

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Higher Tier
June 2013

Biology

Unit Biology B3

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 3(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.

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

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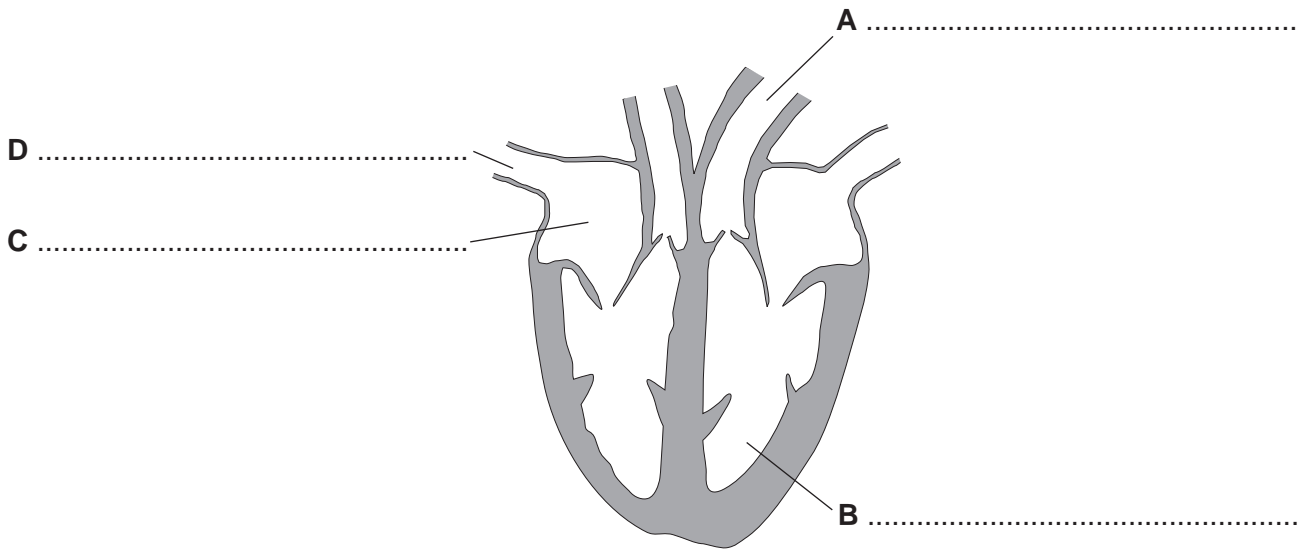
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BL3HP

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

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

Diagram 1



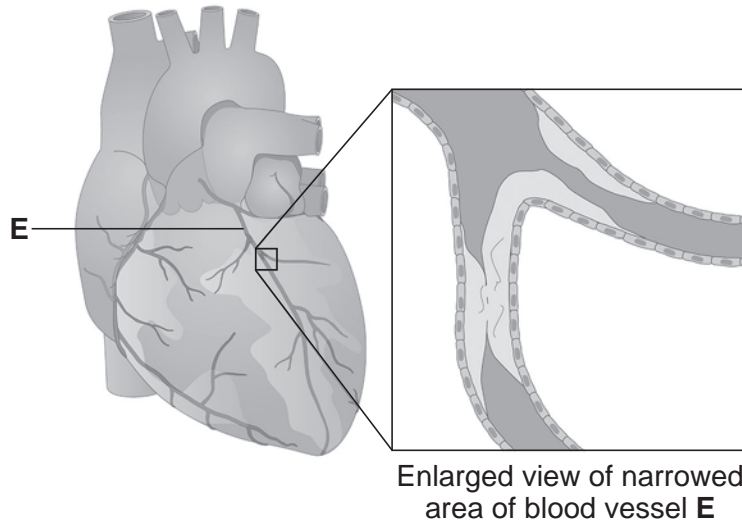
1 (a) On the diagram, name the parts labelled **A**, **B**, **C** and **D**.

