Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2016–2017

Double Award Science: Biology

Unit B1
Foundation Tier

GSD11

[GSD11]

WEDNESDAY 22 FEBRUARY 2017, MORNING

TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Write your answers in the spaces provided in this question paper.
Answer **all ten** questions.

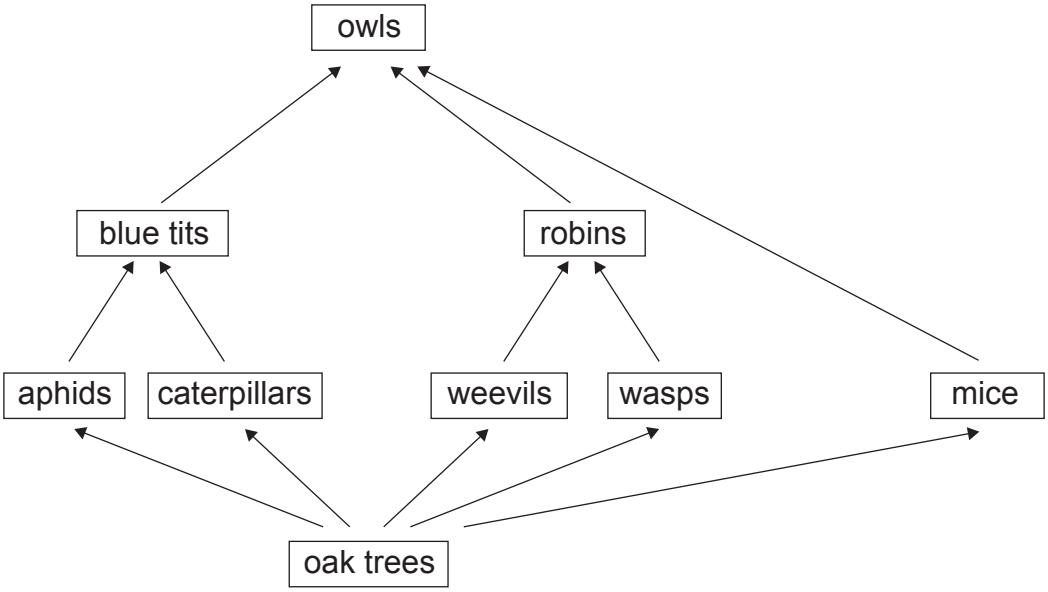
INFORMATION FOR CANDIDATES

The total mark for this paper is 70.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Question **10(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

Examiner Only	
Marks	Remark

1 **(a)** The diagram shows a food web for a woodland.



Source: Principal Examiner

(i) Name the energy source for this food web.

_____ [1]

(ii) Name **one** primary consumer in the food web.

_____ [1]

(b) Describe and explain what would happen to the blue tit population if the robins left the woodland.

_____

_____

_____

_____ [2]

(c) A food chain from the food web opposite is shown below.

oak trees → aphids → blue tits → owls

(i) What do the arrows in the food chain represent?

_____

_____ [1]

(ii) Draw a pyramid of **biomass** for this food chain in the space below.

Label the organisms.

[3]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

2 Plants need minerals from the soil for healthy growth.

The diagram gives three minerals and their functions.

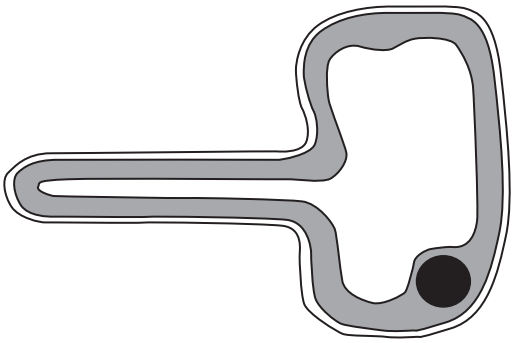
(a) Draw a line to link each mineral to its function.

Mineral	Function
calcium	to make protein
magnesium	to make strong cell walls
nitrogen	to make chlorophyll

[2]

(b) Plants take up minerals from the soil using root hair cells.

