Rewarding Learning

Centre Number

Candidate Number

General Certificate of Secondary Education
2015

Biology

Unit 1
Higher Tier

[GBY12]

GBY12

FRIDAY 5 JUNE, AFTERNOON

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

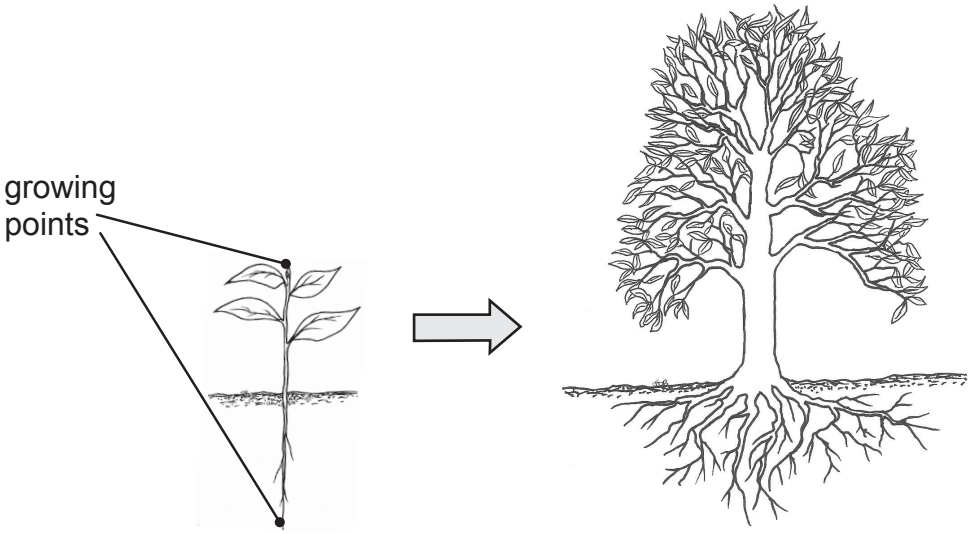
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in blue or black ink only. **Do not write with a gel pen.**
Answer **all twelve** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.
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 Questions **4** and **12(e)**.

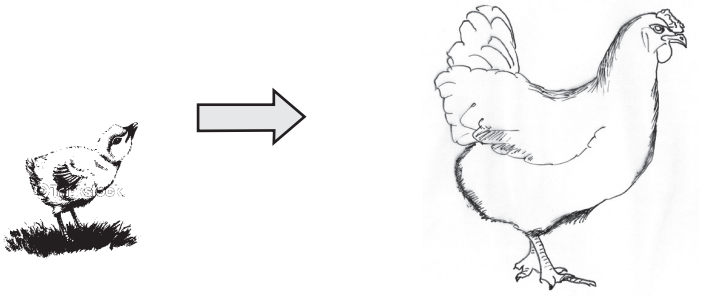
1 Animals grow differently from plants.

The drawings show the growth of a seedling to a mature tree and a chick to a chicken.



Seedling

Mature tree



Chick

Chicken

Look at the drawings.

(a) **Use the drawings** to compare the patterns of growth of a seedling and a chick.

_____

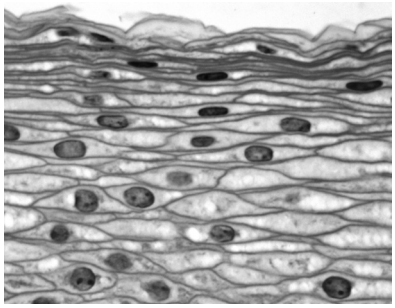
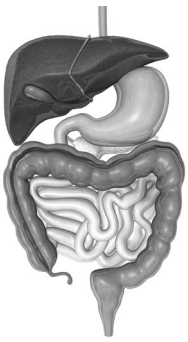
_____

_____

_____ [3]

(b) Organisms are made up of cells which group together to form different tissues which have higher levels of organisation.

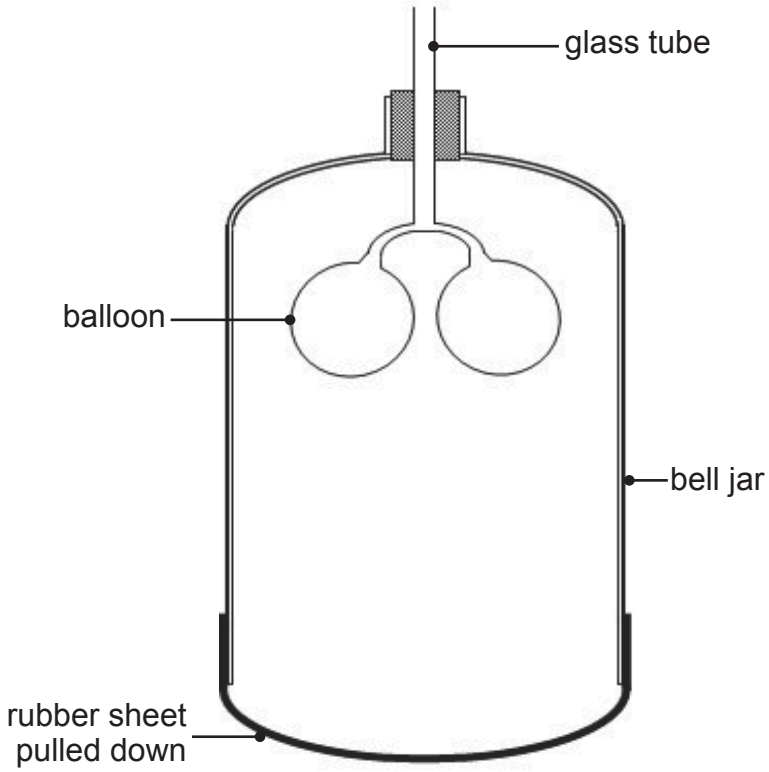
Complete the table to show which level of organisation describes each body part shown.