(4 marks)



1 (b) **Diagram 2** shows the blood vessels that supply the heart muscle.
 Part of one of the blood vessels has become narrower.

Diagram 2



1 (b) (i) Name blood vessel **E**.

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(1 mark)

1 (b) (ii) Give **one** method of treating the narrowed part of blood vessel **E**.

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(1 mark)

1 (b) (iii) Explain how the method of treatment works.

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(2 marks)

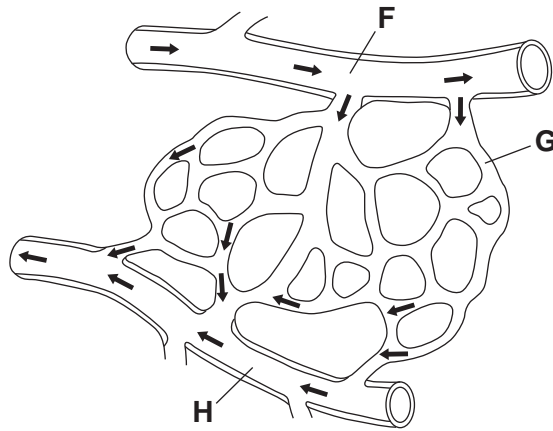
Question 1 continues on the next page

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1 (c) Diagram 3 shows part of the blood supply in the lungs.

Diagram 3



1 (c) (i) Name the types of blood vessel labelled **F**, **G** and **H**.

F

G

H

(3 marks)

1 (c) (ii) Give **one** way in which the composition of the blood in vessel **F** is different from the composition of the blood in vessel **H**.

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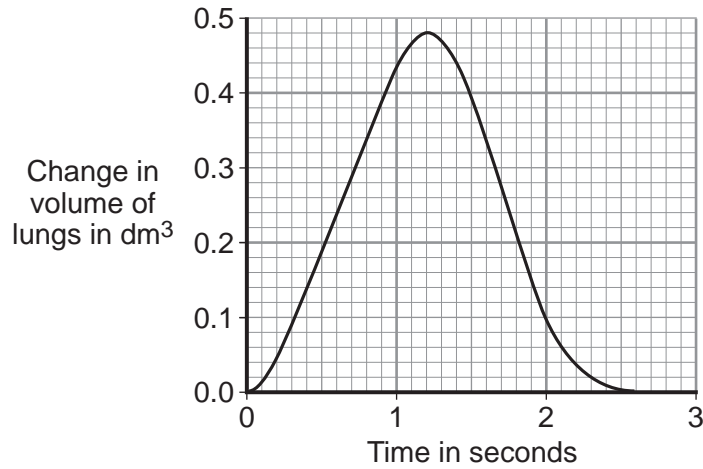
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(1 mark)



2 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.



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

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(3 marks)

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

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(3 marks)

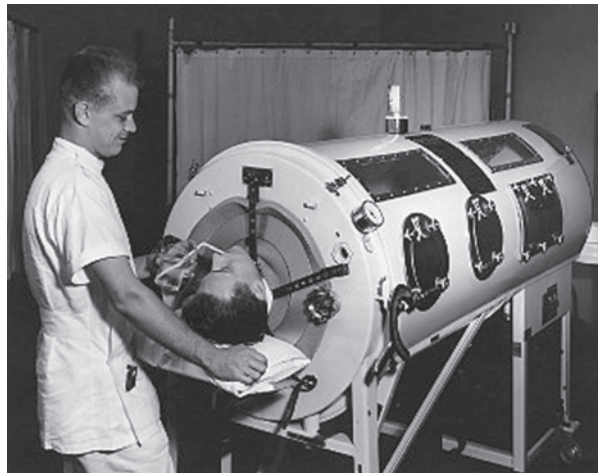
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- 2 (b)** Sometimes patients are unable to breathe for themselves. Mechanical ventilators are used to make these patients breathe.

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.



