New Specification

Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2012

Biology

Unit 1

Higher

[GBY12]

GBY12

WEDNESDAY 30 MAY, AFTERNOON

TIME

1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES

Use blue or black ink.
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
Answer **all twelve** questions in the spaces provided.

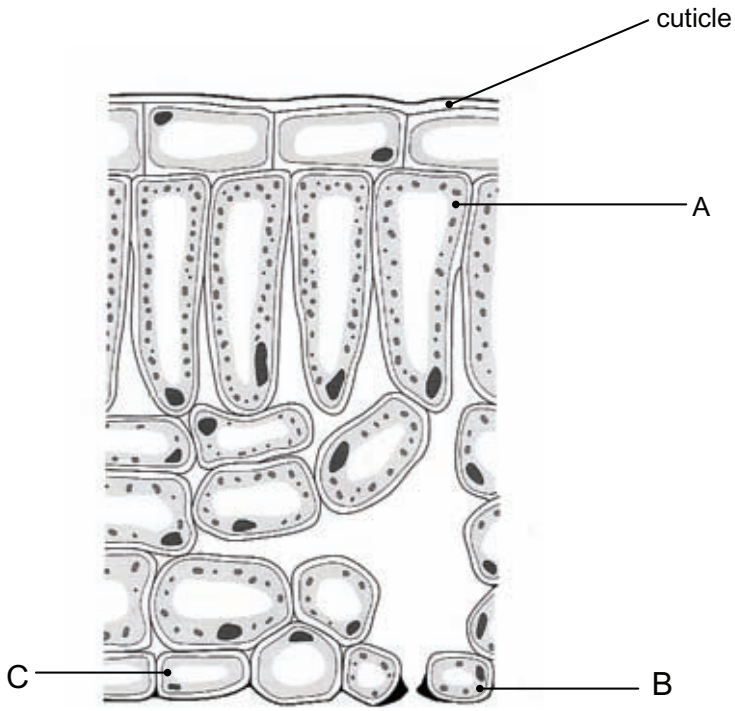
INFORMATION FOR CANDIDATES

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**, **7(c)** and **12(c)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
Total Marks	

Examiner Only	
Marks	Remark

1 The diagram shows part of a leaf.



(a) Name cells A, B and C.

A _____ [1]

B _____ [1]

C _____ [1]

(b) Explain how the cuticle is adapted to allow light to reach the mesophyll cells.

_____

_____ [1]

Examiner Only

Marks	Remark

2 The nervous and hormonal systems carry information from one part of the body to another.

(a) Describe how the nervous and hormonal systems differ in the type of signal they use.

Nervous _____ [1]

Hormonal _____ [1]

(b) The table shows the relationship between the diameter of a neurone and the speed of conduction.

Organism	Neurone diameter/μm	Speed of conduction/m s^{-1}
Cat	1	3
Crab	30	5
Worm	50	30
Squid	500	35

(i) Describe the relationship between the diameter of a neurone and the speed of conduction.

_____

_____ [1]

(ii) Suggest why the large diameter of the squid's neurones helps it to escape predation by whales.

_____

_____ [1]

Examiner Only	
Marks	Remark

3 When investigating the energy requirements of boys and girls with a normal activity level, a scientist found the following table in a research document.

Age/years	Energy requirement/kJ per day	
	Boys	Girls
1–3	5 150	4 878
4–6	7 180	6 469
7–10	8 248	7 285
11–14	9 295	7 725
15–18	11 535	8 834

(a) What conclusions can be reached from these results?

_____

_____

_____

_____

_____ [2]

(b) A thirteen year old boy with normal activity level has a daily energy intake of 9500 kJ.

Describe **two** ways the boy's adult health may be affected by this daily energy intake.

_____

_____

_____ [2]

(c) Explain why the energy requirements change when a woman becomes pregnant.

