Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2013–2014

Double Award Science: Biology

Unit B1

Foundation Tier

[GSD11]

GSD11

MONDAY 24 FEBRUARY 2014, 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 seven** 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 **7(c)**.

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

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Examiner Only	
Marks	Remark

1 Insulin is a substance that prevents blood glucose levels from becoming too high.

(a) What type of substance is insulin?

_____ [1]

(b) Insulin is produced in one organ. It is then carried in the blood to its target organ where it takes effect.

Complete the sentence below by writing the correct name of each organ in the spaces.

Choose from the list below:

liver **heart** **pancreas** **stomach**

Insulin is produced in the _____ and takes effect in its target organ, the _____. [2]

(c) Describe how insulin lowers blood glucose levels.

_____

_____

_____ [2]

(d) Suggest why people with diabetes need to check their blood glucose levels more than once during the day.

_____

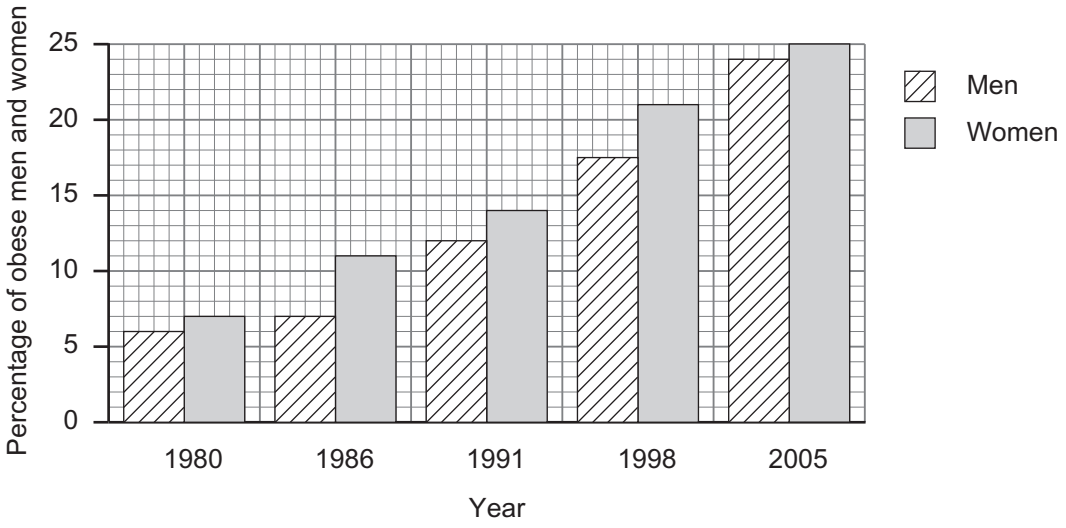
_____

_____

_____ [2]

Examiner Only	
Marks	Remark

2 **(a)** The bar chart shows the percentage of obese men and women in the UK population between 1980 and 2005.



(i) Using the bar chart, give the general trend for the percentage of obese men and women between 1980 and 2005.

_____ [1]

(ii) Suggest **one** change in eating patterns in the UK population that might explain this general trend.

_____ [1]

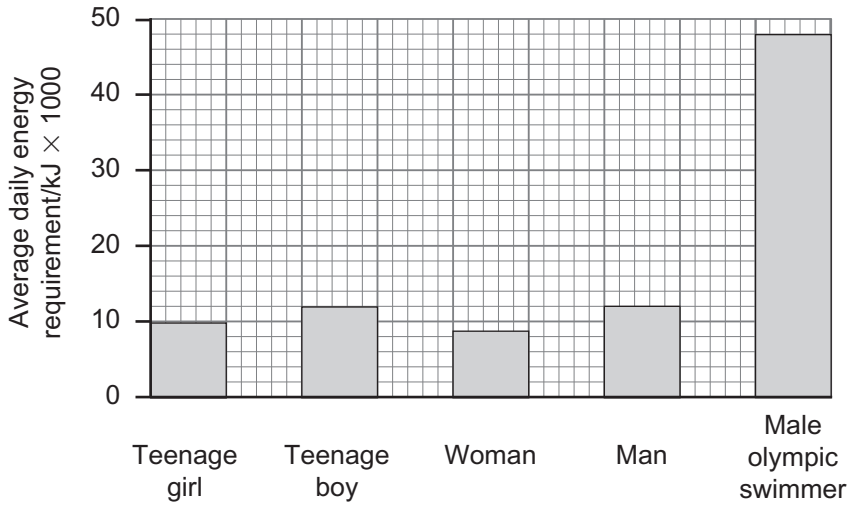
(iii) Obesity can cause harmful effects on the body.

