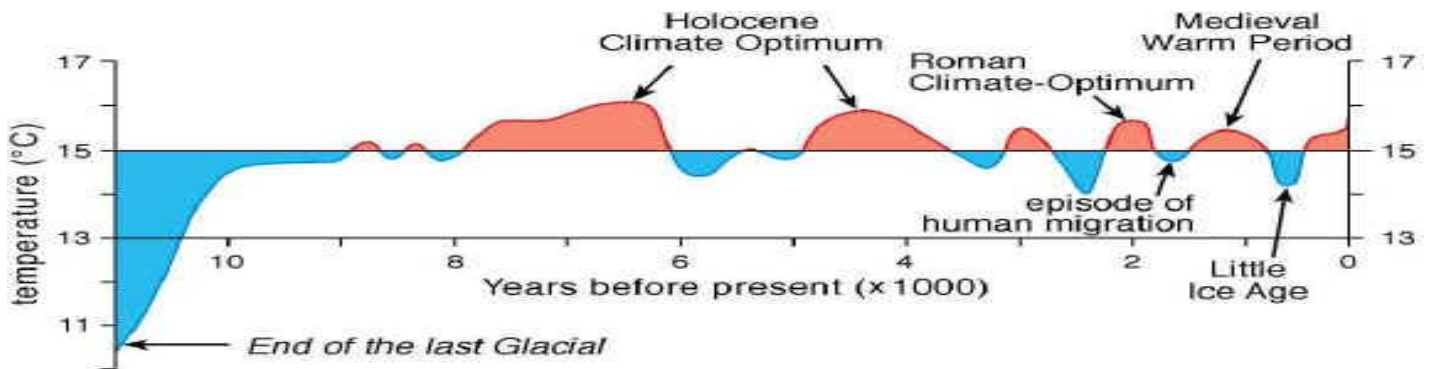
What does this table show?



What type of graph would best show how the climate has changed? Why?



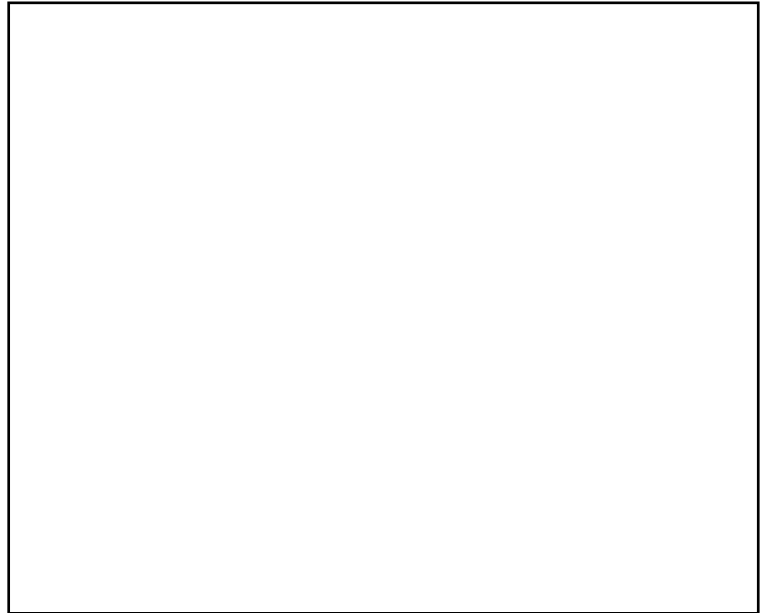
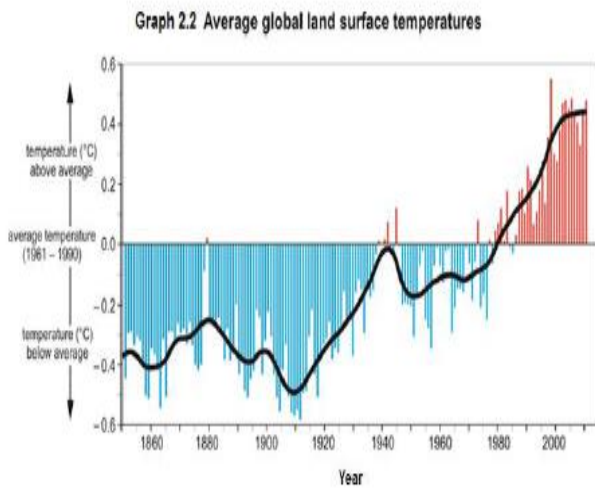
Annotate the graph below to identify key points e.g. highest temperature, trends etc



AO4 exam question:

Describe the changes in average global land surface temperatures since 1850. Use figures from graph 2.2 in your answer (3)

(b) Study the graph below.



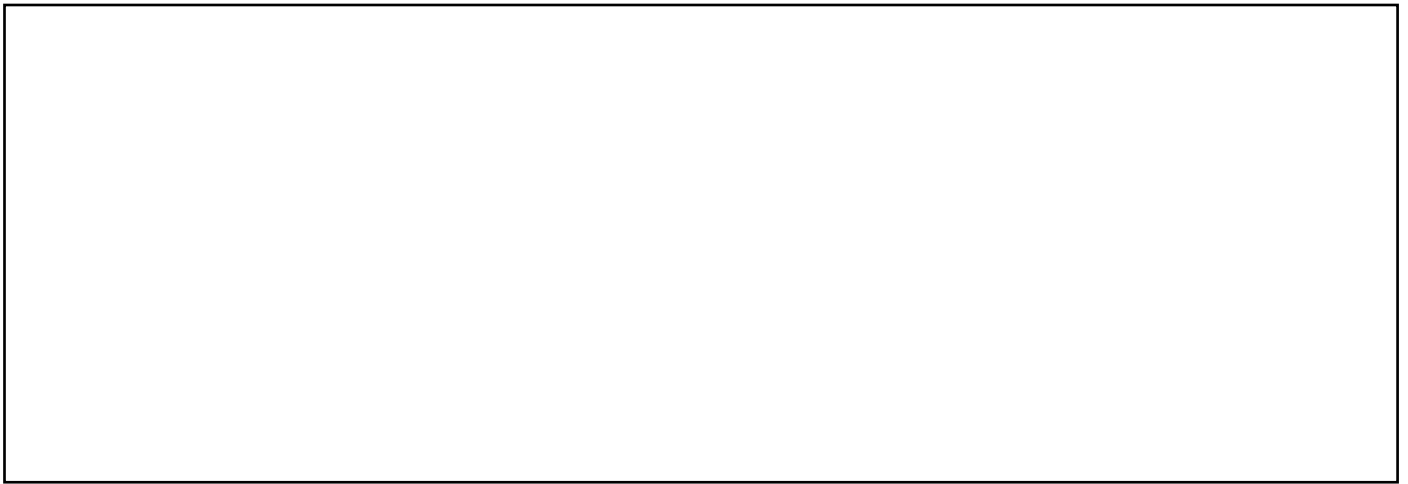
Lesson 2: What are the natural causes of climate change?

LO: To describe and explain the natural causes of climate change

Do Now:

1.	2.	3.	4.	5.
<h2>Why is the Serengeti under threat?</h2>				
6.	7.	8.	9.	10.