_____

_____ [1]

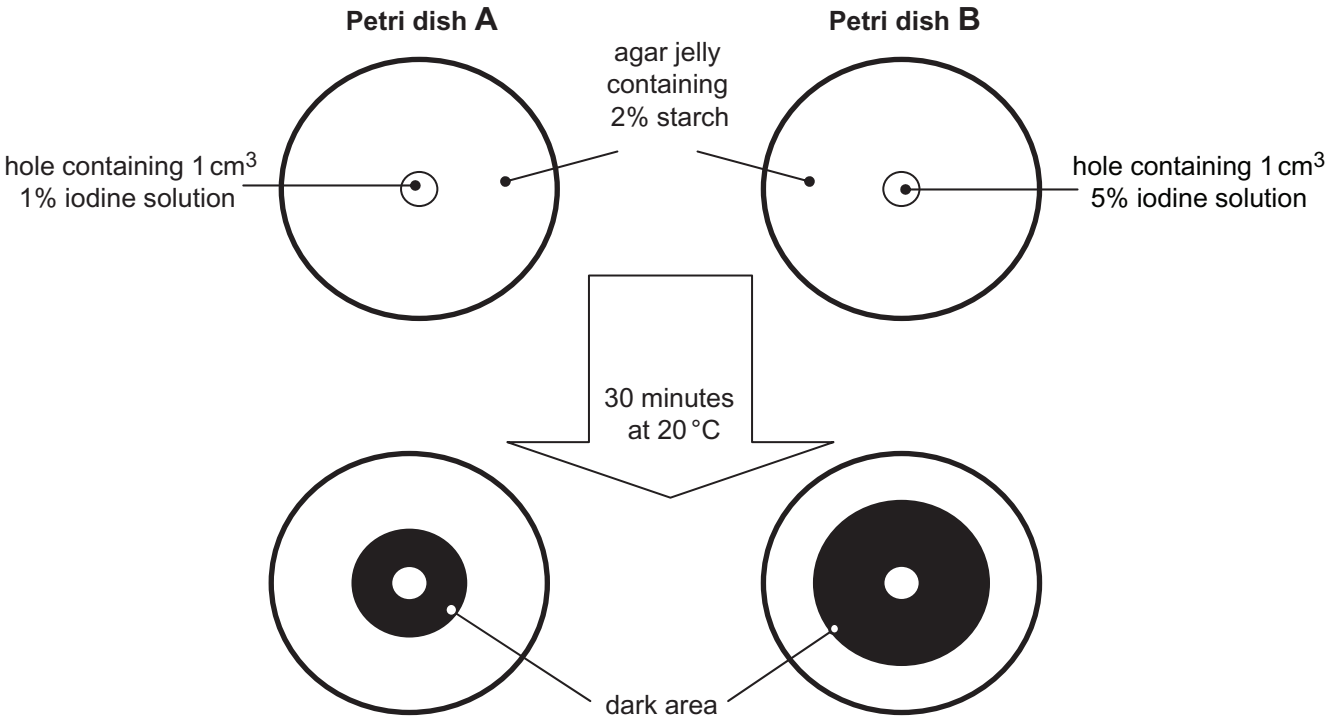
Human health can be affected by the quantity of food eaten, healthy food choices and infections by microorganisms.

(d) Give **one other** factor which affects human health.

_____ [1]

Examiner Only	
Marks	Remark

4 The diagram shows an experiment to investigate the effect of increasing the concentration of iodine solution on the rate at which iodine diffuses through agar jelly.



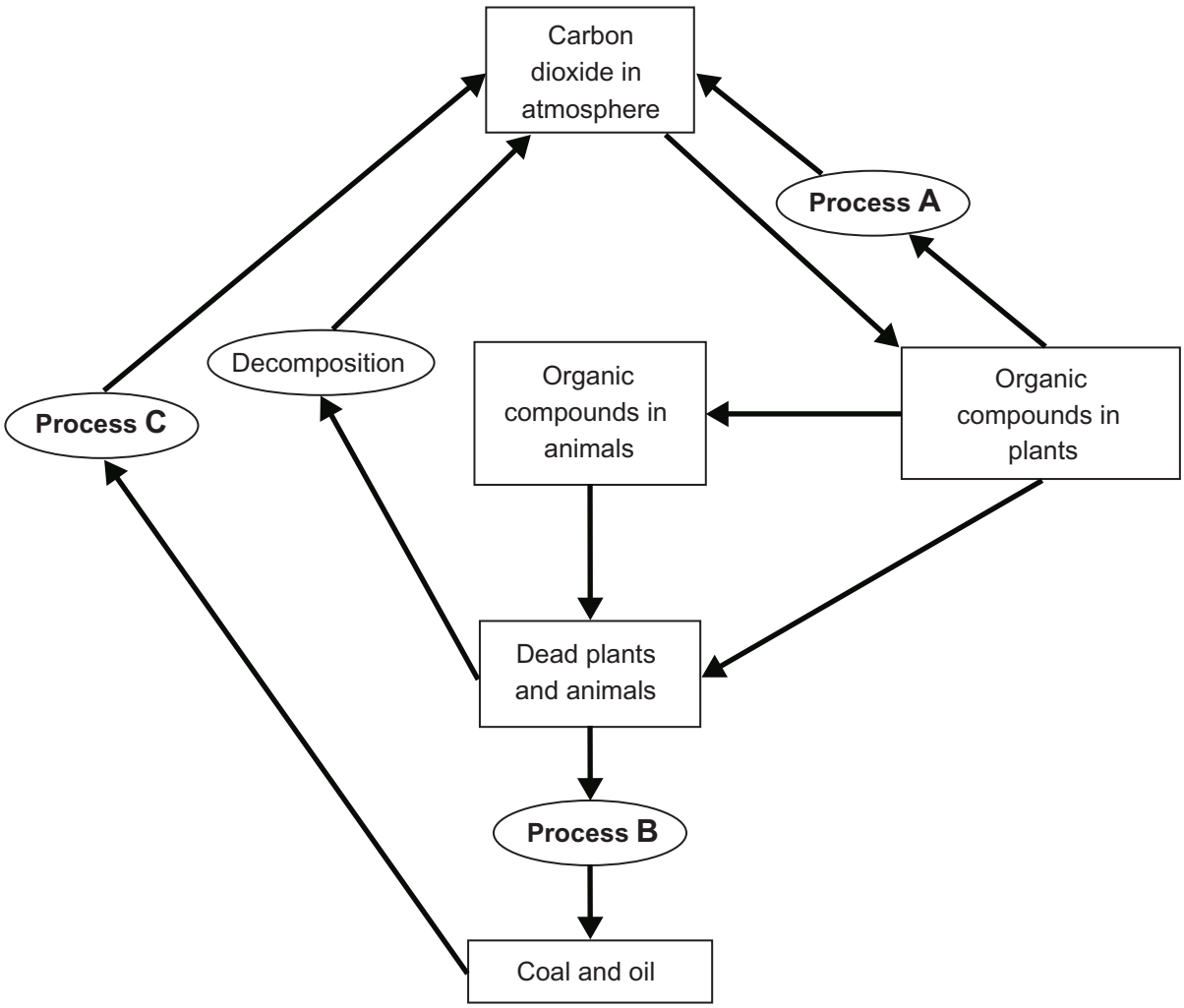
Describe and explain the conclusions that can be made from the results of this experiment.

