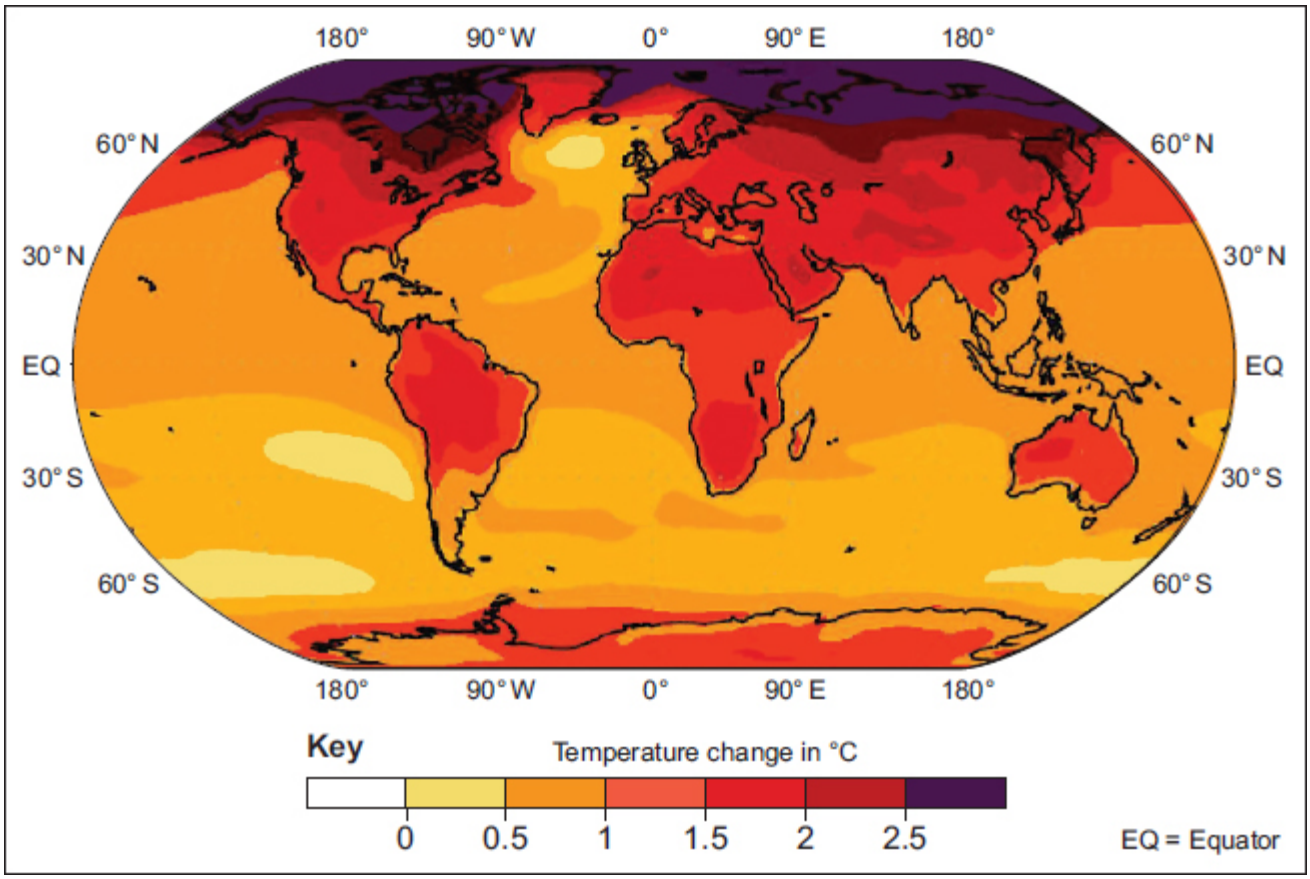
1. State **one** source of evidence for long-term climate change during the Quaternary period.

(Total 1 mark)

2. Study the world map below showing projected global temperature change between 2000 and 2100.



Using the map, which **one** of the following statements is true?

Shade **one** circle only.