Watch the video clips and make notes <https://www.bbc.co.uk/bitesize/clips/zqdpyrd>



What is the difference between anthropogenic and physical causes of climate change?



What are regular and irregular mechanisms?













Theory	What is it?	How does it affect the climate?	Is it a short term or long-term change? Is it regular or irregular?

Quiz

How long is a Milankovitch cycle?	
What shape is the earth's orbit usually?	
What is eccentricity?	
What is a sunspot?	
What is precession?	
What is the current tilt of the earth's axis?	
How regularly does the earth's tilt vary?	
If the sun is closer to the earth in January what would this mean for the northern hemisphere?	
Which eruption in 1991 temporarily offset the greenhouse effect?	
The Mount Tambora eruption reduced the global temperatures by how much?	

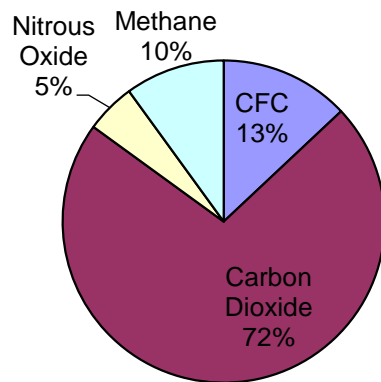
Lesson 3: How do humans cause climate change?

LO: To explain how humans cause climate change and to understand the enhanced greenhouse effect.

1. 	2. 	3. 	4. 	5. 
What are the human and physical causes of climate change?				
6. 	7. 	8. 	9. 	10. 

How do humans cause climate change? https://www.youtube.com/watch?v=G4H1N_yXBIA

Annotate the pie chart and explain what it shows.



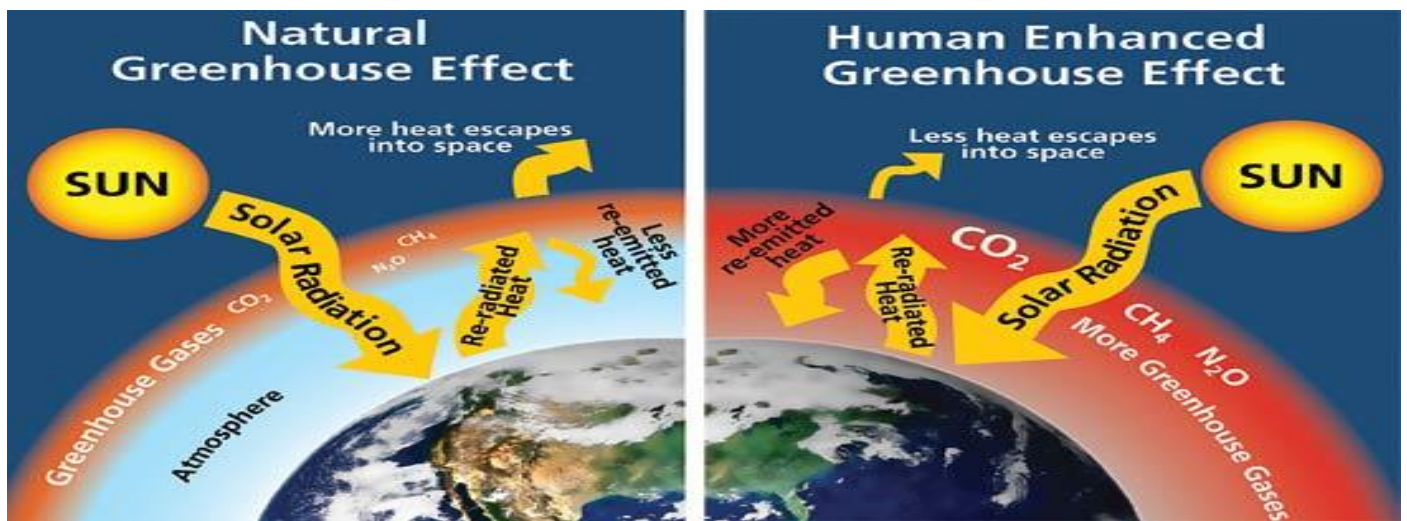
What does the pie chart show?

<https://www.youtube.com/watch?v=aUK0HIMW55s>

What is the greenhouse effect?

Give examples of greenhouse gases.

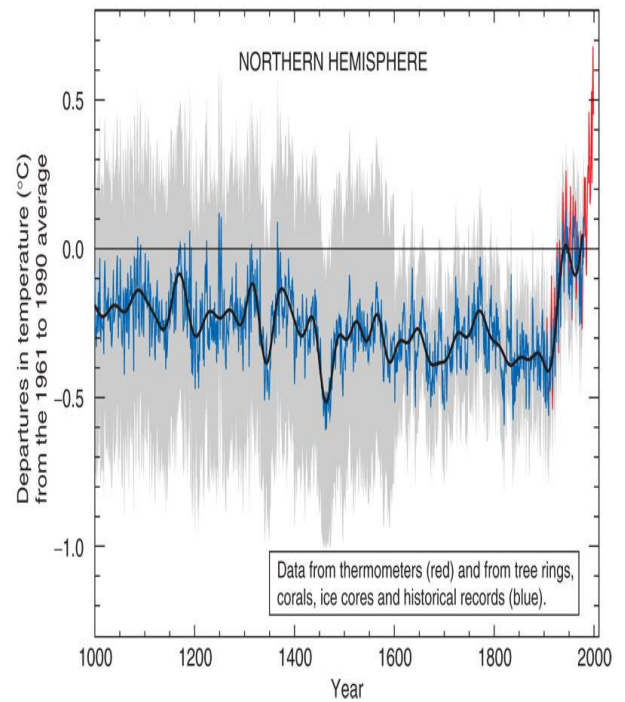
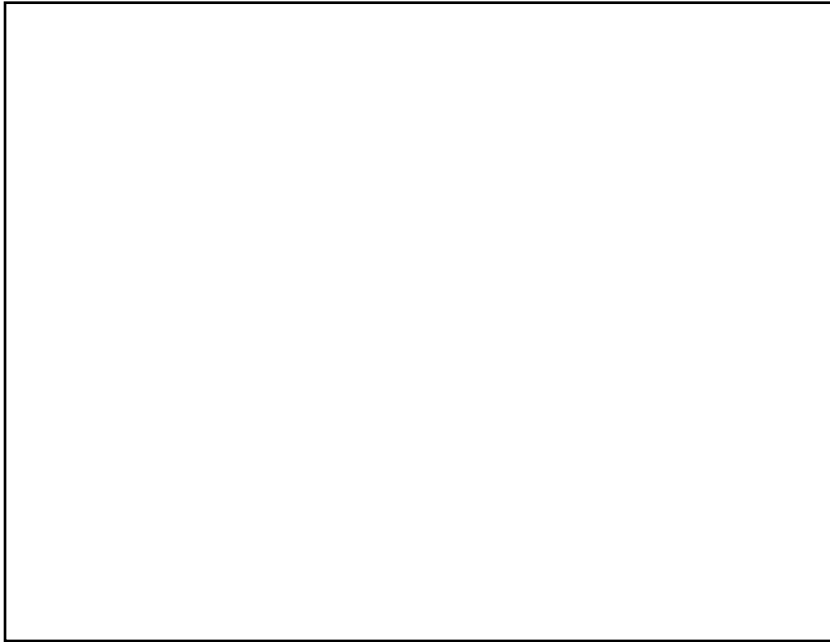
What is the enhanced greenhouse effect?



