

Combined Science - Biology - Key stage 4
Ecology

Global Warming

Dr Clapp



Independent practice

1. Name the three main greenhouse gases.
2. What type of radiation is emitted from the sun (include the wavelength)?
3. What happens to the radiation from the sun when it reaches Earth?
4. How is the wavelength of the radiation emitted from the sun different from that reflected from the Earth's surface?
5. What happens to the reflected radiation?



Independent practice - answers

1. Name the three main greenhouse gases.

Carbon dioxide, methane and water vapour

1. What type of radiation is emitted from the sun (include the wavelength)?

Short wavelength infrared radiation

1. What happens to the radiation from the sun when it reaches Earth?

Some of it is absorbed by the Earth and some of it is reflected



Independent practice - answers

4. How is the wavelength of the radiation emitted from the sun different from that reflected from the Earth's surface?

The radiation reflected from the Earth's surface has a longer wavelength than that emitted from the sun

5. What happens to the reflected radiation?

It gets trapped in the Earth's atmosphere



Independent practice

1. What is the human enhanced greenhouse effect?
2. Why is it difficult to make predictions about future climate change?
3. State two reasons why carbon dioxide levels are increasing.
4. State two reasons why methane levels are increasing.
5. Give two effects of global warming other than rising sea levels.
6. State a consequence of rising sea levels.



Independent practice - answers

1. What is the enhanced greenhouse effect?

An increase in the greenhouse effect caused by rising levels of greenhouse gases (caused in turn by human activity)

1. Why is it difficult to make predictions about future climate change?

Because the global climate is very complex and lots of things are changing at once

1. State two reasons why carbon dioxide levels are increasing.

Burning fossil fuels/deforestation/burning peat



Independent practice - answers

4. State two reasons why methane levels are increasing.

Increased cattle farming and increased rice production

5. Give two effects of global warming other than rising sea levels.

Melting ice caps/more extreme weather/increased land and ocean temperatures

6. State a consequence of rising sea levels.

Loss of habitat



Exam question

ExamBuilder: OCR, B712/01, January 2013

This question is about the greenhouse effect and global warming.

Some scientists say that an increase in global warming is part of a natural cycle.

Other scientists think that an increase in global warming will be disastrous for the world. They think that the surface temperature of the Earth is increasing and that this is because more fossil fuels are being burned.

Burning fossil fuels makes a lot of carbon dioxide.