Give **one** harmful health effect of obesity.

_____ [1]

Examiner Only	
Marks	Remark

(b) The bar chart gives the average daily energy requirements for different groups of people in thousands of kilojoules (kJ) per day.



Adapted from: Big Picture issue 14 Summer 2011 © Wellcome Trust www.bigpictureeducation.com

(i) How many **times** higher is the energy requirement of the male olympic swimmer compared to the teenage boy?

Show your working.

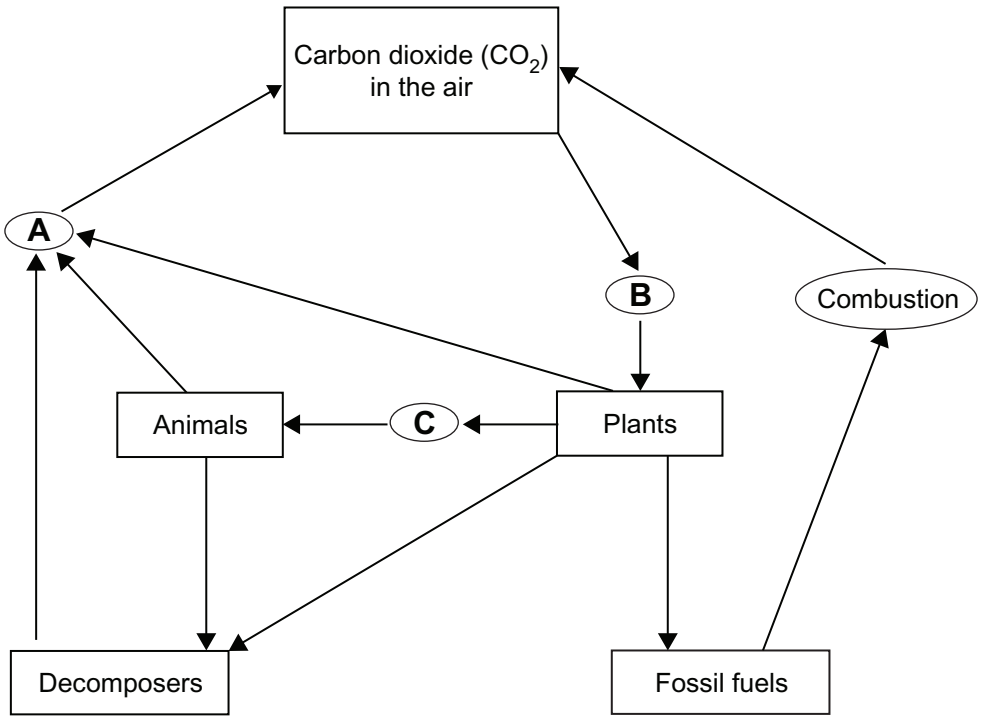
_____ [2]

(ii) Using this information and your knowledge, explain how physical activity can help prevent obesity.

_____

_____ [1]

3 The diagram shows the carbon cycle.



Source: Principal Examiner

(a) Name processes **A**, **B** and **C**.

A _____

B _____

C _____ [3]

(b) Plants make a substance with the carbon dioxide taken in from the air in process **B**.

Name this substance.

_____ [1]

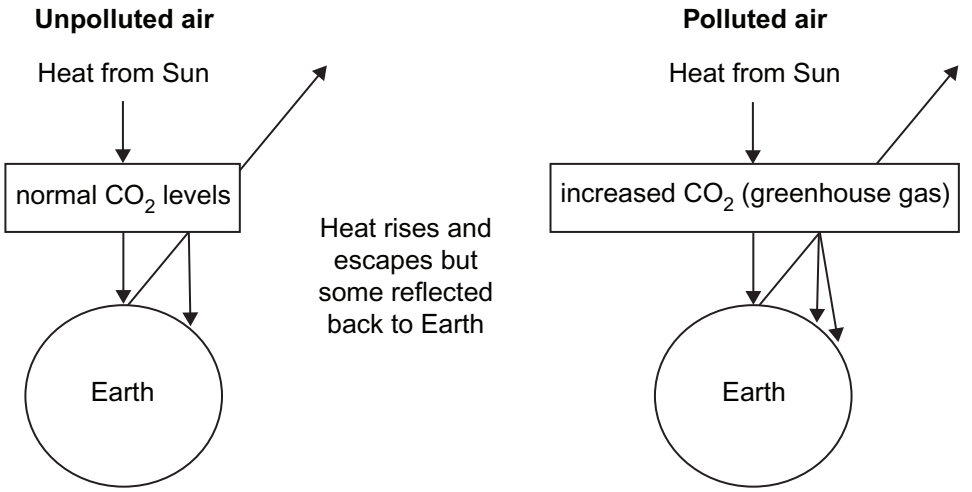
Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

