

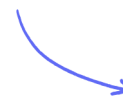
Structured Questions

Climate Change

Causes of Climate Change / Impact of Climate Change / Carbon Sequestration / Climate Change: Phenology (HL) / Climate Change: Evolution (HL)

Easy (1 question)	/8
Medium (3 questions)	/33
Hard (3 questions)	/14
Total Marks	/55

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Easy Questions

- 1 (a) Increased carbon dioxide levels in the atmosphere are having an effect on ocean chemistry.

Outline the way in which atmospheric carbon dioxide affects the pH of oceans and how this change may impact marine organisms.

(7 marks)

- (b) Define the term *carbon sequestration* in the field of climate science.

(1 mark)

Medium Questions

1 (a) The image below shows two shells from marine organisms. Both shells were placed in a saltwater solution for 45 days.

- Shell A was placed in a solution at pH 8.5
- Shell B was placed in a solution at pH 7



A



B

Explain the results shown in the image.

(2 marks)

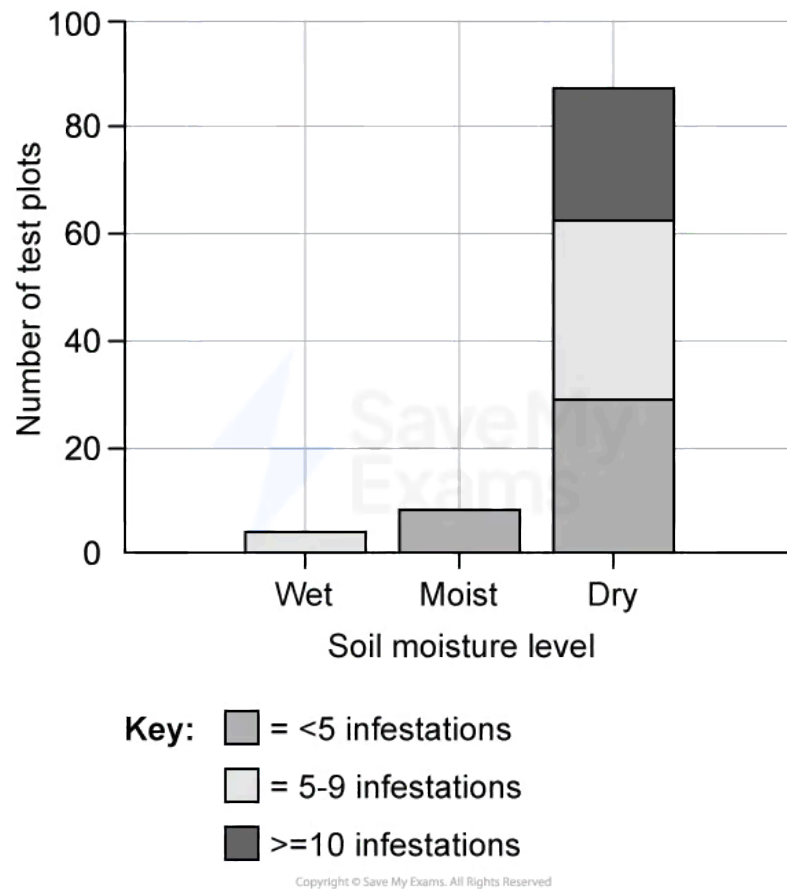
(b) Outline the relevance of increasing atmospheric carbon dioxide levels to the results shown in part (a).

(3 marks)

(c) Describe a process that removes carbon dioxide from the atmosphere **other** than that referred to in part (b).

(2 marks)

2 (a) Spruce bark beetles can cause severe damage to coniferous tree species. A group of scientists assessed the impact of abiotic factors on beetle infestation rates in spruce trees. They set up a series of test plots containing mature spruce trees and assessed symptoms such as bark damage, discoloration and resin flow as signals of infestation. Some of the results are shown in the graph below.



Describe the results shown in the graph.

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(4 marks)

(b) A student read the graph and concluded that trees growing in dry soil are at a higher risk of beetle infestation.

