AQA GCSE BIOLOGY (4401)

BIOLOGY



EXAM QUESTION PACK

UNIT B3 FOUNDATION TIER BL3FP PAPERS

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AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
Biology

F

Foundation Tier Unit Biology B3

Friday 10 June 2016 Morning Time allowed: 1 hour

Materials
For this paper you must have:
- a ruler.

You may use a calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 9 should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

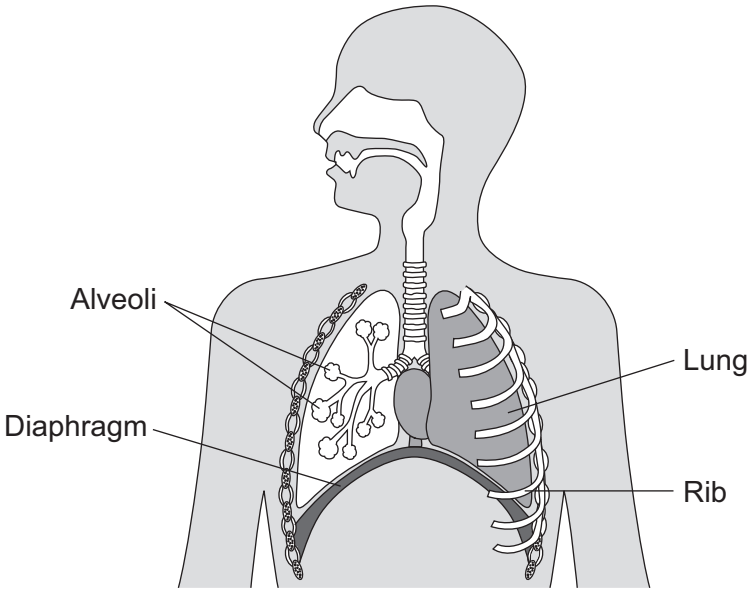
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Answer **all** questions in the spaces provided.

1 (a) **Figure 1** shows the breathing system in humans.

Figure 1



Use the correct answer from the box to complete the sentence.

[1 mark]

abdomen	**air passages**	**thorax**

The lungs and ribs are found in the _____ .

1 (b) (i) What happens to the ribs when we breathe in?

[1 mark]

Tick (✓) **one** box.

The ribs move down and in. ☐

The ribs move up and in. ☐

The ribs move up and out. ☐

1 (b) (ii) Describe what happens to the muscles between the ribs when we breathe in.

[1 mark]

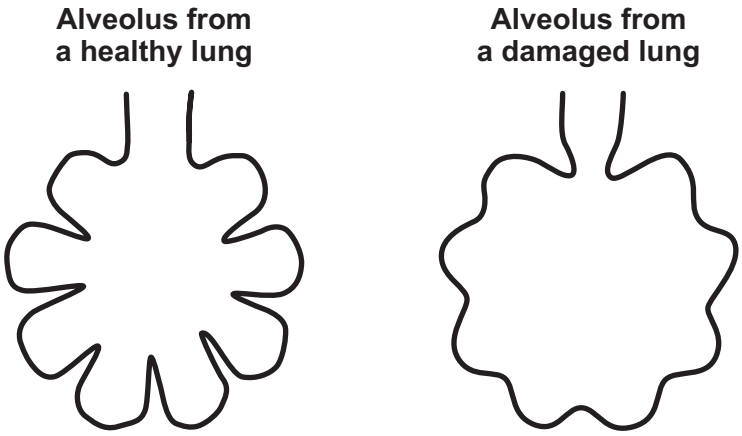
_____

_____

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1 (c) **Figure 2** shows an alveolus from a healthy lung and an alveolus from a damaged lung.

Figure 2



1 (c) (i) Which **one** of the following is a difference between the alveolus from the damaged lung and the alveolus from the healthy lung?

[1 mark]

Tick (✓) **one** box.

The damaged alveolus has a smaller surface area. ☐

The damaged alveolus has a shorter diffusion pathway. ☐

The damaged alveolus has a better blood supply. ☐

1 (c) (ii) A person with damaged alveoli finds exercising difficult.

Which **one** of the following is the reason why the damaged alveoli will make exercising difficult?

[1 mark]

Tick (✓) **one** box.

Less carbon dioxide is taken in. ☐

Less energy is needed for exercise. ☐

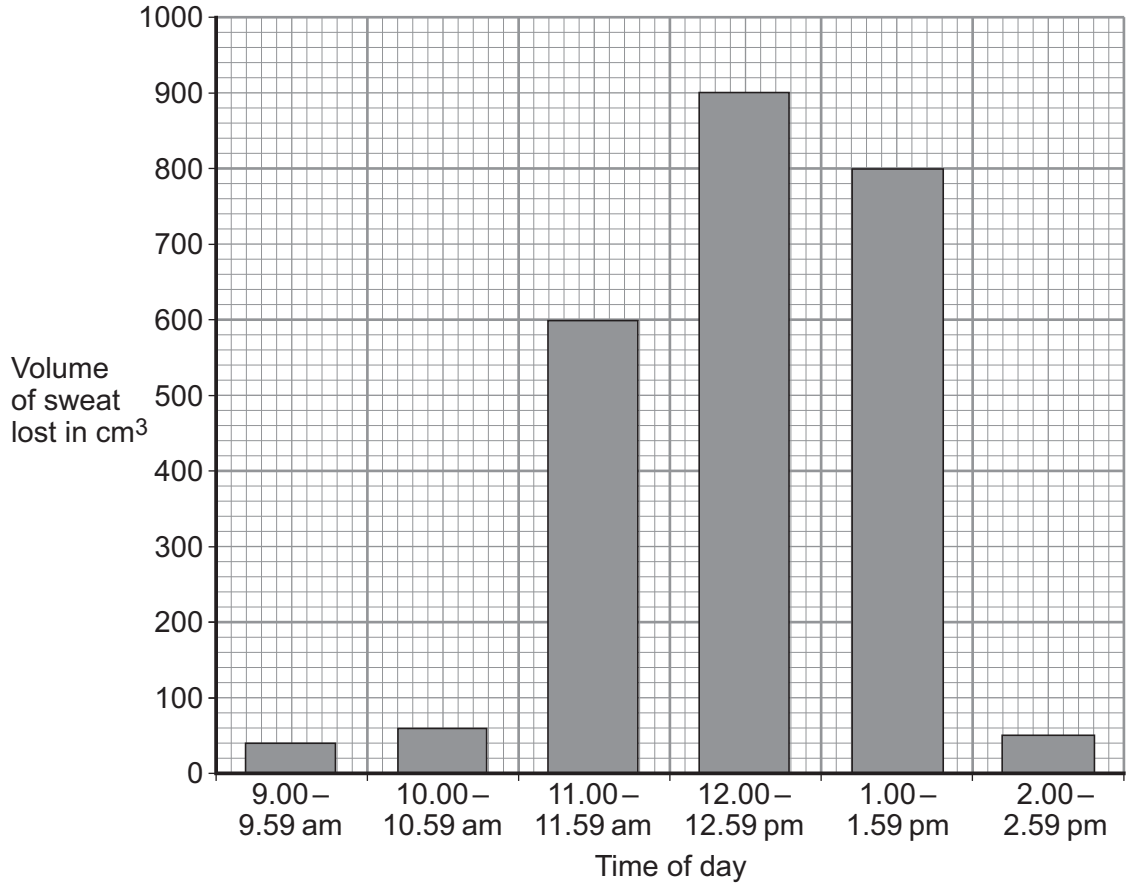
Less oxygen is taken in. ☐

5

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2 A scientist measured the volume of sweat lost between 9.00 am and 2.59 pm in one day by one person. **Figure 3** shows the results.

Figure 3



2 (a) (i) Suggest what happened at 11.00 am.

[1 mark]

Tick (✓) **one** box.

The person moved into a cold room. ☐

The person removed their coat. ☐

The person started running a race. ☐

2 (a) (ii) Calculate the total volume of sweat lost between 11.00 am and 1.59 pm.

[1 mark]

Total volume of sweat lost = _____ cm^3

Do not write outside the box

2 (a) (iii) Suggest **one** way the person could replace the water that was lost as sweat.

[1 mark]

_____

_____

2 (b) (i) Sweating helps keep our internal body temperature within a narrow range.

Which organ monitors body temperature?

[1 mark]

Tick (✓) **one** box.

brain ☐

kidney ☐

pancreas ☐

2 (b) (ii) The organ that monitors internal body temperature receives information about temperature from the skin.

Which structures in the skin send impulses with this information?

[1 mark]

Tick (✓) **one** box.

capillaries ☐

glands ☐

receptors ☐

2 (c) How does sweating help to control body temperature?

[1 mark]

_____

_____

6

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3 The heart is part of the circulatory system.

3 (a) (i) Name **one** substance transported by the blood in the circulatory system.

[1 mark]

_____

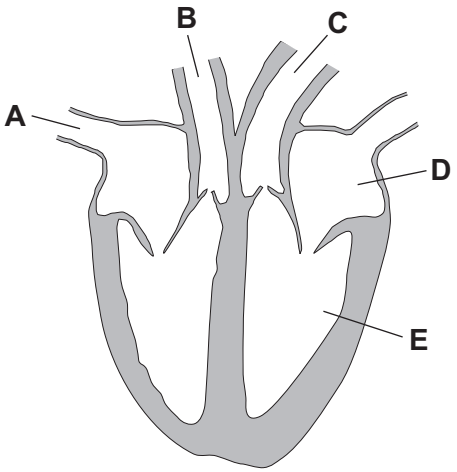
3 (a) (ii) What is the main type of tissue in the heart wall?

[1 mark]

_____

3 (b) **Figure 4** shows the human heart.

Figure 4



3 (b) (i) Which blood vessel, **A**, **B** or **C**, takes blood to the lungs? ☐

[1 mark]

3 (b) (ii) Name parts **D** and **E** shown in **Figure 4**.

[2 marks]

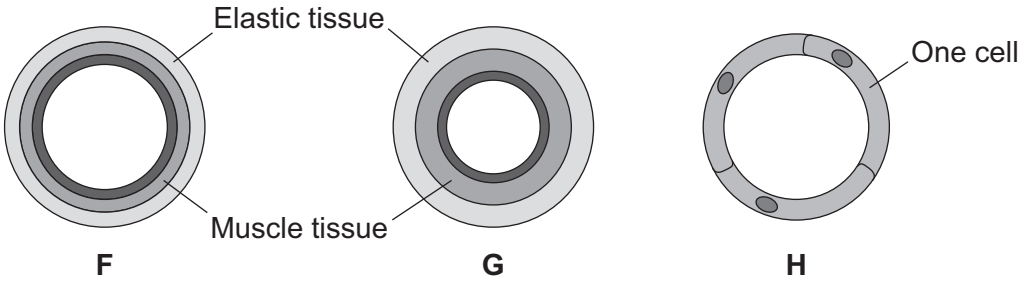
D _____

E _____

Do not write outside the box

3 (c) **Figure 5** shows three types of blood vessel, **F**, **G** and **H**.

Figure 5



Not to scale

3 (c) (i) What type of blood vessel is **F**?

[1 mark]

Tick (✓) **one** box.

an artery ☐

a capillary ☐

a vein ☐

3 (c) (ii) A man needs to have a stent fitted to prevent a heart attack.

In which type of blood vessel would the stent be placed?

[1 mark]

Tick (✓) **one** box.

an artery ☐

a capillary ☐

a vein ☐

3 (c) (iii) Explain how a stent helps to prevent a heart attack.

[2 marks]

_____

_____

_____

_____

9

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4 Some people with diabetes do not produce enough insulin to keep their blood glucose at the correct levels.

4 (a) (i) Which organ monitors blood glucose levels?

[1 mark]

Tick (✓) **one** box.

liver ☐

pancreas ☐

skin ☐

4 (a) (ii) What effect does insulin have on glucose in the blood?

[1 mark]

Tick (✓) **one** box.

Insulin causes glucose to move into the cells. ☐

Insulin increases the amount of glucose in the blood. ☐

Insulin converts glucose to starch. ☐

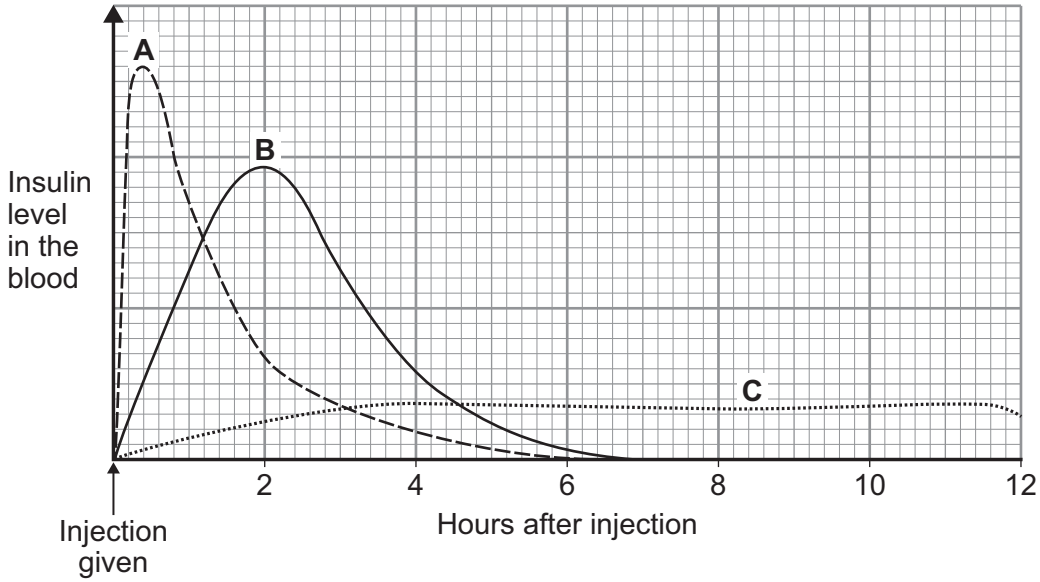
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4 (b) Some people with diabetes inject insulin several times a day.

There are different types of insulin.

Figure 6 shows some information about three different types of insulin, **A**, **B** and **C**.

Figure 6



4 (b) (i) Which type of insulin, **A**, **B** or **C**, should a person with diabetes inject just before eating a meal high in carbohydrates?

[2 marks]

_____

Give a reason for your answer.

_____

_____

Question 4 continues on the next page

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4 (b) (ii) A woman with diabetes has a blood glucose level of 12 mmol per dm^3 of blood.

The woman's normal blood glucose level is 6 mmol per dm^3.

The woman will need to inject insulin to lower her blood glucose level.

For each unit of insulin injected the blood glucose level will fall by 3 mmol per dm^3.

How many units of insulin does the woman need to inject to bring her blood glucose level down to the normal level?

[1 mark]

Number of units = _____

4 (c) Some people have pancreas transplants to treat diabetes.

Give **one** possible disadvantage of a pancreas transplant.

[1 mark]

Tick (✓) **one** box.

The pancreas could be rejected. ☐

The patient will need to inject insulin every day. ☐

The patient's blood glucose levels may rise and fall too much. ☐

6

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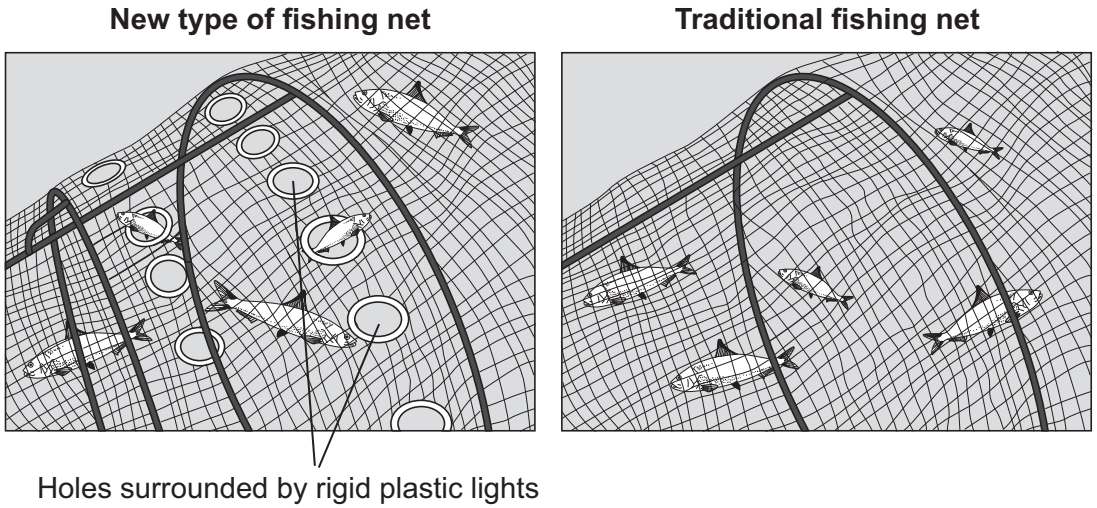
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ANSWER IN THE SPACES PROVIDED

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5 It is important to conserve fish stocks.