Explain how humans are enhancing the greenhouse effect (3)

<https://www.youtube.com/watch?v=fYqdKiT0Eqo>

What is the hockey stick graph?



On your post it note write down 3 ways in which global warming is caused by economic activity.



Lesson 4: What are the effects of climate change?

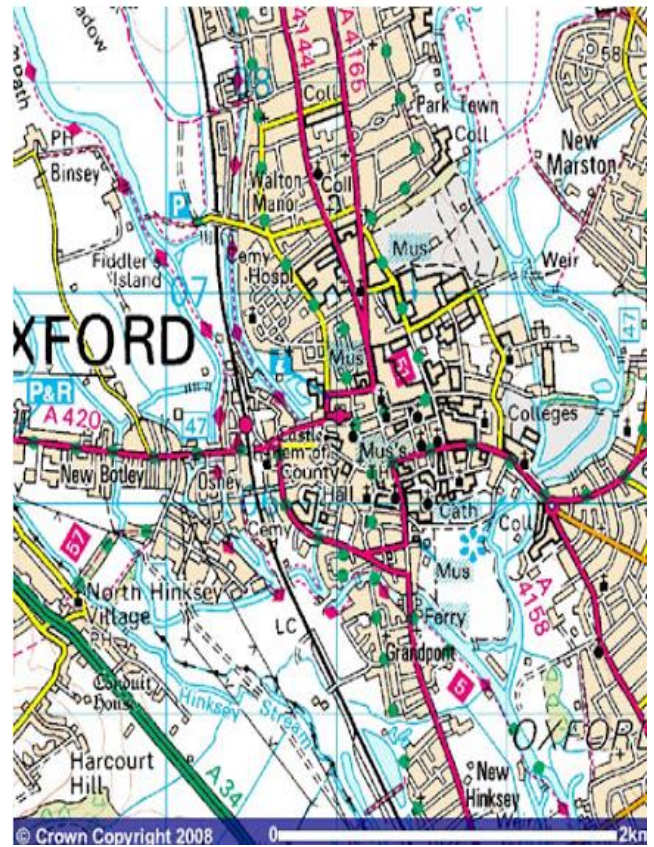
LO: To understand the social, economic and environmental impacts of climate change.

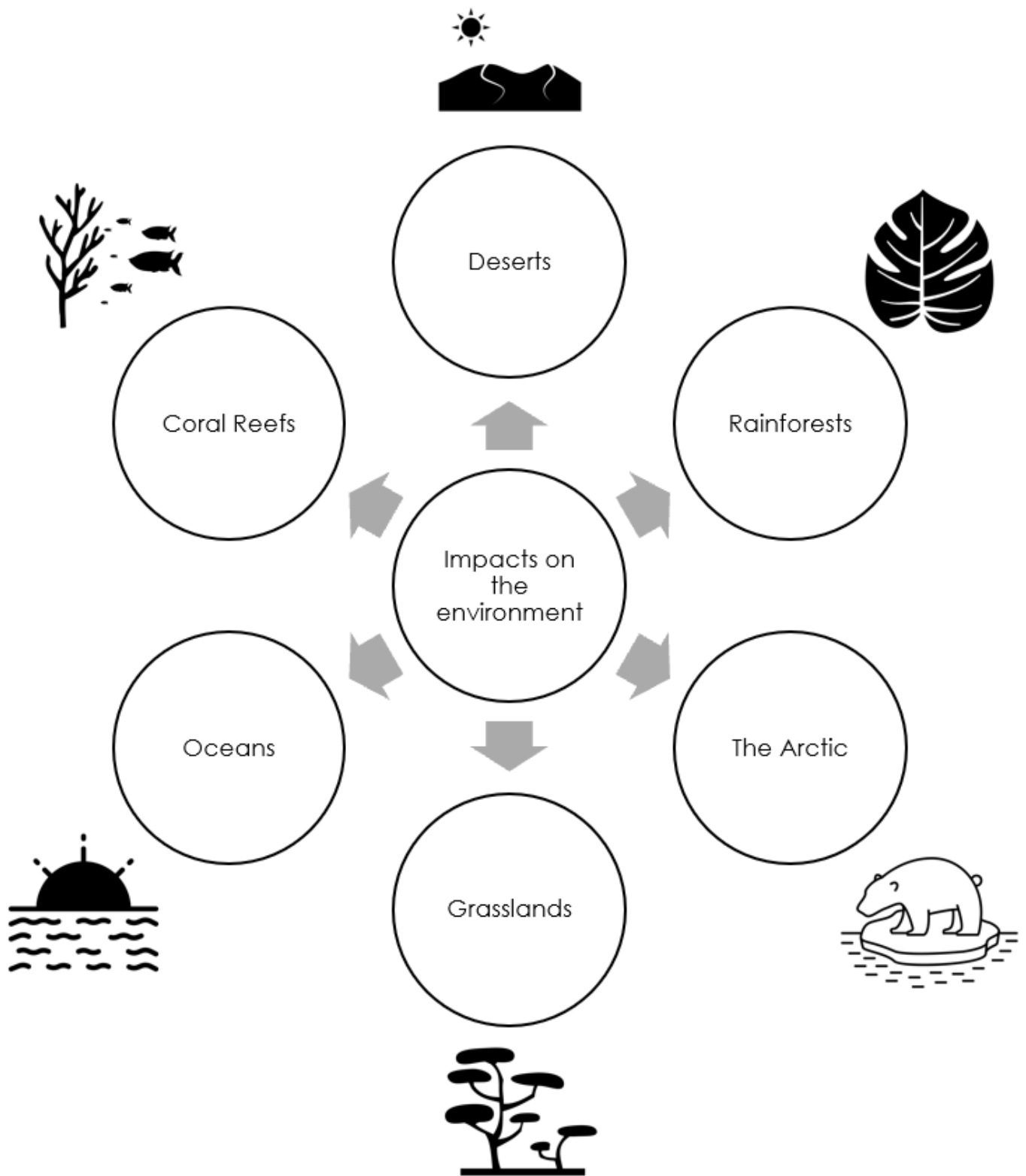
Do Now:

<p>Geographical Knowledge: What is the biggest ocean?</p>	
<p>Earlier this month: Give 2 ways people use water</p>	
<p>Older than a month: Give 2 impacts of desertification</p>	

Geographical Skills:

What colour are trunk, A and B roads?





What are the impacts of climate change in each of the ecosystems?

Coral Reefs

Rainforests

Grasslands

Oceans

The Arctic

Deserts

Rank the ecosystems. Which will be the most at risk? Justify your order.

Most at risk



Least at risk

Justify your order

AO2: Explain the natural causes of climate change (6)

What does this question mean? Decode the question in this box

--

Complete your answer below.

--

Lesson 6: What are the consequences of climate change in Tuvalu?

LO: To explain the impact that climate change can have on individual locations on our planet.

CAN YOU FIND?

WHAT CAN BE FOUND AT:

914 264
929 242
919 249
926 265
932 250

WHAT IS THE 6 FIGURE GRID REFERENCE OF:

THE TRAIN STATION IN LINSLADE
THE CEMETERY
THE SAND PIT



Where do you think this photo was taken?