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

One source of carbon dioxide is from the burning of fossil fuels.

The diagram below shows what happens to heat from the sun in unpolluted air (normal levels of carbon dioxide) and air polluted with increased levels of carbon dioxide.



Source: Principal Examiner

(i) Using the diagram and your knowledge, explain how global warming occurs.

_____

_____

_____

_____

_____ [3]

(ii) Suggest **one** reason why there has been an increase in the burning of fossil fuels over the past thirty years.

_____ [1]

(iii) Give two environmental effects of global warming.

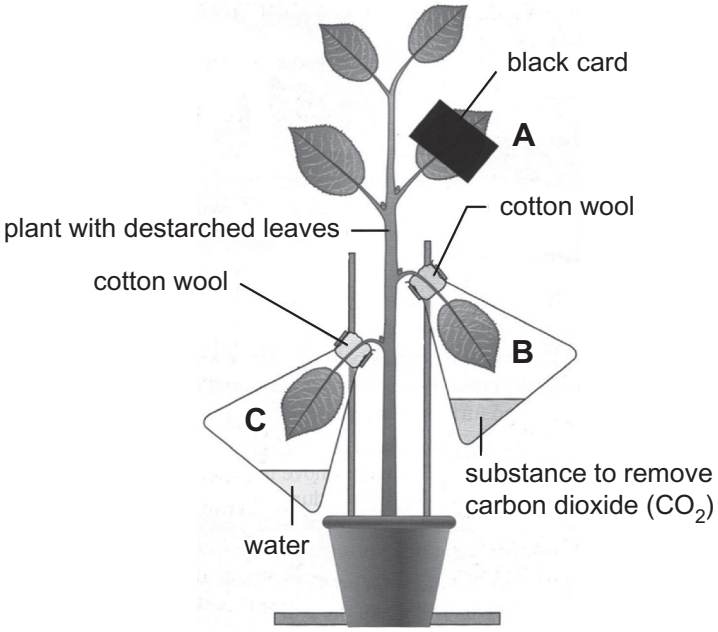
1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

4 **(a)** An experiment was carried out to investigate two factors needed for photosynthesis.

The plant was destarched and set up as shown in the diagram below.



The plant was then left in light for two days before the starch test was carried out on leaves **A**, **B** and **C**.

(i) Apart from water, name the two chemicals used when testing a leaf for starch.

1. _____

2. _____ [2]

(ii) Describe and explain the results when the starch test was carried out on leaf **A**.

_____

_____

_____

_____

_____

_____ [3]

(iii) Leaves **B** and **C** were tested for starch.

Starch was found in leaf **C**.

Explain why there was no starch found in leaf **B**.

_____

_____ [1]

(b) Before being placed in the light, the plant was destarched.

(i) How was the plant destarched?

_____ [1]

(ii) Why was the plant destarched?

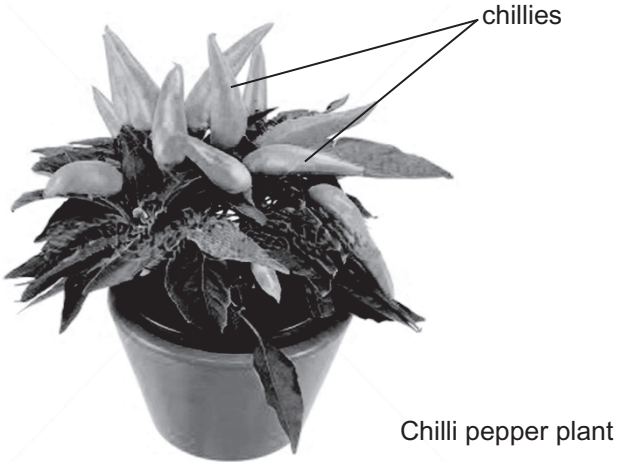
_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

(c) A grower carried out growth trials on three different varieties of chilli pepper plants. Chillies are the fruits of the plant and are used in cooking.