Evaluate the student's conclusion.

(3 marks)

(c) During the early stages of beetle infestation spruce trees are able to defend themselves by producing resin, as well as secreting defensive chemicals.

Suggest a possible explanation for the infestation pattern observed in part (a).

(2 marks)

(d) Spruce bark beetle damage is becoming more prevalent as a result of climate change.

Explain the connection between climate change and increased spruce bark beetle damage.

(2 marks)

3 (a) Outline some of the impacts of increasing average global temperatures.

(7 marks)

(b) Outline how climate change is causing disruption of phenological events for migrating reindeer, *Rangifer tarandus*.

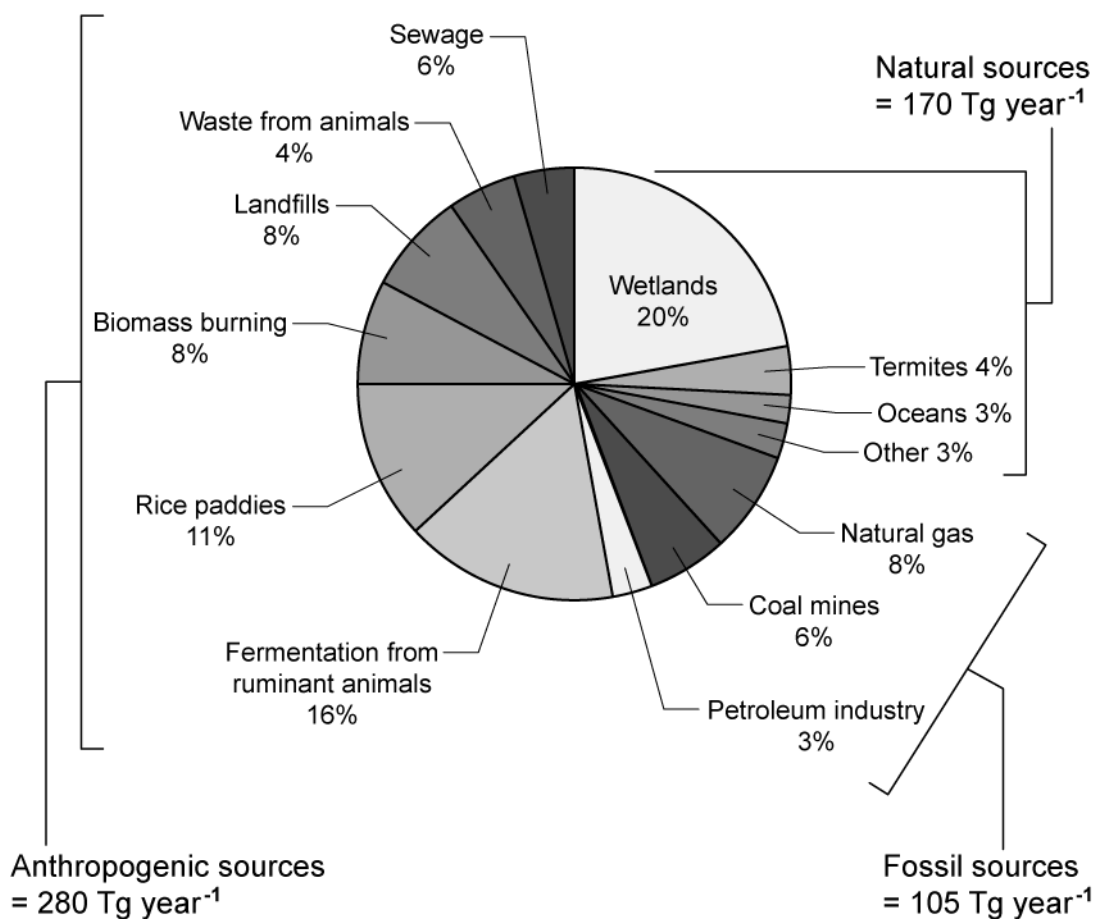
(4 marks)

(c) Describe conservation approaches that aid carbon sequestration.