What can you see in the photo?

Why could the child be holding the sign?

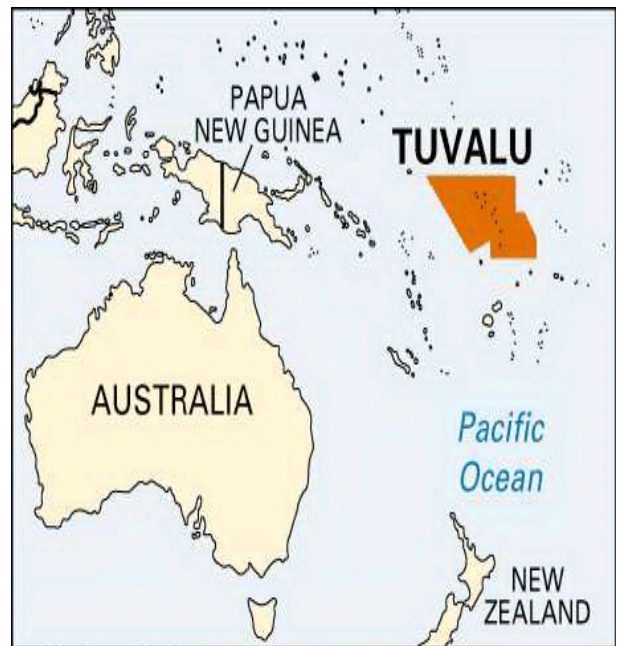
What are the social, economic and environmental effects of the rubbish in the background?

What is the link between sea water and vegetation?



What are the consequences of climate change?

Where is Tuvalu? Remember C.L.O.C.C



Watch the video and make notes – what is happening in Tuvalu?

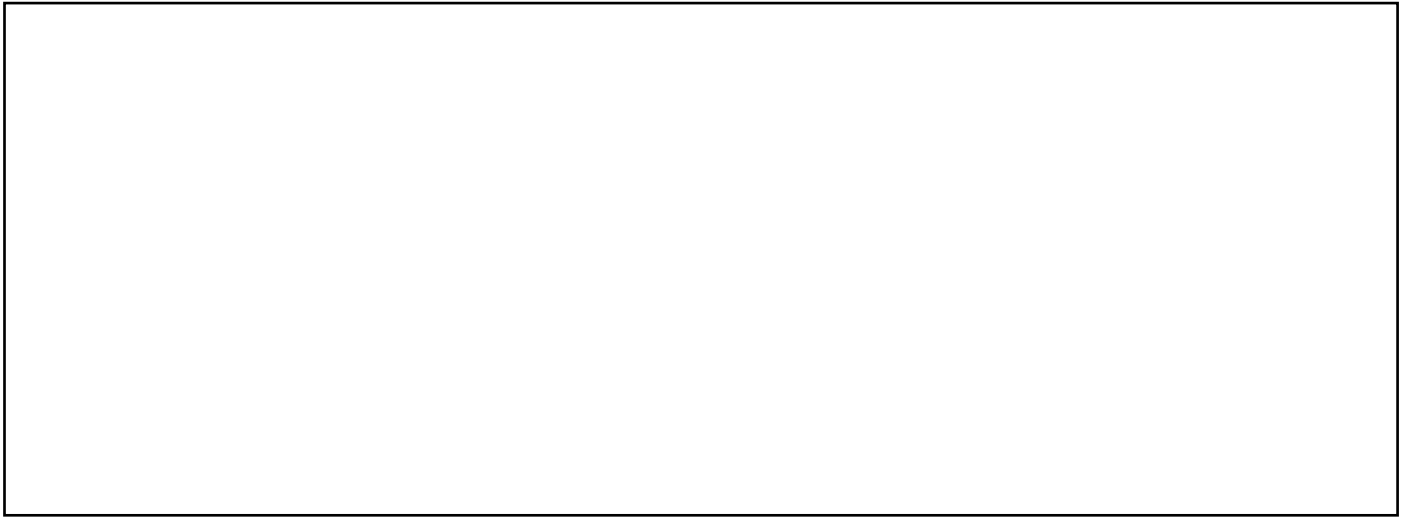
<https://www.youtube.com/watch?v=EZUunoZtfC0>

Watch the video clip and answer the questions below

<https://www.youtube.com/watch?v=DSmN8Eq4qEg>

How many islands make up Tuvalu?	What is the population of Tuvalu?
What is the average elevation of the islands?	How much is the sea level rising by each year?
What is happening to the resident's land?	Why is the ground not suitable for planting in?
What is happening to the fish numbers?	Why are Tuvaluans becoming reliant on imported goods?
Why is there now more rubbish in Tuvalu?	Why is their land important to them?
How are they trying to deal with the issues that are happening?	Why are they planting mangroves on the islands?

What are the consequences for Tuvalu?



Read the information sheets and complete the boxes below. Answer all questions in full sentences.

What is the current climate of Tuvalu and how is it changing?

What impact is climate change having on fishing?

The people of Tuvalu are self-reliant, what does this mean? Include examples.

How is climate change impacting habitats in Tuvalu?

How is climate change affecting food supplies on the islands?

What impact is this having on health?

What impact is climate change having on the land in Tuvalu?

How is this impacting the people of Tuvalu?

How is climate change affecting health in Tuvalu? (other than information linked to food supplies)

Read the article carefully.

Answer the exam question.

You must use BOTH your own knowledge and information from the article. Use information from the Tuvalu case study.

You must EXPLAIN! *"It is likely to have a greater impact because..."*

You must give at least 3 reasons.

(c) Read the following newspaper article about Bangladesh, which is an LEDC.

Climate change and Bangladesh

Adapted from Md Saidur Rahman 2007

Rising sea levels is one of the most important issues humans will have to grapple with in this century. The people who will be affected first live in places with low-lying deltas like Bangladesh.

The increasing intensity of tropical storms and rising sea level are making it impossible for people to live in some parts of the country. Millions of people face the possibility of being among the first climate refugees. A one metre sea level rise would flood more than 15 per cent of Bangladesh, forcing 13 million people to leave their homes.

Explain why climate change is likely to have a greater impact on the lives of people who live in LEDCs, rather than people who live in MEDCs.
Use information from this article and your own knowledge to illustrate your answer.

[6]

Complete your answer in this box

Plenary: Complete the table

Impacts of climate change on the environment	Impacts of climate change on people

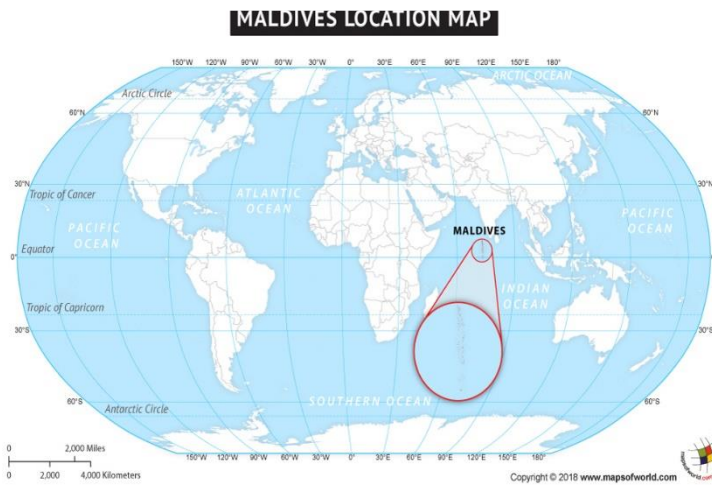
Homework: Revise the Tuvalu case study sheet at the back of this booklet. Complete the meanwhile, elsewhere sheet on The Maldives.