Most people in the UK prefer hot, rather than very hot chillies.



Source: Principal Examiner

At the start of February equal numbers of seeds of the three varieties were planted.

By mid-May, they had developed into seedlings and were placed in a glasshouse.

In mid-August the total number of chillies that had been produced by each variety of plant was recorded as shown in the table below.

Plant variety	Heat of chillies	Number of chillies picked by mid-August
Etna	very hot	18
Fiesta	very hot	56
Demon Red	hot	366

(i) If the grower wanted a second crop of chillies ready by mid-September, suggest in which month he would have planted the seeds.

Month _____ [1]

(ii) Using the information in the table, suggest two reasons why you would recommend the grower uses the Demon Red variety.

1. _____

2. _____ [2]

(iii) Suggest two factors that could affect the growth of the chilli pepper plants.

1. _____

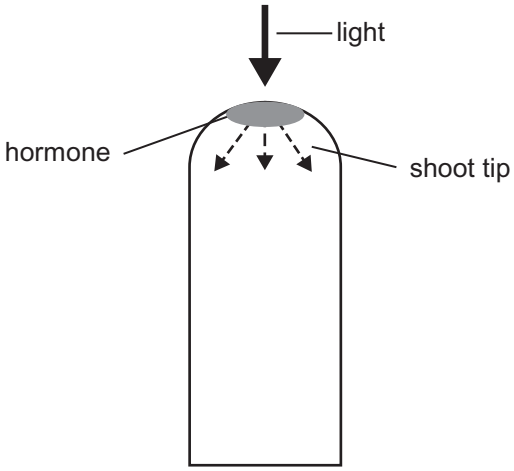
2. _____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

5 A hormone is produced in the shoot tip of a plant, as shown in the diagram below.

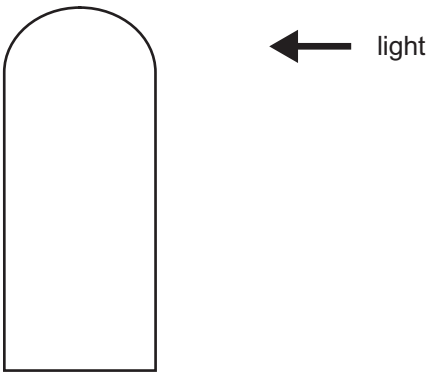
The hormone travels down the shoot tip as shown by the arrows when the light is shone from above.



(a) Name the hormone produced in the shoot tip.

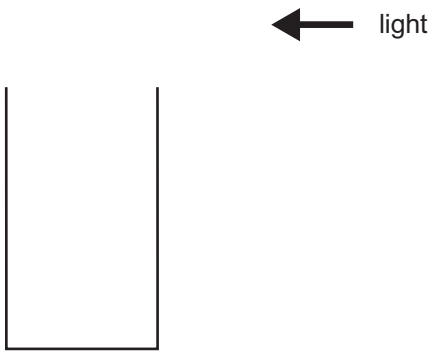
_____ [1]

(b) Draw an arrow on the diagram below, to give the direction the hormone moves in the shoot tip when light shines from the direction shown.



[1]

(c) Complete the diagram below to show the growth of the shoot tip in part **(b)** after a few days.



[1]

(d) Explain how the hormone brings about this growth response in the shoot tip.

_____

_____ [1]

(e) Explain the advantage to the plant of this growth response.

_____

_____ [1]

(f) Name this growth response in plants.

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 It is thought that the barn owl, once a common bird in Northern Ireland, is now reduced to fewer than 50 breeding pairs.

The following passage is from a news article written by a reporter who visited a farm where barn owls were nesting in an old barn.

'Soon the bird appeared, and what a bird! With its silent flight we never heard it arrive. The owl turns its head so that its sensitive ears can find the faint sounds we make. This is one way the owl finds its prey but also explains why it has difficulty hunting in snow or heavy rain. Grasping old beams with its large talons, it turns its very large eyes on us, eyes that are perfect for night time hunting of rodents, e.g. mice.'

Using the information given and your knowledge, answer the following questions.