Body part	Level of organisation
 *Dr Gladden Willis/Visuals Unlimited/ Science Photo Library*	tissue
 *© 3drenderings/ iStock/ Thinkstock.com*	
 *© Anna Omelchenko/ iStock/ Thinkstock.com*	

[2]

[Turn over

2 The diagram shows a model of the respiratory system.



Look at the diagram.

(a) Name the parts of the **respiratory system** represented by the glass tube and the rubber sheet.

glass tube _____ [1]

rubber sheet _____ [1]

(b) **Describe and explain** what would happen to the balloons if the rubber sheet was **pushed up**.

Description _____

_____ [1]

Explanation _____

_____

_____ [2]

3 A student wanted to compare the number of flying insects in two areas of long grass.

(a) (i) Describe how he could use a net to sample the flying insects in each area.

_____

_____

_____ [2]

(ii) Explain what he should do to make sure the results for the two areas can be compared.

_____

_____

_____ [2]

(b) What apparatus can be set up and left for twenty four hours to collect crawling insects in long grass?

_____ [1]

[Turn over

4 The table shows the results of food tests carried out on a biscuit.

Test reagent	Reagent colour at start	Result of food test
Benedict's	blue	positive
Ethanol	clear	positive
Biuret	blue	negative
Iodine	yellow/brown	positive

Look at the table.

Use the information in the table to draw conclusions about the types of food in the biscuit.

Describe the colour change for each food test.

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

_____

_____

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_____

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_____

_____

_____

_____

_____ [6]

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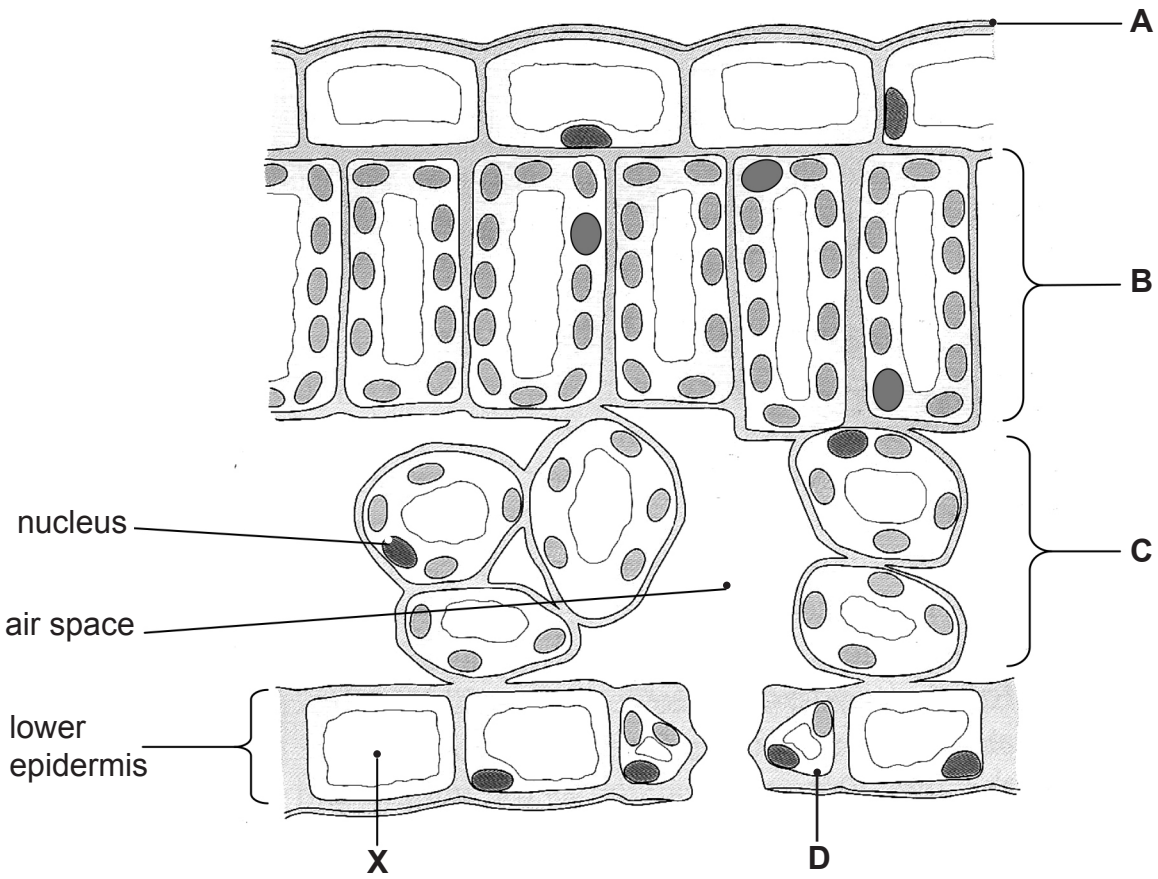
(Questions continue overleaf)

