

Centre Number						Candidate Number				
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Candidate Signature										

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



General Certificate of Secondary Education
Higher Tier
June 2015

Further Additional Science Unit 1 Biology B3

FAS1HP H

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 2(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.



J U N 1 5 F A S 1 H P O 1

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

- 1** 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.

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

Draw a ring around the correct answer.

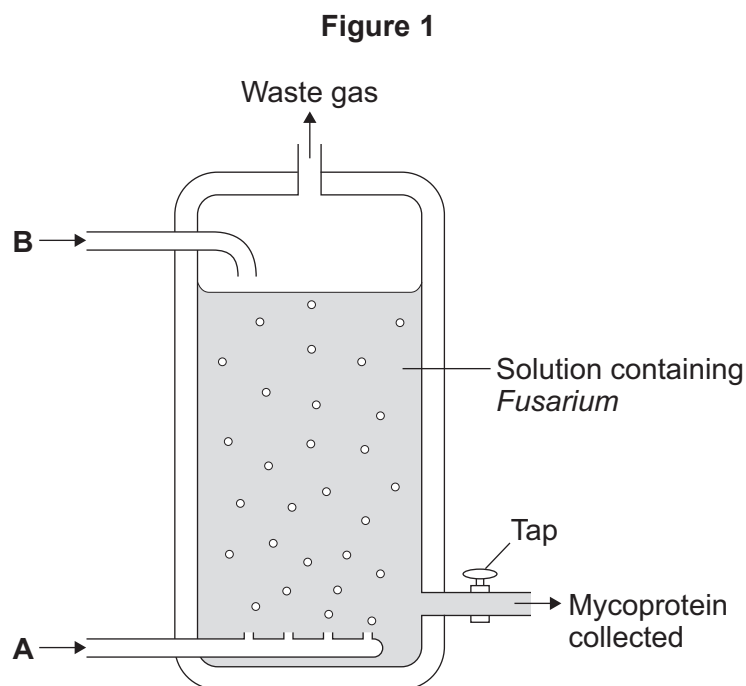
[1 mark]

bacterium

fungus

virus

Figure 1 shows a fermenter used in mycoprotein production.



1 (a) (ii) *Fusarium* makes mycoprotein. *Fusarium* respire aerobically.

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

[1 mark]

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

Name this substance.

[1 mark]

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1 (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

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5

Turn over for the next question

Turn over ►



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ANSWER IN THE SPACES PROVIDED**



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

2 (a) Name **two** other substances that the circulatory system transports around the body. **[2 marks]**

1

2

2 (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

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

What type of tissue is the wall of the heart made of? **[1 mark]**

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Question 2 continues on the next page

Turn over ►



2 (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 2 gives information about two types of heart valve.

Figure 2

Living human heart valve	Artificial heart valve
<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • It has been used for transplants since 1960. • It is made of strong, long-lasting materials such as plastic and metal. • It is implanted during an operation. • During the operation, the patient's chest is opened and the old valve is removed before the new valve is transplanted. • Patient needs to take drugs to prevent blood clots after the implant.

A patient needs a heart valve replacement. A doctor recommends the use of an artificial heart valve.

Give the advantages and disadvantages of using an artificial heart valve compared with using a living human heart valve.

Use information from Figure 2 and your own knowledge in your answer.

[6 marks]