2 (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)

2 (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

Turn over ►



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

3 (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

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

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(1 mark)

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

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(1 mark)



4 Plants exchange substances with the environment.

4 (a) Plant roots absorb water mainly by osmosis.
Plant roots absorb ions mainly by active transport.

Explain why roots need to use the two different methods to absorb water and ions.

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(4 marks)

4 (b) What is meant by the *transpiration stream*?

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(3 marks)

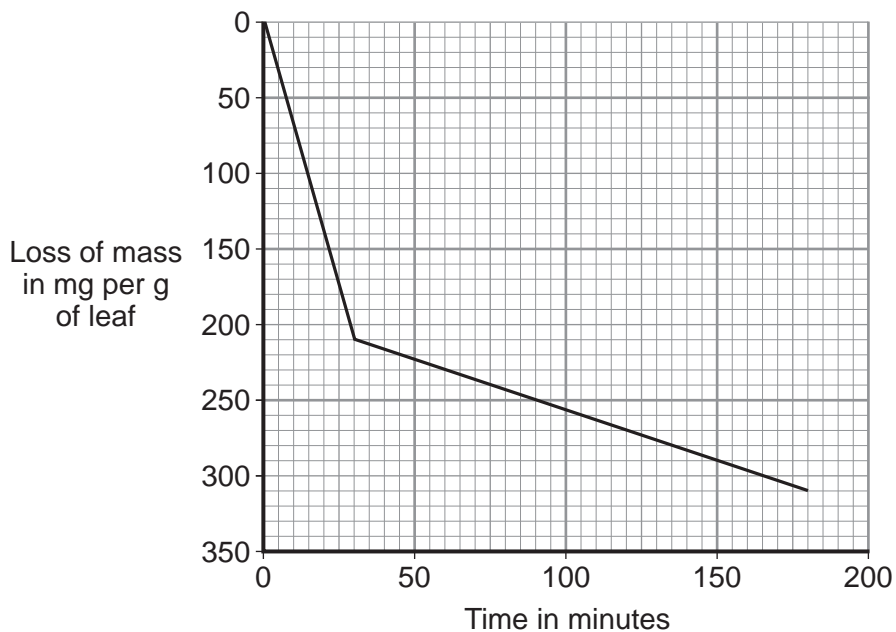


4 (c) Students investigated the loss of water vapour from leaves.

The students:

- cut some leaves off a plant
- measured the mass of these leaves every 30 minutes for 180 minutes.

The graph shows the students' results.



4 (c) (i) The rate of mass loss in the first 30 minutes was 7 milligrams per gram of leaf per minute. Calculate the rate of mass loss between 30 minutes and 180 minutes.

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Rate of mass loss = milligrams per gram of leaf per minute
(2 marks)

4 (c) (ii) The rate of mass loss between 0 and 30 minutes was very different from the rate of mass loss between 30 and 180 minutes.

Suggest an explanation for the difference between the two rates.

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(2 marks)



6 Humans maintain an almost constant body temperature.

6 (a) Describe the role of blood vessels in the control of body temperature.

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(4 marks)

6 (b) An athlete can run a marathon in 2 hours 15 minutes on a dry day in outside temperatures up to 35 °C.

If the air is dry, his body will **not** overheat.

In humid conditions the same athlete can run the marathon in the same time. However, in humid conditions, if the outside temperature goes over 18 °C then his body **will** overheat.

Suggest an explanation for the athlete overheating in humid conditions.