The drawing shows a root hair cell.



Source: Principal Examiner

(i) Describe how this cell is adapted to increase the uptake of minerals from the soil.

_____

_____ [1]

(ii) Explain how this adaptation increases the uptake of minerals from the soil.

_____ [1]

(c) Plants take up nitrogen from the soil in the form of nitrate.

Farmers use natural fertilisers or artificial fertilisers to replace the nitrates in the soil.

(i) Give **one** example of a natural fertiliser.

_____ [1]

(ii) Give **one** advantage of using an **artificial fertiliser** compared to a natural fertiliser.

_____

_____ [1]

Examiner Only	
Marks	Remark

3 The photograph shows a blackbird.

© Duncan Shaw / Science Photo Library

Read the passage about blackbirds and answer the questions that follow.

Blackbirds live in hedgerows.
Berries are produced on the hedgerows in the autumn and provide food for blackbirds.
The berries are very important for blackbirds during the winter.

(a) Name the habitat of the blackbirds.

_____ [1]

Farmers control the growth of hedgerows by cutting them.

(b) Explain why it is better for the blackbirds if the hedgerows are cut in late winter rather than in the autumn.

_____

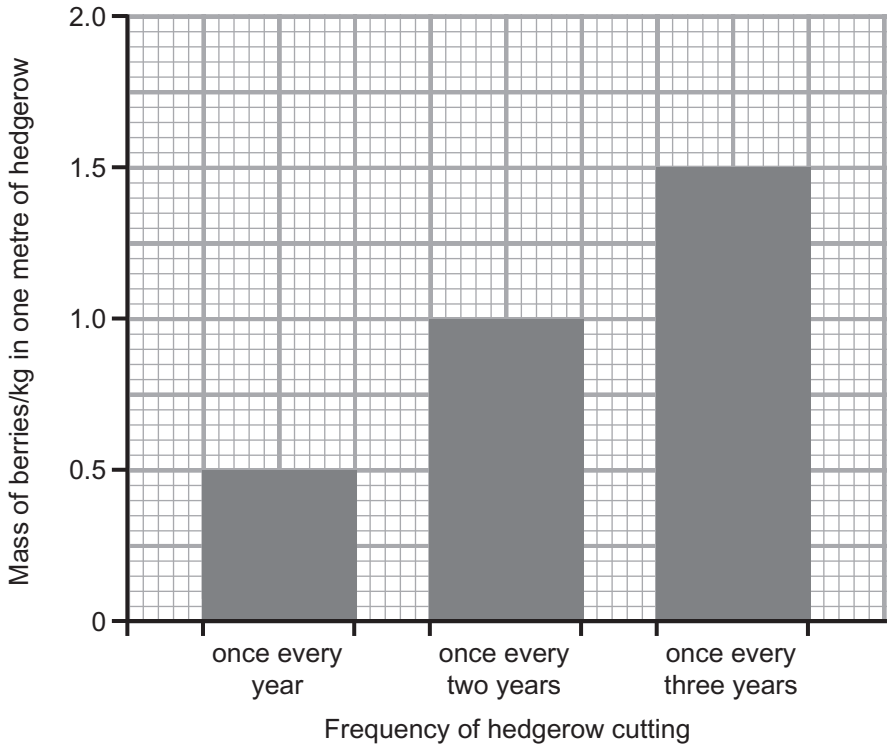
_____ [1]

Examiner Only	
Marks	Remark

In an investigation, the mass of berries was recorded in hedgerows which were cut:

- once every year
- once every two years
- once every three years.

The bar graph shows the results.



(c) Give the frequency of hedgerow cutting which is best for blackbirds. Give data from the graph to support your answer.

_____

_____

_____

_____

_____

_____ [3]

(d) As well as providing food, suggest **one** other benefit that blackbirds get from hedgerows.

_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

4 Enzymes are very important in the digestive system.

(a) What is the function of enzymes in the digestive system?