5 The diagram shows part of a cross section of a leaf viewed through a microscope.



(a) Name layers **A**, **B**, **C** and **cell D**.

A _____ [1]

B _____ [1]

C _____ [1]

D _____ [1]

(b) Suggest why there is no nucleus visible in cell **X**.

_____

_____ [1]

(c) Layer **C** is adapted for gas exchange.

Give **one** adaptation visible in the diagram.

_____

_____ [1]

(d) Use the diagram to describe **two** ways the **cells** in layer **B** are better adapted for absorbing light than the cells in layer **C**.

1. _____

_____

2. _____

_____ [2]

[Turn over

6 **(a)** Plants respond to light.

(i) Name this response.

_____ [1]

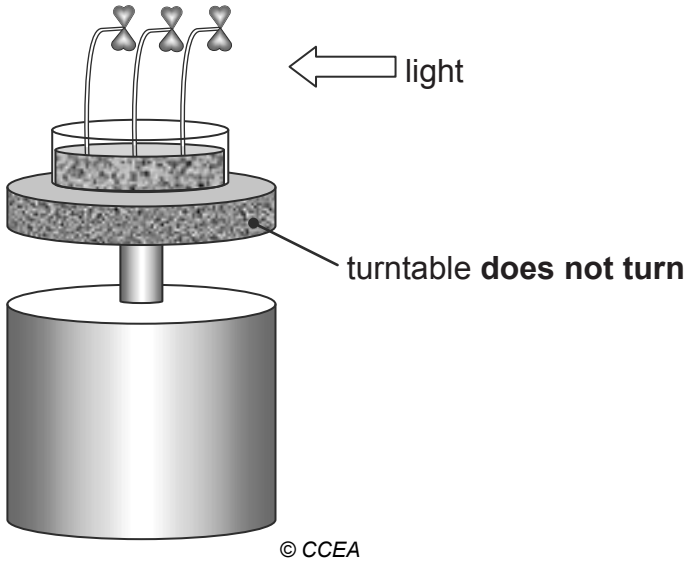
(ii) Name the plant hormone that causes the response.

_____ [1]

The diagram shows the results of an experiment to investigate the effect of light from one side on the growth of seedlings.

Seedlings **A** were placed on a turntable that **does not turn**.

Seedlings A



(b) Explain how the hormone causes the response shown in seedlings **A**.

_____

_____

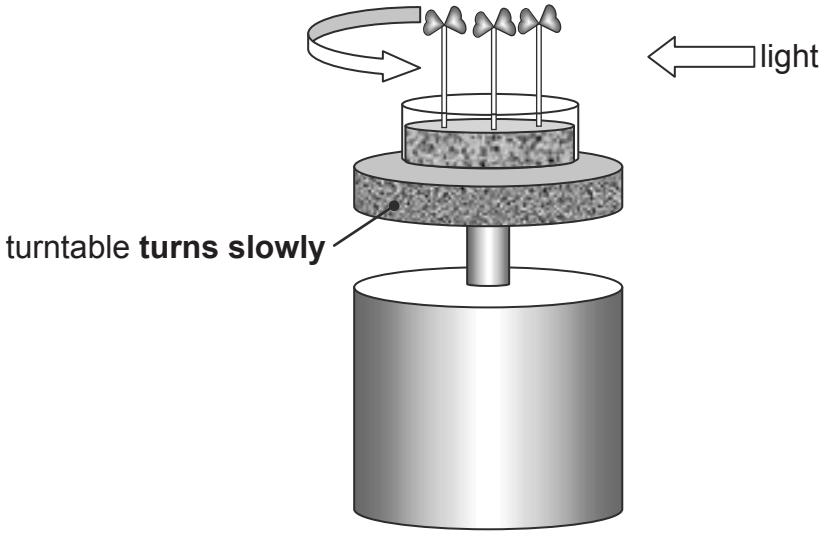
_____

_____ [3]

(c) The experiment was repeated with the turntable **turning slowly**.

The diagram shows the results.

Seedlings B



Describe and explain the difference in the response of seedlings **B** to the turntable turning slowly.

Description _____

_____ [1]

Explanation _____

_____

_____

_____ [2]

[Turn over

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7 **(a)** An unhealthy diet can cause obesity.