How is Tuvalu like the Maldives?

Meanwhile, Elsewhere...



We have been learning about climate change and the impact on Tuvalu. But what is happening in the Maldives?



Describe where the Maldives are located. Remember to use C.L.O.C.C



The Maldives are under threat from climate change, why? Describe the islands and why they are under threat.



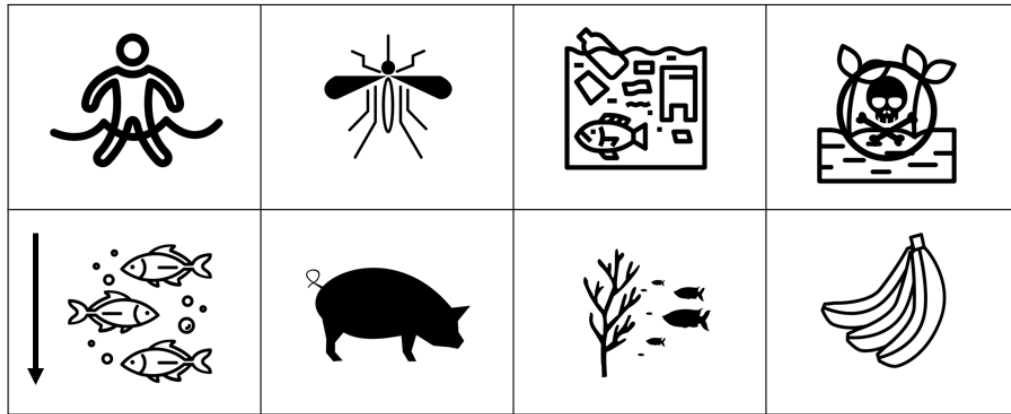
What are the possible impacts of climate change on the Maldives?

To find out more about climate change in the Maldives visit:

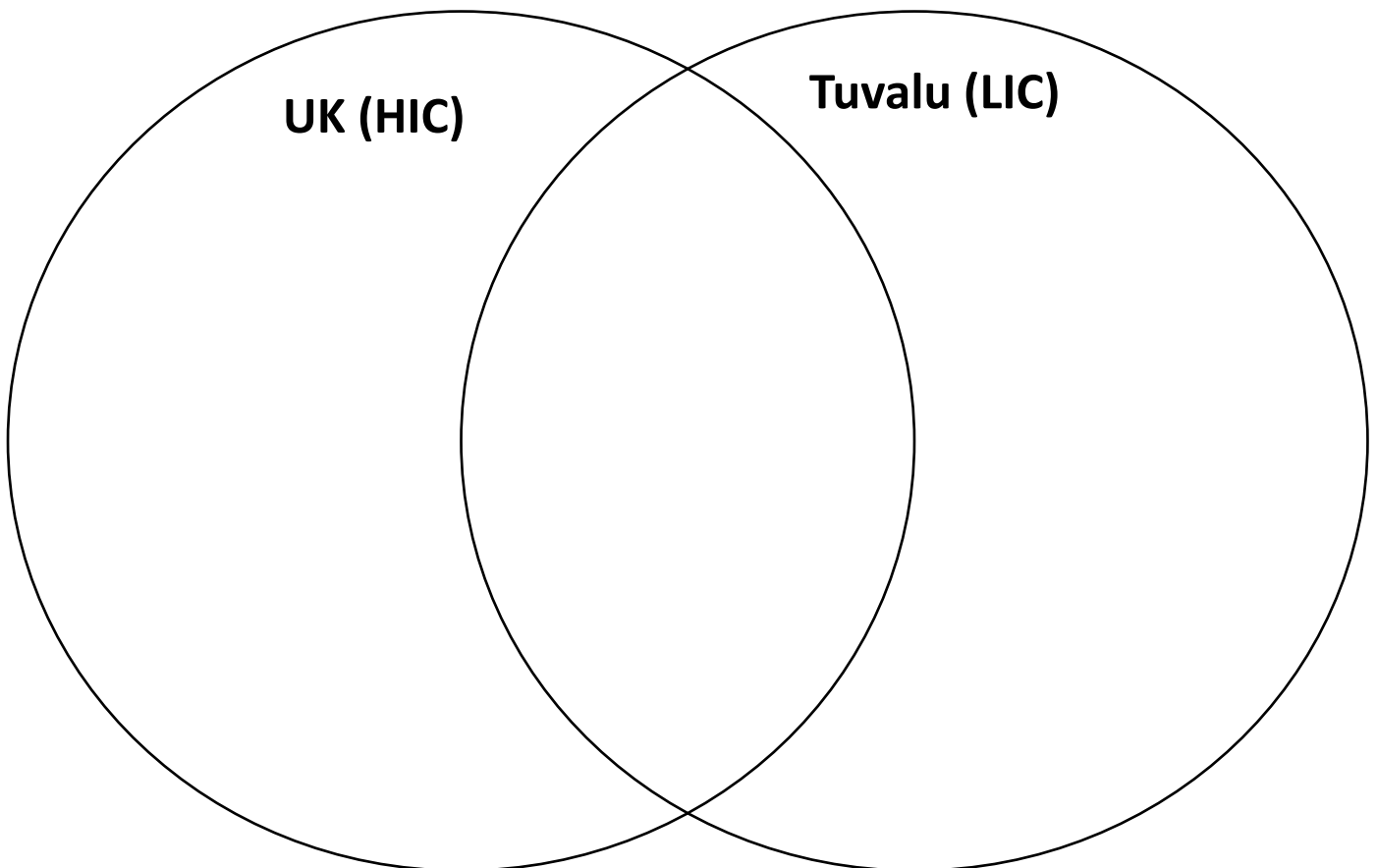
<https://storymaps.arcgis.com/stories/a8f8b5b0477f458ea70826756b46a275>

Lesson 6: What are the impacts of climate change on HICs?

To understand how climate change will affect HICs, with particular focus on migration and tourism.



How might climate change impact HICs and LICs differently?



Complete the Venn Diagram using the impacts.

Wildlife within an area could be affected	People may become refugees	Higher chances of malaria	Water shortages	Higher chances of skin cancer	Some countries may have to rehome refugees	Sea defences are built to deal with rising sea levels
Hotter weather in some areas could increase tourism	Heatwaves cause more deaths	Untreated dirty water may spread disease	The government struggle to pay for solutions, such as sea walls.	Food shortages	More extreme weather, e.g. hurricanes	Loss of habitats

How will the UK be affected by climate change?

Read through the article, then using 2 colours underline or highlight the positive or negative effects on the UK.

Climate change will make UK new holiday destination

Britain will become a holiday hotspot in 40 years because of warmer weather, a Government report on climate change has found, but extra flooding will cost billions.