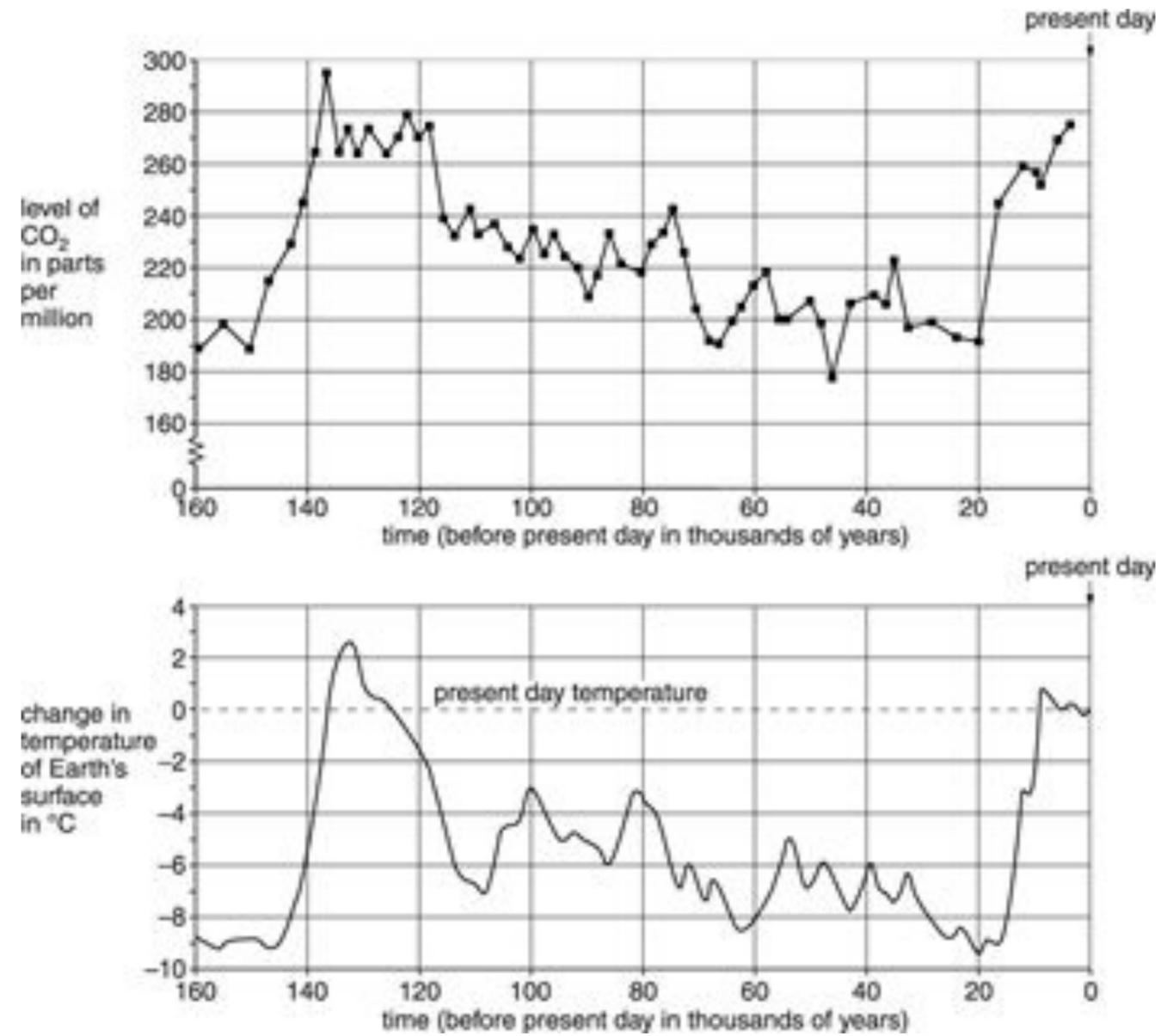
Look at the graphs.

They show how the amount of carbon dioxide in the air and the temperature of the Earth have changed over the last 160 000 years.



