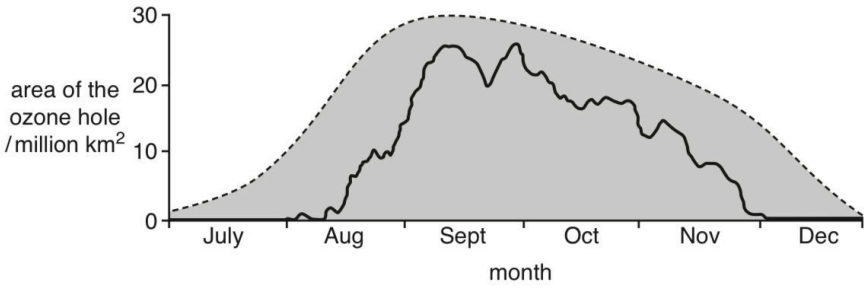
3 The graph shows how the ozone hole over Antarctica in 2014 differed from its largest area recorded for the months July to December.



Key

—— area of the ozone hole in 2014

----- largest recorded area of the ozone hole

(a) (i) State the month when the ozone hole covered the largest recorded area.

…….. [1]

(ii) Compare the length of time that the ozone hole lasted in 2014 with that of the largest recorded area.

.....

.....

.....

.....[2]

(b) (i) Explain the importance of ozone in the atmosphere.

.....

.....

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.....

.....[3]

(ii) Name an atmospheric pollutant that destroys ozone.

.....[1]

(c) In 1987 many governments agreed to ban the use of chemicals that destroy ozone.

Suggest why the ozone hole over Antarctica is likely to exist for many years despite this ban.

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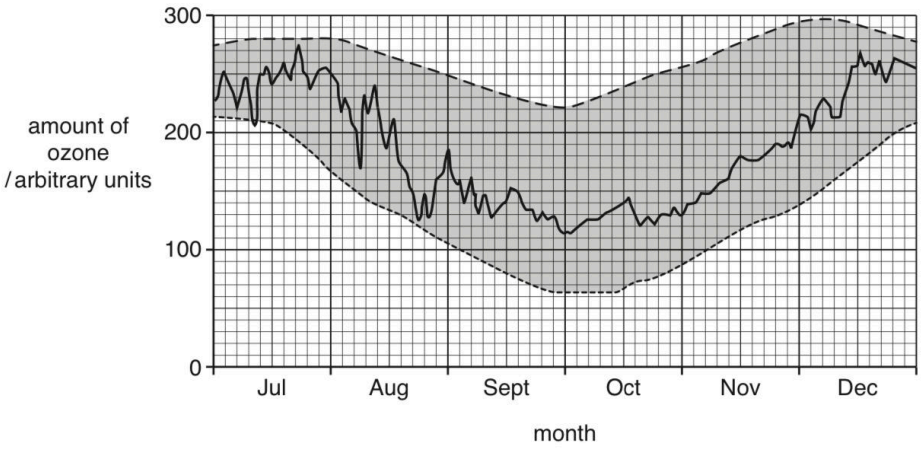
.....[3]

3 The graph shows the amounts of ozone in the atmosphere above Antarctica.



Key

amount of ozone in 2014

– – – highest amount of ozone recorded from 1979 to 2013

------- lowest amount of ozone recorded from 1979 to 2013

(a) (i) State the date with the lowest amount of ozone in 2014.

.....[1]

(ii) Some scientists suggest that attempts to reduce the destruction of ozone have had little success.

Explain how the graph supports this.

.....

.....

.....

.....[2]

(b) Describe strategies to reduce the hole in the ozone layer.

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.....

.....[4]

(c) Suggest why international action was necessary to protect the ozone layer.

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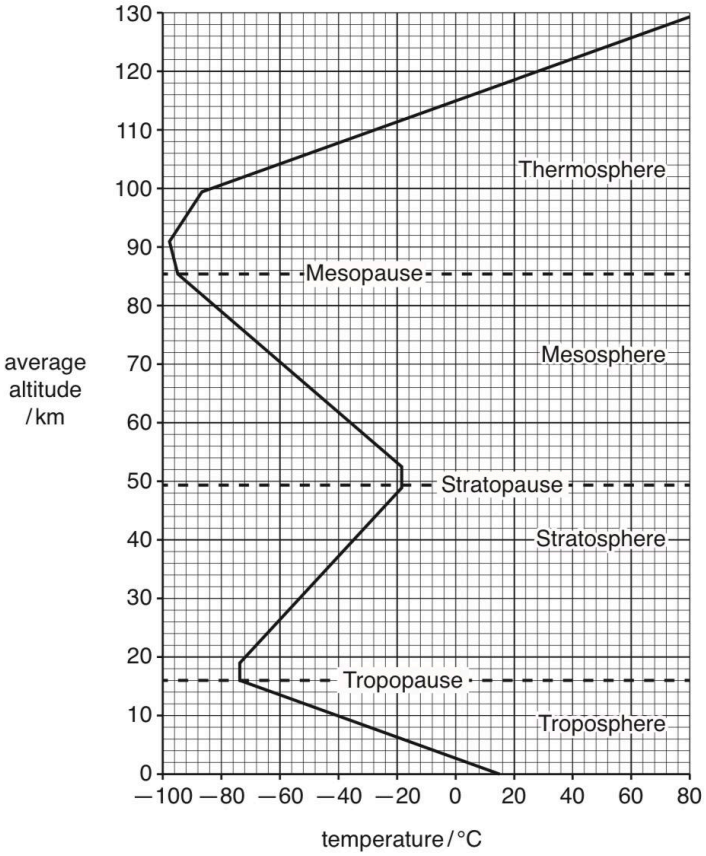
.....[3]