A The greatest increase in temperature will be along the Equator. ⬭

B Most of Africa will have a rise in temperature of between 0 ºC and 0.5 ºC. ⬭

C The oceans will show a greater increase in temperature than land areas. ⬭

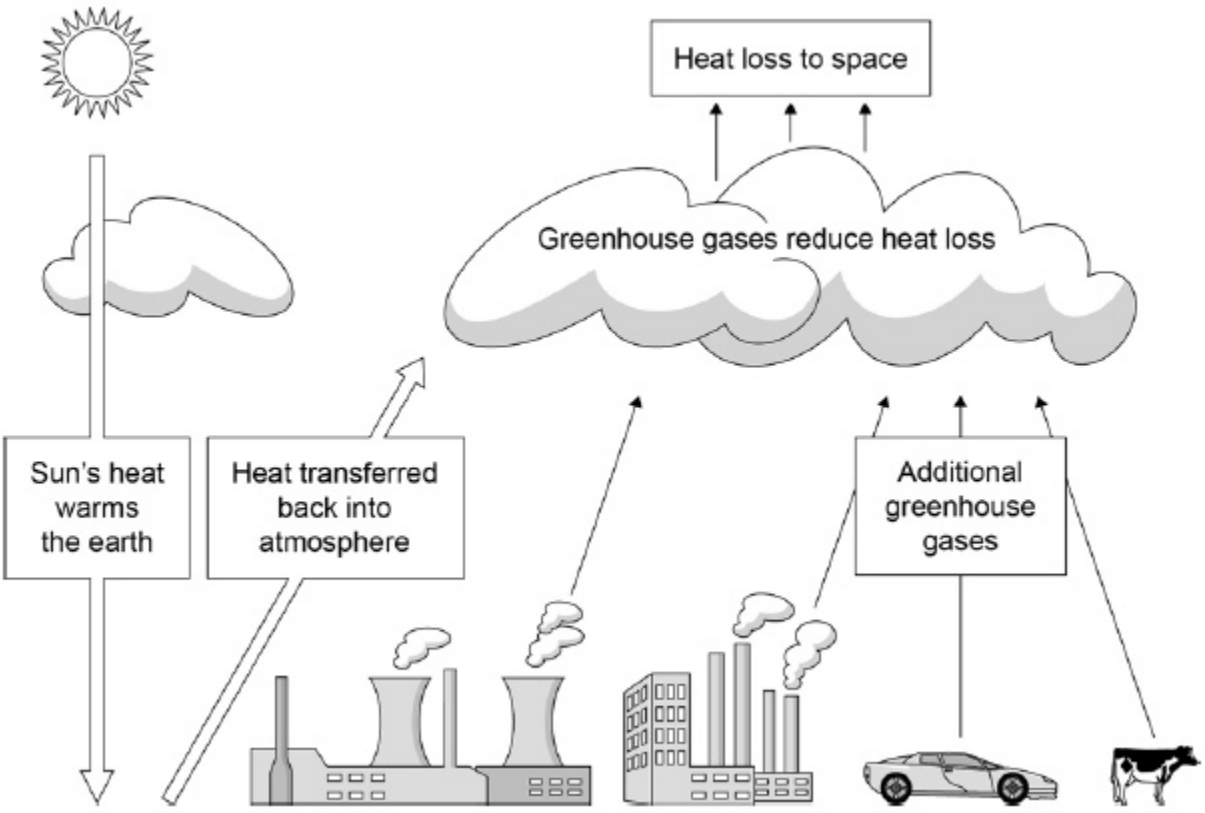
D Areas north of 60 ºN will have the greatest increase in temperature. ⬭

(Total 1 mark)

3. Suggest **one** way the distribution of tropical storms could change if global ocean temperatures continue to rise.

(Total 1 mark)