By [Louise Gray](#), Environment Correspondent

Southern Europeans tourists may come to the UK to escape increased heat while British holidaymakers will remain here rather than travel to France or Spain, according to a report by the Department for Environment, Food and Rural Affairs.

But the main risk is that global warming will cause flooding that could cost up to £12 billion every year because of heavy rainfall in the winter and rising sea levels, affecting up to 3.6 million people by 2050.

There will also be regular hosepipe bans because of droughts, especially in the South East where there is already a shortage this winter. Hot weather will kill crops, devastate wildlife and increase risk of diseases.

Heatwaves could kill up to 6,000 more people every summer by the 2050s and businesses will lose up to two days as employees struggle to work in the heat.

However, there are also "opportunities" for the UK in reduced energy bills during warmer months, up to 24,000 fewer deaths from the cold in winter and growth in new crops like peaches or sunflowers.

The opening of the Arctic shipping route due to ice melt will make it easier and cheaper to transport goods and some species of fish, like plaice and sole, should become more abundant around the UK.

“Hotter summers and warmer year-round temperatures may make the UK a more attractive for foreign and domestic holiday makers. In particular, the UK could be well placed to attract visitors deterred by the uncomfortably high temperatures in southern Europe projected to result from climate change,” read the report.

The Climate Risk Assessment Report sets out the 100 greatest risks for the UK over the next century due to rising temperatures predicted by the Met Office.

Flooding, that currently causes £1.3 billion worth of damage every year, is expected to become a massive problem, costing £12 billion per year not including surface flooding.

The impact will also be felt on health with the number of people killed by floods increasing from 18 today to up to 52 by the 2050s and the number of people affected mentally rising from up to 7,000 to 11,500.

At the same time, a lack of water will also be a problem. In the South East and Anglia, where there is already currently a drought, most people will be considered to be living under “water stress” meaning water meters will have to be introduced and there may be restrictions imposed.

Caroline Spelman, the Environment Secretary, pointed out that the floods in 2007 cost £3 billion in England alone.

She warned that failure to prepare for further disasters will cost even more unless preparations are made now.

“This world class research provides the most comprehensive case yet on why we need to take action to adapt the UK and our economy to the impacts of climate change,” she said. “It shows what life would be like if we stopped our preparations now, and the consequences such a decision would mean for our economic stability.”

Sir Bob Watson, Defra’s chief scientist admitted it was a “mixed bag” for the UK.

Although tens of thousands of people in Britain may be saved by more warm winters there will still be cold snaps.

He also pointed out that other problems will emerge because of the effect of climate change on other parts of the world. For example, food prices are expected to go up because of droughts in the main agricultural areas, water shortages could cause more conflict and millions of people will become ‘climate change refugees.

“If we have a warmer world, we should then in principle have the adverse effects of heat stress mortality but at the same time it should be offset by less people dying by winter,” he said.

Summarise the positive and negative impacts in the box below.

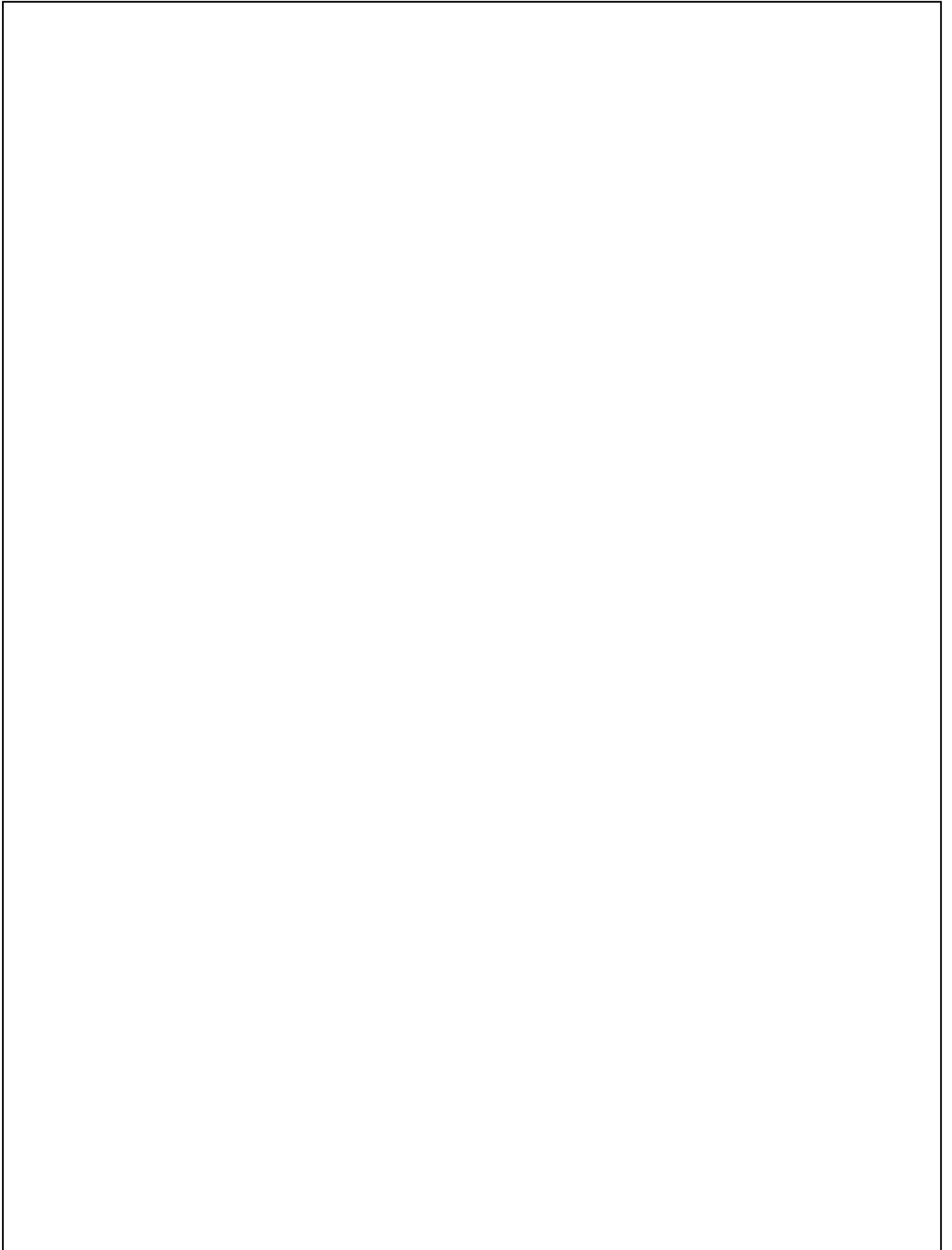
<http://news.sky.com/video/group-is-first-us-climate-change-refugees-10557583>

In Southern Louisiana, USA, the first Climate Change refugees are having to leave their homes. Where do you think they should go? What about a whole country of refugees, like Tuvalu?

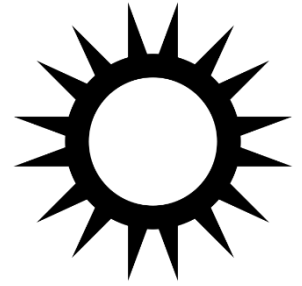
Common Assessment AO3:

“The UK should be housing climate change refugees from countries such as Tuvalu. It is vital that we help other citizens of the world as we have contributed to climate change.” How far do you agree with this statement? Write your response to this argument, giving reasons. (8)

Write your plan here



Meanwhile, Elsewhere...