Section B

Answer **both** questions.

5 **(a)** The diagram shows the structure of the atmosphere.



(i) State the average altitude and air temperature at the tropopause.

altitude ..... km temperature ..... °C [2]

(ii) Describe the changes in temperature above the troposphere.

.....

.....

.....

.....

.....

..... [3]

(iii) The ozone layer occurs at an altitude of approximately 20 to 30 km. Draw the ozone layer on the diagram of the structure of the atmosphere. [1]

(iv) Explain why the ozone layer is vital to life on Earth.

.....

.....

.....

..... [2]

(v) Above Antarctica there is an area of reduced ozone concentration, commonly known as the ozone hole.

Explain how the damage to the ozone layer over Antarctica has occurred.

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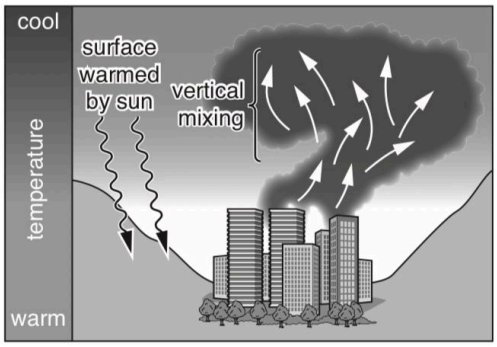
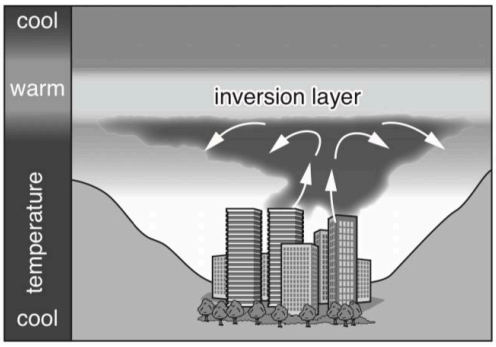
..... [4]

(b) The diagrams show normal atmospheric conditions and a temperature inversion.



normal atmospheric conditions



temperature inversion

(i) Using the diagrams, describe why atmospheric temperatures are usually warmest near the ground surface.

.....

..... [1]

(ii) Using the diagrams, describe what is meant by a *temperature inversion*.

.....

.....

.....

..... [2]

(iii) Explain how a temperature inversion increases atmospheric pollution in a city.

.....

.....

.....

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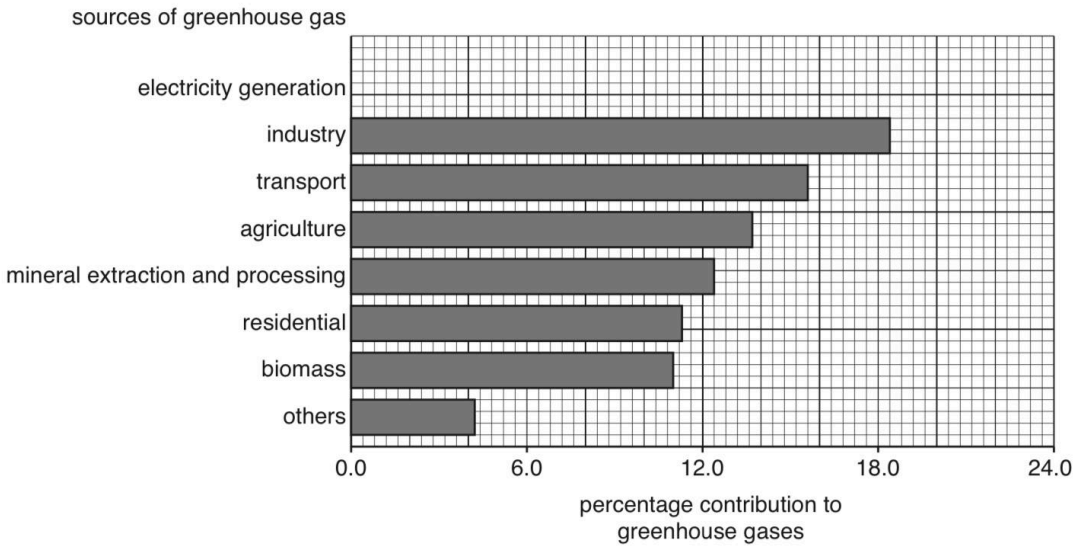
..... [3]

(c) The graph shows sources of greenhouse gases in the atmosphere.