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(3 marks)

7

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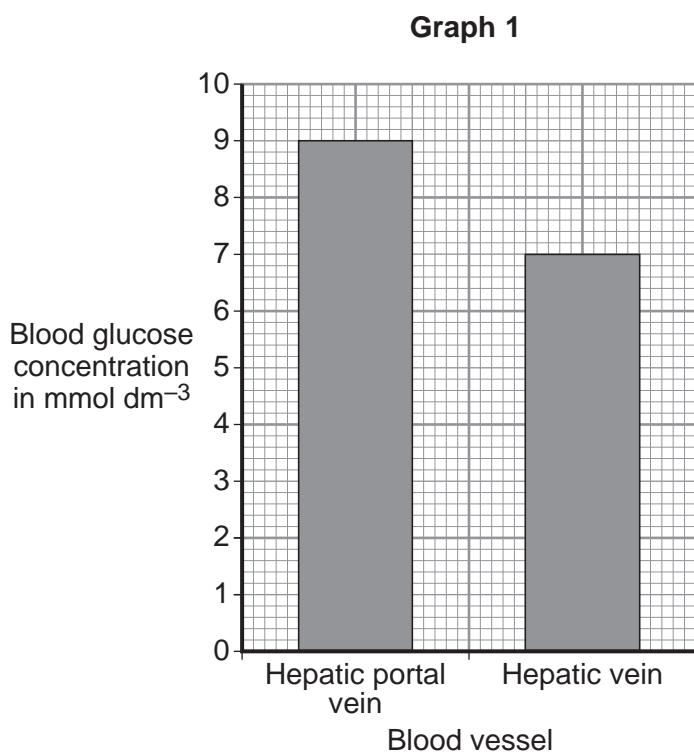
7 The pancreas and the liver are both involved in the control of the concentration of glucose in the blood.

The liver has two veins:

- the hepatic portal vein taking blood from the small intestine to the liver
- the hepatic vein taking blood from the liver back towards the heart.

Scientists measured the concentration of glucose in samples of blood taken from the hepatic portal vein and the hepatic vein. The samples were taken 1 hour and 6 hours after a meal.

Graph 1 shows the concentration of glucose in the two blood vessels 1 hour after the meal.



7 (a) The concentration of glucose in the blood of the two vessels is different. Explain why.

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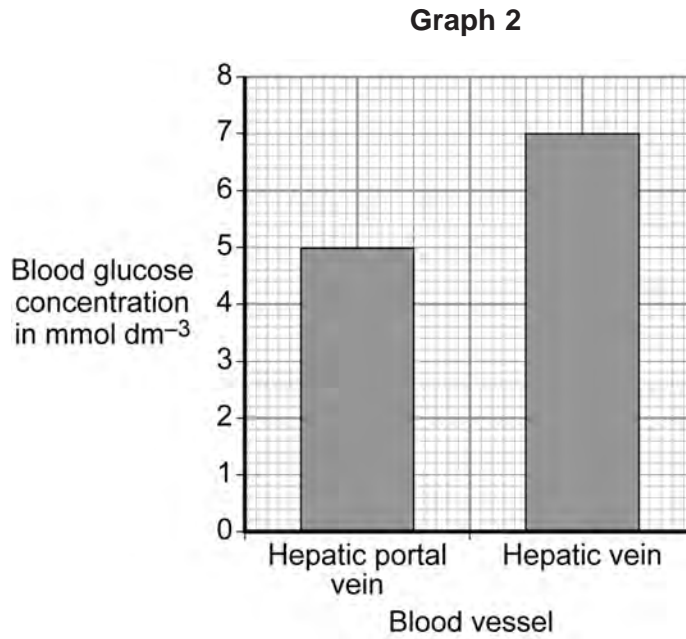
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(3 marks)



7 (b) Graph 2 shows the concentration of glucose in the two blood vessels 6 hours after the meal.



7 (b) (i) The concentration of glucose in the blood in the hepatic portal vein 1 hour after the meal is different from the concentration after 6 hours.

Why?

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(1 mark)

7 (b) (ii) The person does **not** eat any more food during the next 6 hours after the meal.

However, 6 hours after the meal, the concentration of glucose in the blood in the hepatic vein is higher than the concentration of glucose in the blood in the hepatic portal vein.

Explain why.

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(3 marks)

7

END OF QUESTIONS



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