(4 marks)

Hard Questions

- 1 (a) Methane is an example of a greenhouse gas that commonly occurs in the atmosphere. The graph below shows the main sources of methane as well as the percentage contribution of the different components of each source. A teragram (Tg) equals 10^{12} grams and is equivalent to one megatonne (1 million tonnes).



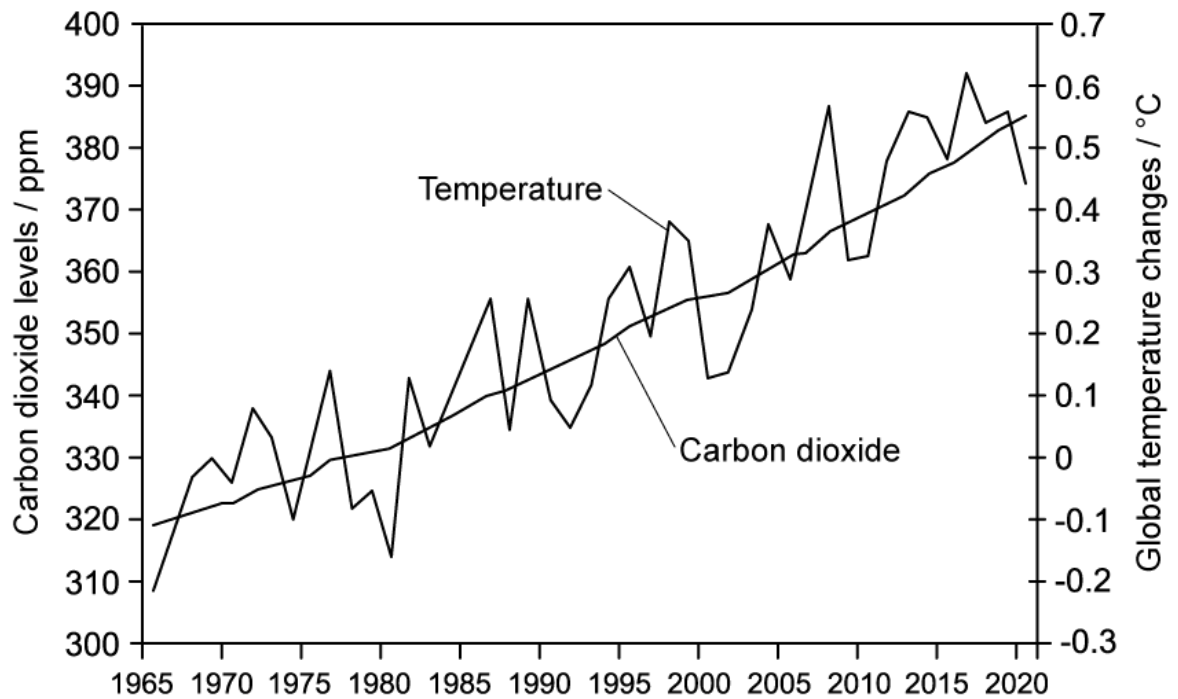
Calculate the amount of methane, in Tg year^{-1} , that is released from wetlands. Show your working.

(2 marks)

- (b) Suggest a reason why wetlands would be the largest contributor of atmospheric methane, as shown in the graph above.

(2 marks)

- 2 (a) Carbon dioxide is one of the main greenhouse gases in the atmosphere. The graph below shows the changes of carbon dioxide levels in the atmosphere, as well as the change in global temperatures over a period of time.



Describe the general trends in the data.

(3 marks)

- (b) Suggest possible causes of the trends in the data presented in part (a).

(2 marks)

- (c) Discuss the importance of greenhouse gases, such as carbon dioxide, in the atmosphere.

(2 marks)

3 *One mark is available for clarity of communication throughout this question.*

Suggest the possible impact that an increase in global temperatures would have on the polar regions, as well as the global consequences of this impact.

(3 marks)