Figure 7 shows a new type of fishing net and a traditional fishing net.

Figure 7



5 (a) (i) Describe how the new type of fishing net helps to conserve fish stocks.

[3 marks]

5 (a) (ii) Give **one** way, other than controlling nets, to reduce overfishing.

[1 mark]

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5 (b) Another way to make sure there is food for an increasing human population is to make food production more efficient.

Figure 8 shows how some cows are farmed.

Figure 8



5 (b) (i) Use information from **Figure 8** to suggest **two** ways in which this type of farming reduces energy loss from the cows.

[2 marks]

1 _____

_____

2 _____

_____

5 (b) (ii) Give **two** reasons why some people disagree with farming cows in this way.

[2 marks]

1 _____

_____

2 _____

_____

8

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6 Human activity affects ecosystems.

6 (a) Draw **one** line from each human activity to the effect on ecosystems.

[2 marks]

Human activity	Effect on ecosystems
Increase in rice fields	Increases the amount of methane in the atmosphere
Destruction of peat bogs	Increases the amount of carbon dioxide that is released into the atmosphere
	Reduces the rate at which carbon dioxide is locked up as wood

6 (b) (i) Deforestation also affects the atmosphere.

Give **two** reasons why deforestation takes place.

[2 marks]

1 _____

_____

2 _____

_____

6 (b) (ii) Changes in the gases in our atmosphere can cause global warming.

Give **two** possible effects of a rise in the Earth's temperature.

[2 marks]

1 _____

_____

2 _____

_____

6

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED

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7 Cells, tissues and organs are adapted to take in different substances and get rid of different substances.

Table 1 shows the concentration of four ions outside cells and inside cells.

Table 1

Ion	Concentration outside cells in mmol per dm^3	Concentration inside cells in mmol per dm^3
Sodium	140	9
Potassium	7	138
Calcium	2	27
Chloride	118	3

7 (a) Use information from **Table 1** to complete the following sentences.

[2 marks]

Sodium ions will move into cells by the process

of _____ .

Potassium ions will move into cells by the process

of _____ .

7 (b) Some students investigated the effect of the different concentrations of sugar in four drinks, **A**, **B**, **C** and **D**, on the movement of water across a partially permeable membrane.

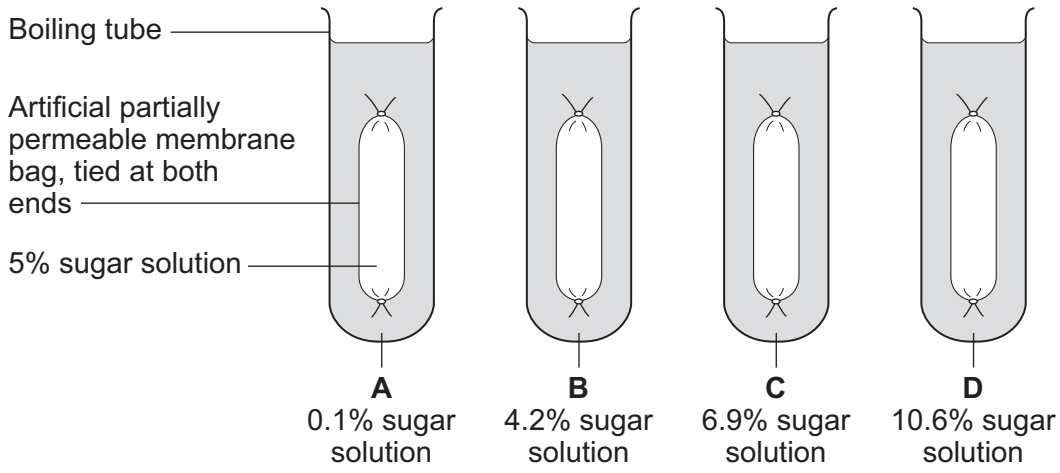
The students:

- made four bags from artificial partially permeable membrane
- put equal volumes of 5% sugar solution in each bag
- weighed each bag containing the sugar solution
- placed one bag in each of the drinks, **A**, **B**, **C** and **D**
- after 20 minutes removed the bags containing the sugar solution and weighed them again.

Do not write outside the box

Figure 9 shows how they set up the investigation.

Figure 9



7 (b) (i) The bag in drink **A** got heavier after 20 minutes.

Explain why.

[3 marks]

7 (b) (ii) In which drink, **A**, **B**, **C** or **D**, would you expect the bag to show the smallest change in mass?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

7 (b) (iii) Explain why you think the bag you chose in part **(b)(ii)** would show the smallest change.

[2 marks]

8

Turn over ▶

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8 (a) Carbon dioxide enters a plant through stomata on the leaves.

Name the cells that control the size of the stomata.

[1 mark]

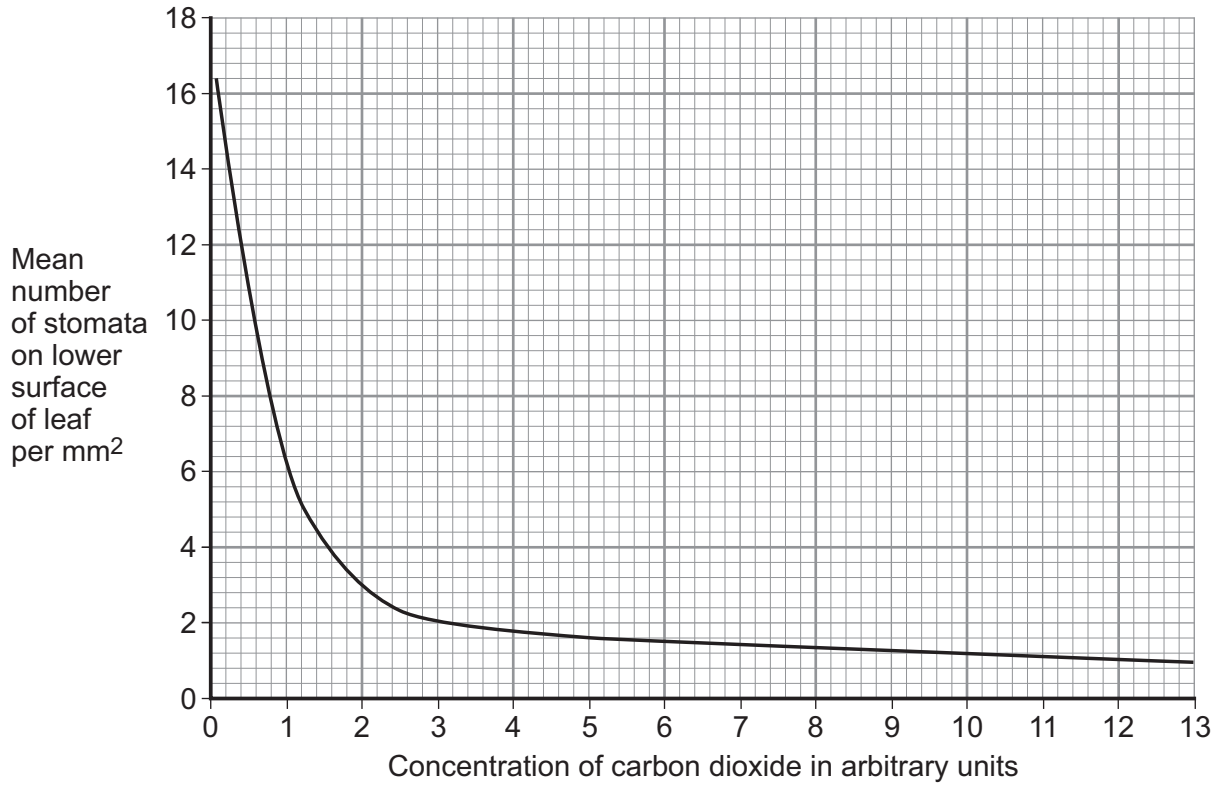
_____

8 (b) Scientists grew tomato plants in air containing different concentrations of carbon dioxide.

The scientists recorded the number of stomata found on the lower surface of the leaves of plants grown at each carbon dioxide concentration.

Figure 10 shows the results.

Figure 10



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8 (b) (i) Describe the relationship between the mean number of stomata per mm^2 and carbon dioxide concentration.

[2 marks]

8 (b) (ii) Suggest a reason for the relationship you described in part **(b)(i)**.

[1 mark]

8 (c) (i) Suggest **one** disadvantage to a plant of having a large number of stomata per mm^2 on each leaf.

[1 mark]

8 (c) (ii) Suggest **one** environmental condition where a large number of stomata per mm^2 on each leaf would be a disadvantage.

[1 mark]

6

Turn over for the next question

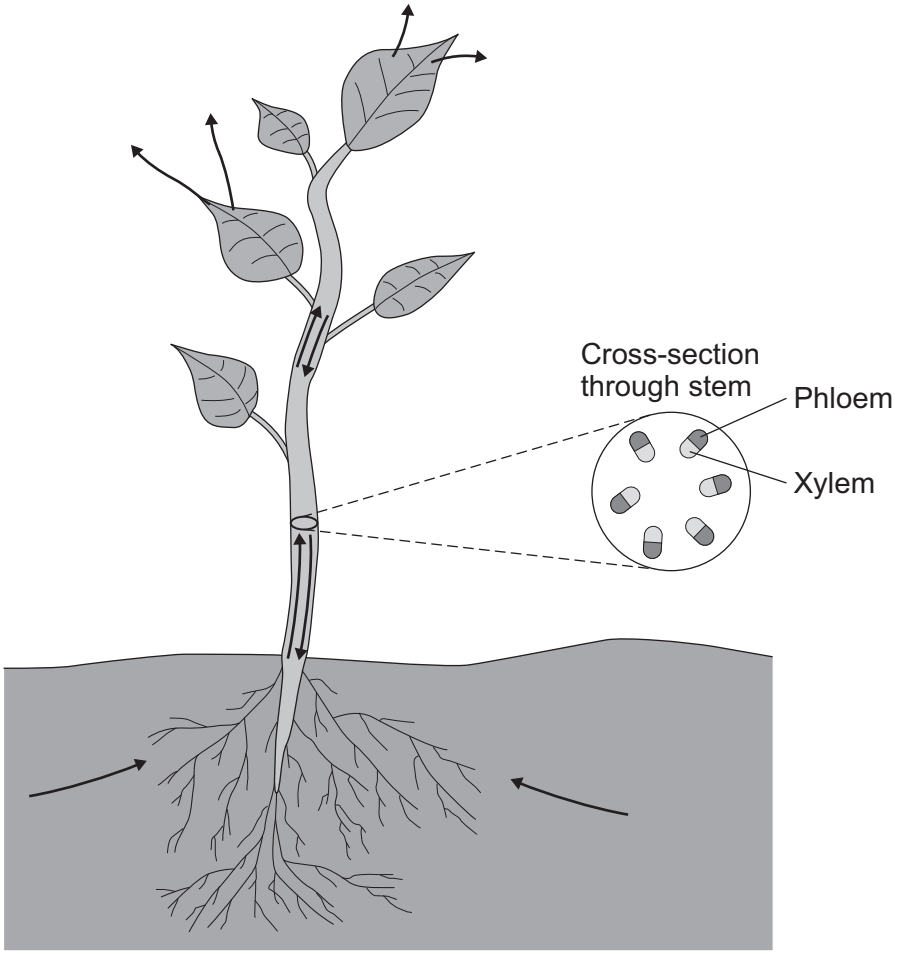
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9 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Plants transport many substances between their leaves and roots.

Figure 11 shows the direction of movement of substances through a plant.

Figure 11



Do not write outside the box

Describe how **ions**, **water** and **sugar** are obtained and transported through plants.

In your answer you should refer to materials moving upwards in a plant and to materials moving downwards in a plant.

[6 marks]

Extra space

6

END OF QUESTIONS

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GCSE

Biology

BL3FP

Mark scheme

4401

June 2016

Version 1.0: Final Mark Scheme

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**.
Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

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Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation 'ecf' in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Accept / allow

Accept is used to indicate an equivalent answer to that given on the left-hand side of the mark scheme. Allow is used to denote lower-level responses that just gain credit.

3.9 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

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4. Quality of Written Communication and levels marking

In Question 9 students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Students will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: Basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: Clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: Detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	thorax		1	AO1 3.1.2a
1(b)(i)	The ribs move up and out.		1	AO1 3.1.2c
1(b)(ii)	(they) contract	allow shorten	1	AO1 3.1.2c
1(c)(i)	The damaged alveolus has a smaller surface area.		1	AO3 3.1.1h
1(c)(ii)	Less oxygen is taken in.		1	AO2 3.1.2b
Total			**5**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	The person started running a race.		1	AO2 3.3.2a
2(a)(ii)	2300		1	AO2 3.3.2a
2(a)(iii)	drinking (water / sports drink) **or** through eating		1	AO1 3.3.2a /3.1.1e
2(b)(i)	brain		1	AO1 3.3.2b
2(b)(ii)	receptors		1	AO1 332c
2(c)	cools us down	allow evaporates	1	AO1 3.3.2a
Total			**6**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)(i)	any **one** from: • glucose • oxygen • carbon dioxide • urea • water	allow hormones allow named example of a product of digestion	1	AO1 3.2.1a
3(a)(ii)	(cardiac) muscle	allow muscular	1	AO1 3.2.1b
3(b)(i)	**B**		1	AO1 3.2.1d
3(b)(ii)	**D** atrium / atria **E** ventricle(s)	ignore references to left or right ignore references to left or right	1 1	AO1 3.21.c/d
3(c)(i)	a vein		1	AO2 3.2.1e
3(c)(ii)	an artery		1	AO1 3.2.1f
3(c)(iii)	keeps artery open / wider (so) blood / oxygen can pass through (to the heart muscle)	allow ecf from 3cii	1 1	AO1 3.2.1f
Total			**9**	