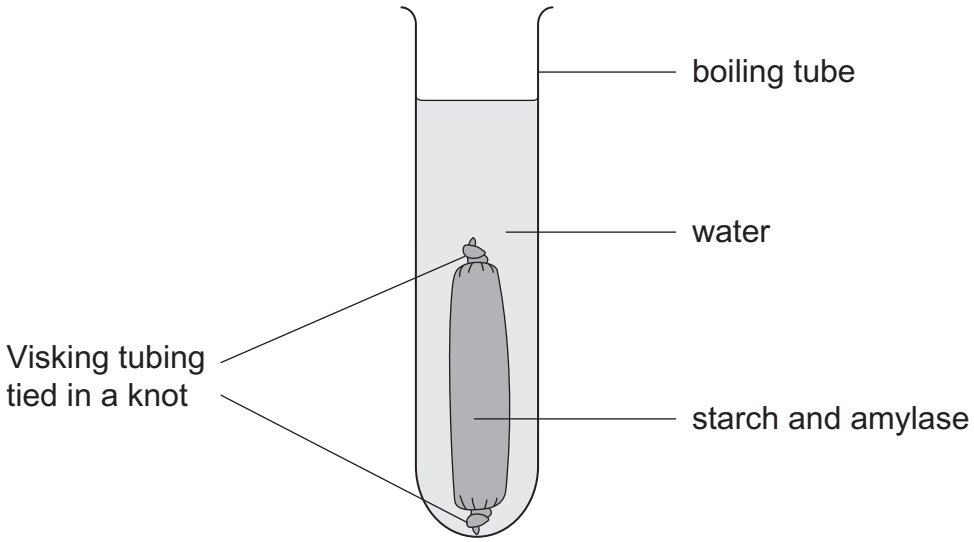
_____

_____

_____ [2]

Amylase is an enzyme found in the digestive system.

(b) The diagram shows an experiment Emily set up to study amylase activity in a model digestive system.



Source: Principal Examiner

The Visking tubing has tiny pores (holes).

Small molecules can pass through the tiny pores but large molecules cannot pass through.

Emily predicted that, after 30 minutes, **glucose** would be present in the water but starch would not be present.

She tested a sample of the water from the boiling tube after 30 minutes using Benedict's reagent.

(i) Describe the colour change in Benedict's reagent if Emily's prediction was correct.

_____ to _____ [1]

(ii) Explain why glucose would be present in the water but starch would not be present.

_____

_____

_____

_____ [2]

Emily repeated the experiment using amylase that had been **boiled**.

(c) Describe and explain how boiling would affect the amylase activity.

_____

_____

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 Insulin is a hormone that controls blood glucose levels.

(a) What is a hormone?