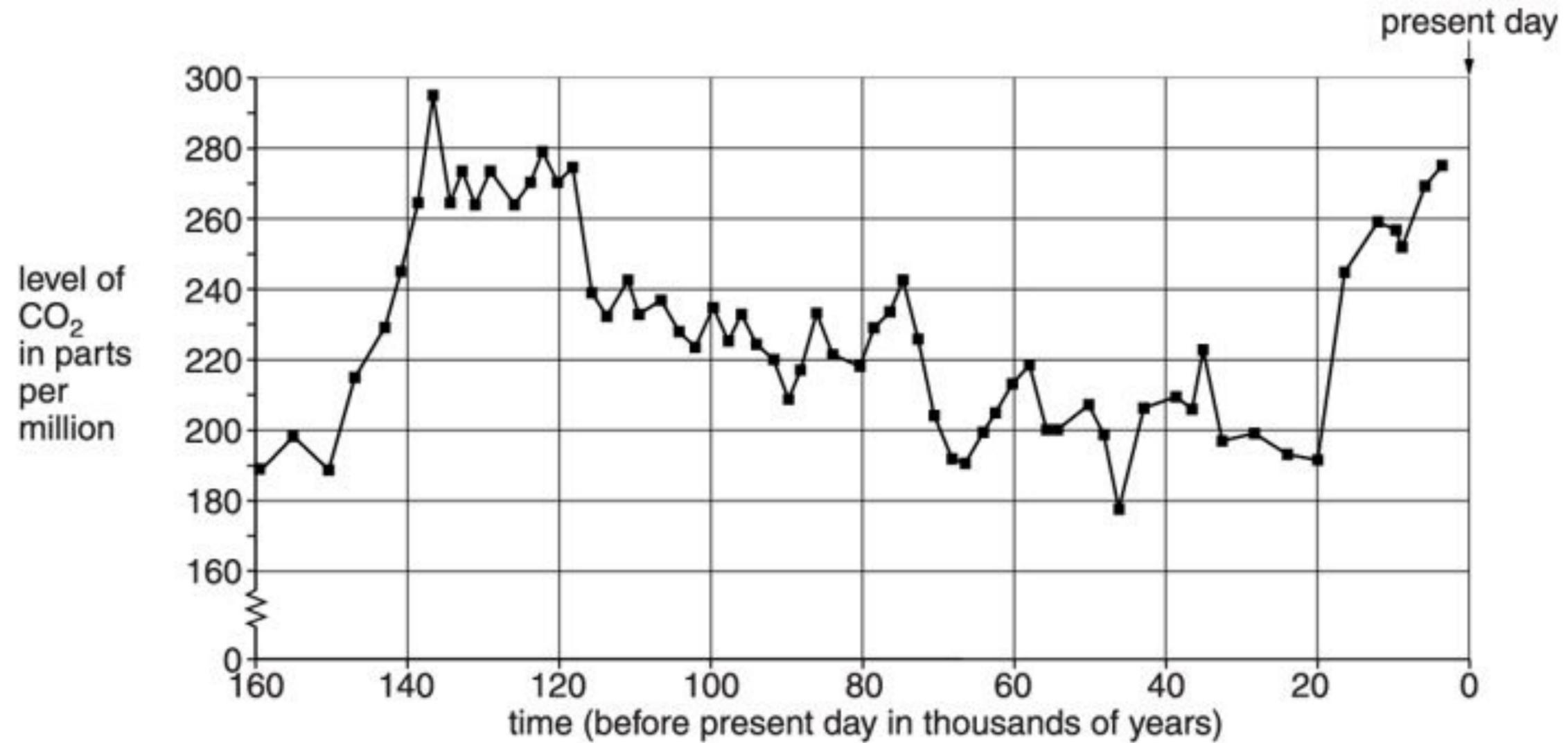
Exam question

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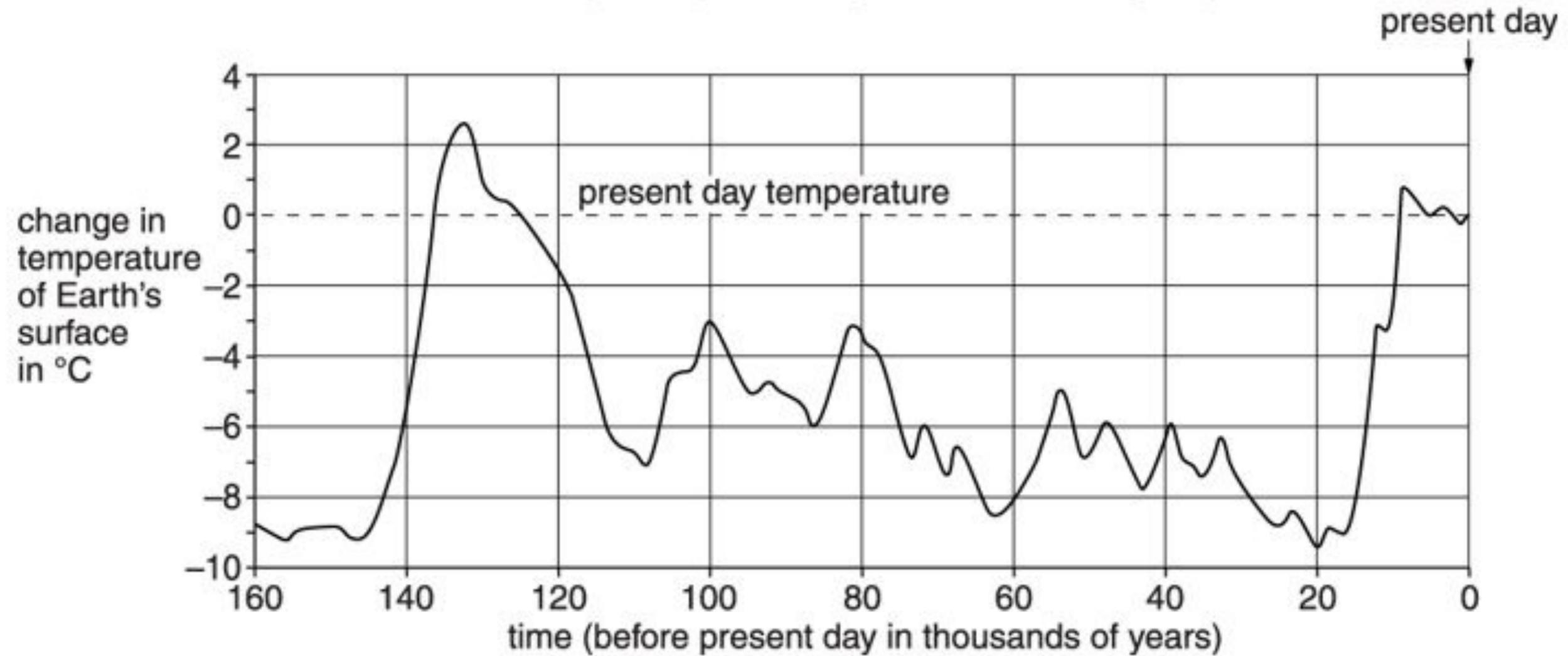
Exam question