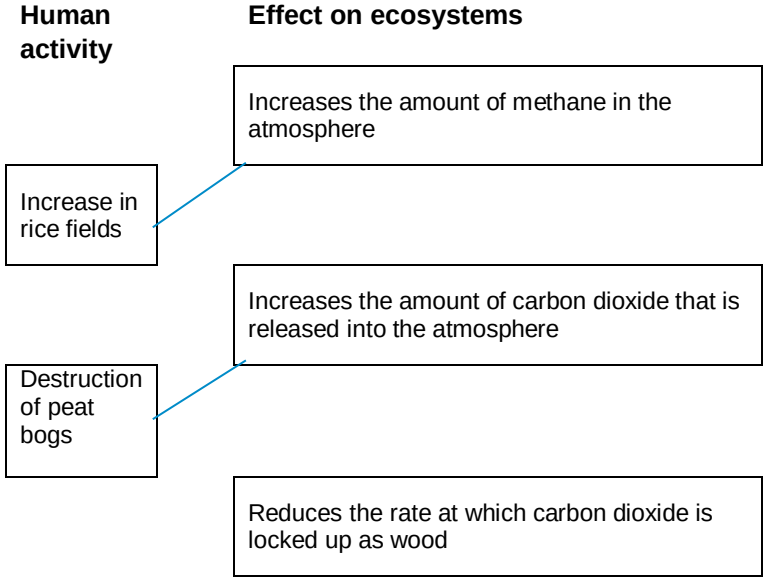
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	pancreas		1	AO1 3.3.3a
4(a)(ii)	Insulin causes glucose to move into cells.		1	AO1 3.33a
4(b)(i)	**A** rapid rise **or** fastest		1 1	AO2/3 3.3.3a
4(b)(ii)	2		1	AO2 3.3.3a
4(c)	The pancreas could be rejected.		1	AO2 3.3.1g
Total			**6**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	any **three** from: • lights to help guide / attract fish (to the holes) • (rigid so) holes stay open • (holes) allow small / young fish to escape • (so that) they can breed		3	AO2/3 3.4.4c
5(a)(ii)	(fishing) quotas / legislation		1	AO1 3.4.4c
5(b)(i)	movement is restricted (in a building **or** close together so) heat is conserved	 allow in heated buildings to reduce heat loss	1 1	AO2 3.4.4b
5(b)(ii)	any **two** from: • it is cruel • disease spreads faster • (meat) often has antibiotics in it	allow descriptions of 'cruelty'	2	AO3 3.4.4b
Total			**8**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)	 extra lines from left cancels mark		2	AO1 3.4.2c/d
6(b)(i)	any **two** from: • (to provide land) for farming / agriculture • (to provide land) for quarrying • (to provide land) for building • to provide wood for building materials • to provide fuel • to provide paper		2	AO1 3.4.2c
6(b)(ii)	any **two** from: • changes in earth's climate, ie droughts, flooding, hurricanes • rise in sea levels • reduce biodiversity • change in migration patterns • may change distribution of species	ignore acid rain **and** the ozone layer **and** forest fires ignore temperature rise allow ice caps melt	2	AO1 3.4.2a
Total			**6**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)	diffusion active transport	this order only	1 1	AO2 3.1.1a/g
7(b)(i)	concentration (of sugar) in the bag was higher (than in the drink) **or** higher concentration of water outside the bag **or** in the drink / boiling tube (so) water moved in (to the tubing) by osmosis	allow concentration (of sugar) in the drink was lower (than in the bag) allow higher water potential outside the bag **or** lower water potential inside the bag allow water moves down **its** concentration gradient do **not** allow sugar moving allow diffusion (of water) do **not** allow sugar moving by osmosis **or** water moving by active transport	1 1 1	AO2 3.1.1.a/b/c
7(b)(ii)	**B**		1	AO3 3.1.1a/b/c
7(b)(iii)	close(st) to the concentration in the bag **or** to 5% (so rate of) diffusion / osmosis is slow	allow small(est) diffusion gradient **or** close(st) to an equilibrium allow (so) less water moves in (to the bag) ignore ref. to sugar	1 1	AO2/3 3.1.1a/b/c
Total			**8**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	guard (cells)	allow phonetic spelling	1	AO1 3.1.3e
8(b)(i)	as carbon dioxide (concentration) increases, the (mean) number of stomata decreases (there is a) rapid drop initially	allow there is a negative correlation allow use of any number between 1.5 and 3.0 to indicate "initially"	1 1	AO2 3.1.3
8(b)(ii)	(there is) more carbon dioxide so plant doesn't need as many stomata (to obtain the amount needed) **or** (there is) less carbon dioxide so the plant needs more stomata (to obtain enough)		1	AO3 3.1.3c
8(c)(i)	may lose too much water	allow plant may wilt ignore references to oxygen / carbon dioxide plants lose a lot of water is insufficient ignore flaccid	1	AO3 3.1.3d
8(c)(ii)	any **one** from: • hot • dry • windy	ignore environments unqualified eg desert	1	AO3 3.1.3d
Total			**6**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
9			6	AO1 3.1.1a/b/g 3.1.1a/d 3.2.3a

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant points are made	At least **one** process (P) for obtaining a material is given **or** at least **one** vessel (V) and the material it carries is given **or** there is a description of the direction of movement (M) for at least **one** material	At least **one** process for obtaining a specified material is given **and** is correctly linked to the vessel that the material is transported in **or** correctly linked to a description of the direction of movement of the material	Processes used for obtaining specified materials are given. **and** correctly linked to the vessels that the materials are transported in **or** correctly linked to a description of the direction of movement of the materials. **For full credit,** in addition to the above descriptors at least **one** of the processes must be linked to the vessel that the material is transported in **and** the direction of the movement of the material.

examples of points made in the response Ions:	extra information
(P) taken up by diffusion or active transport • from an area of high to low concentration (diffusion) **or** an area of low to high concentration (active transport) (V) travels in the xylem (M) to the leaves **or** from the roots / soil	
Water: (P) taken up by osmosis • from an area of low to high concentration (V) travels in the xylem (M) to the leaves **or** from the roots / soil (P) transpiration stream • movement replaces water as it evaporates from leaves (V) in the xylem	allow high concentration of water to low concentration of water allow from high water potential to low water potential ignore along a concentration gradient
Sugar: (P) made during photosynthesis (V) travels in the phloem (M) to other parts of the plant **or** to storage organs **or** travels up and down	

Total		6

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Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2015

Biology
Unit Biology B3

BL3FP

F

Tuesday 12 May 2015 1.30 pm to 2.30 pm

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 1 hour

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 8(c) should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

A

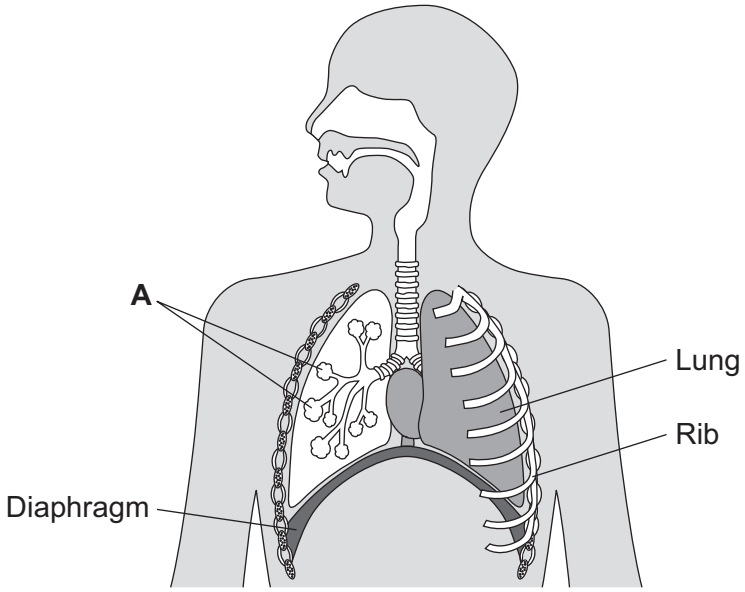
Do not write outside the box

Answer **all** questions in the spaces provided.

1 Our lungs help us to breathe.

Figure 1 shows the human breathing system.

Figure 1



1 (a) (i) Name part **A** in **Figure 1**.

[1 mark]

.....

1 (a) (ii) Give **one** function of the ribs.

[1 mark]

.....

1 (b) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

active transport	**diffusion**	**osmosis**

Oxygen moves from the air inside the lungs into the blood by the process of ..... .

Do not write outside the box

1 (b) (ii) Use the correct answer from the box to complete the sentence.

[1 mark]

arteries	capillaries	veins

Oxygen moves from the lungs into the blood through the walls

of the ..... .

1 (b) (iii) Inside the lungs, oxygen is absorbed from the air into the blood.

Give **two** adaptations of the lungs that help the rapid absorption of oxygen into the blood.

[2 marks]

1 .....

.....

2 .....

.....

6

Turn over for the next question

Do not write outside the box

2 The human population is increasing and more household waste is being produced.

2 (a) Give **one** way in which an increase in household waste affects our environment.

[1 mark]

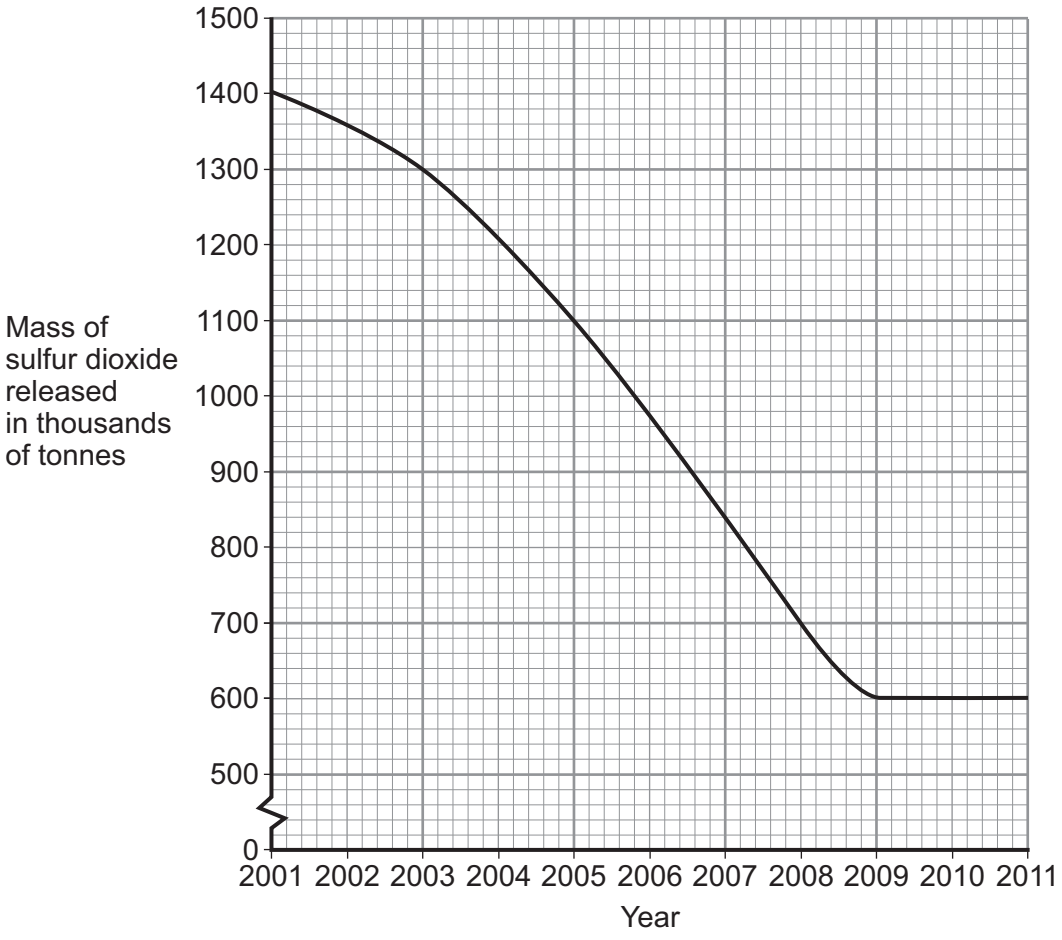
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2 (b) The release of sulfur dioxide affects our environment.

Figure 2 shows how the mass of sulfur dioxide released in the UK has changed from 2001 to 2011.

Figure 2



2 (b) (i) Describe the pattern shown in **Figure 2**.

[2 marks]

.....

.....

.....

.....

Do not write outside the box

2 (b) (ii) In 2001, 1400 thousand tonnes of sulfur dioxide were released.

By which year had the amount of sulfur dioxide released reduced to half of this amount?

[2 marks]

.....

.....

.....

Year = ...

2 (b) (iii) Give **one** problem caused when sulfur dioxide gas is in the air.

[1 mark]

.....

.....

2 (c) Carbon dioxide is another gas that affects the environment.

Which **two** of the following help to reduce the levels of carbon dioxide in the atmosphere by storing carbon dioxide?

[2 marks]

Tick (✓) **two** boxes.

Animals respiring ☐

Carbon dioxide being absorbed in oceans and lakes ☐

Photosynthesis by trees ☐

The production of biogas ☐

8

Do not write outside the box

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

Do not write outside the box

3 (a) Humans need to remove waste products from their bodies.

Which organ removes waste carbon dioxide from the body?

[1 mark]

Tick (✓) **one** box.

Liver ☐

Lung ☐

Skin ☐

3 (b) Kidneys make urine. Urine is stored in the bladder.

Which **one** of the following stages is involved in making urine in a healthy kidney?

[1 mark]

Tick (✓) **one** box.

Filtering the blood ☐

Reabsorbing **all** of the ions ☐

Reabsorbing **all** of the water ☐

3 (c) A healthy kidney keeps the correct amount of water in the blood.

If there is too much water in the blood, what might happen to the blood cells?

[1 mark]

Tick (✓) **one** box.

They will take in water and burst. ☐

There will be no change. ☐

They will lose water and shrink. ☐

Question 3 continues on the next page

Do not write outside the box

3 (d) A child has kidney failure.

A doctor recommends dialysis to treat the kidney failure.

Before dialysis starts, the doctor measures the concentration of glucose and of urea in the child's blood.

The concentration of glucose in the dialysis fluid is 6 mmol per dm^3.

The results are shown in **Table 1**.

Table 1

	Concentration in the blood before dialysis starts in mmol per dm^3
Glucose	6
Urea	28

3 (d) (i) Suggest what the concentration of glucose in the blood will be **after** the dialysis treatment.

Draw a ring around the correct answer.

[1 mark]

less than 6 **6** **more than 6**

3 (d) (ii) Suggest what the concentration of urea in the blood will be **after** the dialysis treatment.

Draw a ring around the correct answer.

[1 mark]

less than 28 **28** **more than 28**

3 (d) (iii) Give a reason for your answer to part **(d)(ii)**.

[1 mark]

.....

.....

Do not write outside the box

3 (e) (i) Some patients have kidney transplants. Transplanted kidneys may be rejected by the body.

Use the correct answer from the box to complete the sentence.

[1 mark]

antibodies	hormones	tissues

Transplanted kidneys have proteins on the surface of the cells. These proteins may be attacked by the patient's ..... .

3 (e) (ii) It is important to prevent rejection of a new kidney.

Which **one** of the following helps to prevent the kidney from being rejected?

[1 mark]

Tick (✓) **one** box.

Giving the patient antibodies ☐

Giving the patient painkillers ☐

Tissue typing the donor kidney ☐

8

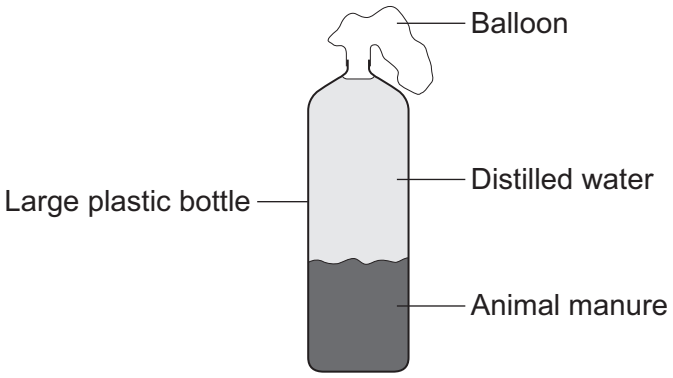
Turn over for the next question

Do not write outside the box

4 Some students set up biogas generators to find out which type of animal manure produced the most biogas.

Figure 3 shows the apparatus they used.

Figure 3



The students:
Step 1: Put some cow manure into the plastic bottle
Step 2: Filled the bottle with distilled water
Step 3: Attached a balloon over the top of the bottle
Step 4: Put the bottle in a warm room for 10 days
Step 5: Measured the diameter of the balloon on day 10
Step 6: Repeated steps 1 to 5 using each type of animal manure.

The students' results are shown in **Table 2**.

Table 2

Type of animal manure	Diameter of balloon on day 10 in cm
Cow	29
Horse	26
Sheep	34
Pig	32

Do not write outside the box

4 (a) What is the main gas found in biogas?

[1 mark]

.....

4 (b) The students concluded that sheep manure is the best type of manure to use in a biogas generator.

A teacher told the students that the design of their investigation meant that their conclusion might **not** be correct.

Suggest **two** reasons why.

[2 marks]

1 .....

.....

2 .....

.....

4 (c) Another student suggested that adding potato to the manure would increase the amount of biogas produced.

Why would adding potato increase the amount of biogas produced?

[1 mark]

Tick (✓) **one** box.

The potato contains a lot of carbohydrate. ☐

The potato contains a lot of protein. ☐

The potato contains a lot of water. ☐

4

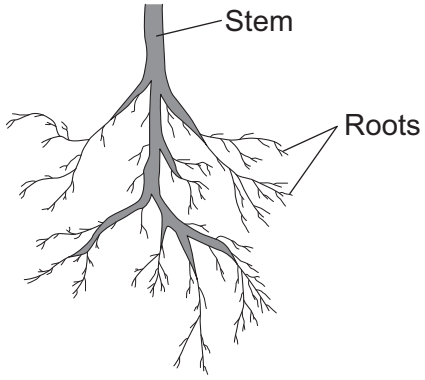
Turn over for the next question

Do not write outside the box

5 Plants need different substances to survive.

Figure 4 shows the roots of a plant.