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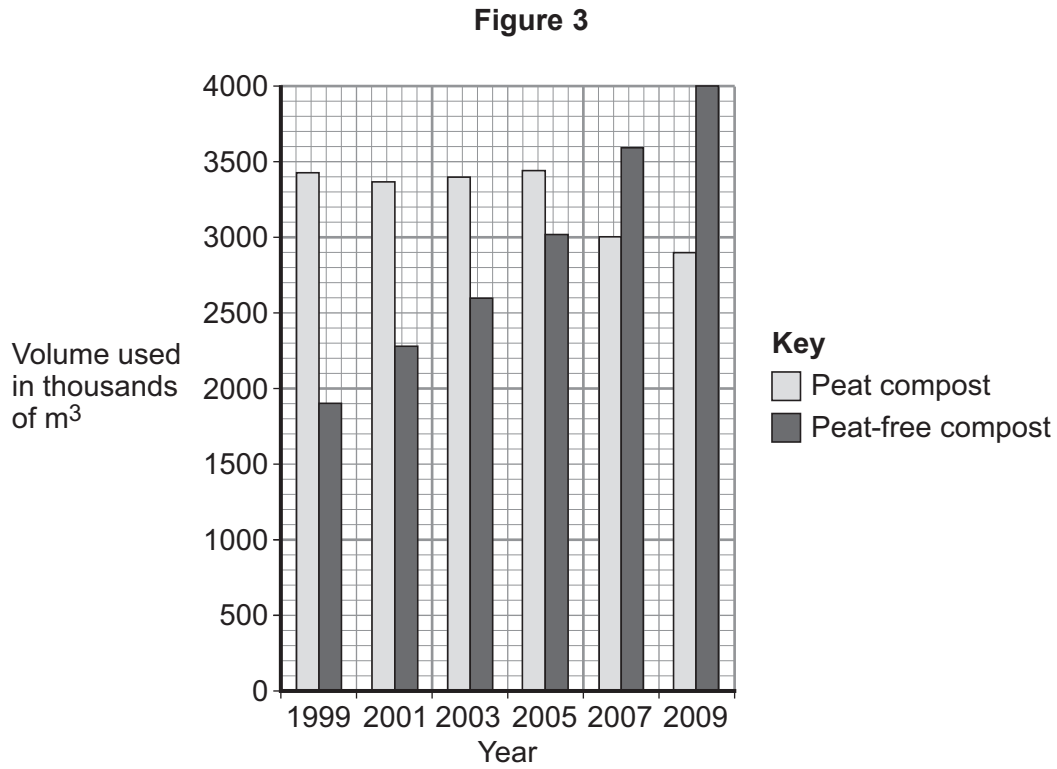
Turn over for the next question

Turn over ▶



3 Human activities have many effects on our ecosystem.

Figure 3 shows the volume of peat compost and peat-free compost used in gardening from 1999 to 2009.



3 (a) Describe the trends shown in **Figure 3**.

[2 marks]

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3 (b) What effect does the destruction of peat bogs have on the gases in the atmosphere? **[1 mark]**

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3 (c) Deforestation is also damaging ecosystems.
Describe **one** effect of deforestation on ecosystems. **[1 mark]**

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4

Turn over for the next question

Turn over ►



4 In many areas of the world the mass of household waste produced each year is increasing.

4 (a) Give **two** reasons why the mass of household waste is increasing each year.

[2 marks]

1

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2

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4 (b) **Table 1** shows how the mass of household waste in the UK has changed from 2004 to 2012.

Table 1

Year	Total mass of household waste in thousands of tonnes (including total household recycling)	Total mass of household recycling in thousands of tonnes	Percentage of household waste recycled
2004	25 658	5785	22.5
2006	25 775	7976	30.9
2008	24 334	9398	38.6
2010	23 454	9733	
2012	22 643	9782	43.2

4 (b) (i) Calculate the percentage of household waste recycled in 2010.

[2 marks]

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4 (b) (ii) The UK government has been encouraging a 'zero waste economy'.

In a 'zero waste economy', we reduce, reuse and recycle as much waste as possible.

A newspaper concluded that: 'The government's 'zero waste economy' has been successful.'

Use information from Table 1 to describe the reasons for and against the newspaper's conclusion.

[4 marks]

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4 (c) (i) Some waste releases carbon dioxide and methane into the atmosphere.
An increase in carbon dioxide and methane contributes to global warming.

Global warming can cause sea levels to rise.

Describe two other possible effects of global warming on our environment.

[2 marks]

1

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2

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4 (c) (ii) Storing the carbon dioxide helps to prevent more global warming.
Carbon dioxide can be stored (sequestered) in trees when they photosynthesise.

Give one different way in which carbon dioxide is sequestered in our environment.

[1 mark]

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5 Many runners drink sports drinks to improve their performance in races.

A group of students investigated the effects of three brands of sports drink, **A**, **B** and **C**, on the performance of three runners on a running machine. One of the runners is shown in **Figure 4**.