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

[6]

Examiner Only	
Marks	Remark

5 The diagram shows some of the processes of the carbon cycle.



Examiner Only	
Marks	Remark

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

A _____ [1]

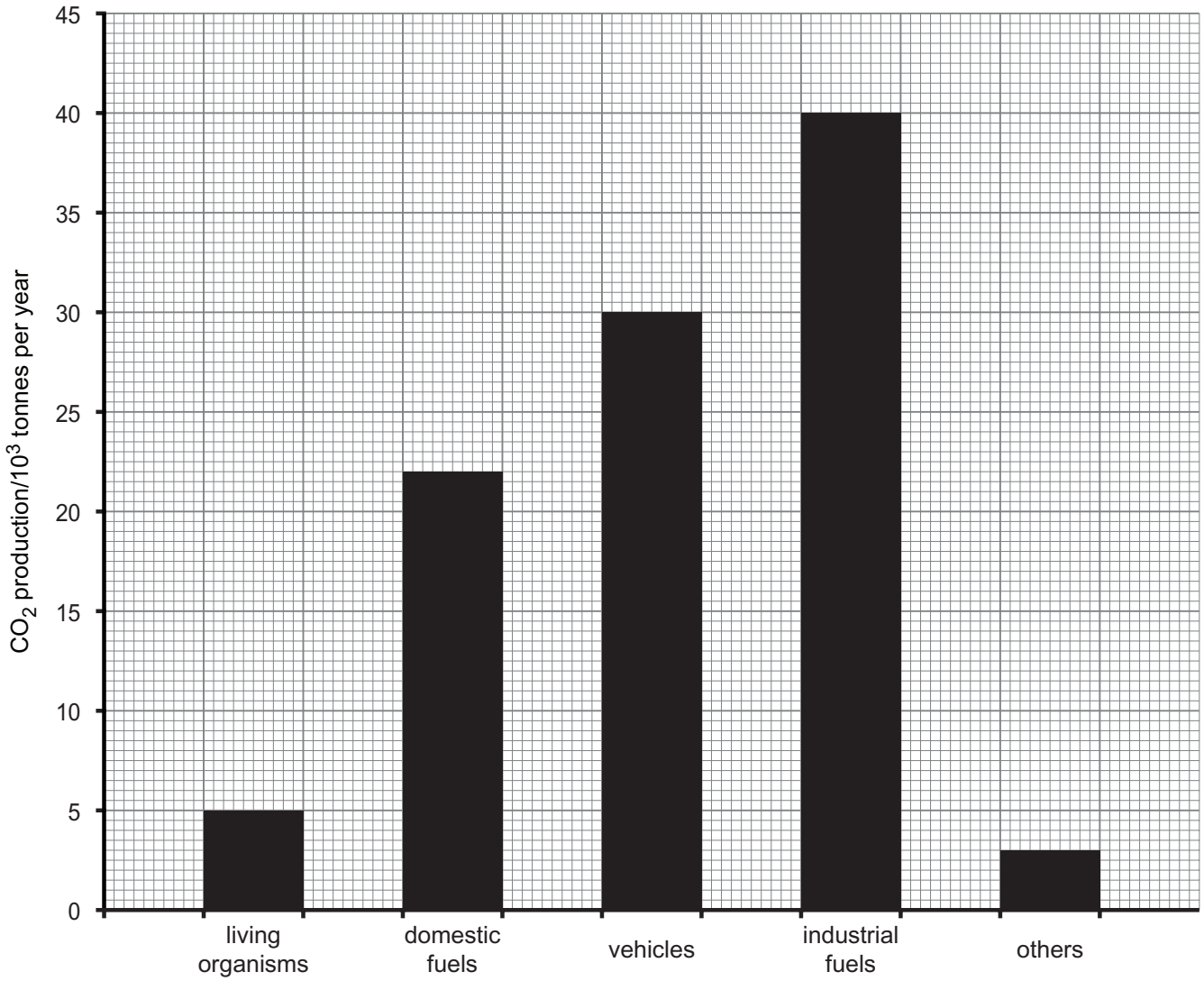
B _____ [1]

C _____ [1]

(ii) Name the only process which decreases the carbon dioxide in the atmosphere.