(i) Give **two** components of an unhealthy diet that can cause obesity.

1. _____ [1]

2. _____ [1]

Obesity can also be caused by an imbalance between the amount of energy taken in and the energy used in exercise.

(ii) Describe this imbalance.

_____

_____ [1]

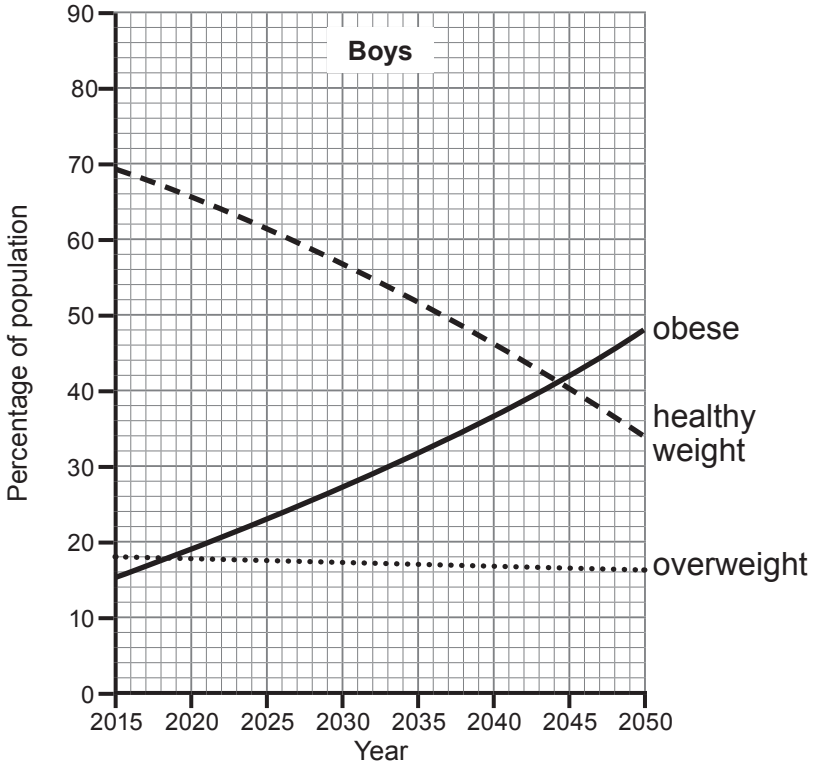
(iii) Name **two** diseases of the circulatory system that are caused by obesity.

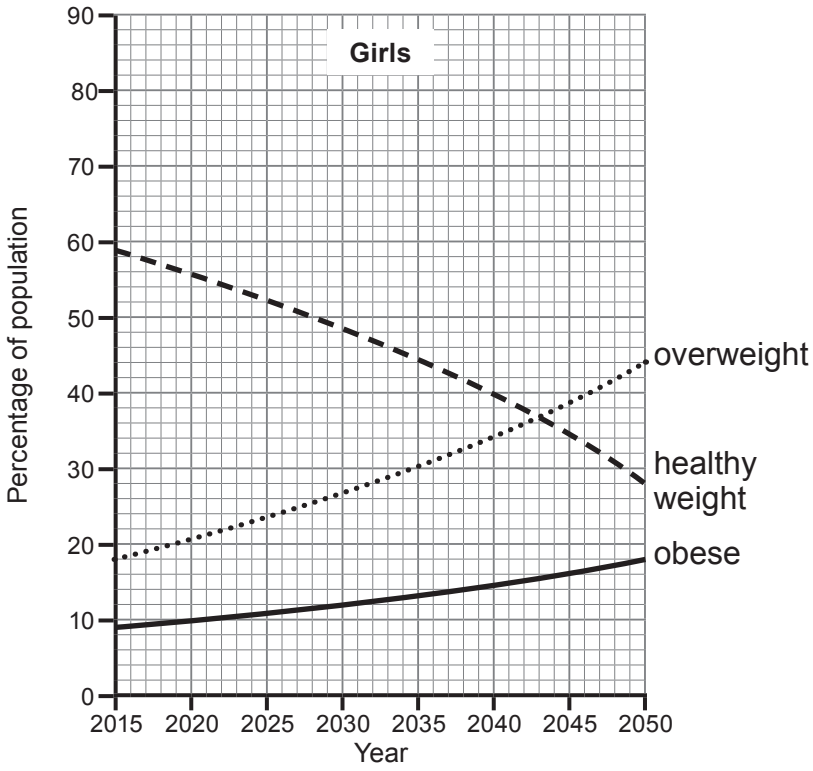
1. _____ [1]

2. _____ [1]

[Turn over

The graphs show the percentage of boys and girls, aged 6 to 10, who are expected to be a healthy weight, overweight and obese between 2015 and 2050 in the UK.





Look at the graphs to answer parts **(iv)** and **(v)**.

(iv) Describe **two** similarities in the trends for boys and girls from 2015 to 2050.

1. _____

_____

2. _____

_____ [2]

(v) Describe **two** ways the trends for boys and girls from 2015 to 2050 differ.