We have been learning about climate change and the impact on the UK. But what is happening in the Netherlands?



Describe where the Netherlands are located.
Remember to use C.L.O.C.C



The Netherlands are under threat from climate change, why? Describe the relief of the land and why they are under threat.





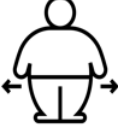











What measures are being taken to reduce the impact of climate change in The Netherlands?

To find out more about climate change in the Netherlands visit:
<https://www.government.nl/topics/climate-change/climate-policy>
<https://www.bbc.co.uk/news/world-europe-50864569>
<https://dutchreview.com/news/weather/effects-of-climate-change-in-the-netherlands/>

Title: What can we do about climate change? Should we do anything?

LO: To identify individual, local and national approaches to tackle climate change risks and to explain the difference between mitigation and adaptation.

Do Now: Which case study is which? Annotate the icons with the case study facts and state whether they are from the UK or Tuvalu.

1. 	2. 	3. 	4. 	5. 	6. 
7. 	What are the impacts of climate change on the UK and Tuvalu? What are the responses?				8. 
9. 	10. 	11. 	12. 	13. 	14. 

What is mitigation? Can you give an example?

What is an adaptation? Can you give an example?

What is happening in each of these photos? Is it adaptation or mitigation?

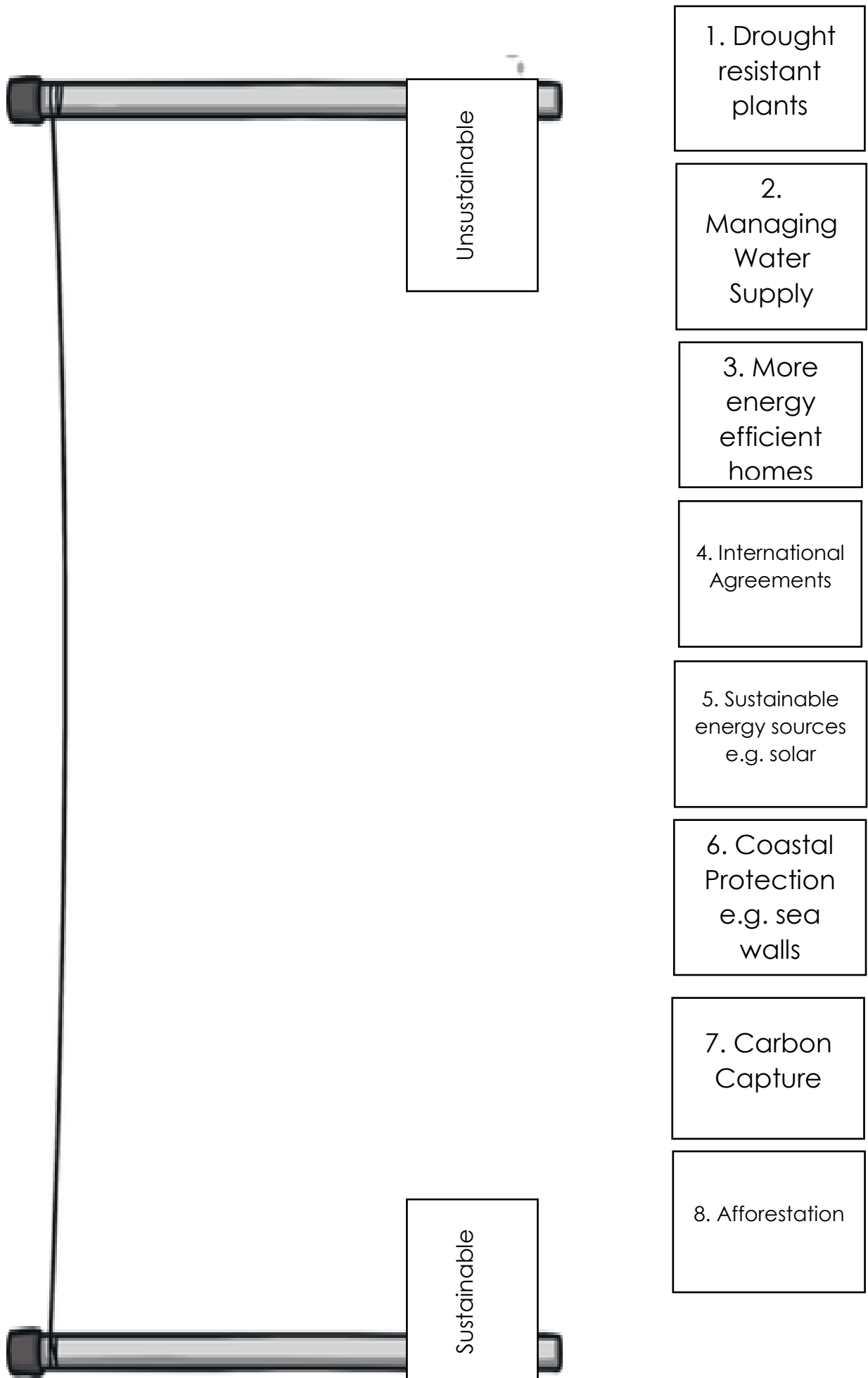




Adaptation or Mitigation?

Strategy	Description	Advantages	Disadvantages
Reducing demand for water			
Carbon capture and storage			
Using renewable energy sources			
Afforestation			
Drought tolerant crops			
Increasing water supply			

	Description	Advantages	Disadvantages
Managing sea level change			
Designing low impact homes			
Eating less meat			
International agreements			



What are the different responses to climate change?

You need to decide if each action is a:

- Individual action: one person doing something
- Local action: response in the local community
- National action: action by the UK government
- International action: response agreed to by many different countries

Izzy has decided to cycle to school rather than get a ride with her dad.	In 2015, The Paris Agreement to tackle climate change was signed by over 150 countries.	In London, the cycle hire scheme has grown and reduced the number of cars in the city.
London started using the congestion charge to put people off driving in the city.	Lower road tax rates are given to people who drive hybrid cars in the UK	The carbon trading scheme has been somewhat useful in reducing European CO2 emissions.
I went on holiday in Dorset this year rather than fly to Spain.	Mr Smith decided to turn down the heating by 1 degree.	The National Grid pays people for the electricity they produce from their solar panels.
The Kyoto Protocol in 1998 was the first major agreement to fight climate change but the USA did not sign it.	News houses at Upton conserve water by installing high efficiency fittings and use rainwater harvesting in gardens	The Eco-Schools programme gives incentives for schools across the country to be more environmentally friendly.
New electrical appliances sold in the UK must have an energy efficiency grading on them.	The recycling bins in Essex are larger than the rubbish bins in many councils.	The city of Brighton has exchanged their old buses for hybrid buses which run on biofuel.

Why should individuals, local and national organisations and government try to do anything to tackle climate change? https://www.youtube.com/watch?v=-h6_hJFD7to

Describe the strengths and weaknesses of adaptation as a way of managing climate change (4)

(b) Describe the strengths and weaknesses of adaptation as a way of managing climate change.