(i) Complete the graph by showing an electricity generation contribution to greenhouse gases of 21.0%. [1]

(ii) State the percentage contribution to greenhouse gases from transport.

.....% [1]

(iii) Explain how electricity generation and agriculture produce greenhouse gases.

electricity generation .....

.....

.....

.....

.....

.....

agriculture .....

.....

.....

.....

.....

.....

[5]

(iv) Suggest ways in which greenhouse gas emissions can be reduced.

.....

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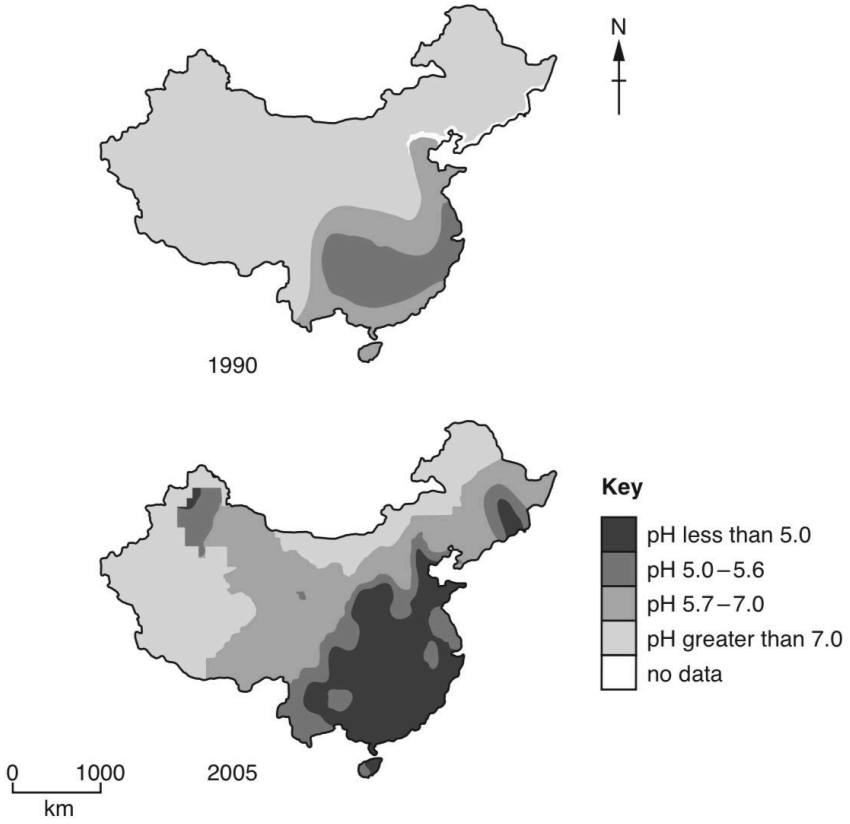
..... [3]

(d) The maps show the pH of rainfall in China in 1990 and 2005. The lower the pH, the more acidic the rainfall.



(i) State the lowest pH of rainfall in China in 1990.

..... [1]

(ii) Describe the changes in the pH of rainfall in China from 1990 to 2005.

.....

.....

.....

.....

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..... [3]

(iii) Suggest **two** reasons for the changes in the pH of rainfall in China from 1990 to 2005.

.....

.....

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..... [2]

(e) Is international cooperation necessary to overcome the problems of atmospheric pollution? Give reasons for your answer.

.....