_____ [1]

(b) The graph shows the annual amount of carbon dioxide emissions produced by five different sources in a city.



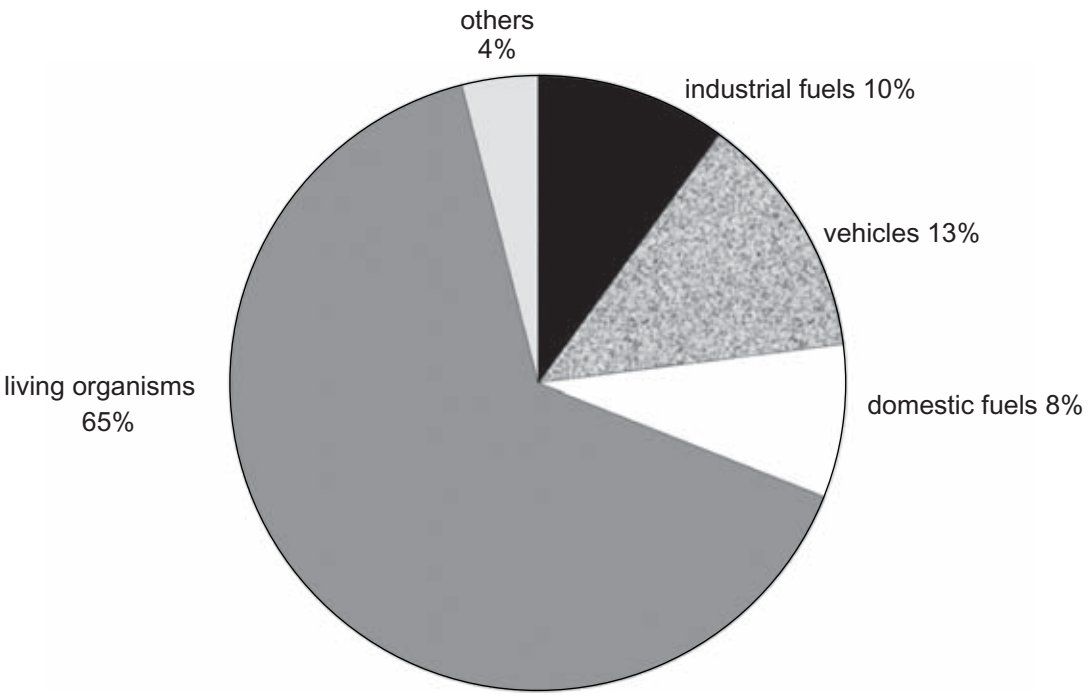
Examiner Only	
Marks	Remark

(i) Calculate the percentage of the total carbon dioxide emissions that is produced by domestic fuels.

Show your working.

Answer _____ [2]

The pie chart shows the annual amount of carbon dioxide produced by the same five sources in the countryside.



(ii) Explain **two** differences between the carbon dioxide produced in the city and the countryside.

_____

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

6 Researchers may obtain human stem cells from embryos or adult sources. Stem cells can be cultured and used to produce tissues. It may then be possible to use these cultured cells to replace damaged tissues in people with certain diseases such as Parkinson's disease.

(a) What is a stem cell?

_____

_____

_____ [2]

(b) Suggest **two** advantages of using embryonic rather than adult stem cells.

_____

_____

_____

_____ [2]

(c) Explain why some people object to human stem cell research for ethical reasons.

_____

_____

_____

_____

_____ [3]

Parkinson's disease is caused by degeneration of tissue in the brain.

(d) Suggest what type of tissue researchers need to culture to help in the treatment of this disease.

_____ [1]

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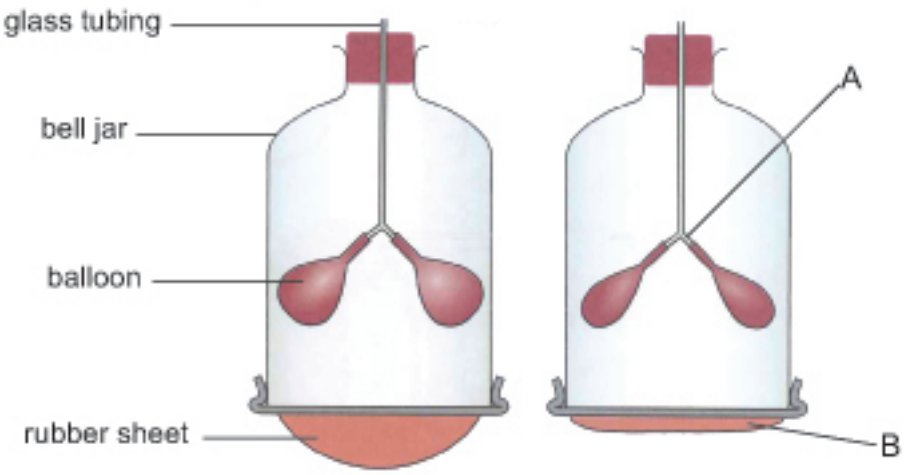
Examiner Only	
Marks	Remark

7 The diagram shows a lung model.



© GCSE Biology for CCEA second edition Revision Book by James Napier & Neal McKnight, published by Hodder Education, 2012

(a) (i) Name the parts of the respiratory system represented by A and B.