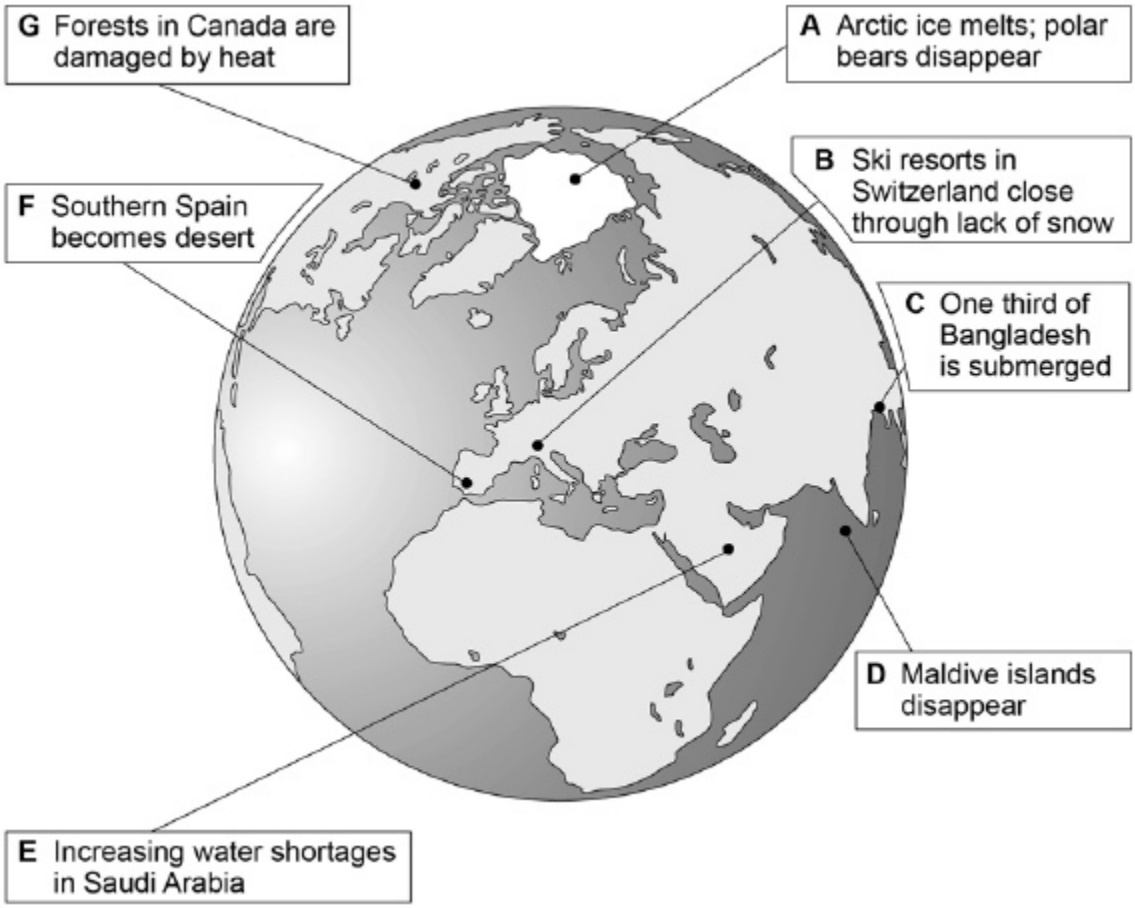
4. Study the diagram showing the process of global warming, a cause of climatic change.



Identify **two** sources of greenhouse gases suggested by the diagram.

(Total 2 marks)

5. Study the figure, a diagram describing some of the effects of climatic change.



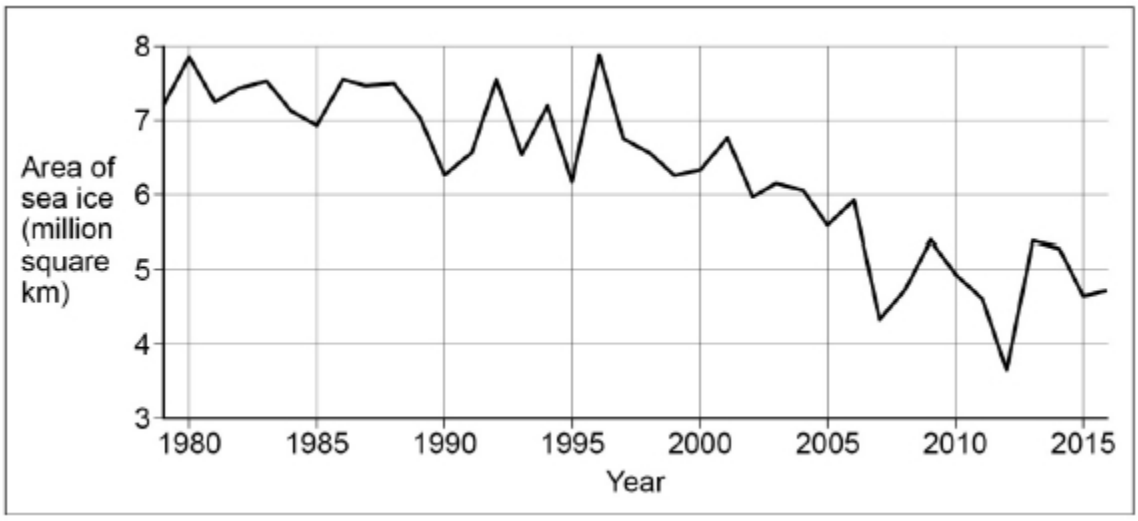
Use the figure to give **two** countries which might be affected by climatic change under each of the headings in the table below.