Figure 4



5 (a) (i) Mineral ions are absorbed through the roots.

Name **one** other substance absorbed through the roots.

[1 mark]

.....

5 (a) (ii) The plant in **Figure 4** has a higher concentration of mineral ions in the cells of its roots than the concentration of mineral ions in the soil.

Which **two** statements correctly describe the absorption of mineral ions into the plant's roots?

[2 marks]

Tick (✓) **two** boxes.

The mineral ions are absorbed by active transport. ☐

The mineral ions are absorbed by diffusion. ☐

The mineral ions are absorbed down the concentration gradient. ☐

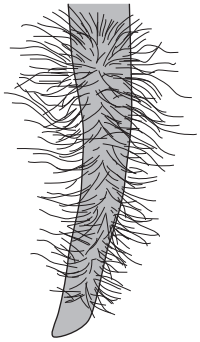
The absorption of mineral ions needs energy. ☐

Do not write outside the box

5 (a) (iii) The plant in **Figure 4** has roots adapted for absorption.

Figure 5 shows a magnified part of a root from **Figure 4**.

Figure 5



Describe how the root in **Figure 5** is adapted for absorption.

[2 marks]

.....

.....

.....

.....

5 (b) The leaves of plants have stomata.

What is the function of the stomata?

[1 mark]

.....

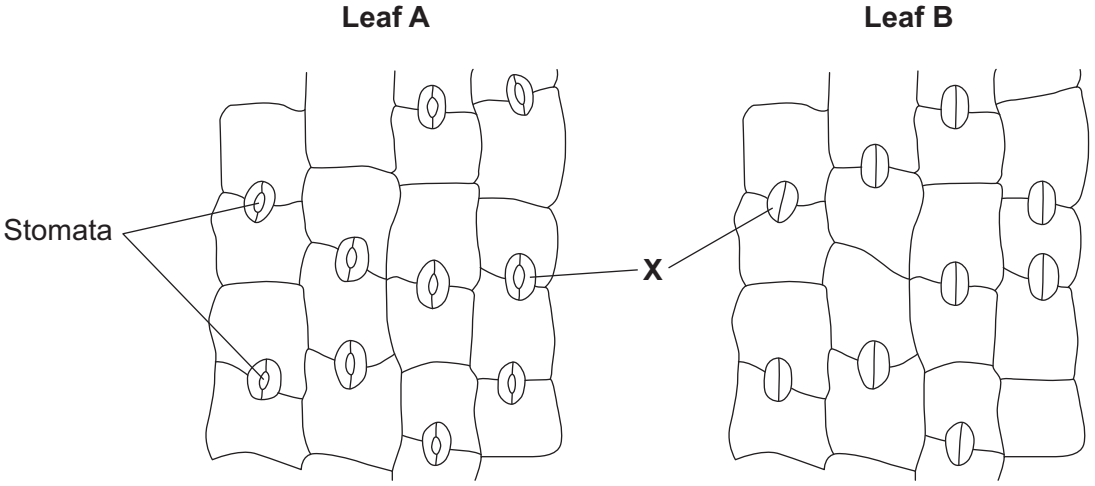
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Question 5 continues on the next page

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5 (c) **Figure 6** shows the underside of two leaves, **A** and **B**, taken from a plant in a man's house.

Figure 6



5 (c) (i) In **Figure 6**, the cells labelled **X** control the size of the stomata.

What is the name of the cells labelled **X**?

[1 mark]

Tick (✓) **one** box.

Guard cells ☐

Phloem cells ☐

Xylem cells ☐

5 (c) (ii) Describe how the appearance of the stomata in leaf **B** is different from the appearance of the stomata in leaf **A**.

[1 mark]

.....

.....

5 (c) (iii) The man forgets to water the plant.

What might happen to the plant in the next few days if the stomata stay the same as shown in leaf **A** in **Figure 6**?

[1 mark]

.....

.....

9

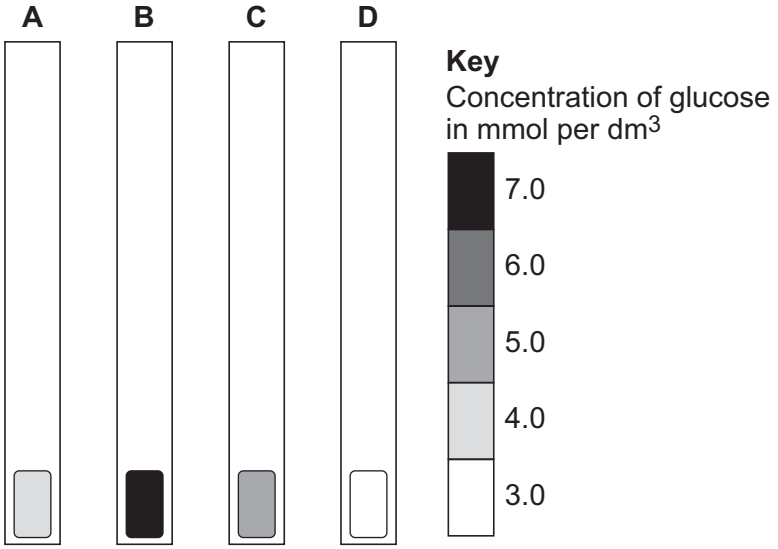
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6 Blood glucose concentration in humans must be kept between 4.4 and 6.1 mmol per dm^3.

Four students, **A**, **B**, **C** and **D**, tested their blood glucose concentration with glucose testing strips.

Figure 7 shows the results of their tests and the key from the test strip bottle.

Figure 7



6 (a) (i) Which student, **A**, **B**, **C** or **D**, has diabetes and has eaten a large piece of cake? ☐

[1 mark]

6 (a) (ii) Which student, **A**, **B**, **C** or **D**, is in most need of eating carbohydrates? ☐

[1 mark]

6 (a) (iii) Which student, **A**, **B**, **C** or **D**, has a healthy blood glucose concentration? ☐

[1 mark]

6 (b) (i) Name the hormone that people with diabetes inject to prevent their blood glucose concentration from becoming too high.

[1 mark]

.....

6 (b) (ii) Blood glucose concentration is monitored in the body.

Which organ monitors blood glucose concentration?

Draw a ring around the correct answer.

[1 mark]

brain **liver** **pancreas**

5

Do not write outside the box

7 The world population is increasing and the need for food is increasing.

Mycoprotein is a high-protein food made in fermenters using the organism *Fusarium*.

The process takes only a few weeks to produce a large amount of food.

7 (a) (i) What type of organism is *Fusarium*?

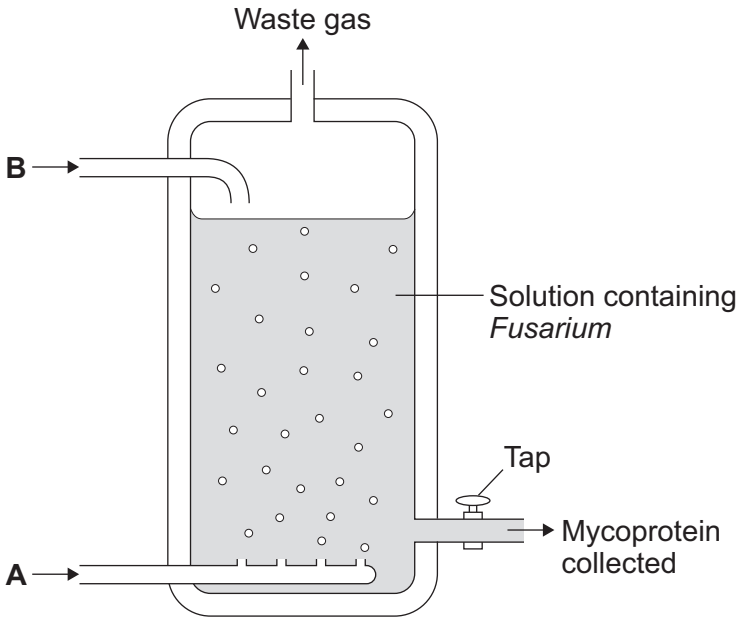
Draw a ring around the correct answer.

[1 mark]

bacterium **fungus** **virus**

Figure 8 shows a fermenter used in mycoprotein production.

Figure 8



7 (a) (ii) *Fusarium* makes mycoprotein. *Fusarium* respires aerobically.

Suggest which gas is added to the fermenter at point **A**.

[1 mark]

.....

7 (a) (iii) Another substance is added to the fermenter at point **B**. This substance is used in aerobic respiration.

Name this substance.

[1 mark]

.....

Do not write outside the box

7 (b) People need to eat protein to grow and to be healthy.

Some people think that it would be an advantage to get more food from mycoprotein and less from farming animals.

Suggest **two** possible advantages of getting more food from mycoprotein.

[2 marks]

1 .....

.....

2 .....

.....

5

Turn over for the next question

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There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

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8 The circulatory system transports substances such as glucose and oxygen around the body.

8 (a) Name **two** other substances that the circulatory system transports around the body.

[2 marks]

1 .....

2 .....

8 (b) (i) Blood is a tissue. Blood contains red blood cells and white blood cells.

Name **two** other components of blood.

[2 marks]

1 .....

2 .....

8 (b) (ii) The heart is part of the circulatory system.

What type of tissue is the wall of the heart made of?

[1 mark]

.....

Question 8 continues on the next page

Do not write outside the box

8 (c) **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Every year, many patients need to have heart valve replacements.

Figure 9 gives information about two types of heart valve.

Figure 9

Living human heart valve	Cow tissue heart valve
• It has been used for transplants for more than 12 years. • It can take many years to find a suitable human donor. • It is transplanted during an operation after a donor has been found. • During the operation, the patient's chest is opened and the old valve is removed before the new valve is transplanted.	• It has been used since 2011. • It is made from the artery tissue of a cow. • It is attached to a stent and inserted inside the existing faulty valve. • A doctor inserts the stent into a blood vessel in the leg and pushes it through the blood vessel to the heart.

A patient needs a heart valve replacement. A doctor recommends the use of a cow tissue heart valve.

Give the advantages and disadvantages of using a cow tissue heart valve compared with using a living human heart valve.

Use information from **Figure 9** and your own knowledge in your answer.

[6 marks]

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11

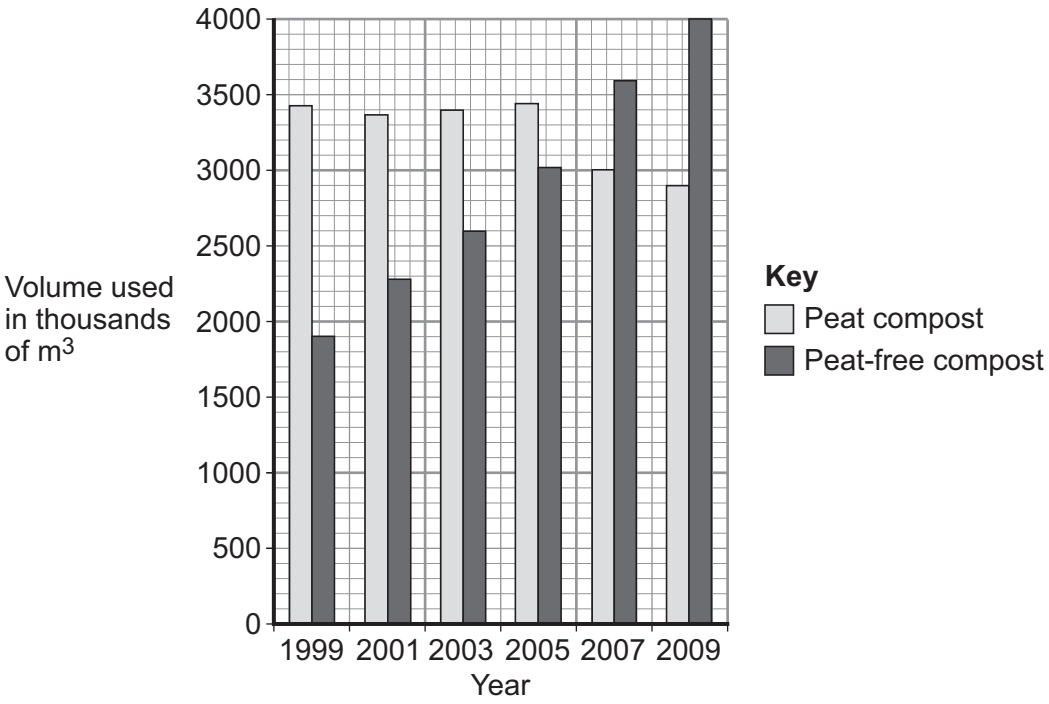
Turn over for the next question

Do not write outside the box

9 Human activities have many effects on our ecosystem.

Figure 10 shows the volume of peat compost and peat-free compost used in gardening from 1999 to 2009.

Figure 10



9 (a) Describe the trends shown in **Figure 10**.

[2 marks]

.....

.....

.....

.....

.....

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9 (b) What effect does the destruction of peat bogs have on the gases in the atmosphere?

[1 mark]

.....

.....

9 (c) Deforestation is also damaging ecosystems.

Describe **one** effect of deforestation on ecosystems.

[1 mark]

.....

.....

4

END OF QUESTIONS

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GCSE

Biology

BL3FP

Mark scheme

4401

June 2015

Version: 1.0 Final

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

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Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

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Quality of Written Communication and levels marking

In Question 8(c) students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Students will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	alveoli / alveolus	allow air sacs allow phonetic spelling	1	AO1 312a
1(a)(ii)	any **one** from: • protection (of lungs / heart) • help you breathe / inflate lungs		1	AO1 312a
1(b)(i)	diffusion		1	AO1 312b
1(b)(ii)	capillaries		1	AO1 311h/i/k
1(b)(iii)	any **two** from: • (have many) alveoli • large surface / area • thin (exchange) surface **or** short diffusion pathway • good blood supply / many capillaries	allow air sacs accept only one / two cell(s) thick allow (kept) ventilated or maintained concentration gradient	2	AO1 321g
Total			**6**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)	any **one** from: • increased pollution • dumping waste	 allow described consequence eg vermin accept (increased) landfill accept (increased) fly tipping	1	AO1 341a
2(b)(i)	(mass of SO_2) decreases and then levels off / plateaus		1 1	AO2 341b
2(b)(ii)	2008	clear evidence of calculating 700 (000) = 1 mark	2	AO2 341
2(b)(iii)	any **one** from: • acid rain • erosion of statues / buildings • destruction of habitats • reduction in biodiversity • damage to lichen • breathing problems	ignore reference to ozone layer allow damage to plants	1	AO1 341b
2(c)	Carbon dioxide being absorbed in oceans and lakes Photosynthesis by trees		1 1	AO1 343b,342a
Total			**8**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	Lung		1	AO1 331a
3(b)	Filtering the blood		1	AO1 331c
3(c)	They will take in water and burst		1	AO2 311f,331b
3(d)(i)	6		1	AO2 331c/d/e
3(d)(ii)	less than 28		1	AO2 331c/d/e
3(d)(iii)	urea not reabsorbed **or** dialysis (fluid) has removed urea		1	AO2 331c/d/e
3(e)(i)	antibodies		1	AO1 331g/h
3(e)(ii)	Tissue typing the donor kidney		1	AO1 311i
Total			**8**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)	methane / CH_4	allow CH_4 do **not** allow CH^4 **or** ch4 or CH4	1	AO1 343c
4(b)	any **two** from: • didn't carry out repeats • only tested four types of manure • don't know the mass of manure was the same each time • inaccuracies in measuring (diameter of) balloon • bottles might have been different sizes • temperature of the room may have been different		2	AO3 343c
4(c)	The potato contains a lot of carbohydrate		1	AO1 343c
Total			**4**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	water / H_2O	accept oxygen allow H_2O do **not** allow H^2O or H2O	1	AO1 313a
5(a)(ii)	the mineral ions are absorbed by active transport the absorption of mineral ions needs energy		1 1	AO1 / AO2 311a/g, 313a
5(a)(iii)	have (many root) <u>hairs</u> (which) give a large surface area (for absorption)		1 1	AO2 313b
5(b)	carbon dioxide in **or** oxygen out **or** control water loss	accept gas exchange ignore gases in and out ignore gain / lose water	1	AO1 313c
5(c)(i)	guard cells		1	AO1 313e
5(c)(ii)	(stomata are) closed	allow there is no gap / space	1	AO2 313d/e
5(c)(iii)	plant will wilt / droop	ignore die	1	AO3 313d/e
Total			**9**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	**B**		1	AO2 333a
6(a)(ii)	**D**		1	AO2 333a
6(a)(iii)	**C**		1	AO2 333a
6(b)(i)	insulin		1	AO1 333a
6(b)(ii)	pancreas		1	AO1 333a
Total			**5**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	fungus		1	AO1 344d
7(a)(ii)	oxygen / O_2	accept air accept O_2 do **not** allow O^2/ O / O2	1	AO2 344d
7(a)(iii)	glucose (syrup)	allow carbohydrate / sugar ignore food / starch allow oxygen if oxygen / air not given in (a)(ii)	1	AO1 344d
7(b)	any **two** from: • quicker • suitable for vegetarians • cheaper • more efficient **or** less land / methane	ignore high in protein ignore sustainability unqualified ignore less pollution unqualified allow less animals harmed / killed allow food chain is shorter **or** has less trophic levels allow less energy lost (from the food chain) do **not** allow no energy lost allow low(er) in calories (than some meat) allow low(er) in fat / healthier (than some meat) allow source of fibre / prevent constipation	2	AO3 344a/d
Total			**5**	