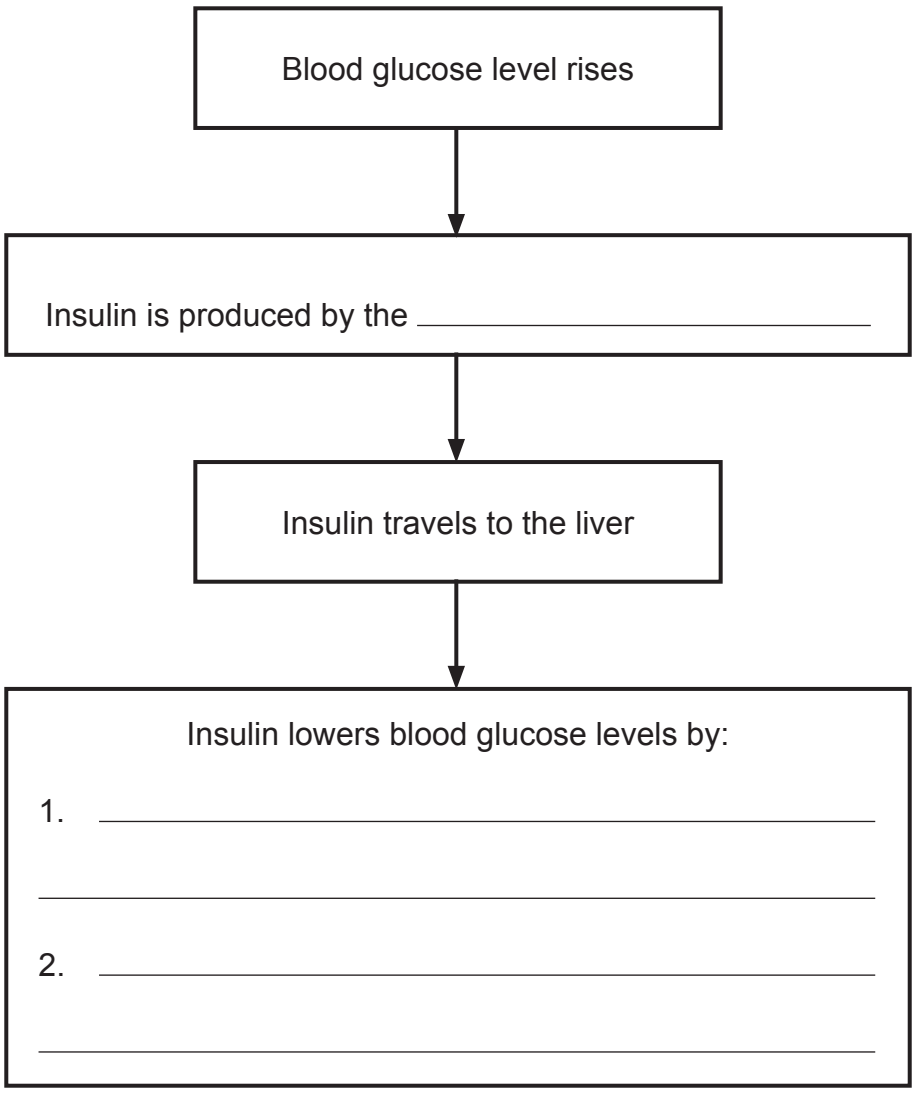
_____

_____

_____

_____ [2]

(b) Complete the flow chart to show how insulin controls blood glucose levels.



[3]

Diabetes is a condition in which the blood glucose control mechanism fails.

In the United Kingdom (UK), the number of people with diabetes increased by 60% between 2005 and 2015.

In 2005, the number of people in the UK with diabetes was 2.1 million.

(c) Calculate the number of people with diabetes in the UK in 2015.

Give your answer to one decimal place.

Show your working.

_____ million [3]

One symptom of diabetes is high blood glucose levels.

(d) Give **one other** symptom.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 Glucose made in photosynthesis can be converted into starch in leaves.

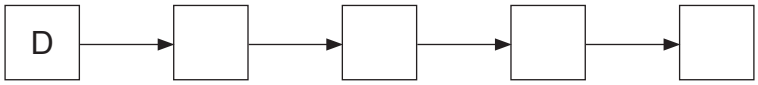
The steps A–E in testing a leaf for starch are given.

The steps are not in the correct order.

A	Place the leaf in warm water.
B	Add iodine solution to the leaf.
C	Spread the leaf on a white tile.
D	Place the leaf in boiling water.
E	Place the leaf in boiling alcohol.

(a) Use the letters to put the steps in the correct order in the boxes below.

The first step has been given.