(a) Apart from having very large eyes, describe and explain two ways in which the barn owl is adapted for hunting.

1. _____

_____

2. _____

_____ [4]

(b) Suggest why the barn owl has difficulty hunting in snow or heavy rain.

_____ [1]

Many farmers use poisons to limit rodent numbers. The owls eat these poisoned rodents and then die themselves. To give owls a chance of increasing their numbers there are now schemes run by the government to encourage farmers to:

1. leave old barns standing.
2. use cage traps to limit the number of rodents.
3. plant crops such as canola near the edges of woodland. This encourages the rodents that eat the canola to come out into areas where they are clearly visible.

(c) Suggest how **each** of the three measures described above could help increase the barn owl population.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

(d) **(i)** Using the above information, draw a food chain that includes the barn owl.

[2]

(ii) In the space below, sketch a pyramid of biomass for the food chain you have drawn. Label your sketch with the names of the organisms.

[2]

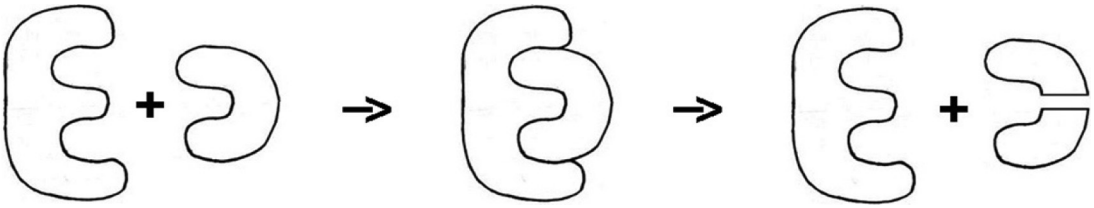
Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

7 **(a)** Enzymes speed up chemical reactions in the body. The diagram below shows how an enzyme works.

(i) Label the diagram with the letter:

- E for the enzyme molecule
- S for the substrate molecule
- P for a product molecule



Source: Principal Examiner

[3]

(ii) Name the model of enzyme action shown by the diagram.

_____ [1]

(iii) Using the information in the diagram, describe what happens to the substrate molecule during the reaction.

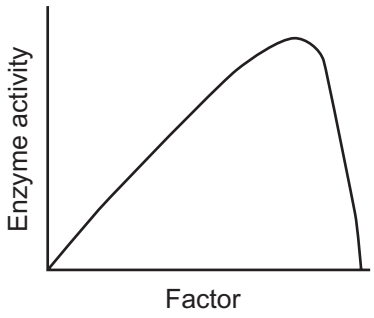
_____ [1]

(iv) How would this enzyme differ from one with a different specificity?

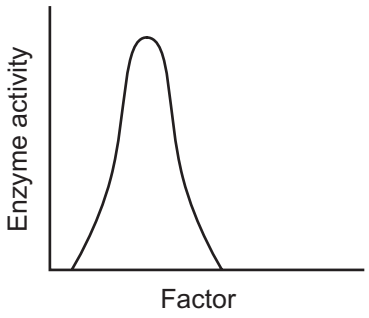
_____ [1]

(b) The graphs show how enzyme activity in stomach protease varies with three different factors.

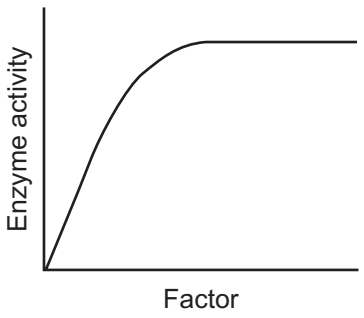
Graph 1



Graph 2



Graph 3



Source: Principal Examiner

Examiner Only	
Marks	Remark

(i) Match each graph to the correct factor from the list below.

pH : enzyme concentration : temperature

Graph 1 _____

Graph 2 _____

Graph 3 _____ [2]

(ii) Name the substrate for protease.

_____ [1]

(iii) Apart from the stomach, where else in the digestive system would protease be found?

_____ [1]

Examiner Only	
Marks	Remark

(c) The lining of the small intestine in mammals is adapted for absorption of digested food molecules by having villi.

A disease in cows causes the lining of the small intestine to become smooth and flat. Cows with this disease lose weight and die.

Describe how villi are adapted for their role and explain why cows with this disease die.

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

[6]

THIS IS THE END OF THE QUESTION PAPER