Complete the table by using the letters from the labels in the figure.

Increase in temperature	Decrease in rainfall	Rise in sea level

(Total 3 marks)

6. Study the graph showing the area of Arctic sea ice each September between 1979 and 2016.



(a) Using the graph, describe how the area of Arctic sea ice has changed.

(2)

(b) Give **two** ways that human activity may have contributed to the changes shown in the graph.

(2)

(Total 4 marks)

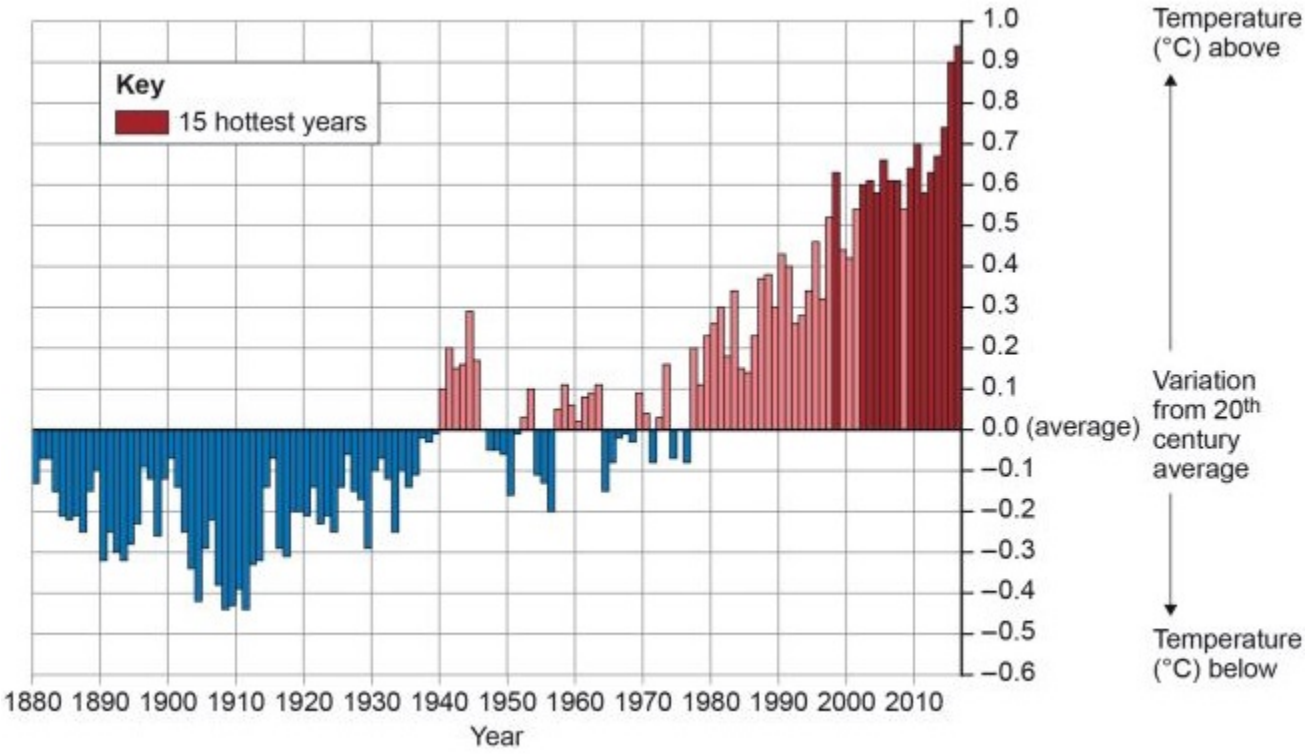
7. Give **two** pieces of evidence, other than the change in global temperature, that show climate change has taken place.