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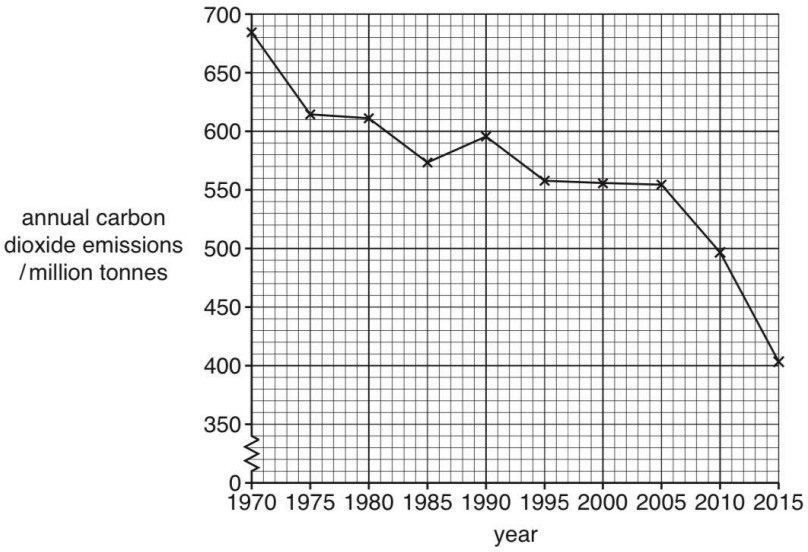
..... [6]

3 The graph shows carbon dioxide emissions for a more economically developed country (MEDC) from 1970 to 2015.



(a) Calculate the change in carbon dioxide emissions from 1970 to 2015.

..... million tonnes [2]

(b) Which 10-year period showed the greatest decrease in carbon dioxide emissions?

..... [1]

(c) Explain why the government of the MEDC needed to decrease carbon dioxide emissions.

.....

.....

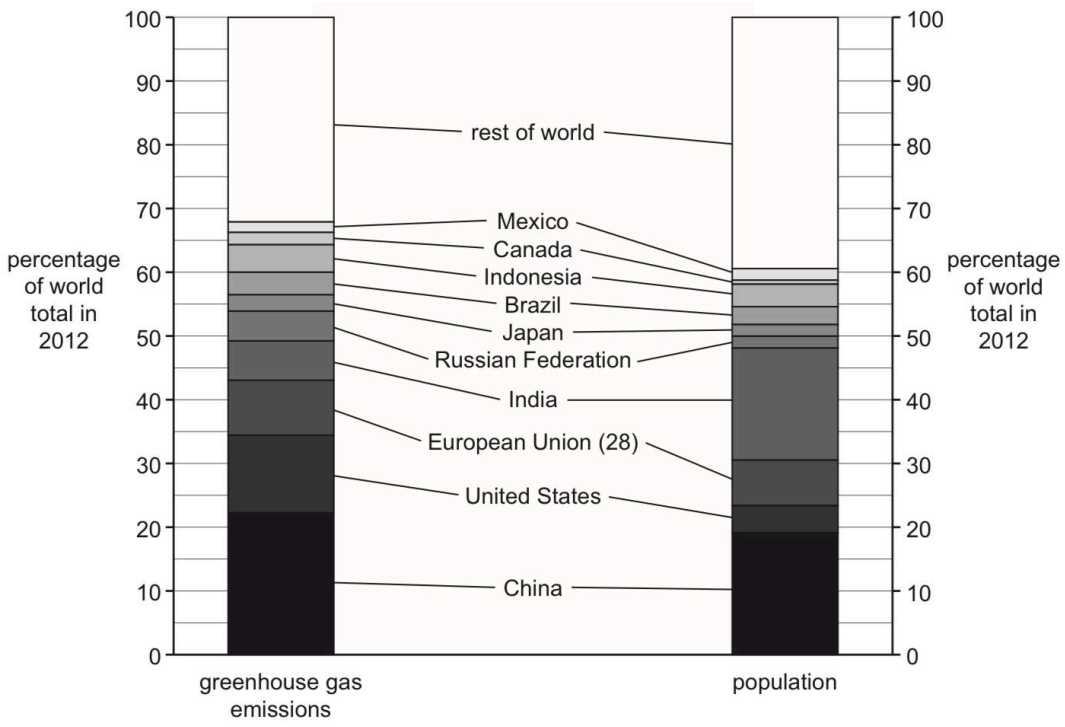
.....

..... [2]

[Total: 5]

Section A

1 The divided bar chart shows percentage of greenhouse gas emissions and percentage population in 2012.



(a) State the percentage of greenhouse gas emissions from the rest of the world in 2012.

.....% [1]

(b) Identify the country that produced the most greenhouse gas emissions in 2012 **and** state the percentage of greenhouse gas emissions it produced.

country .....

percentage of greenhouse gas emissions .....

[1]

(c) State the name of **two** greenhouse gases.

1 .....

2 .....

[2]

(d) India contains nearly 19% of the world's population, but contributes only 6% of the world's greenhouse gases.

Suggest reasons why.

.....

.....

.....

.....

.....

..... [3]

[Total: 7]

4 Atmospheric pollution may be harmful to humans.

One example of atmospheric pollution is smog.

(a) Explain how smog is formed.

.....

.....

.....

.....

.....

..... [3]

(b) State **two** ways smog is harmful to human health.

1 .....

.....

2 .....

.....