Figure 4



Table 2 gives information for each drink.

Table 2

Nutrient per dm ³	Brand of sports drink		
	A	B	C
Glucose in g	63	31	72
Fat in g	9	0	2
Ions in mg	312	332	495



5 (a) (i) In the investigation, performance was measured as the time taken to reach the point of exhaustion.

Exhaustion is when the runners could not run anymore.

All three runners:

- ran on a running machine until the point of exhaustion
- each drank 500 cm³ of a different brand of sports drink
- rested for 4 hours to recover
- ran on the running machine again and recorded how much time they ran until the point of exhaustion.

The speed at which the runners ran was the same and all other variables were controlled.

The students predicted that the runner drinking brand **B** would run for the shortest time on the second run before reaching the point of exhaustion.

Use information from **Table 2** to suggest an explanation for the students' prediction.

[2 marks]

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5 (a) (ii) If the balance between ions and water in a runner's body is not correct, the runner's body cells will be affected.

Describe **one** possible effect on the cells if the balance between ions and water is **not** correct.

[1 mark]

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5 (b) When running, a runner's body temperature increases.

Describe how the brain monitors body temperature.

[3 marks]

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Turn over ►



5 (c) (i) **Table 2** is repeated here to help you answer this question.

Table 2

Nutrient per dm ³	Brand of sports drink		
	A	B	C
Glucose in g	63	31	72
Fat in g	9	0	2
Ions in mg	312	332	495

People with diabetes need to be careful about drinking too much sports drink.

Use information from **Table 2** to explain why drinking too much sports drink could make people with diabetes ill.

[3 marks]

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5 (c) (ii) Other than paying attention to diet, how do people with diabetes control their diabetes?

[1 mark]

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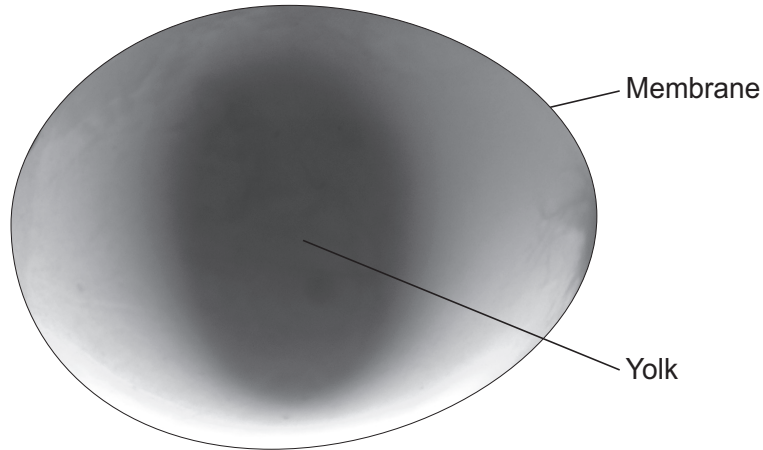
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ANSWER IN THE SPACES PROVIDED**

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- 6 A student investigated the effect of different concentrations of sugar on the mass of raw eggs. The shell had been taken off each egg, like the egg shown in **Figure 5**.

Figure 5



The student:

- recorded the mass of each egg at the start of the investigation
- put one egg in each of four different sugar solutions, **A**, **B**, **C** and **D**
- kept each egg in its solution for 3 hours
- recorded the mass of each egg after 3 hours
- calculated the percentage change in mass for each egg.

Table 3 shows the results.

Table 3

Solution	Mass of egg at start in g	Mass of egg at end in g	Percentage change in mass (%)
A	71	111	+56.3
B	73	95	+30.1
C	77	74	-3.9
D	75	51	



6 (a) Calculate the percentage change in mass for the egg that was in solution **D**. **[3 marks]**

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Percentage change =

6 (b) Explain why the mass of the egg in solution **A** has changed. **[5 marks]**

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Turn over for the next question

Turn over ►



7 It is important to remove waste products from our bodies.

Healthy kidneys help to keep our internal environment constant.