(Total 2 marks)

8. Give **one** natural cause of changes in global temperatures.

(Total 1 mark)

9. Study the graph below showing variation in average global temperatures, 1880-2017.



Which **one** of the following statements is true?

Shade **one** circle only.

A In the early 1940s global temperatures were below the 20th century average. ⬭

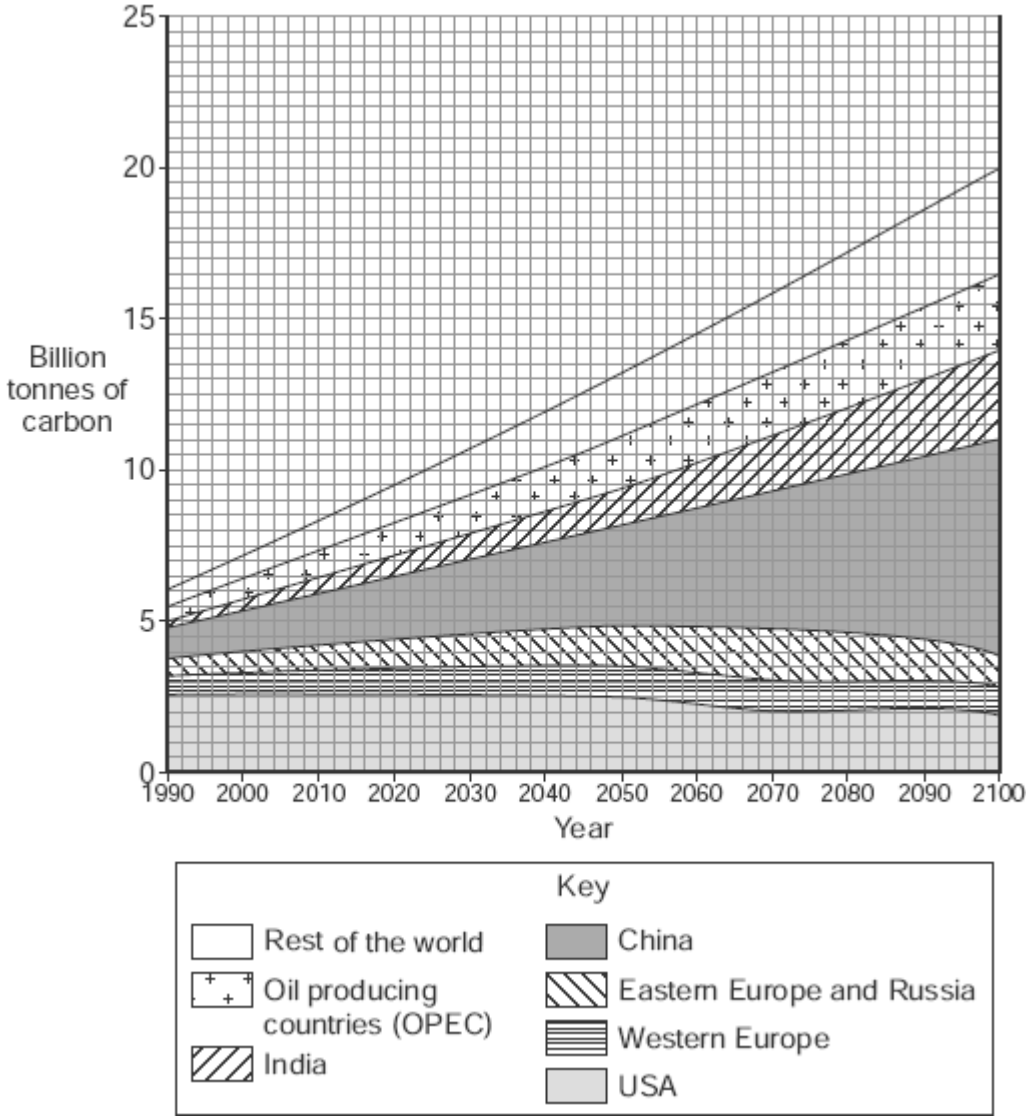
B Global temperatures showed a steady increase between 1940 and 1980. ⬭