[2]

[Total: 5]

6 The newspaper report is about air pollution in 2012.

> **7 million deaths due to air pollution in 2012**
>
> The World Health Organisation estimates that around 7 million people died as a result of air pollution in 2012. This represents one in eight of total global deaths. This information confirms that air pollution is now the world's largest single environmental health risk. Reducing air pollution could save millions of lives.
>
> Low and middle income countries in the South East Asia and Western Pacific regions were the most affected by air pollution in 2012. There were 3.3 million deaths due to indoor air pollution and 2.6 million deaths due to outdoor air pollution in these regions.

(a) (i) Calculate the percentage of global deaths that were due to air pollution in 2012.

.....% [1]

(ii) Suggest reasons why low and middle income countries were greatly affected by air pollution in 2012.

.....

.....

.....

.....

.....

..... [3]

(iii) Give the ratio of air pollution deaths in the South East Asia and Western Pacific regions compared to the total global deaths from air pollution in 2012.

..... [1]

(b) Suggest **two** health problems that could be caused by the air pollution.

1 .....

2 .....

[2]

(c) Suggest reasons why governments have difficulty in reducing air pollution.

.....

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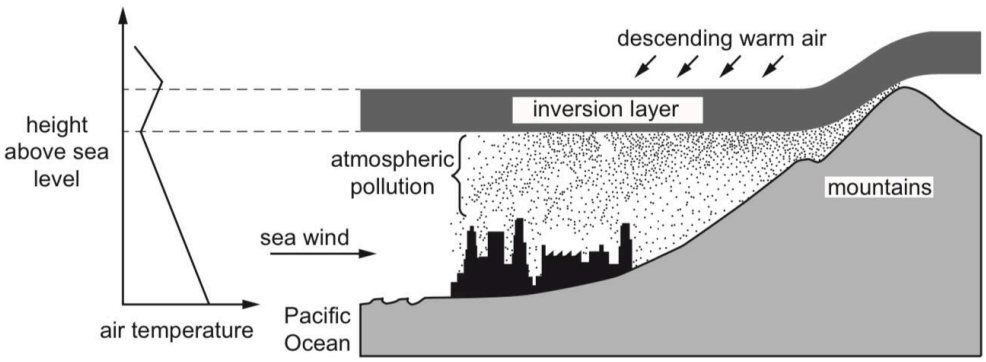
..... [4]

[Total: 11]

2 The city of Los Angeles is on the west coast of the USA. The city frequently experiences smog.

The diagram shows some of the causes of smog.



(a) Use the diagram to describe the causes of smog in Los Angeles.

.....

.....

.....

.....

.....

..... [3]

(b) Describe the impacts of smog on human health.

.....

.....

.....

.....

.....

..... [3]

(c) Vehicle emissions are a major cause of smog.

Describe ways the government could reduce emissions from vehicles in Los Angeles.

.....

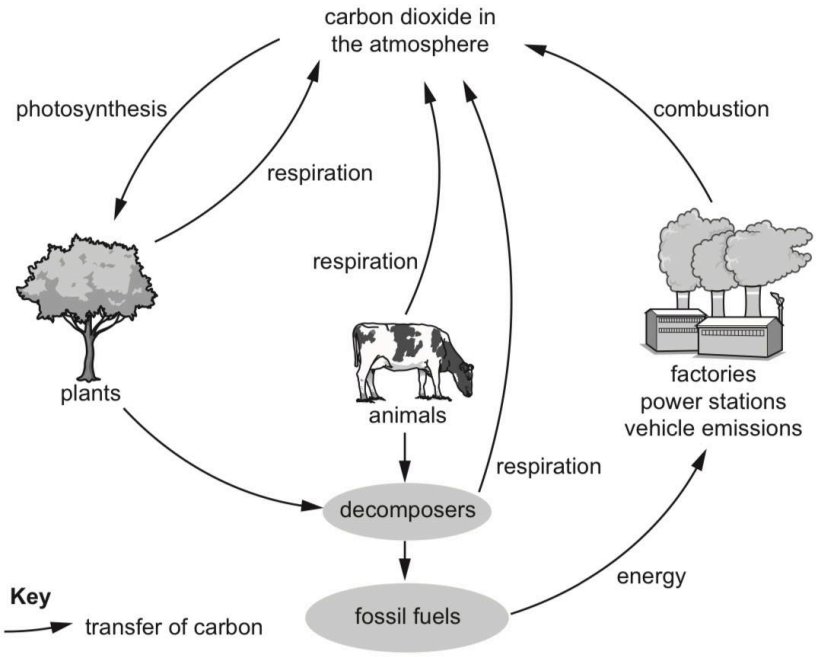
.....

.....

..... [2]

[Total: 8]

4 The diagram shows part of the carbon cycle.



(a) Use the diagram to state **two** different processes that release carbon dioxide into the atmosphere.