1. _____

_____

2. _____

_____ [2]

(b) The table shows the number of people in Northern Ireland who are obese and the number of people in Northern Ireland with diabetes from 2008 to 2013.

Year	Number of people suffering	
	Obesity	Diabetes
2008	161 871	60 822
2009	165 956	65 066
2010	174 180	68 980
2011	170 840	72 693
2012	167 150	75 837
2013	168 976	79 072

(i) Give evidence from the table which supports the conclusion that obesity can cause diabetes.

_____

_____

_____ [1]

(ii) Give evidence from the table which suggests that obesity is **not the only** cause of diabetes.

_____

_____

_____ [1]

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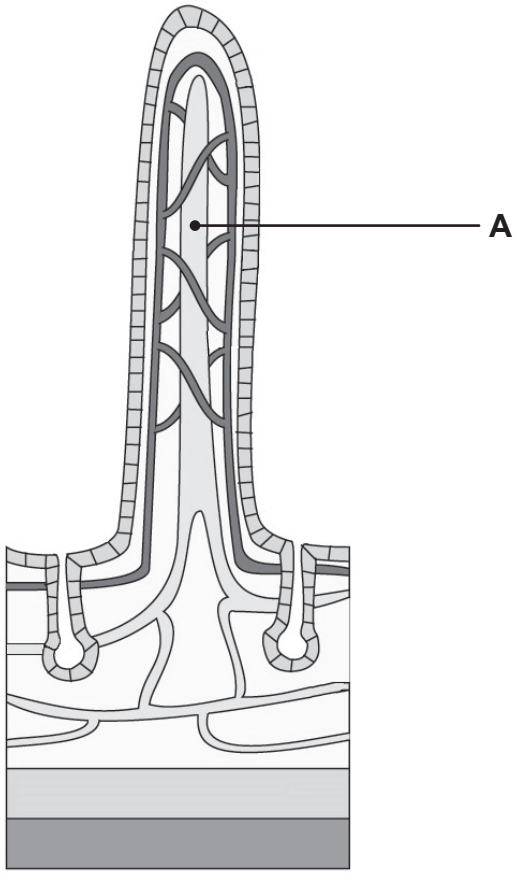
(Questions continue overleaf)

8 The diagram shows a section through a villus.



(a) Name part **A** and describe its function.

_____

_____

_____ [2]

(b) The villus is adapted for absorbing digested food by maintaining a high concentration gradient.

Explain how the villus maintains a high concentration gradient.

_____

_____

_____ [2]

(c) Describe **one other** adaptation of the villus and explain how it brings about absorption of digested food.

_____

_____

_____ [2]

9 Photographs **A** and **B** show activities which can lead to global warming.

Photograph **A**

© Mischa Kejiser / Science Photo Library

Photograph **B**

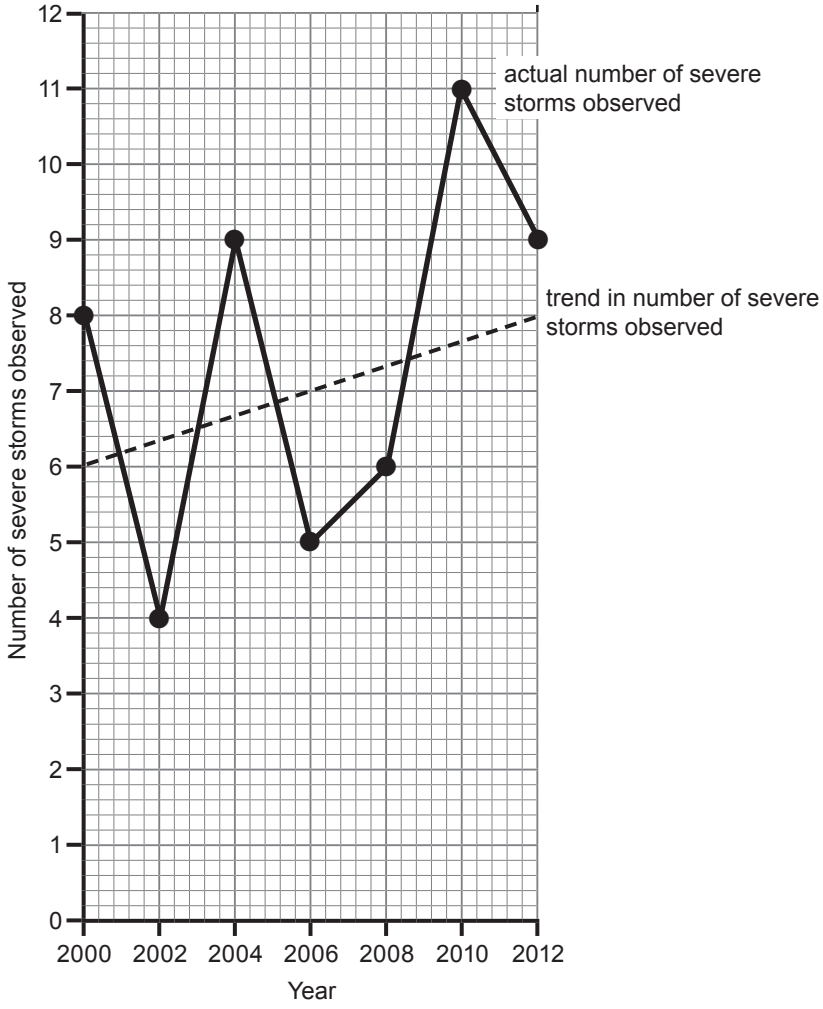
© Dr. Morley Read / Science Photo Library

(a) Describe the activity shown in each photograph and explain how these activities may cause increased global warming.