C The 15 hottest years were all recorded between 1995 and 2017. ⬭

D Global temperatures have been above the 20th century average every year since 1960. ⬭

(Total 1 mark)

10. Study the figure below, a compound graph showing the amount of carbon produced in different parts of the world.



(i) What was the total amount of carbon produced in 1990?

(1)

(ii) What is the predicted increase in the amount of carbon produced between 1990 and 2100?

(1)

(iii) Which country will be producing the largest amount of carbon in 2100?

(1)

(iv) Explain why international agreement is needed to reduce the amount of carbon produced.

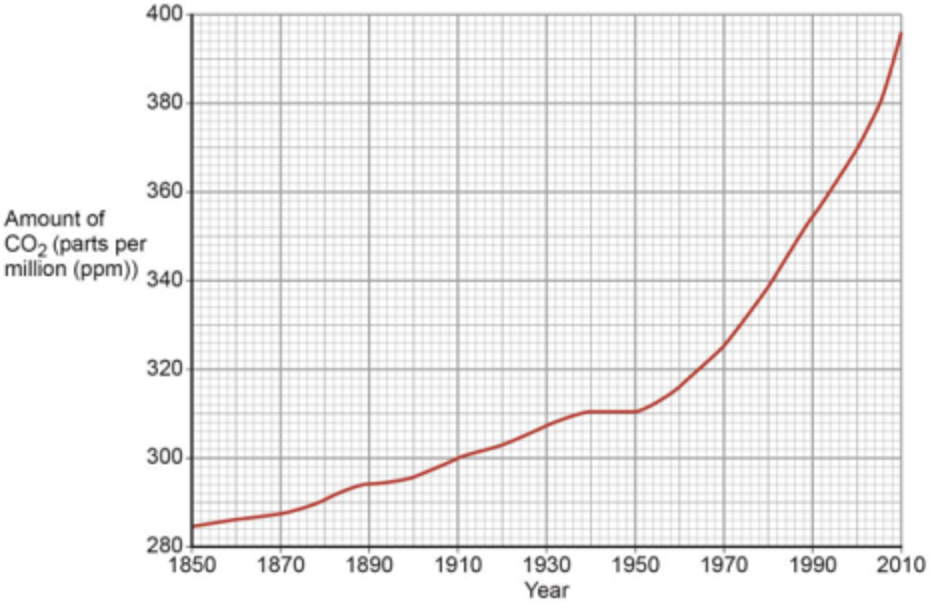
(2)

(Total 5 marks)

11. What is 'global climate change'?

(Total 2 marks)

12. Study the figure, a graph showing changes in the amount of carbon dioxide (CO_2) in the atmosphere.



(a) Describe the change in the amount of carbon dioxide in the atmosphere shown in the graph.

(2)

(b) Outline **one** reason why the concentration of carbon dioxide in the atmosphere has changed over time.

(2)

(Total 4 marks)

Mark schemes

1. Ice cores (which show CO^2 and methane concentrations) (1).
Evidence from ocean sediments/rocks/ fossils/plankton (helps to show temperature changes) (1).
Pollen analysis(1).

Credit other valid answers.

No credit for evidence of recent short-term temperature change.

AO1 – 1 mark

[1]

2. D Areas north of 60°N will have the greatest increase in temperature.

No credit if two or more answers are circled.

AO4 – 1 mark

[1]

3. They may affect areas further from the Equator (1).
They could affect parts of the sub tropics/the South Atlantic/NE USA (1).
They could have a broader distribution/affect larger parts of the world (1).

Credit alternative idea.
(As the science is uncertain) regions where tropical storms take place are not expected to change much as a result of climate change (1).