1 .....

2 .....

[2]

(b) Plants use carbon dioxide in photosynthesis.

State where the energy for this process comes from.

..... [1]

(c) Carbon dioxide is a greenhouse gas.

Name **two** other greenhouse gases.

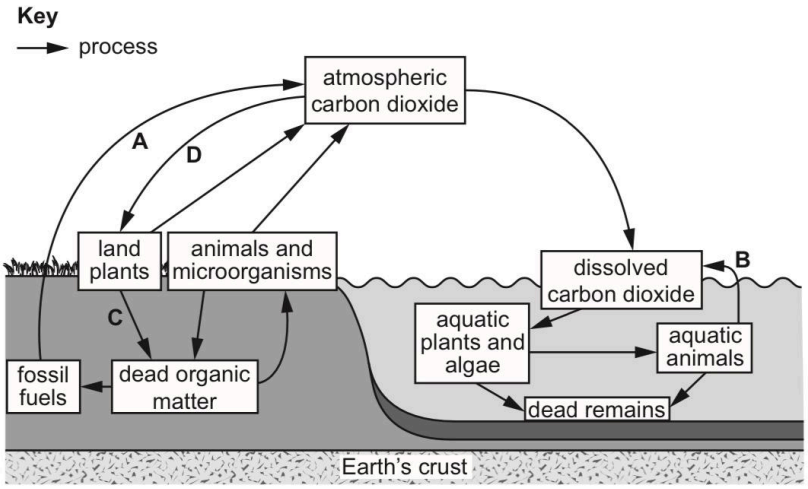
1 .....

2 .....

[2]

[Total: 5]

6 The diagram shows part of the carbon cycle.



(a) State the names of processes **A**, **B**, **C** and **D**.

A .....

B .....

C .....

D .....

[4]

(b) Explain why fossil fuels are described as a non-renewable energy resource.

.....

.....

.....

..... [2]

(c) Suggest the impacts of urbanisation on the carbon cycle.

.....

.....

.....

.....

.....

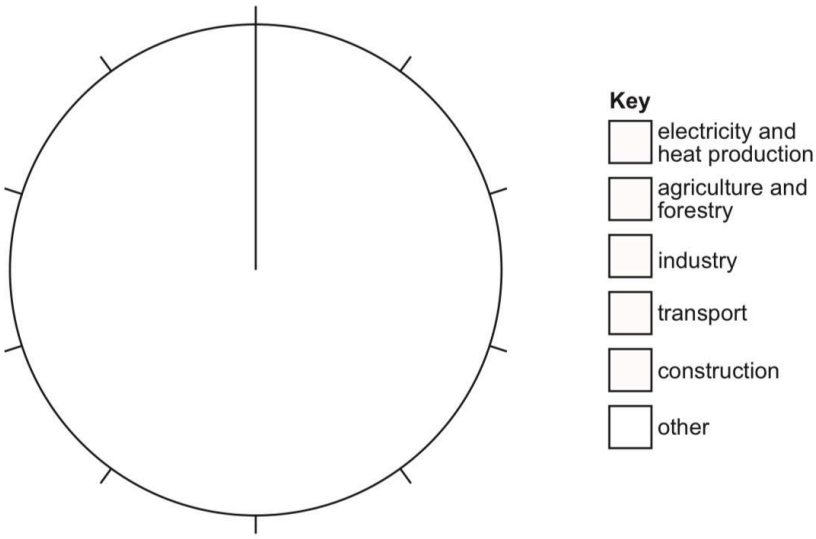
..... [3]

[Total: 9]

8 The table shows the sources of global greenhouse gas emissions.

source of greenhouse gas emission	percentage of greenhouse gas emissions
electricity and heat production	25
agriculture and forestry	24
industry	21
transport	14
construction	6
other	10

(a) Use the data in the table to complete the pie chart and key.



[3]

(b) Describe how atmospheric pollution causes acid rain.

.....

.....

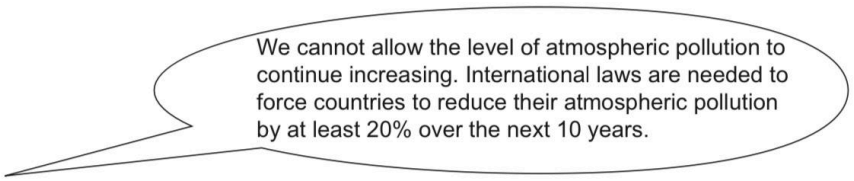
.....

.....

.....

..... [3]

(c) A student says:



To what extent do you agree with this statement? Give reasons for your answer.