A _____ [1]

B _____ [1]

(ii) Give **one** structure found in the respiratory system that is not represented in this lung model.

_____ [1]

(iii) Explain the changes in the bell jar which cause the balloon to inflate.

_____

_____

_____

_____ [2]

(b) Describe and explain how **two** named features of the respiratory system adapt it for efficient gas exchange.

1. _____

_____

_____ [2]

2. _____

_____

_____ [2]

The table shows the percentage of some gases in inhaled and exhaled air.

Gas	Inhaled air/%	Exhaled air/%
Oxygen	21	16
Carbon Dioxide	0.04	4
Nitrogen	78	78

(c) Describe and explain the differences in the composition of inhaled and exhaled air.

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

_____

_____

_____

_____

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_____

_____ [6]

Examiner Only	
Marks	Remark

8 The diagram shows a section through part of the ileum.

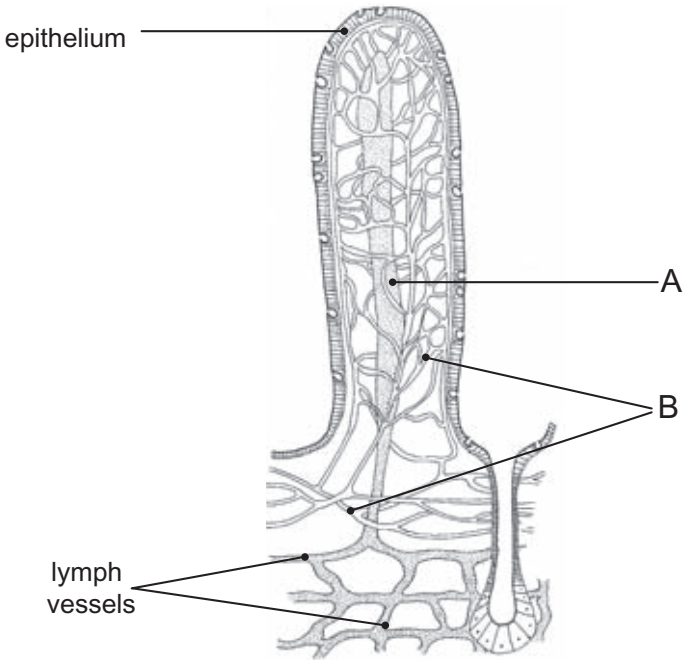

Diagram from Biology: a Modern Introduction by B S Beckett (OUP, 1976), copyright © Oxford University Press 1976, reprinted by permission of Oxford University Press

(a) Name the structure shown in the diagram.

_____ [1]

(b) Identify parts A and B.
Explain the role of each in the absorption of digested food.

A _____

_____

_____ [2]

B _____

_____

_____ [2]

(c) How does the epithelium aid the absorption of digested food?

_____

_____

_____ [1]

Examiner Only	
Marks	Remark

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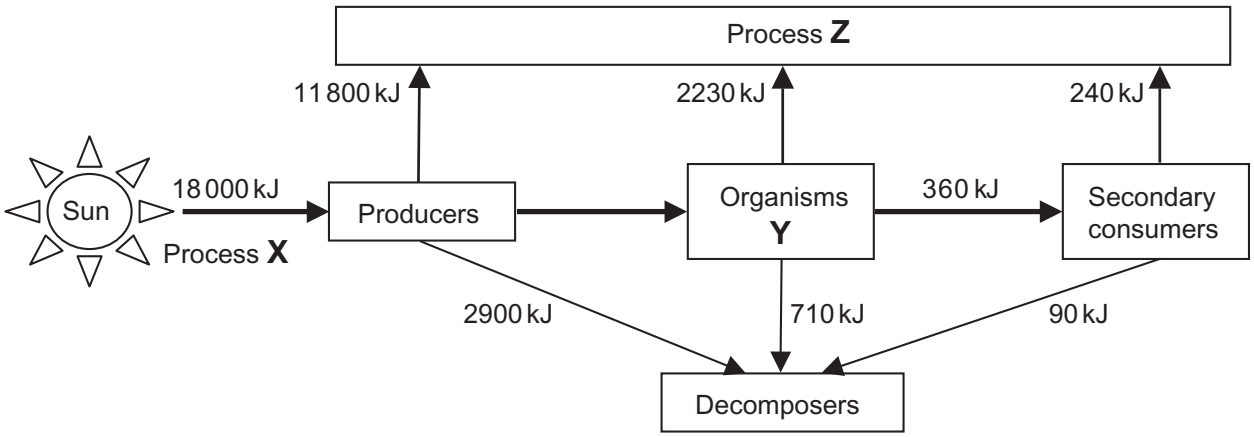
(Questions continue overleaf)

9 The diagram shows the energy flow in a food chain.



Examiner Only	
Marks	Remark

(a) Name process **Z**.