AO1 = 1 mark

[1]

4. Any two (2 × 1 marks) from; power stations; factories; transport; animals.

AO2 = 2

[2]

5. Increase in temperature – B and G

Decrease in rainfall – E and F

Rise in sea level – C and D

1 mark for each completed category which has two correct answers (3 × 1 marks)

AO4 = 3

[3]

6.

(a) There has been an overall decrease in extent of Arctic Sea ice (1).
The changes in Arctic sea ice have fluctuated considerably (1)
There was limited change from 1979-1996 (1) followed by rapid decrease 1996 onwards (d) (1).

Credit use of data shown on graph or for data manipulation.
e.g. a decrease in extent from almost 8 million km to approx. 4 million at lowest point.(1)
A loss of almost 50% (in 36 years). (1)
A decrease from 7.2 million sq km to 4.8 million sq km between 1979-2016. (1)
Considerable fluctuations from year to year-rapid decrease 2006-2007, followed by rapid increase 2007-2009.(1)

No credit for stating that there has been a steady or consistent decrease.
No credit for explanations of change.

AO4 = 2

(b) Two separate ways are required. Credit relevant human activities that link to rising temperatures / enhanced greenhouse effect and diminishing sea ice. The links with extent of Arctic sea ice do not have to be explicit.

E.g. Increased burning of fossil fuels (1)
Increased manufacturing of products (1)
Rapid rates of deforestation (1)
Increased methane emission from agriculture / mining (1)
Carbon emissions from transport using oil and gas. (1)
Greater use of fertilisers / sewage farms (1)
Use of halocarbons ('man made' powerful greenhouse gas used by industry to make solvents and for equipment cooling). (1)

AO1 = 2

[4]

7.

E.g.
Shrinking ice sheets / glaciers / reduced Arctic or sea ice / less snowfall (1)
Sea level rise (1)
Extreme weather events / more droughts / more tropical storms (1)
Ocean acidification (1)
Desertification (1)
Increased concentration of greenhouse gases / higher CO_2 concentration

Accept longer term evidence such as ice cores, tree rings, ocean sediments, rocks and fossils, pollen analysis.

AO1 = 2

[2]

8. One natural cause should be identified.

The specification includes:

(Changes to the) earth's orbit/ (1)
(Changes in) volcanic activity (1)
(Variations in) solar output / sunspot activity (1).

Accept other valid natural causes such as movement of tectonic plates, shifts in ocean currents / El Nino effects.

Reject human causes such as the enhanced greenhouse effect.

AO1 = 1

[1]

9. One mark for the correct answer:

C. The 15 hottest years were all recorded between 1995 and 2015.

No credit if two or more statements are shaded.

AO4 = 1

[1]

10. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

(i) 6 (units given)

1
AO3 – 1

(ii) 14 (units given).

1
AO3 – 1

(iii) China.

1
AO3 – 1

(iv) 1×2 or 2×1
The effect of one country working alone will have little effect on the global position. Working together will allow the different countries to police each other's success or failure. Accept lack of agreement could mean continued increase in carbon.

2
AO2 – 2

[5]

11. *This mark scheme is from a question paper that assessed a previous specification and has not been edited.*

Click [here] to access a document explaining the differences that might apply to it.

There should be recognition of a worldwide change for 1 mark and reference to increasing or decreasing temperatures, rainfall patterns for the second mark. Both components of the answer must be addressed for 2 marks.
2 × 1

AO1 – 2

[2]

12. (a) One mark for idea of steady increase followed by rapid rise in CO_2 levels / exponential rise.

Second mark for use of data shown on graph or for data manipulation, e.g. CO_2 concentration increased by almost 100 ppm in 150 years.

No credit for increase in CO_2 levels without qualification.

AO4 = 2

(b) Credit **one** reason only. Valid developed point awarded 2 marks.

One mark for appropriate reason, e.g.

- burning of fossil fuels (1)
- manufacturing of products like cement (1)
- deforestation (1).

Allow natural factors such as volcanic activity (1).

Second mark for developed reason, e.g.

- thermal power stations burn fossil fuels which release gases including carbon dioxide which build up in the atmosphere (2).

AO2 = 2

[4]