[4]

(b) Changes in the number of severe storms in the North Atlantic are thought to be evidence of global warming.

The graph shows the actual number and the trend in the number of severe storms observed in the North Atlantic Ocean between 2000 and 2012.



Adapted from: www.gfdl.noaa.gov/global-warming-and-hurricanes-figures

(i) Suggest why scientists use the trend in the number of severe storms as evidence to support increasing global warming.

Include data from the graph in your answer.

_____

_____

_____

_____ [2]

(ii) Explain why the records for the actual number of severe storms observed between 2000 and 2006 could cause uncertainty about the prediction of global warming.

_____

_____

_____

_____ [2]

(iii) Suggest how such uncertainty about the evidence of global warming may be overcome.

_____

_____

_____ [1]

[Turn over

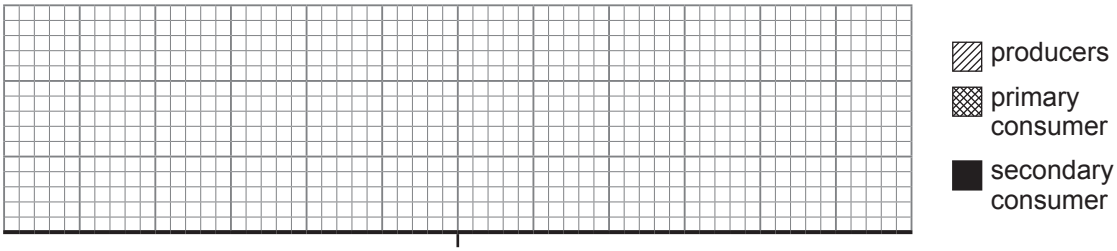
10 (a) The table shows the biomass of organisms at each trophic level in a food chain.

Trophic level	Biomass/g m^{-2}
Producers	11 000
Primary consumers	800
Secondary consumers	40

(i) **Use the information in the table** to draw a pyramid of biomass.

Use a scale of 5 small squares to represent 1 000 g m^{-2}.

Use the key shown.



[3]

(ii) Give one advantage and one disadvantage of using a pyramid of biomass rather than a pyramid of numbers.

Advantage _____

_____

_____ [1]

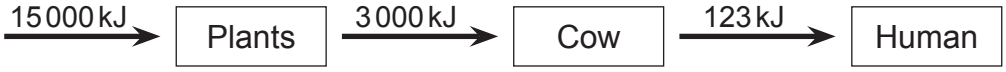
Disadvantage _____

_____

_____ [1]

(b) The diagram shows the flow of energy through a food chain.

The values are for $1m^2$ of ground.



(i) Calculate the percentage of energy reaching the primary consumer which is available to the secondary consumer.

Show your working.

_____ % [2]

(ii) Explain **two** reasons for this decrease in energy available to the secondary consumers.

_____

_____

_____

_____ [2]

(iii) Charities provide people living in countries suffering from famine with rice or cereals rather than meat.

Use evidence from the food chain to explain why.

_____

_____

_____

_____ [2]

[Turn over

11 Manufacturers use protease enzymes to pre-digest food for babies.

(a) Suggest why the food is blended to a fine pulp before the enzyme is added.

_____

_____

_____ [2]

(b) A manufacturer carried out an experiment to find out the optimum pH for a protease enzyme.

Equal volumes of different pH solutions were placed in separate test tubes.

0.5 g of blended food was placed in each test tube.

5 ml of 1% protease enzyme solution was added to each test tube.

The time taken to digest the food was recorded for each test tube.

(i) Give **one other** factor that must be controlled in this experiment.

_____ [1]

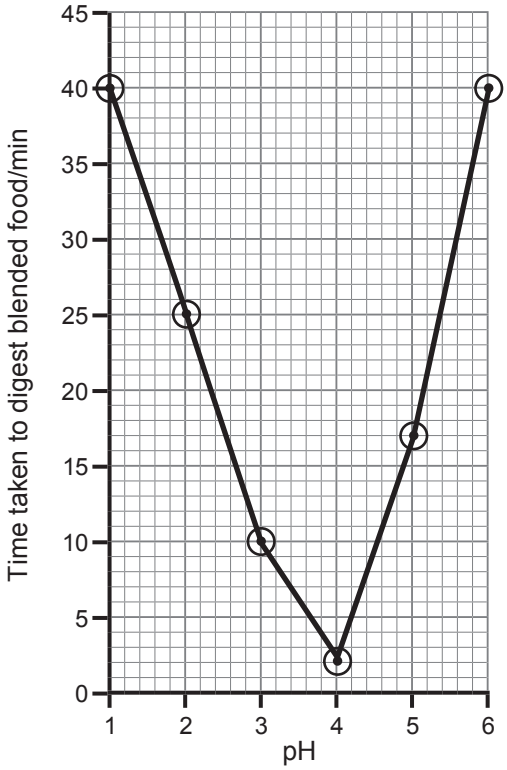
(ii) Suggest how this factor should be controlled.