7 (a) Describe how a healthy kidney produces urine.

[5 marks]

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7 (b) A child has kidney failure and is treated with dialysis.

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

Table 4 shows the results.

Table 4

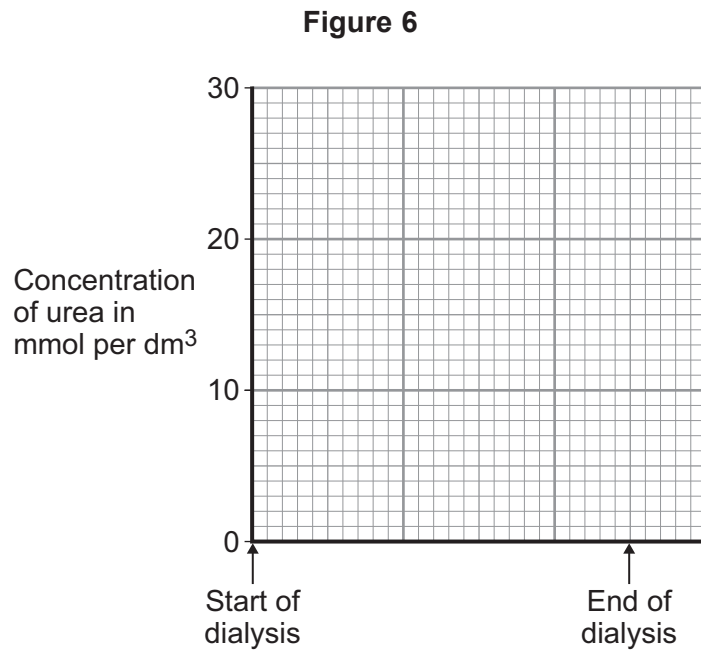
	Concentration in the blood before dialysis starts in mmol per dm ³
Urea	28
Glucose	6

The child has a normal blood glucose concentration.



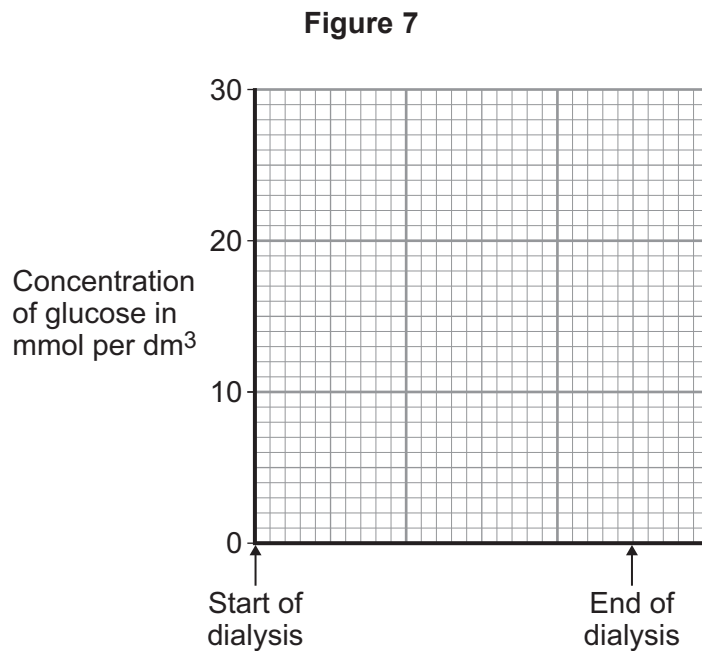
- 7 (b) (i) Sketch a graph on **Figure 6** to suggest what will happen to the concentration of urea in the blood during dialysis.

[1 mark]



- 7 (b) (ii) Sketch a graph on **Figure 7** to suggest what will happen to the concentration of glucose in the blood during dialysis.

[1 mark]



Question 7 continues on the next page

Turn over ►



7 (c) (i) Another way of treating kidney failure is with a kidney transplant.

A transplanted kidney can be rejected.

Explain why the new kidney may be rejected.

[3 marks]

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7 (c) (ii) Describe **one** way in which doctors try to prevent kidney rejection.

[1 mark]

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END OF QUESTIONS

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