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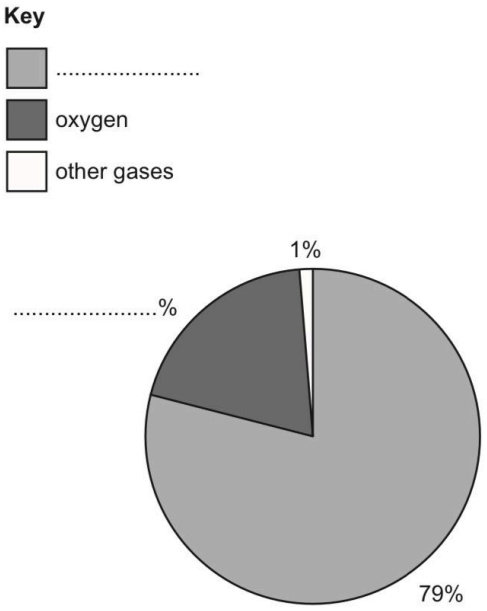
..... [6]

[Total: 12]

Section A

1 The pie chart shows the proportion of gases in the atmosphere.

(a) (i) Complete the missing information in the chart and the key.



[2]

(ii) State the names of **two** gases which are included in the category 'other gases'.

1 .....

2 .....

[2]

(b) State the main source of oxygen in the atmosphere.

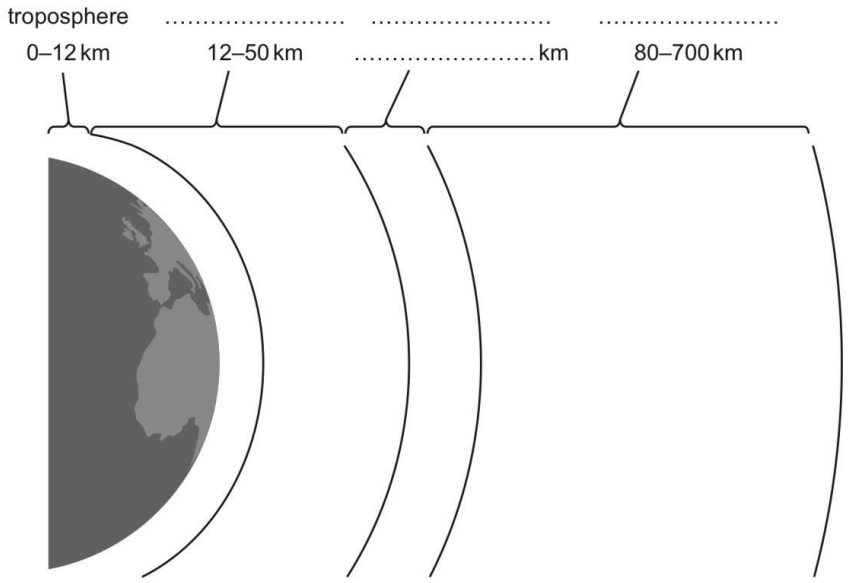
.....

..... [1]

[Total: 5]

Section A

1 The diagram shows the layers in the atmosphere.



(a) Complete the diagram to show the layers in the atmosphere. [3]

(b) Add a letter **O** to the diagram to show the position of the ozone layer. [1]

(c) Explain why the ozone layer is important to life on Earth.

.....

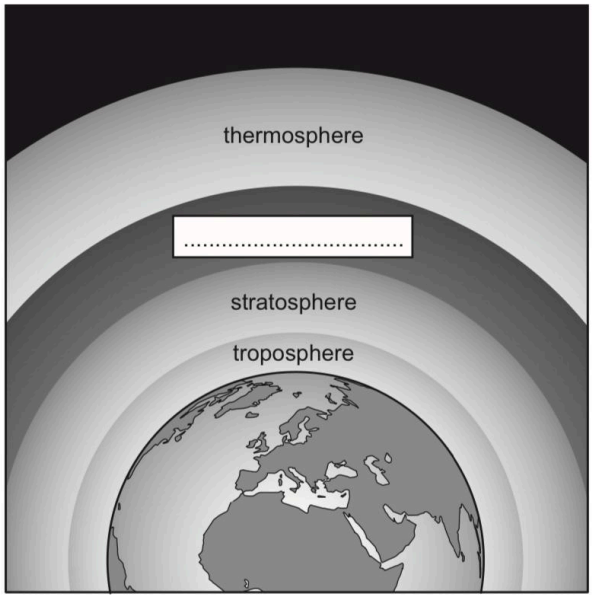
.....

.....