_____ [1]

(b) Give the term used to describe organisms **Y**.

_____ [1]

(c) **(i)** Calculate the amount of the energy passed from the producers to organisms **Y**.

Show your working.

Answer _____ [2]

One reason why this value is smaller than the energy absorbed by producers is because some of the energy passes to process **Z**.

(ii) Explain **two other** reasons why this value is smaller than the energy absorbed by producers.

_____

_____

_____ [2]

(d) Use evidence from the diagram to help explain why this food chain has only three trophic levels.

_____

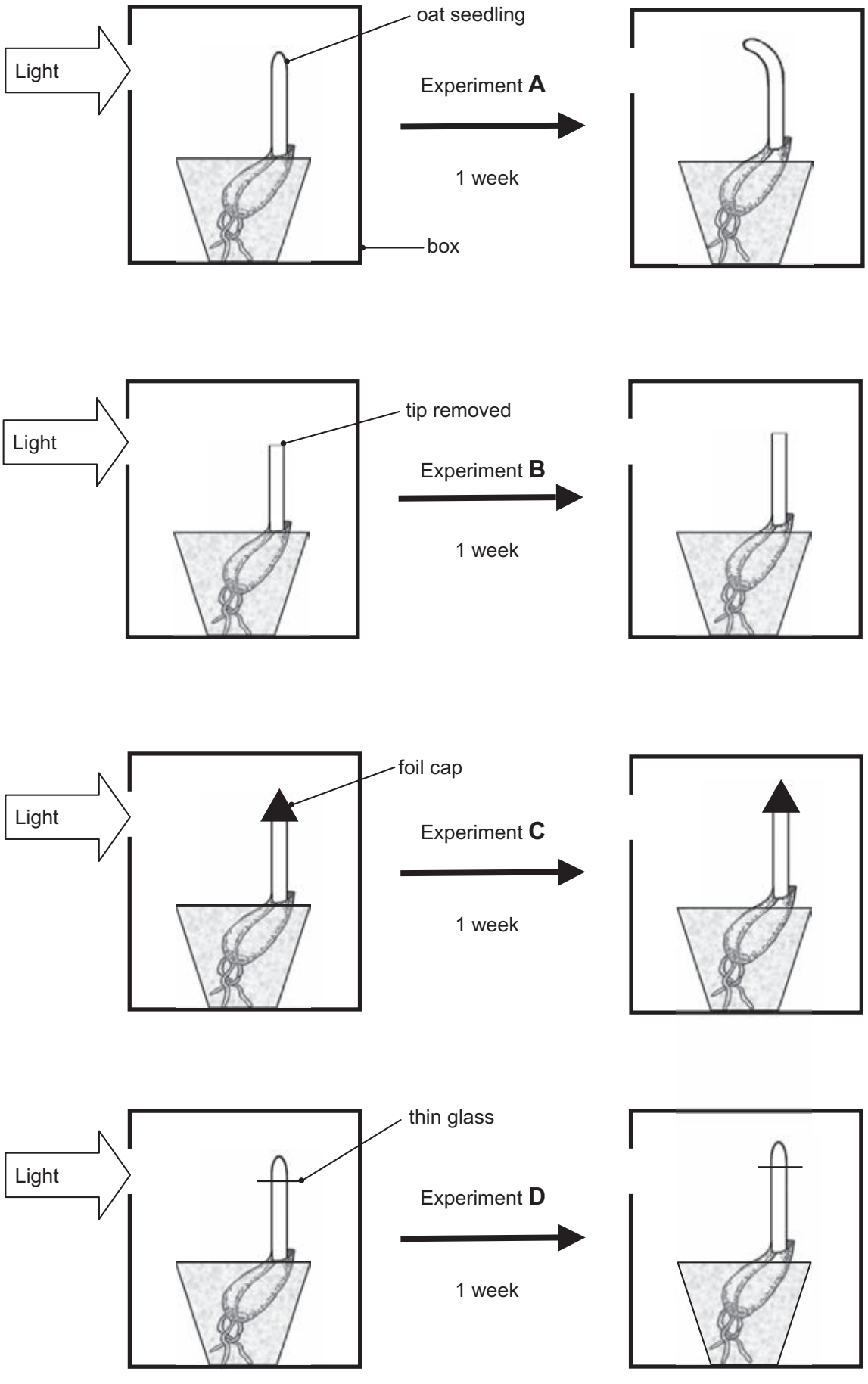
_____

_____

_____ [2]

Examiner Only	
Marks	Remark

10 The diagrams show experiments used to investigate the effect of one-sided light on the growth of oat seedlings.



(a) (i) Name the response shown by the oat seedling in experiment **A**

_____ [1]

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

_____ [1]

Experiment **A** is the control experiment in the investigation and demonstrates that oat seedlings respond to light.

