

GCSE Combined Science: Trilogy

Worksheet: Human activities which contribute to an increase in greenhouse gases in the atmosphere

TIME 35 min	TOTAL 31 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Human activities which contribute to an increase in greenhouse gases in the atmosphere

NAME _____ **CLASS** _____ **DATE** _____

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1

Give **two** human activities that increase the amount of methane in the atmosphere.

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.....

.....

[2 marks]

0 2

0 2 . 1

Which human activity is a major source of methane?

Tick (✓) **one** box.

Burning coal in power stations

☐

Rice farming in flooded paddy fields

☐

Quarrying limestone

☐

Driving diesel cars

☐

[1 mark]

0 2 . 2

Give **one** way an individual (rather than a government or industry) could reduce their personal contribution to greenhouse gas emissions.

.....

.....

[1 mark]

0 3

0 3 . 1

Give **two** human activities that increase the amount of carbon dioxide in the atmosphere.

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.....

[2 marks]

0 3 . 2

Give **two** human activities that increase the amount of methane in the atmosphere.

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.....

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[2 marks]

0 4

A newspaper article included this headline:

‘Coldest winter in our town for 20 years — so global warming is not happening!’

0 4 . 1

Explain why the conclusion in the headline is **not** valid.

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[2 marks]

0 4 . 2

Explain why it is important that research about climate change is peer reviewed.

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[2 marks]

0 4 . 3

Suggest **one** reason why reports about climate change in the media may be misleading.

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[1 mark]

0 5

Human activities have increased the amounts of carbon dioxide and methane in the atmosphere. Many scientists predict that this will cause the Earth's average surface temperature to rise, but different studies predict different sizes of rise.

0 5 . 1

Describe human activities that increase the amounts of carbon dioxide and methane in the atmosphere.

Suggest why it is difficult for scientists to predict exactly how much the Earth's temperature will rise.

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[6 marks]

0 6

Table 1 shows the approximate area of tropical rainforest lost each year in a country over three decades.

Table 1

Decade	Area lost per year in km ²
1990s	28 000
2000s	19 000
2010s	24 000

0 6 . 1

Calculate the total area of rainforest lost over these three decades.

.....

.....

.....

.....

Area = km²

[2 marks]

0 6 . 2

Explain how deforestation increases the amount of carbon dioxide in the atmosphere.

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.....

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[2 marks]

0 7

0 7 . 1

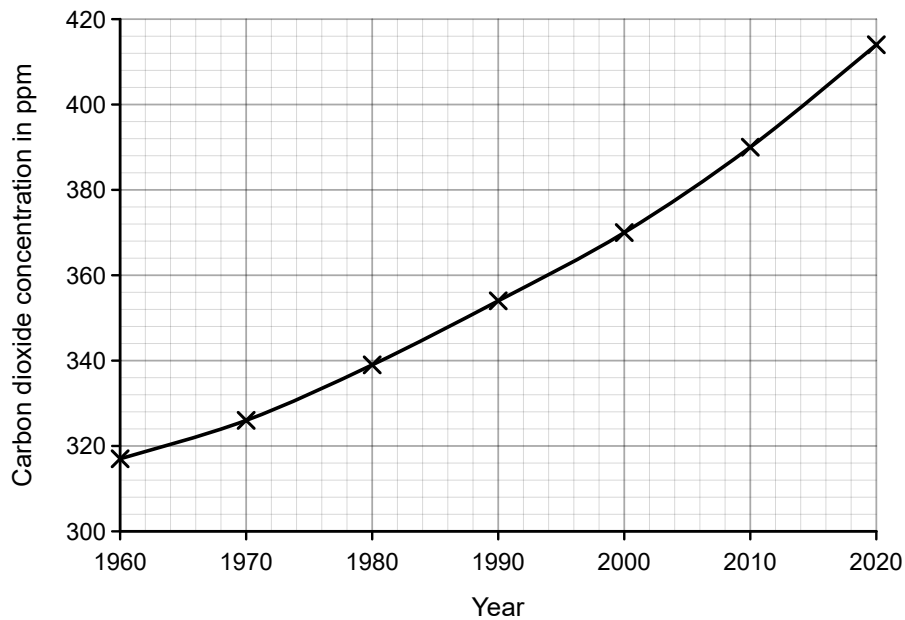
Explain how cattle farming leads to methane being released into the atmosphere.

[2 marks]

0 8

Figure 1 shows the mean concentration of carbon dioxide in the atmosphere, in parts per million (ppm), measured at an observatory between 1960 and 2020.

Figure 1



0 8 . 1

Calculate the mean rate of increase in carbon dioxide concentration between 2000 and 2020.

Give your answer in ppm per year.

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.....

Rate = ppm per year

[2 marks]

0 8 . 2

Give **two** human activities that caused the increase.

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[2 marks]

0 8 . 3

Explain why deforestation increases the amount of carbon dioxide in the atmosphere.

.....

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.....