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Exam question

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Exam question - independent practice

ExamBuilder: OCR, B712/01, January 2013

ai. What is the **highest** level of carbon dioxide in the air during the last 160 000 years? **[1]**

aii. Describe what has happened to the surface temperature of the Earth in the last 160 000 years. **[2]**

aiii. Is there a link between the surface temperature of the Earth and the level of carbon dioxide in the air? Explain your answer. Use information from the graphs. **[2]**



Exam question - answers

ExamBuilder: OCR, B712/01, January 2013

ai. What is the **highest** level of carbon dioxide in the air during the last 160 000 years? **[1]**

292-298 parts per million



Exam question - answers

ExamBuilder: OCR, B712/01, January 2013

aii. Describe what has happened to the surface temperature of the Earth in the last 160 000 years. **[2]**

Any two from:

Initially the temperature increased up to 130,000

Between 130,000 and 20,000 the temperature fell

Gradual increase from 20,000 to the current time



Exam question - answers

ExamBuilder: OCR, B712/01, January 2013

aiii. Is there a link between the surface temperature of the Earth and the level of carbon dioxide in the air? Explain your answer. Use information from the graphs. **[2]**

Yes, as carbon dioxide levels increase so does temperature (1) and the peaks mostly coincide (1)

OR

There is no direct link (1) because the peaks do not coincide exactly (1)



Exam question

ExamBuilder: OCR, B712/01, January 2013

Look at the table. It shows the carbon dioxide emissions for some countries in 2003.

It also shows the population for these countries in 2003.



Exam question

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Country	Continent	Carbon dioxide emissions in million tonnes per year	Population in millions
Botswana	Africa	4	2
China	Asia	3762	1254
France	Europe	390	62
Germany	Europe	854	82
Ghana	Africa	7	23
India	Asia	1050	1064
Indonesia	Asia	318	215
Japan	Asia	1201	128
Mozambique	Africa	2	21
Russia	Asia	1527	143
UK	Europe	540	59
USA	America	5729	291
World		24983	6268



Exam question - independent practice

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- bi. Which three countries had the lowest carbon dioxide emissions in 2003? Suggest why. **[2]**
- bii. Show that the percentage of the world emissions of carbon dioxide in 2003 made by the USA was 22.9%. **[1]**
- biii. In 2003, about 4.6% of the world's population lived in the USA. 22.9% of the world's emissions of carbon dioxide came from the USA. Some other countries are concerned about the difference between these two percentages. Suggest why. **[2]**



Exam question - answers

ExamBuilder: OCR, B712/01, January 2013

bi. Which three countries had the lowest carbon dioxide emissions in 2003? Suggest why. **[2]**

Botswana, Ghana and Mozambique (1)

They are all developing (poor) countries/they have the lowest populations (1)



Exam question - answers

ExamBuilder: OCR, B712/01, January 2013

bii. Show that the percentage of the world emissions of carbon dioxide in 2003 made by the USA was 22.9%. **[1]**

$$(5729 \div 24983) \times 100 = 22.9\%$$



Exam question - answers

ExamBuilder: OCR, B712/01, January 2013

biii. In 2003, about 4.6% of the world's population lived in the USA. 22.9% of the world's emissions of carbon dioxide came from the USA. Some other countries are concerned about the difference between these two percentages. Suggest why. **[2]**

any two from:

idea that USA uses more than its fair share of resources (1)

idea that they produce more pollution than they should (1)

idea that they have a relatively low population (compared to the emissions) (1)

USA should contribute 4.6% of carbon dioxide emissions (1)