(b) Choose **one other** experiment and explain how it shows that this response

is sensitive to light. _____

_____

_____ [2]

involves the diffusion of a plant hormone from the tip.

_____

_____

_____ [2]

(c) Explain how the plant hormone causes bending in experiment **A**.

_____

_____

_____

_____

_____ [3]

Examiner Only	
Marks	Remark

Daniel has found many dandelions growing in his lawn and has been advised to spray selective weed killer. The broad leaves of the dandelion plants absorb the weed killer and the plants die. The grasses remain unharmed.

(d) Suggest why the selective weed killer kills only the dandelions.

_____

_____

_____ [2]

Once the dandelions and other weeds had been killed Daniel noticed that the grass plants grew faster and produced more leaves.

(e) Suggest why the grass plants grew faster in the absence of weeds.

_____

_____

_____ [2]

Plant hormones can also be used to stimulate all the fruit in an orchard to form at the same time.

(f) Suggest why this is economically useful for apple farmers.

_____

_____

_____ [2]

Examiner Only	
Marks	Remark

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11 Read the passage on the discovery of insulin and answer the questions below.

Examiner Only	
Marks	Remark

The discovery of insulin started in the nineteenth century with observations that those who died from diabetes frequently had a diseased pancreas. In 1869 Paul Langerhans identified groups of cells in the pancreas which did not have a known function.
Twenty years later two other German scientists, Minkowski and Mering, showed that if the pancreas was removed from a dog it got diabetes but if the tube from the pancreas to the intestine was surgically tied the dog only suffered minor digestive problems. This suggested that the pancreas not only produced digestive juices but also released a substance directly into the blood stream which controlled the blood glucose concentration.
Many attempts were made to isolate the anti-diabetic substance produced by the pancreas but significant progress was not made until 1921 when Fredrick Banting and his assistant Charles Best started a series of experiments, under the supervision of Professor John Macleod at the University of Toronto. They extracted a substance they called “isletin” which, when injected into a diabetic dog several times a day, returned it to full health.
To obtain larger volumes Banting and Best used the pancreas of cattle and showed that it also could be used to treat diabetic dogs. Work progressed quickly and the extract, renamed insulin, was eventually purified sufficiently to make it a successful treatment for human diabetics.

Source: www.nobelprize.org

(a) Give **three** reasons why the discovery of insulin is an example of the collaborative nature of science.

1. _____

_____

2. _____

_____

3. _____

_____ [3]

(b) Explain how the results of scientific experiments (lines 14–16), such as those of Banting and Best, are validated by the scientific community.

_____

_____ [1]

One symptom of diabetes is high blood glucose concentration.

Examiner Only	
Marks	Remark

(c) Give **one other** symptom of diabetes.

_____

_____ [1]

(d) Explain how the control of blood glucose concentration by insulin is an example of a feedback mechanism.

_____

_____

_____

_____

_____ [2]

A second hormone called glucagon is now known to help control the blood glucose concentration.

(e) Describe the role of glucagon in controlling blood glucose concentration.