(4)

Strengths

using wind turbines does reduce the amount of greenhouse gas emissions
recycling schemes are a sustainable way of reducing the amount of greenhouse gases ^{emitted}

Weaknesses

wind turbines are ~~not~~ ^{visually} ~~attractive~~ polluting and you need a lot to create the same energy as a coal power station.

How many marks would this answer get?
What is good or bad about it?

How many marks would this answer get? What is good or bad about it?

(b) Describe the strengths and weaknesses of adaptation as a way of managing climate change.

(4)

Strengths

They address the present situation of climate change which ~~is~~ already occurring and affecting parts of the Earth. Even if we stabilised emissions of greenhouse gases, climate change would still occur so it is vital to adapt to new environments. It will also allow development of countries with fossil fuel usage

Weaknesses

It will allow global warming to still happen and ~~the~~ regions of the world will still face decline in biodiversity, higher pollution, and more hydrometeorological disasters. To add to this, it

Climate Change

Social effects (e.g Health)

History of climate change

Evidence of CO2 & temp rise

Greenhouse gases - origin?

Economic effects

Environmental effects

What is the greenhouse effect?

Global strategies and issues

Tuvalu

Impacts on the UK

Local strategies

National strategies



Lesson 1: Describe the changes in average global land surface temperatures since 1850. Use figures from graph 2.2 in your answer (3)

Figure 2.2 shows that the overall trend of global land surface temperatures has fluctuated, however there is an overall increase. Temperatures were below average until 1980 and above average after 1980. There has been an overall increase from -0.4 in 1850 to +0.5 in 2020. Figure 2.2 shows that there is also a steep rise in land surface temperature after 1970 and between 1910 and 1940.

Lesson 3: Explain how humans are enhancing the greenhouse effect (3)

One way in which humans are enhancing the greenhouse effect is through burning fossil fuels, this releases greenhouse gases such as carbon dioxide. Greenhouse gases help to trap heat within the earth's atmosphere.

Another way in which humans are enhancing the greenhouse effect is through agriculture and farming. Cows release methane and they are farmed on a large scale. Methane is another greenhouse gas which helps to trap heat in the earth's atmosphere.

Lesson 4: Explain the natural causes of climate change (6)

One natural cause of climate change is volcanic eruptions. In 1991 the eruption of Mount Pinatubo temporarily offset the greenhouse effect; it is also thought that the eruption of Krakatoa in the 1800s led to a period of global cooling. This is because the atmosphere becomes filled with dust and ash which therefore blocks incoming solar radiation.

A second natural cause of climate change is eccentricity, this is when the earth's orbit around the sun changes from an elliptical orbit to a circular one. When the earth's orbit is elliptical the earth receives more solar energy therefore the climate is warmed. When the earth's orbit is circular it receives less solar energy and therefore the climate is cooled.

A final way in which climate change is caused naturally is sunspots. A sunspot is a darker patch on the sun – these are cooler than the rest of the sun and therefore less solar energy is emitted. If there is an increase in sunspots this could change the earth's average temperature between 0.5 and 1.0 degrees Celsius.

Lesson 5: Explain why climate change is more likely to have an impact on the lives of people who live in LICs, rather than people who live in HICs (6)

LICs are likely to be more greatly impacted because they do not have the technology or finances to be able to build effective defences such as seawalls. Bangladesh is at risk because it is in a low-lying delta and a 1m sea level rise would flood more than 15% of Bangladesh – forcing people to leave their homes. If there were greater finances available a sea wall could be built therefore the homes would be protected. Also, people in Bangladesh live on the delta because they are employed in agriculture. If more money were available, they would not have to rely on farming. In HICs more people work in industry rather than in agriculture.

Tuvalu is another LIC which is being adversely affected by climate change. It is having a huge impact on the lives of people there as they also rely on agriculture. The salt water is poisoning the land and therefore crops cannot grow. If this were an HIC more money would be available for salt tolerant crops and further sea walls could be built. Health is also at risk as there has been an increase in vector borne and water-borne diseases and they do not have the health care available to ensure that people are treated. This is not the case in HICs where healthcare is more readily available.

Lesson 6: "The UK should be housing climate change refugees from countries such as Tuvalu. It is vital that we help other citizens of the world as we have contributed to climate change."

How far do you agree with this statement? Write your response to this argument, giving reasons. (8)

The UK has been partly responsible for climate change due to the burning of fossil fuels through industry, cars and high energy use. Therefore, we have a real responsibility to the world to support those affected by climate change. This means that countries, such as Tuvalu, which is seeing the effects of climate change through sea level rise and extreme weather, should be supported by other nations worldwide. Furthermore, Tuvalu is an LIC which means it has fewer resources to deal with extreme events such as sea level rise and, as a result, our duty is to provide shelter for those who become climate change refugees.

On the other hand, the UK is now changing its approach in terms of burning fossil fuels, and therefore is acting as a role model to LICs. As a result, LICs should be providing their own countries with solutions and stopping their citizens becoming refugees.

Overall, I strongly agree with the statement as the UK is a richer country which has benefited from the burning of fossil fuels and therefore should be taking responsibility by providing homes for those directly affected by climate change.


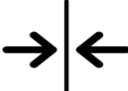




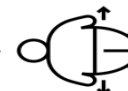



Lesson 7: Describe the strengths and weaknesses of adaptation as a way of managing climate change (4)

A strength is that it is adjusting our environment and how we use it. Adaptations help us to cope with the difficulties that climate change can bring, for example this could be sea walls to help with rising sea levels. This enables us to still use the environment whilst working on mitigation strategies.

A weakness of adaptation is that climate change will still happen regardless, and many areas of the world will still be at risk, for example there will be a decline in biodiversity and sea level rise.










Take 10 Tuvapu

Case study knowledge is important. Learn these 10 facts and apply them to your 6 and 8 mark questions.

Location: A small atoll of 9 islands in the Pacific Ocean 	They are low lying so susceptible to climate change. The average elevation is 2m 
It is a poor island nation. Residents rely on agriculture. 	Water shortages are common and bottled water is imported. 
As temperatures rise, fish resources are decreasing. 	Salt water is leached into the ground and is poisoning the soil. 
Obesity is increasing as more food is imported. Leading to healthcare issues. 	Livestock is suffering due to the lack of suitable food and the increase in saltwater. 
Salt resistant plants are being introduced as a solution. 	Mass migration may have to occur as sea levels rise. 

Take 10 UK Climate Change

Case study knowledge is important. Learn these 10 facts and apply them to your 6 and 8 mark questions.

Sea levels could rise, covering low lying areas e.g. East Anglia. 	Scottish ski resorts may have to close to the lack of snow. 
Droughts and flood become more likely as extreme weather increases. 	There will be an increased demand for water in the hotter summers. 
Crops such as oranges, grapes and peaches could be grown in a hotter climate. 	London could be at risk as the Thames Barrier is unlikely to cope with sea level rise. 
In 1997 the UK signed up to the Kyoto Protocol to limit carbon emissions. 	In 2015 the UK signed the Paris Accord to keep global warming below 2°C. 
National strategies: Investment in nuclear/renewables, public transport upgrades, car taxation, etc. 	Local strategies: park and ride, bike hire schemes, congestion charges, car sharing, etc. 