_____

_____

_____ [1]

(c) The results of the experiment are shown in the graph.



(i) What is the optimum pH for this enzyme?

_____ [1]

(ii) The experiment could be improved to find a more **accurate** value for the optimum pH.

Suggest how.

_____

_____

_____ [1]

[Turn over

(iii) The rate at which the enzyme digested the 0.5 g of blended food at pH 2 is 0.02 g per minute.

Calculate the rate of digestion at pH 1.

Show your working.

_____ g per minute [2]

(iv) Explain the results for pH 1.

_____

_____

_____

_____ [2]

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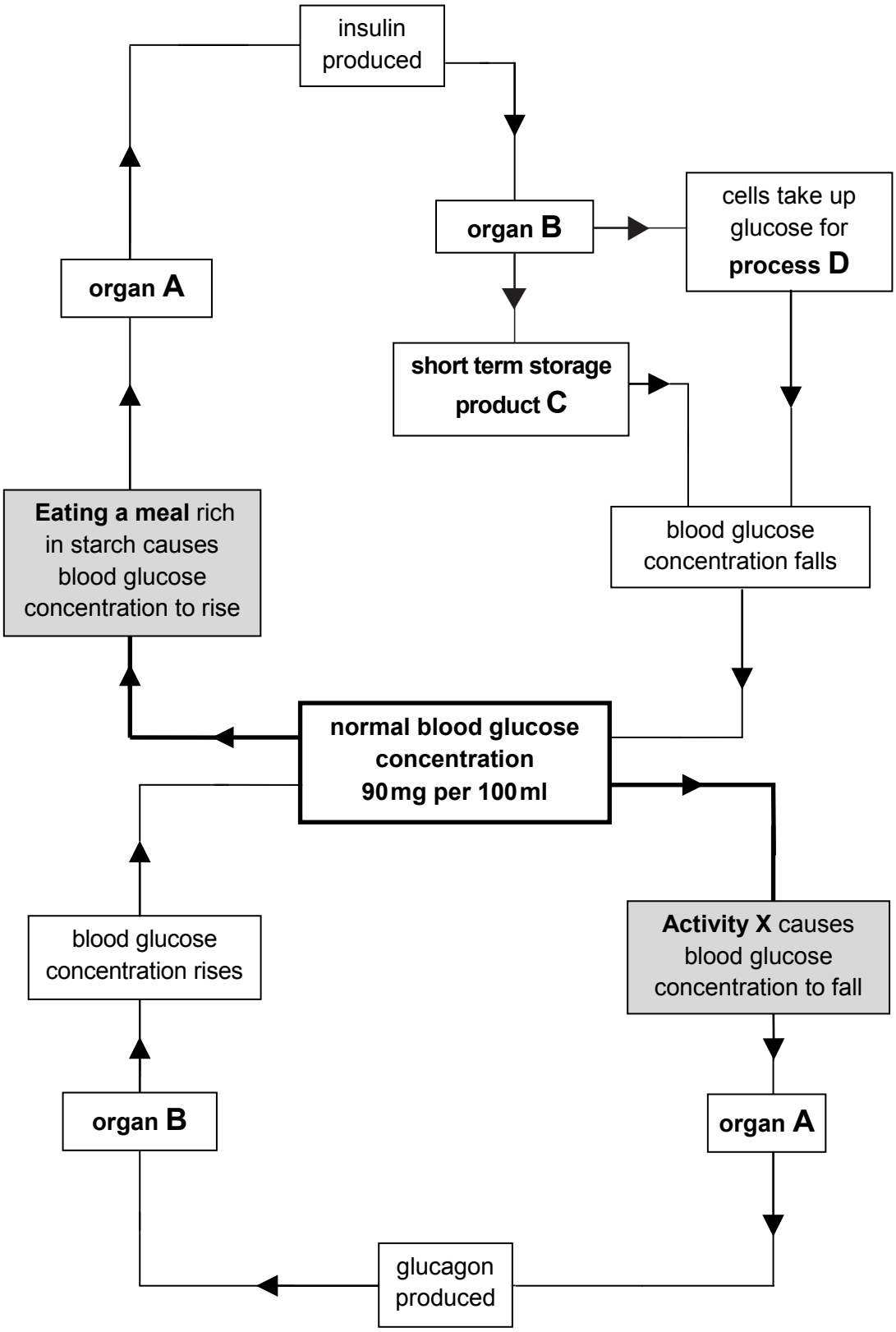
12 The diagram shows the control of blood glucose.