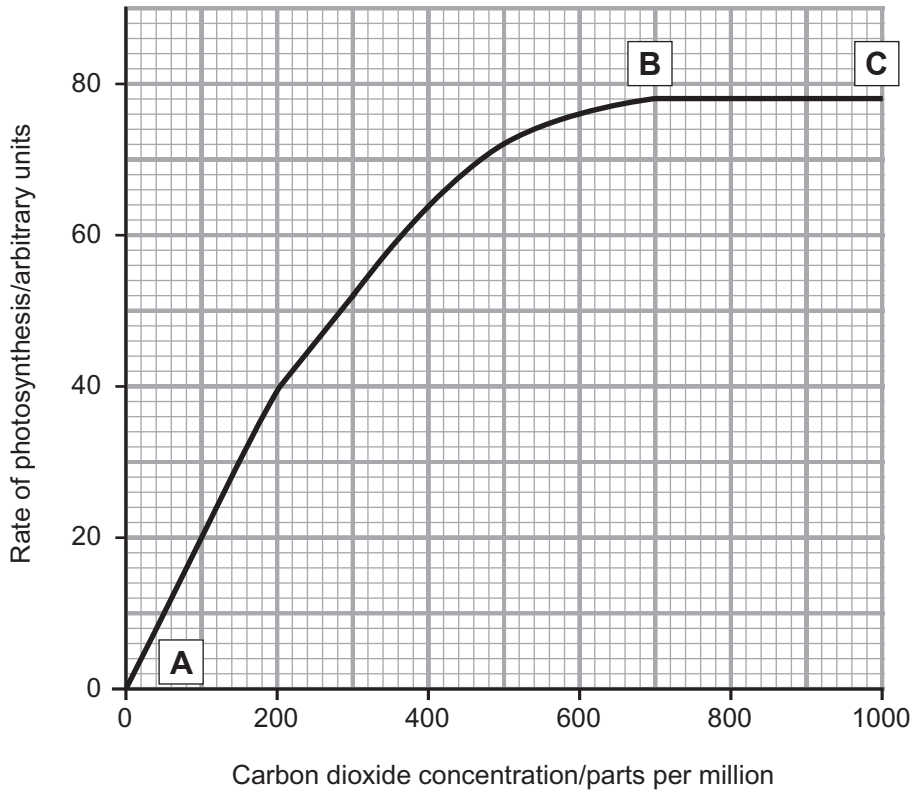
[2]

(b) Apart from being converted into starch in leaves, give **one other** way glucose is used in plants.

_____ [1]

Examiner Only	
Marks	Remark

(c) The graph shows the effect of carbon dioxide concentration on the rate of photosynthesis in tomato plants grown in a glasshouse.



(i) What factor limits the rate of photosynthesis between **A** and **B**?

_____ [1]

(ii) Suggest **one** factor that might limit the rate of photosynthesis between **B** and **C**.

_____ [1]

(d) There is no advantage in adding extra carbon dioxide in the glasshouse at night.

Explain why.

_____

_____

_____

_____ [2]

One way of adding extra carbon dioxide to a glasshouse is to burn a fuel such as natural gas.

(e) Suggest why it is better to use several small gas burners at different places in the glasshouse rather than one large burner placed at one end.

_____

_____

_____ [1]

Examiner Only	
Marks	Remark

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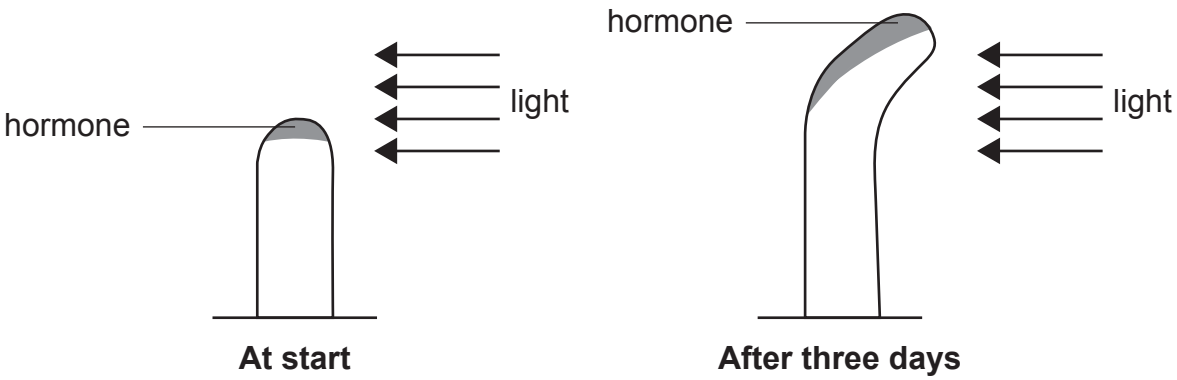
(Questions continue overleaf)