..... [2]

[Total: 6]

7 The diagram shows the structure of the Earth's atmosphere.



(a) Complete the diagram with the name of the layer. [1]

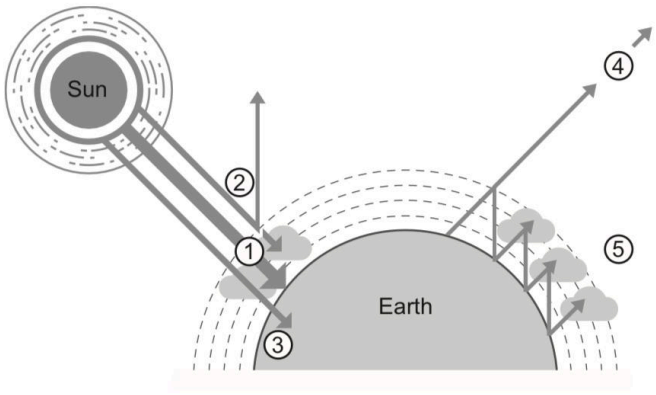
(b) The table shows some gases found in the troposphere.

Complete the table.

gas	percentage in troposphere
.....	78.09
oxygen	20.95
carbon dioxide	.....
other gases	0.92

[2]

(c) The diagram shows the processes in the natural greenhouse effect.



Match the following statements to the numbered processes shown in the diagram.

statement	numbered process in diagram
Greenhouse gases absorb some of the infrared radiation.	.....
Some ultraviolet radiation is absorbed by the Earth's surface.	.....
Some ultraviolet radiation is reflected and absorbed by the Earth's atmosphere.	.....
The Earth re-emits infrared radiation back towards space.	.....
Ultraviolet radiation travels through the Earth's atmosphere.	.....

[3]

(d) A government introduces a national policy to limit vehicle emissions.

Suggest reasons why this policy is **not** enough to reduce the enhanced greenhouse effect.

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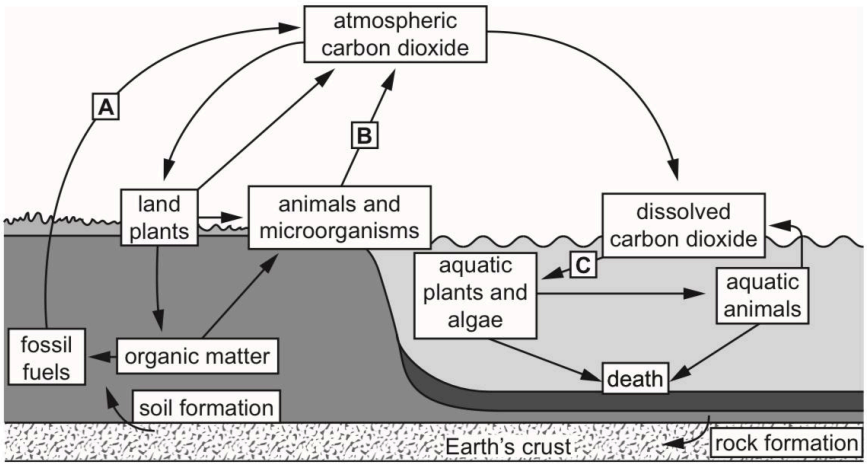
..... [5]

[Total: 11]

Section A

1 The diagram shows part of the carbon cycle.



(a) State the processes at **A**, **B** and **C**.

A .....

B .....

C .....

[3]

(b) Explain why aquatic plants and algae are essential to aquatic animals.

.....

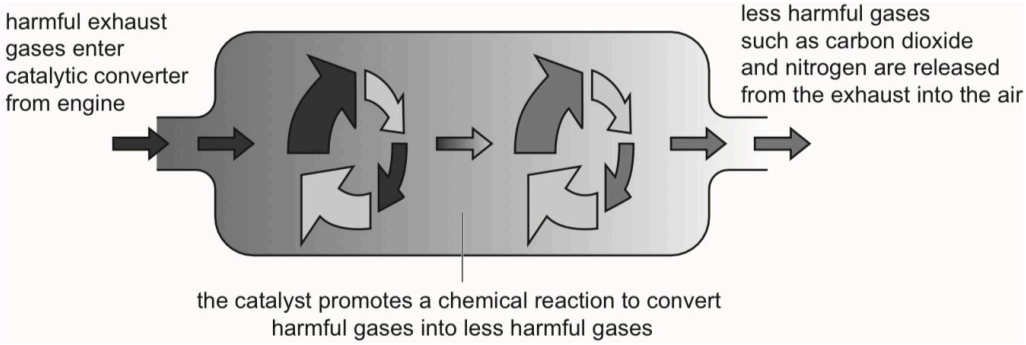
.....

.....

..... [2]

[Total: 5]

3 The diagram shows a catalytic converter used in vehicles.



(a) State **two** harmful gases converted by the catalytic converter.

1 .....

2 .....

[2]

(b) State **three** reasons why catalytic converters will **not** solve the problem of atmospheric pollution.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

(c) State **three** strategies for reducing atmospheric pollution from vehicles other than catalytic converters.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

[Total: 8]