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	any **two** from: • carbon dioxide / CO_2 • urea • protein • water / H_2O • hormones / insulin	ignore food / waste / alcohol / drugs / enzymes ignore glucose and oxygen allow **two** correct hormones for 2 marks allow **two** correct food components for 2 marks allow antibodies allow antitoxins	2	AO1 321a,322b /c,331a
8(b)(i)	plasma platelets		1 1	AO1 322a
8(b)(ii)	(cardiac) muscle	allow muscular	1	AO1 321b

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<table>
<tr><th>Question</th><th>Answers</th><th>Extra Information</th><th>Mark</th><th>AO / Spec. Ref</th></tr>
<tr><td>8(c)</td><td></td><td></td><td>6</td><td>AO3
32, 321f</td></tr>
<tr><td colspan="4">Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a ‘best-fit’ approach to the marking.</td></tr>
<tr><td>0 marks</td><td>Level 1 (1–2 marks)</td><td>Level 2 (3–4 marks)</td><td>Level 3 (5–6 marks)</td></tr>
<tr><td>No relevant content</td><td>There is a description of at least one advantage of the cow tissue valve
or
a description of at least one disadvantage of the cow tissue valve.</td><td>There is a description of at least one advantage of the cow tissue valve
and
at least one disadvantage of the cow tissue valve.</td><td>There is a description of the advantages and disadvantages of the cow tissue valve
or
a description of several advantages of the cow tissue valve and at least one disadvantage.</td></tr>
<tr><td colspan="2">examples of the points made in the response
Advantages of cow tissue valve:
• abundant supply of cows
• so shorter waiting time
• no need for tissue typing
• quicker operation
• less invasive or shorter recovery time
• cheaper operation costs
• less operation / anaesthetic risks

Disadvantages of cow tissue valve:
• made from cow so possible objections on religious grounds
• new procedure so could be unknown risks
• risks of using a stent eg. blood clots, stent breaking or valve tearing
• not proven as a long term treatment
• may be rejected</td><td colspan="2">extra information
ignore information copied directly from the table without value added

ignore can take many years to find a suitable human donor

ignore ethical arguments

allow possible transfer of disease from cow</td></tr>
</table>

Total			11

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Question	Answers	Extra information	Mark	AO / Spec. Ref.
9(a)	any **two** from: • (volume of) peat compost has been steady and then declined **or** volume of peat compost has declined since 2005 • (volume of) peat-free compost has increased (since 1999) • (volume of) peat is higher than peat-free until 2005, then peat-free compost is higher (than peat) • total volume of peat and peat-free compost has increased	allow 2007 instead of 2005 allow 2007	2	AO2 342d
9(b)	increases carbon dioxide (in the atmosphere)	ignore methane	1	AO1 342
9(c)	any **one** from: • reduces biodiversity • destruction of habitats • disruption of food chains		1	AO1 342b
Total			**4**	

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Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2014

Biology
Unit Biology B3

BL3FP

F

Tuesday 13 May 2014 9.00 am to 10.00 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 1 hour

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 7 should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

A

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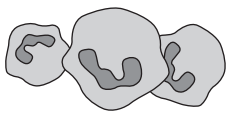
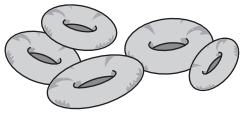
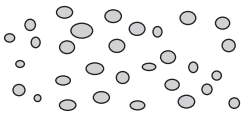
Do not write outside the box

Answer **all** questions in the spaces provided.

1 (a) (i) Blood is part of the circulatory system.

Draw **one** line from each part of the blood to its correct function.

[3 marks]

Part of the blood	Function
 White blood cells	carry glucose around the body
 Red blood cells	carry oxygen around the body
 Platelets	help the blood to clot
	destroy microorganisms

1 (a) (ii) Name **one** waste product that is transported by the blood plasma.

[1 mark]

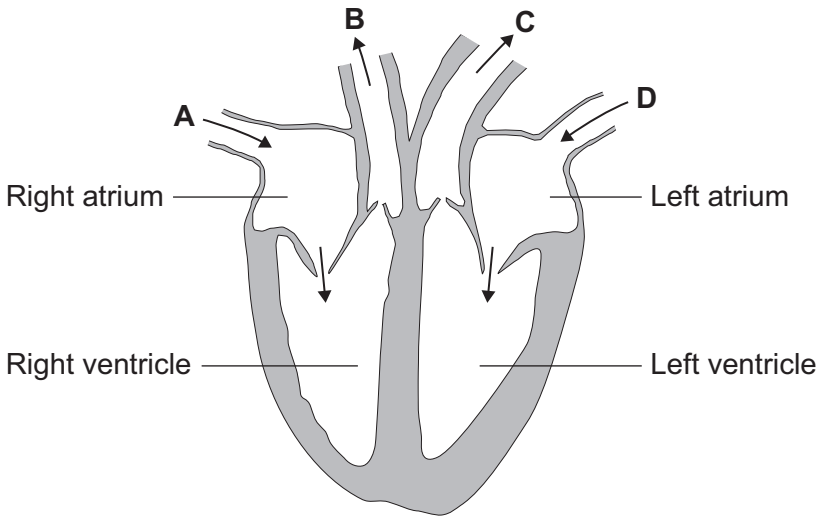
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1 (b) The heart is also part of the circulatory system.

Figure 1 shows a section through the human heart.

Figure 1



1 (b) (i) Which arrow, **A**, **B**, **C** or **D**, shows blood leaving the heart in the pulmonary artery to go to the lungs? ☐

[1 mark]

1 (b) (ii) Which arrow, **A**, **B**, **C** or **D**, shows blood from the lungs entering the heart in the pulmonary vein? ☐

[1 mark]

1 (b) (iii) Valves in the circulatory system make sure blood only travels in one direction.

Name the type of blood vessel that has valves.

[1 mark]

.....

Question 1 continues on the next page

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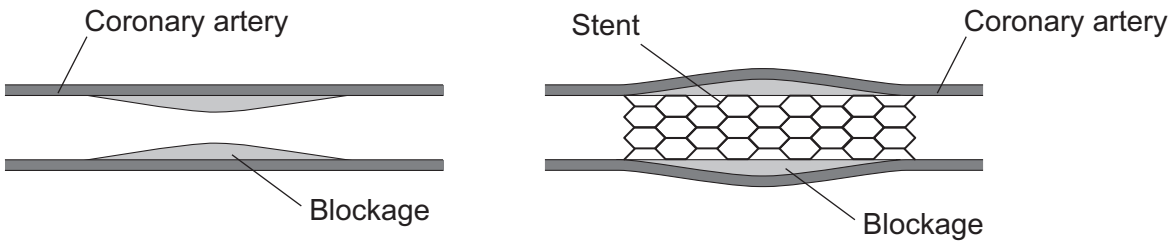
1 (c) A person's coronary artery has become narrower.

The person has a heart attack.

A doctor puts a stent into the person's coronary artery.

Figure 2 shows a stent inside a coronary artery.

Figure 2



1 (c) (i) How does the stent help to prevent another heart attack?

Give **one** way.

[1 mark]

.....

.....

Do not write outside the box

1 (c) (ii) **Figure 3** shows a surgeon putting a stent into a patient.

Figure 3



The surgeon puts the stent into an artery in the leg. He moves the stent through the artery to the coronary artery.

Suggest **two** possible risks of this operation.

[2 marks]

1 .....

.....

2 .....

.....

10

Turn over for the next question

Do not write outside the box

2 Human body temperature must be kept within narrow limits.

Figure 4 shows a cyclist in a race.

Figure 4



2 (a) Use the correct answer from the box to complete each sentence.

[3 marks]

blood	**brain**	**kidney**	**sweat**	**urine**

The cyclist's body temperature is monitored by a centre in the ..... .

This centre is sensitive to the temperature of the cyclist's ..... .

If the cyclist's body temperature increases, his body increases

the production of ..... .

Do not write outside the box

2 (b) (i) Cyclists drink sports drinks after a race.

Table 1 shows the ratio of glucose to ions in three sports drinks, **A**, **B** and **C**.

Table 1

	Sports drink		
	A	**B**	**C**
Ratio of glucose (g per dm^3) to ions (mg per dm^3)	15:14	12:1	2:7

The closer this ratio of glucose to ions is to 1:1 in a sports drink, the faster the body replaces water.

Which sports drink, **A**, **B** or **C**, would replace water fastest in an athlete? ☐

[1 mark]

2 (b) (ii) Why should sports drinks contain ions?

[1 mark]

.....

.....

2 (b) (iii) Why should a person with diabetes **not** drink too much sports drink?

[1 mark]

.....

.....

6

Turn over for the next question

Do not write outside the box

3 Substances can move into cells and out of cells.

3 (a) Draw a ring around the correct answer to complete each sentence.

[2 marks]

Water moves into cells and out of cells by

- active transport.
- osmosis.
- reabsorption.

The water moves through a

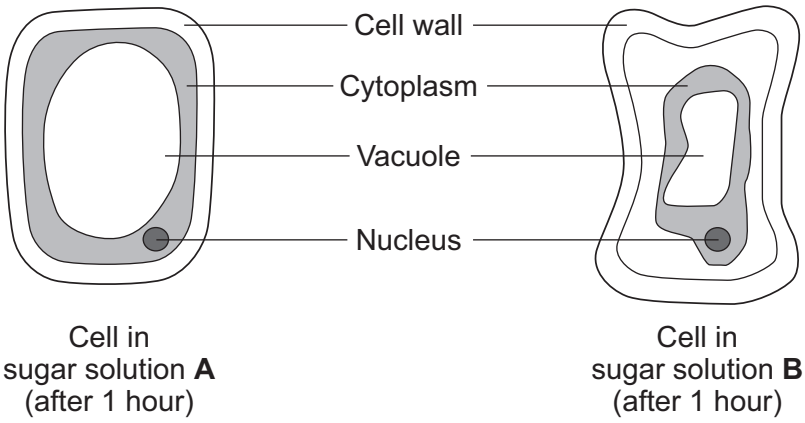
- freely permeable
- non-permeable
- partially permeable

membrane.

3 (b) Students put plant cells into two different strengths of sugar solutions, **A** and **B**.

Figure 5 shows what the cells looked like after 1 hour.

Figure 5



3 (b) (i) Describe **two** ways in which the cell in sugar solution **B** is different from the cell in sugar solution **A**.

[2 marks]

1 .....

.....

2 .....

.....

Do not write outside the box

3 (b) (ii) A student put red blood cells into water.

Suggest what would happen to the cells.

[1 mark]

.....

.....

.....

3 (c) In the human body, glucose is absorbed into the blood from the small intestine.

The small intestine contains many villi.

Which **two** of the following help the absorption of glucose in the small intestine?

Tick (✓) **two** boxes.

[2 marks]

Villi have a cell wall. ☐

Villi are covered in thick mucus. ☐

Villi give the small intestine a large surface area. ☐

Villi have many blood capillaries. ☐

7

Turn over for the next question

Do not write outside the box

4 Substances are transported through plants.

4 (a) Use the correct answer from the box to complete each sentence.

capillary	**guard cells**	**phloem**
stomata	**transpiration**	**xylem**

4 (a) (i) Water is transported from the roots to the stem of a plant

in the ..... .

[1 mark]

4 (a) (ii) Dissolved sugars are transported through the plant

in the ..... .

[1 mark]

4 (a) (iii) Movement of water through the plant is called the

..... stream.

[1 mark]

4 (a) (iv) Water vapour moves out of the plant through pores

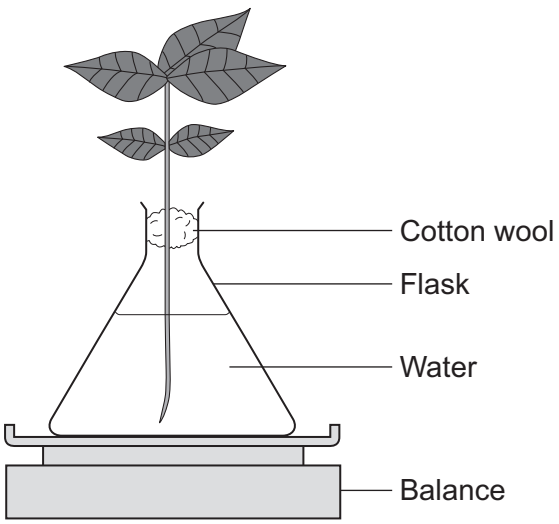
called ..... .

[1 mark]

4 (b) Students investigated the effect of different conditions on water loss from leaves.

The apparatus is shown in **Figure 6**.

Figure 6



Do not write outside the box

The students set up four flasks, **A**, **B**, **C** and **D**.

The students:

- used the same size plant shoot in each flask
- recorded the mass of the flask and plant shoot at the start of each experiment
- left each flask and plant shoot in different conditions
- recorded the mass of each flask and plant shoot after 2 hours.

Table 2 shows the conditions that flasks **A**, **B**, **C** and **D** were left in for 2 hours.

Table 2

Flask	Temperature in °C	Fan or no fan
A	20	No fan
B	20	Fan
C	35	No fan
D	35	Fan

4 (b) (i) Suggest why the students used cotton wool in each flask.

[1 mark]

.....

.....

4 (b) (ii) The use of the same size of plant shoot made the investigation a fair test.

Explain why.

[2 marks]

.....

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.....

.....

.....

Question 4 continues on the next page

Do not write outside the box

4 (b) (iii) **Table 3** shows the students' results.

Table 3

Flask	Conditions		Mass at the start in grams	Mass after 2 hours in grams	Mass of water lost in 2 hours in grams
	Temperature in °C	Fan or no fan			
A	20	No fan	150.0	148.1	1.9
B	20	Fan	152.0	148.5	3.5
C	35	No fan	149.0	145.9	3.1
D	35	Fan	150.0	145.5	

What mass of water was lost by the plant shoot in flask **D**?

[1 mark]

.....

.....

..... grams

4 (b) (iv) Suggest what conclusion can be made about the effect of temperature on water loss from the plant shoot.

[1 mark]

.....

.....

.....

4 (b) (v) Suggest what conclusion can be made about the effect of the fan on water loss from the plant shoot.

[1 mark]

.....

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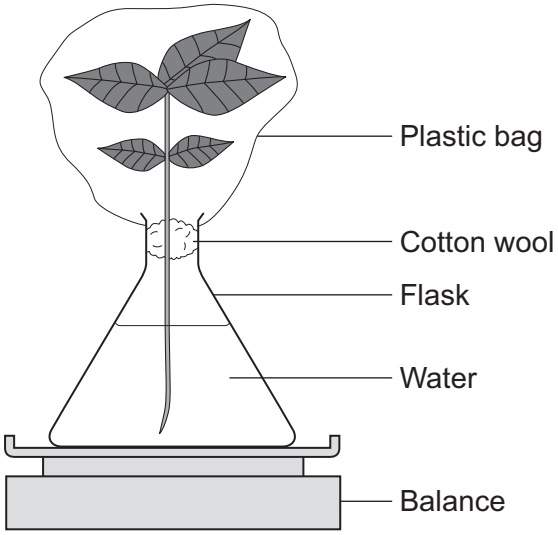
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Do not write outside the box

4 (c) The students carried out another experiment at 20 °C, with no fan.

The students used the apparatus in **Figure 7**.