[2 marks]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Human activities which contribute to an increase in greenhouse gases in the atmosphere · 31 marks

Question 1 (2 marks)

01.1 [2 marks]

- cattle / livestock farming (1)
- rice farming (in flooded paddy fields) (1)
- landfill sites (decay of waste) (1)
- leaks of natural gas (e.g. from gas pipes or mining) (1)

Any 2 of the points above.

Question 2 (2 marks)

02.1 [1 mark]

Correct: Rice farming in flooded paddy fields

02.2 [1 mark]

- e.g. use less energy at home, walk / cycle or use public transport instead of driving, eat less meat, or fly less (any sensible individual action) (1)
-

Question 3 (4 marks)

03.1 [2 marks]

- burning fossil fuels (e.g. in power stations or vehicles) (1)
- deforestation / cutting down or burning forests (1)

Notes: Allow other valid activities, e.g. making cement (heating limestone). Two examples of burning fossil fuels (e.g. driving cars and generating electricity in power stations) score 1 mark only.

03.2 [2 marks]

- animal farming (e.g. cattle) (1)
- decomposition of rubbish in landfill sites (1)

Notes: Allow 'rice growing in paddy fields' and 'leaks of natural gas (e.g. from gas wells or pipes)'. Two examples of farming animals (e.g. cattle and sheep) score 1 mark only.

Question 4 (5 marks)

04.1 [2 marks]

- one town / one winter is not representative of the whole Earth (1)
 - climate change is about long-term trends in average global temperature (weather varies from year to year) (1)
-

04.2 [2 marks]

- other (independent) scientists check the methods, data and conclusions (1)
 - so errors or bias can be found and the findings are more likely to be valid (1)
-

04.3 [1 mark]

- they may be based on only part of the evidence / may be simplified / may be biased / may present opinions or speculation as fact (1)
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Question 5 (6 marks)

05.1 [6 marks]

Answer: Carbon dioxide: burning fossil fuels for electricity, heating and transport; deforestation (burning trees, and fewer trees to photosynthesise). Methane: cattle and other livestock farming; rice paddy fields; waste decaying in landfill. Predictions are uncertain because the climate is very complex so models are simplified, future emissions depend on human choices, and other factors (natural variation, volcanoes, the Sun) and incomplete data about the past add uncertainty.

Levels of response

- **Level 3 (5–6)** A detailed, coherent answer. Relevant points are accurate, linked in a logical sequence and use correct scientific terms.
- **Level 2 (3–4)** Several relevant points with some linking, but the answer has gaps, errors or lacks detail.
- **Level 1 (1–2)** Simple statements making one or two relevant points, with little or no linking.
- **No marks (0)** Nothing relevant or worthy of credit.

Indicative content

- burning fossil fuels (coal, oil and natural gas) for electricity, heating and transport releases carbon dioxide
- deforestation: burning the trees releases carbon dioxide, and fewer trees are left to remove carbon dioxide by photosynthesis
- more cattle and other livestock farming releases methane (from the animals' digestion)
- rice paddy fields and the decay of waste in landfill sites release methane
- the climate is a very complex system, so the models used to predict it have to be simplified
- it is not known how much carbon dioxide and methane will be released in future, because this depends on human choices such as how much fossil fuel is used
- other factors also affect temperature (e.g. natural variation, volcanic eruptions, changes in the Sun's output) and data about past climate are incomplete, so different studies can reach different predictions

Notes: Do not credit references to the ozone layer.

Level 3 (5–6 marks): describes at least two activities for each gas and gives at least two well-explained reasons why predictions are uncertain.

Level 2 (3–4 marks): describes activities for both gases, or activities for one gas with some reasons for the uncertainty.

Level 1 (1–2 marks): simple statements, e.g. 'burning fuels' or 'cows', with little or no explanation.

Question 6 (4 marks)

06.1 [2 marks]

Answer: 710 000 km²

- $(28\,000 + 19\,000 + 24\,000) \times 10$ (1)
- 710 000 (km²) (1)

Notes: 71 000 (not multiplying by 10 years per decade) scores 1 mark.

06.2 [2 marks]

- there are fewer trees, so less carbon dioxide is removed from the atmosphere by photosynthesis (1)
 - trees that are burned or left to decay release carbon dioxide (1)
-

Question 7 (2 marks)

07.1 [2 marks]

- cattle (and other ruminants) produce methane during the digestion of their food, in their stomachs (1)
- the methane is released into the atmosphere, mainly by belching (1)

Notes: Allow: methane is produced by microorganisms in the digestive system; released by belching or passing wind. Allow methane from manure / animal waste.

Question 8 (6 marks)

08.1 [2 marks]

Answer: 2.2 ppm per year

- $(414 - 370) \div 20$ (1)
- 2.2 (ppm per year) (1)

Notes: Allow values read from the graph within ± 2 ppm, giving answers from 2.0 to 2.4.

08.2 [2 marks]

- burning fossil fuels (1)
- deforestation (1)

Notes: Allow other valid activities, e.g. making cement. Two examples of burning fossil fuels score 1 mark only.

08.3 [2 marks]

- fewer trees to remove carbon dioxide from the atmosphere by photosynthesis (1)
 - the trees are often burned / decompose, releasing carbon dioxide (1)
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