_____

_____

_____

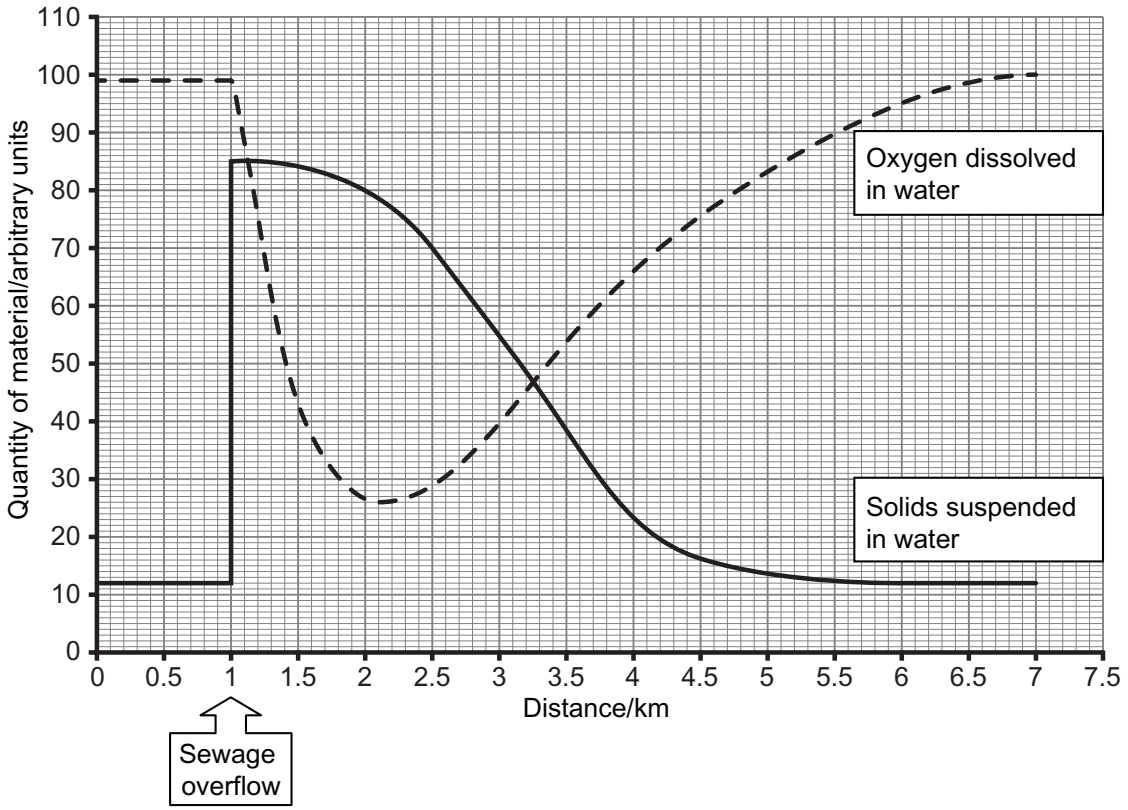
_____

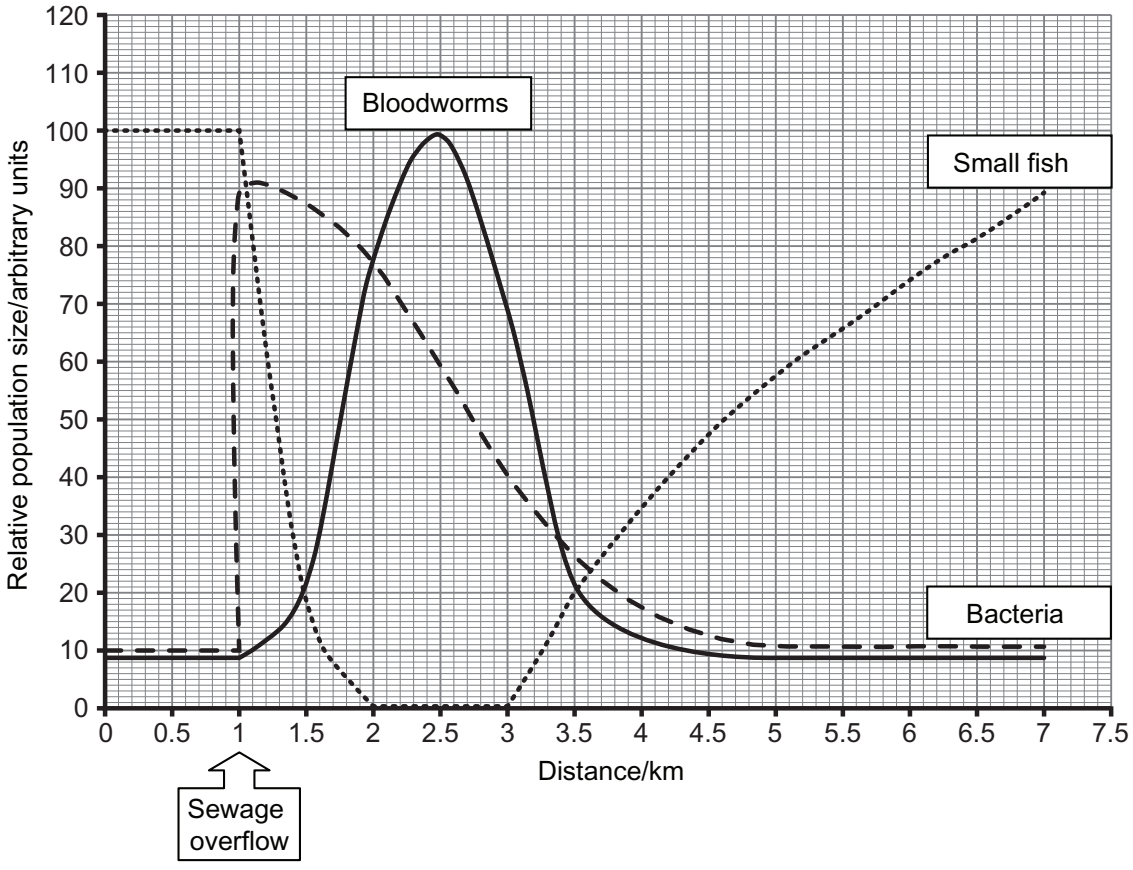
_____

_____ [3]

Examiner Only	
Marks	Remark

12 During periods of heavy rain some sewage treatment plants overflow and release sewage directly into a river. The sewage released contains suspended solids which have a high concentration of nitrogen compounds. The graphs show changes which occur in a river when sewage is released into it.





Examiner Only	
Marks	Remark

(a) Suggest what effect the high concentration of suspended solids in the sewage entering the river would have on the plants in the river.

[3]

(b) At what distance from the sewage overflow are no fish left alive?

[1]

(c) Use information from the graphs to help explain the link between the numbers of bacteria and bloodworms with the quantity of suspended solids found in the river.

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