Figure 7



In this experiment, the students:

- recorded the mass of the flask and plant shoot before tying the plastic bag around the plant shoot
- removed the bag after 2 hours and recorded the mass again.

4 (c) (i) What mass of water would be lost from the plant shoot in 2 hours?

Draw a ring around the correct answer.

[1 mark]

0.3 g **1.9 g** **3.9 g**

4 (c) (ii) Give a reason for your answer to part **(c)(i)**.

[1 mark]

.....

.....

.....

12

Turn over ▶

Do not write outside the box

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

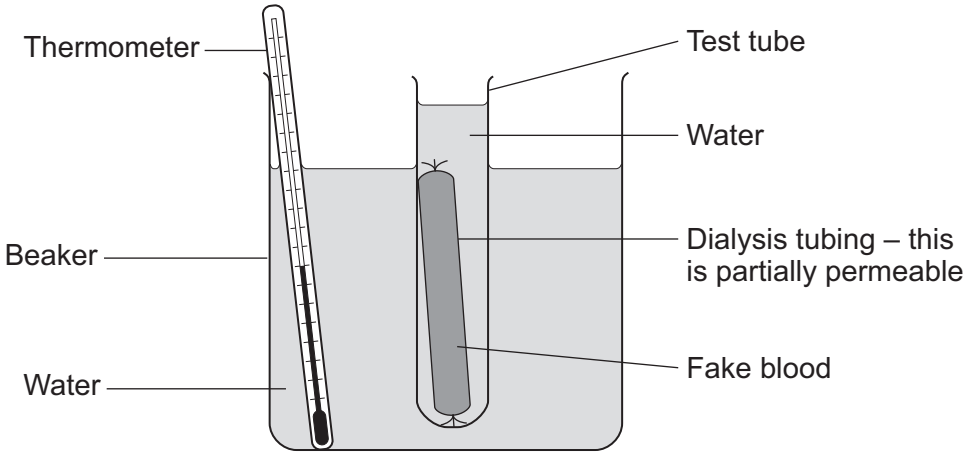
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5 A person's kidneys stop working. The person may be treated using a dialysis machine.

Some students made a model of a dialysis machine.

Figure 8 shows the students' model.

Figure 8



The fake blood contained:

- water
- sodium ions
- urea
- glucose
- protein.

5 (a) (i) Suggest why the students kept the water in the beaker at 37 °C.

[1 mark]

.....

.....

Question 5 continues on the next page

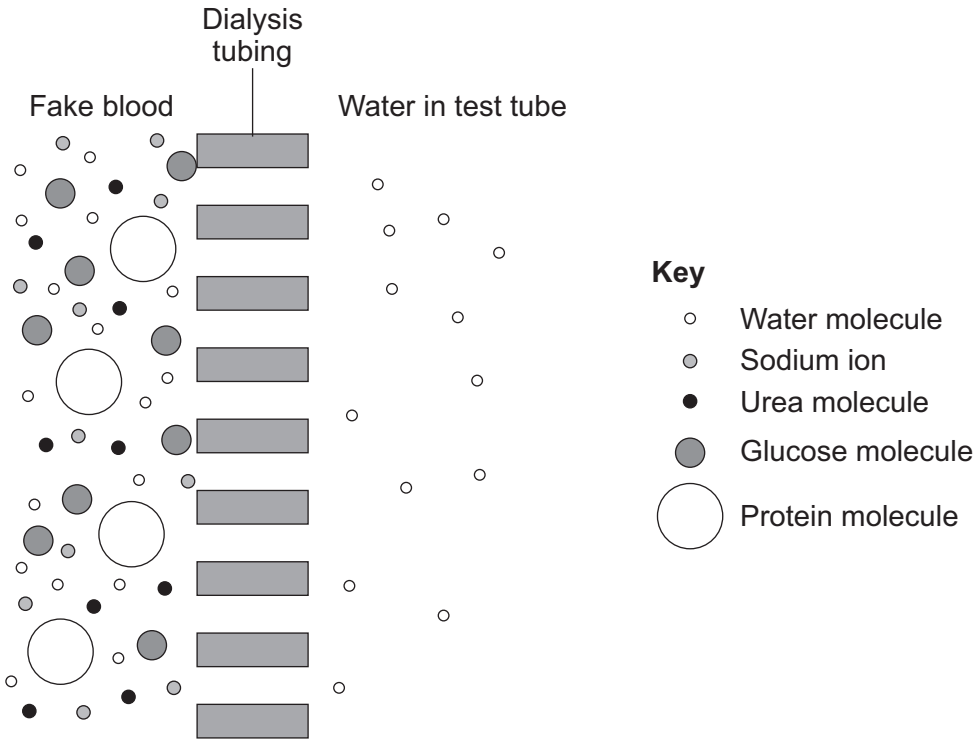
Turn over ▶

Do not write outside the box

5 (a) (ii) The dialysis tubing separates the fake blood from the water in the test tube.

Figure 9 shows the fake blood, the dialysis tubing and the water in the test tube.

Figure 9



After 1 hour, the students tested the water in the test tube to see which substances had filtered through from the fake blood.

Name **one** substance that the students would find in the water in the test tube after 1 hour.

[1 mark]

.....

5 (a) (iii) Give a reason for your answer to part **(a)(ii)**.

[1 mark]

.....

.....

.....

Do not write outside the box

5 (a) (iv) In hospitals, dialysis machines use dialysis fluid, not pure water.

Dialysis fluid contains the same concentration of useful substances as the blood.

Which substance is at the same concentration in dialysis fluid as in blood?

Tick (✓) **one** box.

[1 mark]

Glucose ☐

Insulin ☐

Oxygen ☐

5 (b) When the kidneys stop working, the person can be treated by a continuous process called CPD.

In CPD:

- dialysis fluid is put into the abdomen
- the fluid is changed four times a day at home
- changing the fluid takes about 45 minutes.

Suggest **two** advantages of having CPD instead of treatment on a dialysis machine.

[2 marks]

1 .....

.....

2 .....

.....

6

Turn over for the next question

Do not write outside the box

6 The number of fish in the oceans is decreasing.

Table 4 shows information about the mass of fish caught by UK fishermen between 2002 and 2010.

Table 4

Year	Mass of fish caught by UK fishermen from ALL SOURCES in thousands of tonnes	Mass of fish caught by UK fishermen from SUSTAINABLE SOURCES in thousands of tonnes	Percentage of fish caught from sustainable sources
2002	690.0	427.8	62.0
2004	655.0	396.6	60.5
2006	619.0	386.0	62.4
2008	589.0	436.1	74.0
2010	611.5	465.0	

6 (a) (i) Calculate the percentage of fish caught from sustainable sources in 2010.

[2 marks]

.....

.....

.....

..... %

Do not write outside the box

6 (a) (ii) Describe the pattern in **Table 4** for the mass of fish caught from all sources.

Suggest reasons for this pattern.

[4 marks]

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6 (a) (iii) Suggest why the percentage of fish caught from sustainable sources is increasing.

[1 mark]

.....

.....

6 (b) Give **two** methods of maintaining fish stocks at a sustainable level.

[2 marks]

1 .....

2 .....

Question 6 continues on the next page

Do not write outside the box

6 (c) **Figure 10** shows a fish farm.

Figure 10



In a fish farm, large numbers of fish are grown in cages in the sea.

Why do fish in the cages grow faster than fish of the same species that are free in the sea?
You should refer to energy in your answer.

[4 marks]

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13

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7 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Deforestation affects the environment.

Deforestation is causing a change in the amounts of different gases in the atmosphere. This change causes global warming and climate change.

Figure 11 shows an area of deforestation.

Figure 11



Give the reasons why deforestation is taking place.

Describe how deforestation is causing the change in the amounts of different gases in the atmosphere.

[6 marks]

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END OF QUESTIONS

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AQA Qualifications

GCSE

BIOLOGY

BL3FP

Mark scheme

4401

June 2014

Version: 1.0 Final

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Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Assessment Writer.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available from aqa.org.uk

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives and specification content that each question is intended to cover.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening and underlining

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

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Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Quality of Written Communication and levels marking

In Question 7 students are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Students will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

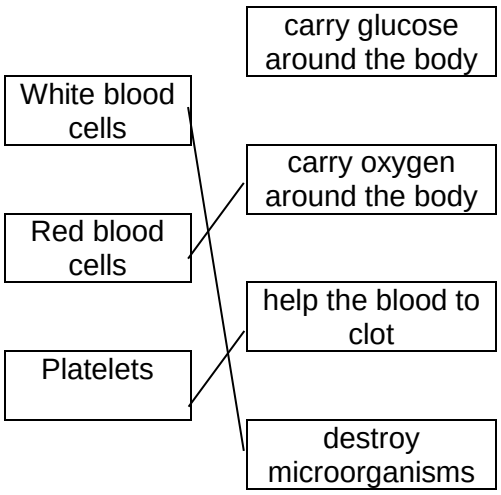
- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

Question	Answers	Extra information	Mark	AO / spec ref.
1(a)(i)		one mark for each line extra line negates a mark	3	AO1 3.2.2c, d,e
1(a)(ii)	any **one** from: • carbon dioxide / CO_2 • urea	do **not** allow urine ignore water ignore ions	1	AO1 3.2.2b
1(b)(i)	B		1	AO1 3.2.1d
1(b)(ii)	D		1	AO1 3.2.1d
1(b)(iii)	vein	accept correct named examples	1	AO1 3.2.1e
1(c)(i)	any **one** from: • keeps artery / blood vessel open **or** widens artery / blood vessel • allows (more) blood to heart / cardiac muscle • (allows) blood to flow more easily • allows (more) oxygen to heart / cardiac muscle		1	AO1 3.2.1f
1(c)(ii)	any **two** from: • bleeding • infection • damaging blood vessels • damaging the heart • risk from anaesthetic	allow blood clots	2	AO3 3.2
Total			10	

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Question	Answers	Extra information	Mark	AO / spec ref.
2(a)	brain blood sweat	in correct order only	1 1 1	AO1 3.3.2a, b,c
2(b)(i)	A		1	AO3 3.1.1e
2(b)(ii)	to replace ions lost (in sweat)	accept salts allow named examples, eg. prevent cramps	1	AO1 3.1.1e
2(b)(iii)	any **one** from: • there is too much glucose / sugar in the sports drink • they shouldn't have too much glucose / blood sugar • it would cause their blood glucose / sugar to rise (too high)		1	AO2 3.1.1d, 3.3.3d
Total			6	

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Question	Answers	Extra information	Mark	AO / spec ref.
3(a)	osmosis partially permeable		1 1	AO1 3.1.1b
3(b)(i)	any **two** from: • vacuole is small(er) • cytoplasm has shrunk • gap between cytoplasm and cell wall • cell wall curves inwards • the (cell) membrane has moved away from the wall	allow correct answers in terms of A allow cytoplasm is smaller allow cell B is flaccid or cell A is turgid	2	AO2 3.1.1
3(b)(ii)	any **one** from: • water will move / diffuse in • (cells) will swell • (cells) will burst	ignore turgid	1	AO2 3.1.1c
3(c)	villi give the small intestines a large surface area villi have many blood capillaries		1 1	AO1 3.1.1k,j,l
Total			7	

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Question	Answers	Extra information	Mark	AO / spec ref.
4(a)(i)	xylem		1	AO1 3.2.3a
4(a)(ii)	phloem		1	AO1 3.2.3a
4(a)(iii)	transpiration		1	AO1 3.2.3a
4(a)(iv)	stomata		1	AO1 3.1.3d
4(b)(i)	any **one** from: • reduce / prevent evaporation of water from flask • holds plant shoot in place • prevent damage to the plant		1	AO2 3.2.3
4(b)(ii)	same surface area **or** number of leaves from which (the same amount of) water evaporates	(because if they used larger / smaller size shoots) there would be a larger / smaller surface area **or** a larger/ smaller number of leaves allow same number of stomata (and therefore) more / less water would escape allow from which water escapes	1 1	AO2 3.2.3
4(b)(iii)	4.5	look for answer written in table	1	AO2 3.2.3
4(b)(iv)	increasing temperature / heat increases (rate of) water loss / evaporation		1	AO3 3.2.3
4(b)(v)	having moving air / a fan increases (rate of) water loss / evaporation		1	AO3 3.2.3
4(c)(i)	0.3 g		1	AO2 3.2.3
4(c)(ii)	plastic bag reduces air flow across leaves **or** air is humid around the leaves	allow plastic bag stops water (vapour) leaving allow air (in plastic bag) becomes saturated (with water)	1	AO3 3.2.3
Total			12	

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Question	Answers	Extra information	Mark	AO / spec ref.
5(a)(i)	(37C is the same as human) body temperature		1	AO2 3.3.1
5(a)(ii)	any **one** from: • urea • glucose • sodium	ignore water	1	AO2 3.3.1f
5(a)(iii)	(as they are) small enough to pass through (the membrane)	allow because there is a high concentration in the fake blood and a low concentration in the water (so will diffuse across)	1	AO2 3.3.1f
5(a)(iv)	glucose		1	AO1 3.3.1f
5(b)	any **two** from: • don't have to go to hospital **or** done at home rather than hospital • less effect on lifestyle / can be mobile • always filtering urea out • don't need a medical professional (to do it for you)	continuous is insufficient allow takes a shorter time allow does not have to be connected to blood vessels ignore 'less painful'	2	AO3 3.3
Total			6	

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Question	Answers	Extra information	Mark	AO / spec ref.
6(a)(i)	76.0 / 76	correct answer with or without working gains 2 marks allow 76.04 for 2 marks allow 76.04 with extra decimal places eg 76.042 for 1 mark $\frac{465}{611.5}$ for 1 mark	2	AO2 3.4.4c
6(a)(ii)	mass of fish declines (until 2008) (due to an) increase in fishing / overfishing and then rises (until 2010) (which could be due to) quotas / net restrictions working	ignore use of numbers allow number of fish decline (until 2008) allow any reasonable suggestion, such as countries swapping quotas or restrictions on fishing during breeding seasons ignore less fishing if no other marks awarded allow 1 mark for a decrease in mass **and** an increase in mass if answer relates to sustainable fishing	1 1 1 1	AO2 / AO3 3.4.4c
6(a)(iii)	(this is due to) public awareness / demand	allow legislation / rules	1	AO3 3.4.4c
6(b)	fishing quotas / bans (small) net / mesh size	 if size of net is stated then it must be smaller if size of mesh is stated then it must be larger	1 1	AO1 3.4.4c

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6(c)	(fish) cannot move freely / as much		1	AO1 / AO2 3.4.4b
	(therefore) less <u>energy</u> loss from the fish	do **not** allow 'no energy is lost' ignore references to less heat loss though controlling body temperature ignore references to respiration	1	
	(there is) more food available / better quality food / fed more often	accept 'high-protein food (for making cells)'	1	
	(so) there is more energy for growth **or** (more food) is converted to biomass		1	
Total			13	

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Question	Answers	Extra information	Mark	AO / spec ref.
7			6	AO1 3.3.1

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	There is at least one reason for deforestation **or** an attempt at a description of at least one way deforestation is affecting the atmosphere.	There is at least one reason for deforestation **and** a description of the way deforestation is affecting one gas in the atmosphere **or** the process that causes an effect.	There are reasons for deforestation **and** a clear description of the way deforestation is affecting one gas in the atmosphere **and** the process that causes this.

examples of the points made in the response	extra information
Reasons for deforestation • timber for construction / furniture / boat building / paper production • growing plants for biofuels for motor fuel / aviation / lawnmowers • use of wood as a fuel • land for building or agriculture to provide food, such as rice fields and cattle ranching	

Effects of deforestation
• increase in carbon dioxide in atmosphere
  ○ due to burning
  ○ due to activities of microbes
  ○ less carbon dioxide taken in / locked up (by trees)
  ○ less photosynthesis
• increase in methane in atmosphere
  ○ due to rice production / cattle
	ignore references to oxygen
	
	accept explanations of the effect of water (vapour)

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Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
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7	
8	
TOTAL	

General Certificate of Secondary Education
Foundation Tier
June 2013

Biology

BL3FP

Unit Biology B3

F

Tuesday 14 May 2013 9.00 am to 10.00 am

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 1 hour

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 8(b) should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

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Answer **all** questions in the spaces provided.

1 Human activities affect the environment.

1 (a) **List A** gives four human activities.

List B gives the effect of the activities on the environment.

Draw **one** line from each human activity in **List A** to its effect on the environment in **List B**.