Examiner Only	
Marks	Remark

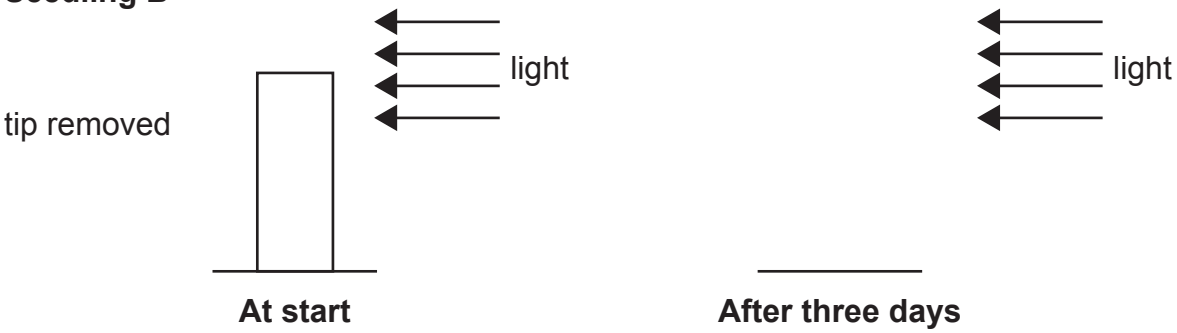
7 The diagram shows an experiment where light shines from one direction on two plant seedlings, A and B.

A hormone is made in the tip and moves down the shoot.

Seedling A



Seedling B



Source: Principal Examiner

After three days, seedling A had bent towards the light.

Examiner Only	
Marks	Remark

(a) Name this response.

_____ [1]

(b) Use the diagram and your knowledge to explain why seedling A had bent towards the light.

_____

_____

_____

_____

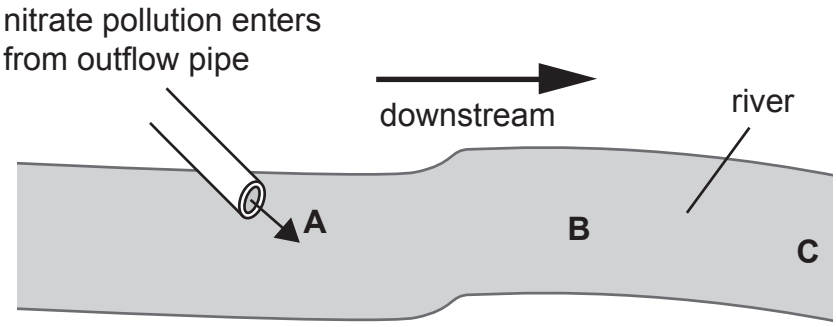
_____

_____ [2]

The shoot tip was removed in seedling B.

(c) In the space on the diagram **opposite**, draw how seedling B would appear **after three days**. [2]

8 The diagram shows a river where nitrate pollution is entering the water at point A.

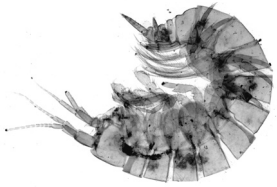


Source: Principal Examiner

The table shows the nitrate levels at three points A, B and C in the river.

Point in the river	**Nitrate level mg/litre**
A	30
B	15
C	0

The table below gives information on indicator species of water pollution.

Name of indicator species	Photograph of indicator species	Level of water pollution where indicator species is found in large numbers
Freshwater shrimp	 © Dr Keith Wheeler / Science Photo Library	Medium to none
Stonefly	 © troutnut / iStock / Thinkstock	None
Bloodworm	 © Nigel Cattlin / Science Photo Library	High

Use the information given to name and explain which indicator species:

- would be found in **greatest** numbers at point A.

_____

_____

_____

_____ [2]

- could be found in **large** numbers at point C.