(a) Name organs **A** and **B**, the short-term storage product **C** and process **D**.

Organ **A** _____ [1]

Organ **B** _____ [1]

Short-term storage product **C** _____ [1]

Process **D** _____ [1]

(b) Explain why eating a meal rich in starch causes the blood glucose concentration to rise.

_____

_____ [1]

(c) **Activity X** causes the blood glucose concentration to fall.

Suggest one example of **activity X**.

_____ [1]

(d) Use information from the diagram to help describe how the control of blood glucose by insulin is an example of a negative feedback mechanism.

_____

_____

_____

_____

_____

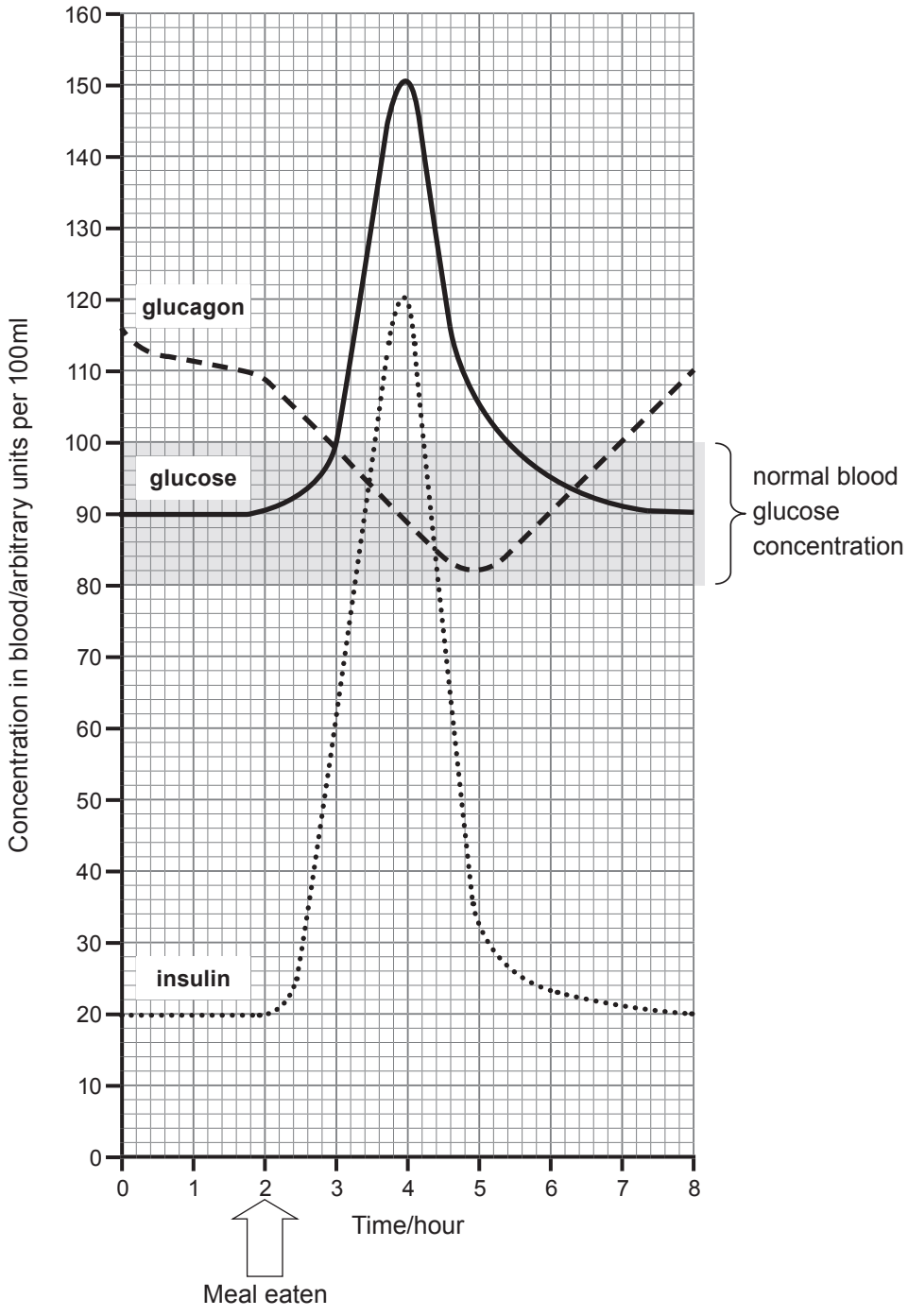
_____

_____

_____ [4]

[Turn over

(e) The graph shows changes in the concentration of glucose, insulin and glucagon in the blood of a healthy adult over a period of 8 hours, during which he ate a meal rich in starch.



Describe and explain how insulin and glucagon work together to control the concentration of glucose in the blood **before** and **after** the meal.

Use evidence from the diagram and data from the graph to support your answer.

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

[6]

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For Examiner's use only	
Question Number	**Marks**
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Examiner Number