List A **Human activity**	**List B** **Effect on the environment**
	Adds methane to the atmosphere
Digging a new quarry	
	Pollutes hedges around fields
Spraying pesticides on crops	
	Reduces the land available for wild animals
Growing rice	
	Produces lots of litter
Driving cars that release sulfur dioxide	
	Produces acid rain

(4 marks)

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1 (b) Human activities are increasing *global warming*.

Give **two** effects of *global warming* on the environment.

1 .....

.....

2 .....

.....

(2 marks)

6

Turn over for the next question

Do not write outside the box

2 Plants exchange substances with the environment.

2 (a) Use words from the box to complete each sentence.

alveoli	**phloem**	**root hairs**	**stomata**
storage organs	**villi**	**xylem**	

2 (a) (i) Most water enters a plant through ..... .

(1 mark)

2 (a) (ii) The water is transported up the stem to the leaves in the ..... .

(1 mark)

2 (a) (iii) Carbon dioxide enters leaves through ..... .

(1 mark)

2 (a) (iv) A leaf uses the carbon dioxide to produce sugars.

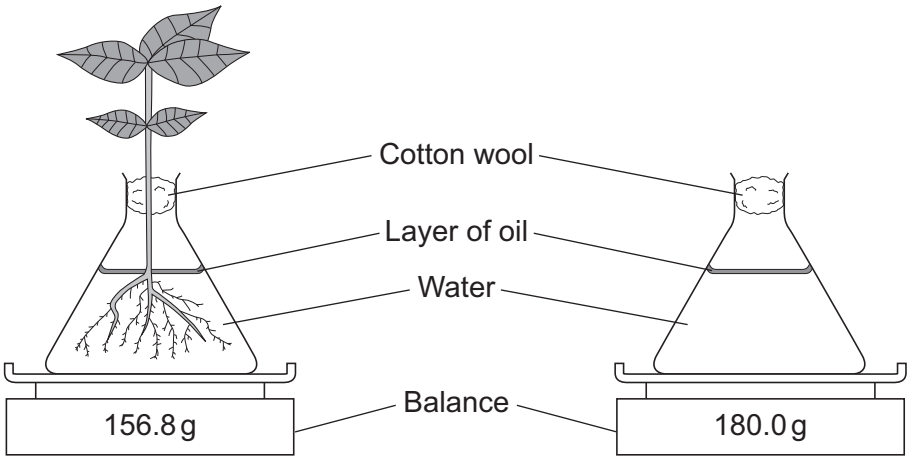
Sugars are transported to ..... through the ..... .

(2 marks)

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2 (b) A student set up the apparatus shown in the diagram.

At the start of the experiment both balances showed a mass of 180.0 g.



The diagram shows the reading on each balance 24 hours later.

2 (b) (i) Look at the mass shown on each balance.

Calculate the difference between the two masses.

.....

.....

Difference in mass = ... g

(1 mark)

2 (b) (ii) Suggest an explanation for the difference between the two masses.

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(2 marks)

8

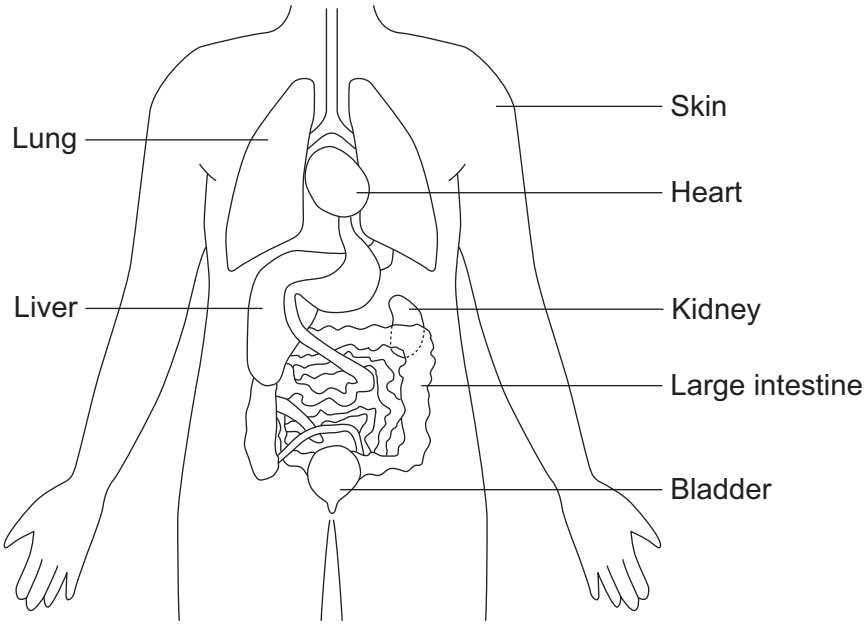
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3 The diagram shows some of the organs of the human body.



3 (a) Which organ labelled on the diagram:

3 (a) (i) produces urine .....

(1 mark)

3 (a) (ii) stores urine .....

(1 mark)

3 (a) (iii) produces urea .....

(1 mark)

3 (a) (iv) gets rid of carbon dioxide .....

(1 mark)

3 (a) (v) helps to control body temperature? .....

(1 mark)

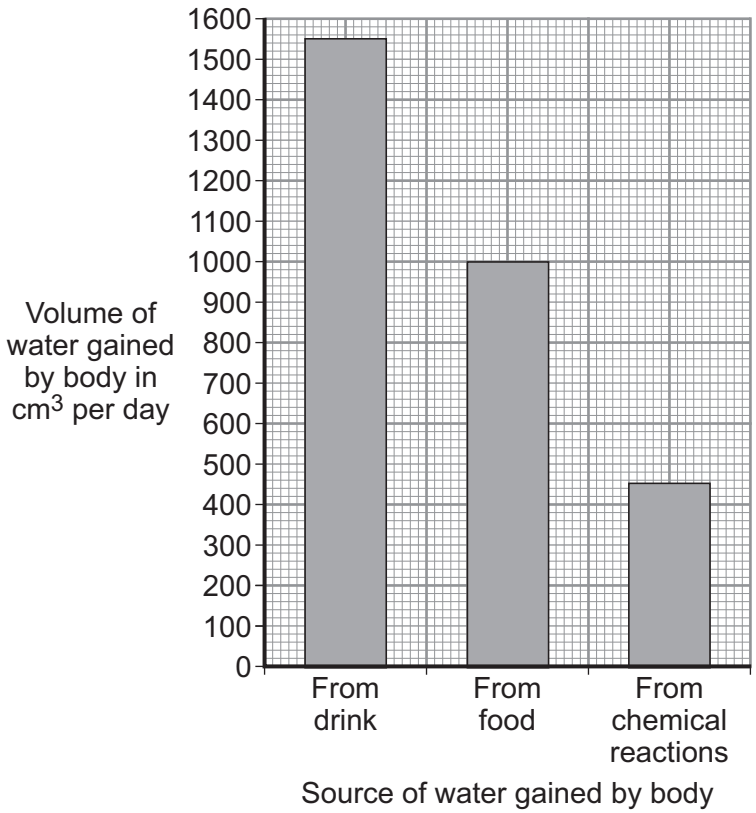
Question 3 continues on the next page

Turn over ▶

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3 (b) **Bar chart 1** shows the volume of water the human body gains each day.

Bar chart 1



3 (b) (i) Calculate the total volume of water the body gains each day.

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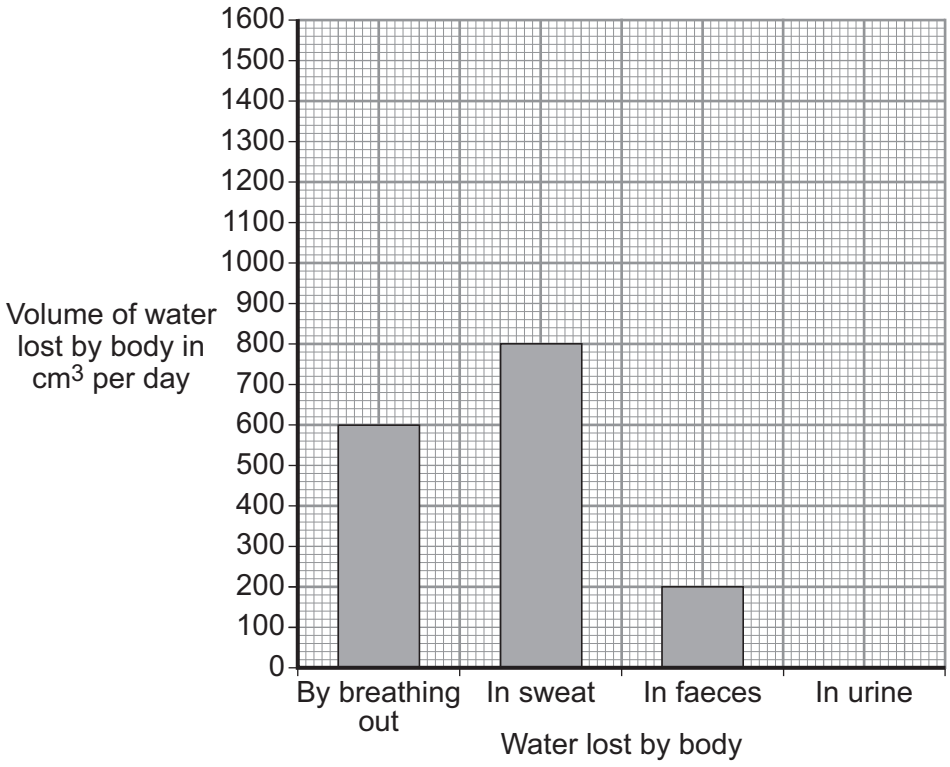
Total volume of water gained = ... cm^3

(2 marks)

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Bar chart 2 shows the volume of water lost each day by breathing out, in sweat and in faeces.

Bar chart 2



3 (b) (ii) Calculate the total volume of water lost each day by breathing out, in sweat and in faeces.

.....

.....

Volume = ... cm^3

(1 mark)

3 (b) (iii) The volume of water the body loses must balance the volume of water the body gains.

Use your answers to part **(b)(i)** and part **(b)(ii)** to calculate the volume of water lost in urine.

.....

.....

Volume of water lost in urine = ... cm^3

(1 mark)

3 (b) (iv) Plot your answer to part **(b)(iii)** on **Bar chart 2**.

(1 mark)

Turn over ▶

Do not write outside the box

3 (b) (v) After taking some types of recreational drugs, the kidneys produce very little urine.

What happens to the body cells if the kidneys produce very little urine?

.....

.....

(1 mark)

11

4 Type 1 diabetes develops when the body does not produce enough insulin.

4 (a) Which organ produces insulin?

.....

(1 mark)

4 (b) One treatment for diabetes is to inject insulin.

The table gives the properties of four different types of insulin, **A**, **B**, **C** and **D**.

Type of insulin	Time taken for the insulin to begin to work in minutes	Time taken for insulin to reach maximum concentration in the blood in minutes	Time when insulin is no longer effective in hours
A	15–20	30–90	3–4
B	30–60	80–120	4–6
C	120–240	360–600	14–16
D	240–360	600–960	18–20

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4 (b) (i) Some people with diabetes need to inject insulin just before a meal to stop a big increase in blood sugar concentration.

Which type of insulin, **A**, **B**, **C** or **D**, should these people with diabetes inject just before a meal?

.....

Give the reason for your answer.

.....

.....

(2 marks)

4 (b) (ii) A person with diabetes is told to inject type **B** insulin immediately after breakfast at 09.00.
The person with diabetes is told to then inject a second type of insulin at lunchtime at 12.00.
The second type of insulin should keep the blood sugar level under control for the rest of the 24 hours.

Which type of insulin, **A**, **C** or **D**, should this person with diabetes inject at lunchtime?

.....

Give the reason for your answer.

.....

.....

(2 marks)

4 (b) (iii) Apart from injecting insulin, give **one** other way in which Type 1 diabetes can be controlled.

.....

(1 mark)

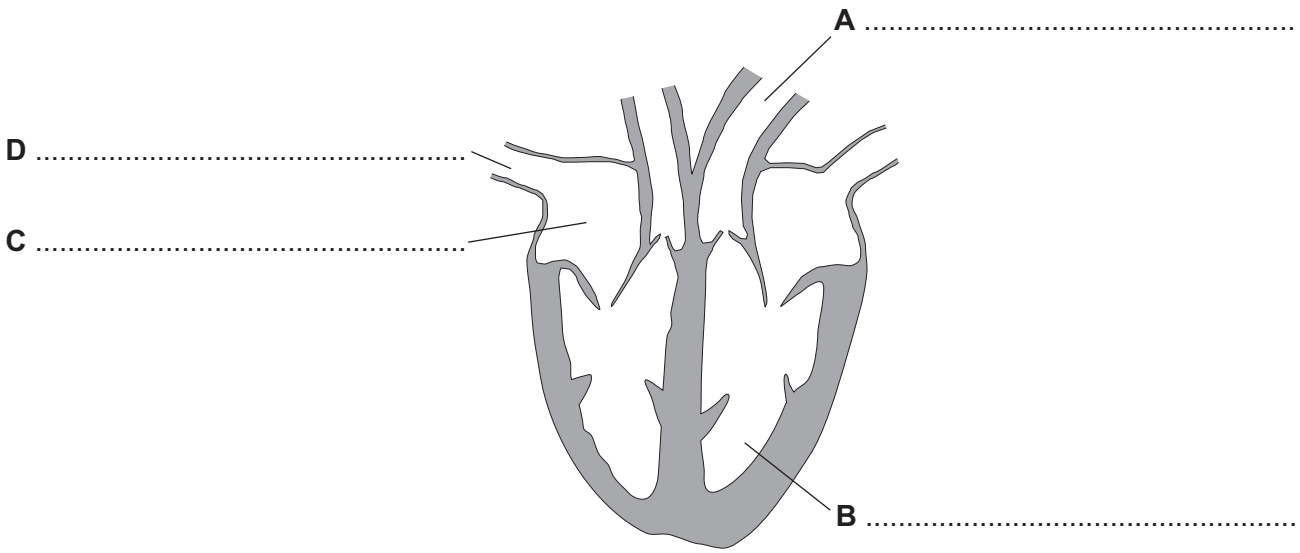
6

Turn over for the next question

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5 **Diagram 1** shows a section through the heart.

Diagram 1



5 (a) Use words from the box to label parts **A**, **B**, **C** and **D**.

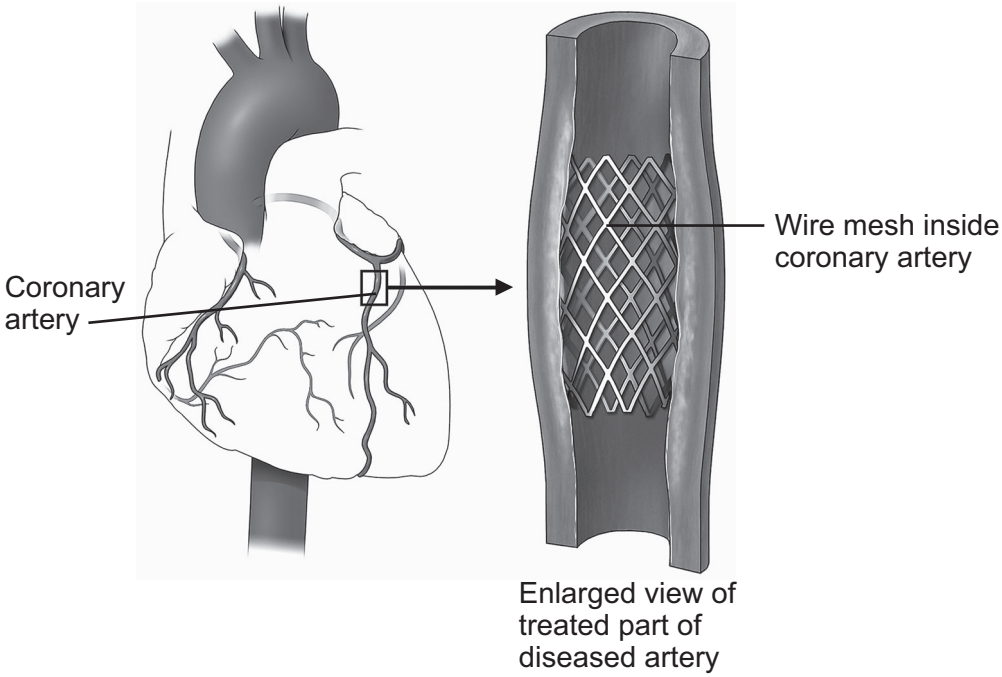
artery	**atrium**	**capillary**	**platelet**	**vein**	**ventricle**

(4 marks)

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5 (b) **Diagram 2** shows one treatment for a diseased coronary artery.