_____

_____

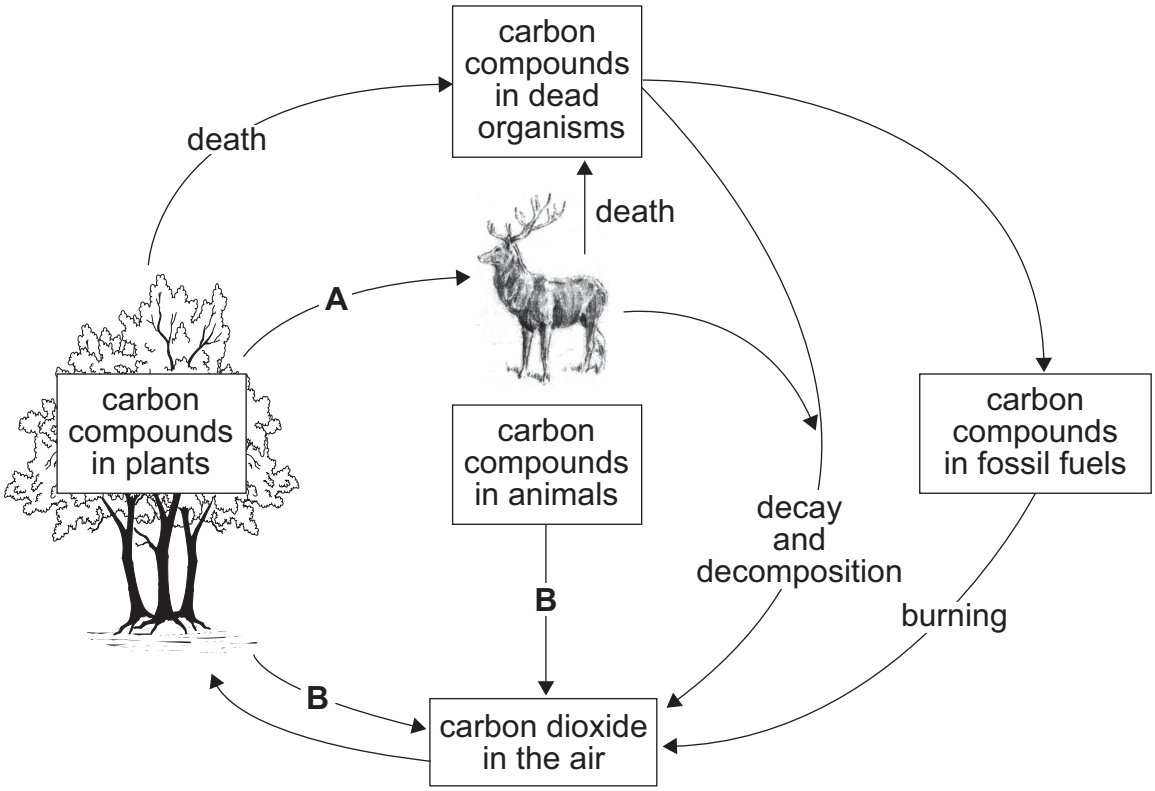
_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

9 **(a)** The diagram shows the carbon cycle.



Source: Principal Examiner

(i) Name process **A**.

_____ [1]

(ii) Name process **B**.

_____ [1]

Deforestation is the cutting down of trees in large numbers to make land available for other uses.

The photograph shows deforestation.

(b) Explain why deforestation leads to an increase in atmospheric carbon dioxide levels.