Diagram 2



5 (b) (i) Name the treatment shown in **Diagram 2**.

.....

(1 mark)

5 (b) (ii) Explain how the treatment works.

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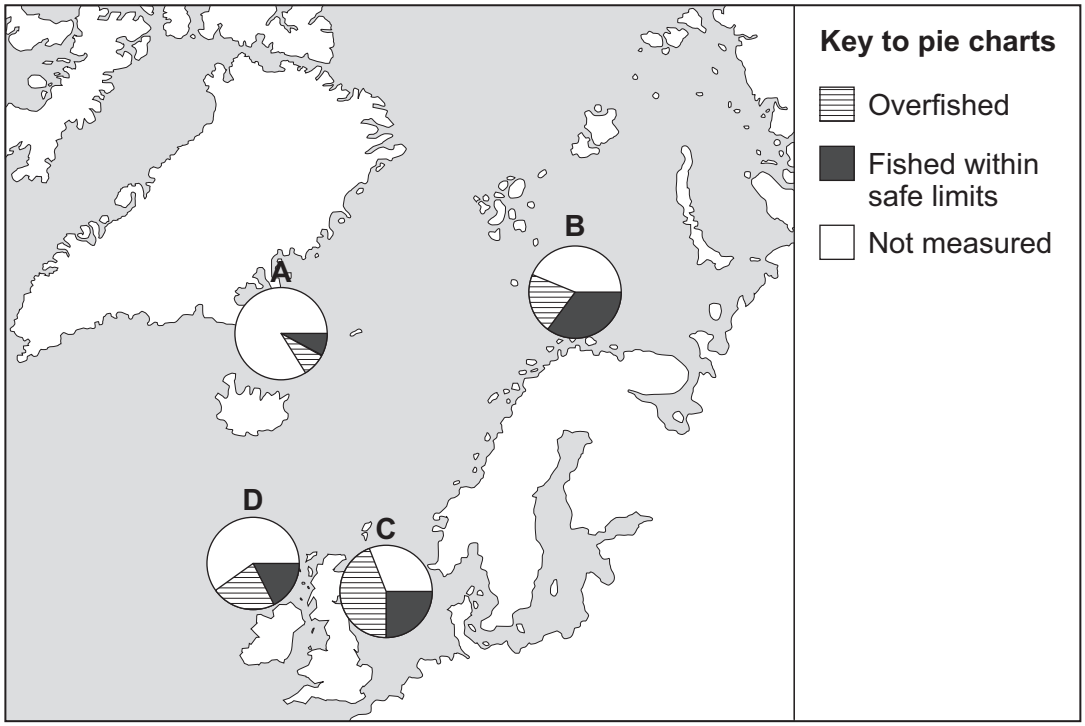
(2 marks)

7

Turn over for the next question

Do not write outside the box

6 The map shows pie charts, **A**, **B**, **C** and **D**, that give information about fisheries in some of the seas around Europe.



6 (a) Which pie chart, **A**, **B**, **C** or **D**, shows the fishery with the largest amount of overfishing? ☐

(1 mark)

6 (b) It is important to maintain fish stocks high enough for breeding to continue.

Give the reason why.

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(1 mark)

6 (c) Give **two** ways fish stocks can be conserved.

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(2 marks)

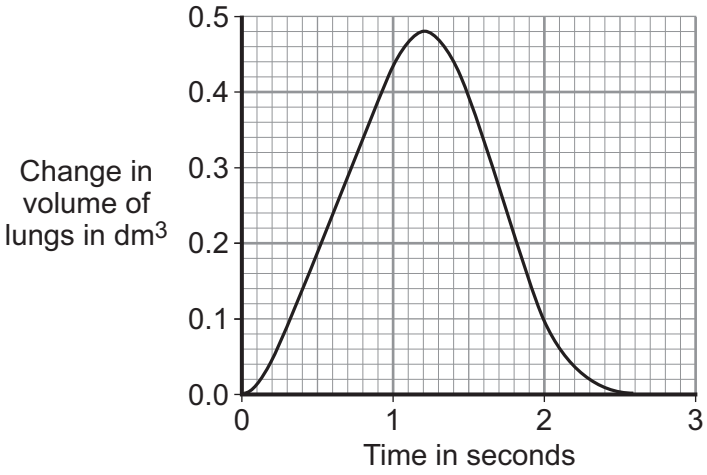
4

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7 The diaphragm and ribcage move air into the lungs and out of the lungs.

The graph shows changes in the volume of the lungs in one breathing cycle.



7 (a) (i) Describe the changes in the volume of the lungs in one breathing cycle.

.....

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(3 marks)

7 (a) (ii) Explain how the diaphragm and ribcage cause the changes in lung volume shown in the graph.

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(3 marks)

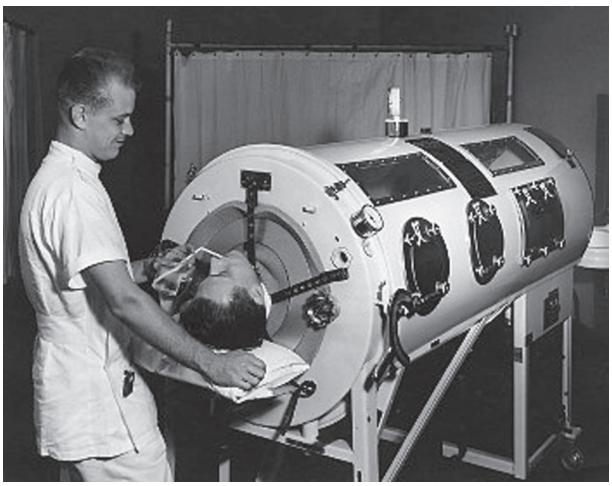
Turn over ▶

Do not write outside the box

7 (b) Sometimes patients are unable to breathe for themselves.
Mechanical ventilators are used to make these patients breathe.

Photograph 1 shows a patient in an iron lung ventilator.

Photograph 1



Air is pumped out of the iron lung, creating a very low pressure.
This low pressure causes the thorax to expand, causing air to flow into the lungs.
When air is pumped back into the iron lung the pressure inside the tank increases, causing air to move out of the lungs.

Photograph 2 shows a modern ventilator.

Photograph 2



Modern ventilators increase the pressure in the patient's airways using a tube put into the trachea.
The increased pressure in the patient's airways causes air to flow into the patient's lungs.
Then, the ventilator causes the pressure in the patient's airways to drop to zero, and the patient breathes out.

Do not write outside the box

7 (b) (i) The ventilators shown in **Photographs 1** and **2** make the patient inhale in a very different way.

Describe this difference.

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(2 marks)

7 (b) (ii) The iron lung ventilator was used mainly in the 1900s.

Most patients are now treated with the type of ventilator shown in **Photograph 2**.

Give **one** advantage and **one** disadvantage of using the modern ventilator rather than the iron lung ventilator.

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(2 marks)

10

Turn over for the next question

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8 There are many ways to increase the efficiency of food production.

8 (a) The table shows the energy available to humans from two different food chains.

Food chain	Energy transferred to humans in kJ per hectare of crop
Wheat → humans	900 000
Wheat → pigs → humans	90 000

8 (a) (i) Compare the amount of energy the two food chains transfer to humans.

.....

.....

(1 mark)

8 (a) (ii) Give **one** reason for the difference in the amount of energy the two food chains transfer to humans.

.....

.....

(1 mark)

Do not write outside the box

8 (b) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Give methods used in the factory farming of animals.
Explain the advantages and disadvantages of these methods.

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(6 marks)

8

END OF QUESTIONS

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Question 6 Map: © European Environment Agency

Question 7 Photograph 1: © SuperStock/Corbis

Question 7 Photograph 2: © Getty Images

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Version 1.0



General Certificate of Secondary Education
June 2013

Biology BL3FP

(Specification 4401)

Unit 3: Biology 3

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error / contradiction negates each correct response. So, if the number of error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

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Example 2: Name two planets in the solar system. (2 marks)

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column or by each stage of a longer calculation.

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

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Quality of Written Communication and levels marking

In Question 8(b) candidates are required to produce extended written material in English, and will be assessed on the quality of their written communication as well as the standard of the scientific response.

Candidates will be required to:

- use good English
- organise information clearly
- use specialist vocabulary where appropriate.

The following general criteria should be used to assign marks to a level:

Level 1: basic

- Knowledge of basic information
- Simple understanding
- The answer is poorly organised, with almost no specialist terms and their use demonstrating a general lack of understanding of their meaning, little or no detail
- The spelling, punctuation and grammar are very weak.

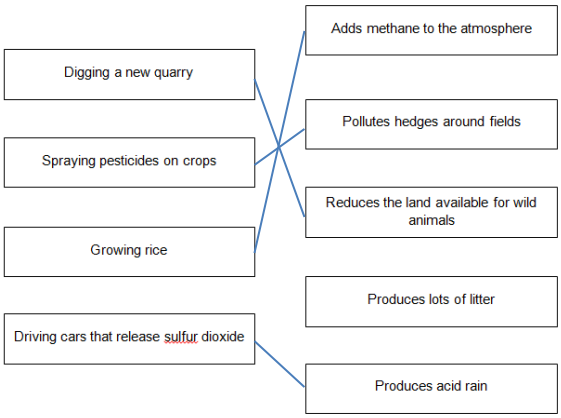
Level 2: clear

- Knowledge of accurate information
- Clear understanding
- The answer has some structure and organisation, use of specialist terms has been attempted but not always accurately, some detail is given
- There is reasonable accuracy in spelling, punctuation and grammar, although there may still be some errors.

Level 3: detailed

- Knowledge of accurate information appropriately contextualised
- Detailed understanding, supported by relevant evidence and examples
- Answer is coherent and in an organised, logical sequence, containing a wide range of appropriate or relevant specialist terms used accurately.
- The answer shows almost faultless spelling, punctuation and grammar.

Question 1

question	answers	extra information	mark
1(a)		**1** mark for each correct line extra line from box in left hand column cancels mark	4
1(b)	any **two** from: • climate change • more extreme weather / changes to weather (patterns) / described • rise in sea level • melting of ice caps • reduced biodiversity • changes to migration patterns • changes in distribution of species	ignore 'Earth warmer' accept faster plant growth / tropical species can be grown in UK accept tropical diseases / example spread to temperate regions	2
Total			**6**

Question 2

question	Answers	extra information	mark
2(a)(i)	root hairs	if clear which word then allow	1
2(a)(ii)	xylem	if clear which word then allow	1
2(a)(iii)	stomata	if clear which word then allow	1
2(a)(iv)	storage organs phloem	in this order	1 1
2(b)(i)	23.2		1
2(b)(ii)	loss of water (from flask with plant) from leaves / plant via transpiration / via evaporation	 if no other marks allow used in photosynthesis for one mark	1 1
Total			**8**

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Question 3

question	answers	extra information	mark
3(a)(i)	kidney		1
3(a)(ii)	bladder		1
3(a)(iii)	liver		1
3(a)(iv)	lung(s)		1
3(a)(v)	skin		1
3(b)(i)	3000	allow 2970 to 3030 correct answer gains **2** marks with or without working if answer incorrect allow **1** mark for evidence of 1550 + 450 + 1000 (allow tolerance of + or – ½ square on each)	2
3(b)(ii)	1600	allow 1570 to 1630	1
3(b)(iii)	1400	allow (b)(i) – (b)(ii)	1
3(b)(iv)	correct plot from (b)(iii)	tolerance ½ square ignore width	1
3(b)(v)	cells swell / overhydrated / damaged	accept poisoned (by urea)	1
Total			**11**

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Question 4

question	answers	extra information	mark
4(a)	pancreas	allow phonetic spelling	1
4(b)(i)	A shortest / quicker time (to work)		1 1
4(b)(ii)	D acts for longest time	 mark dependent on D allow D will last until 09.00 / breakfast / 24 hours	1 1
4(b)(iii)	diet / exercise	if 'diet' is qualified, then will need correct qualification, e.g. 'less carbohydrate / sugar' accept pancreas transplant / stem cell treatment	1
Total			**6**

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Question 5

question	answers	extra information	mark
5(a)	**A** artery	allow aorta	1
	B ventricle	ignore references to left and right	1
	C atrium	ignore references to left and right allow atria	1
	D vein	allow vena cava	1
5(b)(i)	stent		1
5(b)(ii)	keeps (artery) open		1
	so (more) blood can flow through	allow blood can flow (more) easily ignore ref to blood clots	1
Total			**7**

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Question 6

question	answers	extra information	mark
6(a)	C		1
6(b)	otherwise species may disappear altogether	allow to avoid extinction	1
6(c)	any **two** from: • regulate net size • impose fishing quotas • limit fishing during breeding seasons • bans on discarding of fish • bans on fishing in certain areas	if mesh size specified, must be larger	2
Total			**4**

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Question 7

question	Answers	extra information	mark
7(a)(i)	rise then fall		1
	to peak at 0.48 dm^3 / after 1.2s		1
	(fall) back to 0 / (falling) back after 2.5s	allow 2.6s allow after a further 1.3s / *1.4s*	1
7(a)(ii)		ignore contraction and relaxation of muscles ignore reference to pressures, ribcage expanding	
	rise / air in caused by upward/outward movement of ribcage		1
	decrease / air out caused by return of ribcage to original position/downward		1
	and (rise / air in) by downward movement / flattening of diaphragm **or** (decrease / air out) by upward movement / doming of diaphragm		1

Question 7 continues on the next page . . .

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Question 7 continued

question	Answers	extra information	mark
7(b)(i)	in iron lung atmospheric / outside pressure forces air into lungs	allow air sucked / drawn into lungs	1
	in modern respirator air forced (mechanically) into lungs		1
		allow for one mark pressures acts externally in iron lung and internally in modern ventilator	
7(b)(ii)		ignore cost	
	advantage any **one** from: • more freedom of movement for patient • more portable • does not affect blood flow in lower body		1
	disadvantage any **one** from: • (tube in trachea) uncomfortable • more difficult to eat/talk	allow it can damage / overinflate the lungs / over breathe	1
Total			**10**

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Question 8

question	Answers	extra information	mark
8(a)(i)	wheat → humans chain transfers 10 times more energy than wheat → pigs → humans chain or wheat → pigs → humans chain transfers 810 000 (kJ per hectare) less	allow 10% if given as a comparison e.g. one is 10% of the other ignore less unqualified	1
8(a)(ii)	any **one** reason for energy loss from pigs e.g.: • movement • (maintaining) body temperature • waste materials • not all parts of pig eaten by human • because there is an extra stage (pigs) in the food chain and energy is lost at each stage	ignore respiration, growth ignore heat unqualified allow named examples allow longer food chain so more energy lost	1

Question 8 continues on the next page . . .

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Question 8 continued

8(b)	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5, and apply a 'best-fit' approach to the marking.		6
0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**
No relevant content.	There is a basic description of at least one factory farming method **or** identification of an advantage or disadvantage of factory farming.	There is a description of at least one factory farming method **and** an advantage or disadvantage is explained.	There is a description of factory farming methods **and** advantage(s) and disadvantage(s) are explained.

examples of biology points made in the response:

factory farming methods e.g.:

- Kept in cramped conditions / battery hens / calf crates / pig barns / fish tanks
- Controlled temperature / heating
- Controlled feeding / modified food given / growth hormones
- Controlled lighting
- Treated with prophylactic antibiotics

Advantages e.g.:

- Increased efficiency / profit / greater food production / cheaper food / faster growth
- Farmer can have more livestock
- Less energy is lost through movement
- Less energy is used keeping warm
- (Food is high in calories / protein) so animals will grow faster / lay more eggs
- Easier to vaccinate all the animals
- Easier to protect animals from predators
- Antibiotic treatment stops infections in animals

Disadvantages e.g.:

- Stress / cruelty / inhumane / unethical
- Restricted movement / overcrowding
- Faster spread of diseases
- Antibiotics in the food chain / residual chemicals in the food chain
- Wasting fossil fuels / increasing global warming
- Increased pollution from animal waste and from additional transport

Total			**8**

UMS Conversion Calculator: www.aqa.org.uk/umsconversion

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