_____

_____

_____

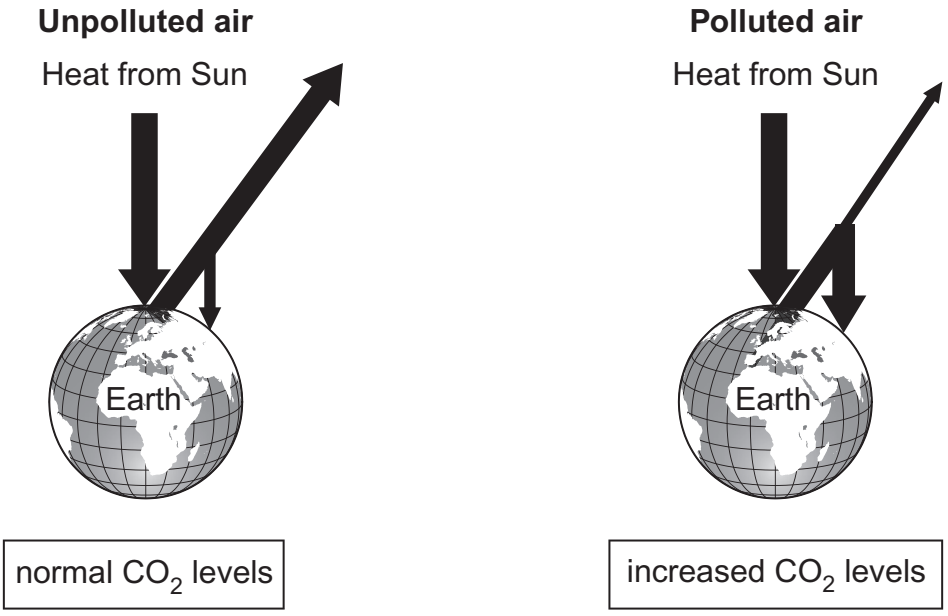
_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(c) Carbon dioxide (CO_2) is a greenhouse gas.

The diagram shows what happens to heat from the Sun in unpolluted air and polluted air.



Source: Principal Examiner

(i) Use the diagram and your knowledge to explain how polluted air has caused an increase in global warming.

_____

_____

_____

_____

_____

_____ [2]

(ii) Give **two** environmental effects of global warming.

1. _____

2. _____ [2]

(d) The table gives information on carbon dioxide emissions for China and the United States of America (USA) in 2013.

Country	Average mass of carbon dioxide produced **per person**/tonnes	Percentage of total world emissions of carbon dioxide
China	7.2	28
USA	16.4	14

© Global Carbon Budget 2014 by Global Carbon Project. Published 21 September 2014.

(i) Suggest why the average mass of carbon dioxide produced per person in the USA is greater than that of a person in China.

_____

_____ [1]

(ii) Suggest why the percentage of total world emissions of carbon dioxide is greater for China than the USA.

_____

_____ [1]

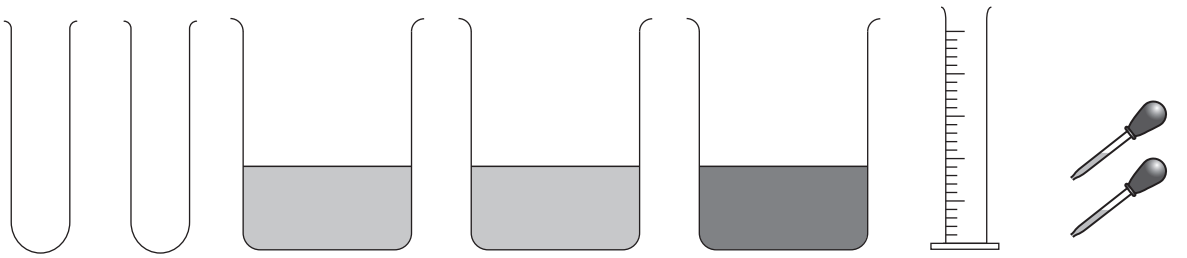
Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

10 James carried out an experiment to compare the vitamin C content of lemon juice and grapefruit juice.

The diagram shows the apparatus and materials James used.



test tubes | lemon juice | grapefruit juice | DCPIP | 5 cm^3 measuring cylinder | droppers

Apparatus not to scale

Source: Principal Examiner

(a) Describe the experiment that James carried out.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.

Examiner Only

Marks	Remark

_____

_____

_____

_____

_____

_____ [6]

James had predicted that lemon juice contains more vitamin C than grapefruit juice.
The results showed that his prediction was **wrong**.

(b) Describe the results James obtained.

_____

_____ [1]

THIS IS THE END OF THE QUESTION PAPER