

Write your name here	
Surname	Other names
Centre Number	Candidate Number
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Edexcel IGCSE	
Biology	
Unit: 4BI0	
Paper: 2B	
Tuesday 7 June 2011 – Afternoon	Paper Reference
Time: 1 hour	4BI0/2B
You do not need any other materials.	Total Marks
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Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- Show all the steps in any calculations and state the units.

Information

- The total mark for this paper is **60**.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Write your answers neatly and in good English.
- Try to answer every question.
- Check your answers if you have time at the end.

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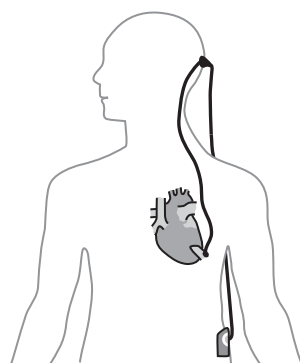
Answer ALL questions.

- 1 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Artificial heart pump gives life to dying patients

- 1 In June 2000, a 61-year-old man in the United Kingdom became the first person to have a permanent artificial heart pump fitted. Before the pump was fitted, the man was told that he had only a few weeks left to live. However, the pump has taken on the work of his heart: taking blood from the heart and delivering it to the rest of the body.
- 5 Pumps like these could be a possible alternative to heart transplants, which are usually performed on patients whose heart has begun to fail.

- The operation to insert the pump took several hours but the surgeons were very pleased with the speed of the man's recovery. During the operation, the pump
- 10 was fitted into the left ventricle of the man's heart. This heart chamber provides much of the pumping power of the heart when it contracts.



- The pump is powered by batteries, which are usually carried around the patient's waist. The batteries are connected to the pump by wires which enter the body at the back of the skull. The wires then pass down through the neck, into the chest
- 15 cavity and connect to the pump in the heart. The batteries are rechargeable and need changing every eight hours.

- The surgeon who performed this operation wrote about it in a medical journal. He said that the pump had helped to lower the patient's blood pressure and had done no damage to his red blood cells. He also reported that, six weeks after the
- 20 operation, the patient's heart and liver were working much better than before the procedure and that the man was able to take exercise. As the patient takes exercise, he can change the speed of the pump.

- The important medical advance with this pump is that it is fitted permanently. Previous artificial heart pumps had to be replaced every few months and
- 25 were also much larger and noisier. The new pumps give doctors hope that this treatment could solve the problem of a shortage of hearts available for transplants. The heart surgeon said, 'Currently, the outlook for patients who are not able to have a transplant is poor. Our laboratory experience and the result from this first operation with a small, silent intraventricular device suggests a
- 30 potential alternative for many patients.'



(a) Name **two** of the blood vessels that carry blood away from the heart.

(2)

1

2

(b) Suggest why the batteries for the heart pump are placed outside the body (lines 12 and 13).

(1)

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(c) Describe how the blood in the left side of the heart differs from the blood in the right side of the heart.

(2)

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(d) Explain why the patient might need to change the speed of the pump (line 22).

(2)

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(e) Explain why some patients are 'not able to have a transplant' (line 28).

(1)

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(f) Suggest what is meant by the term **intraventricular** (line 29).

(1)

(g) Suggest **two** advantages of using the new artificial heart pump compared to previous artificial heart pumps.

(2)

1

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2

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(Total for Question 1 = 11 marks)

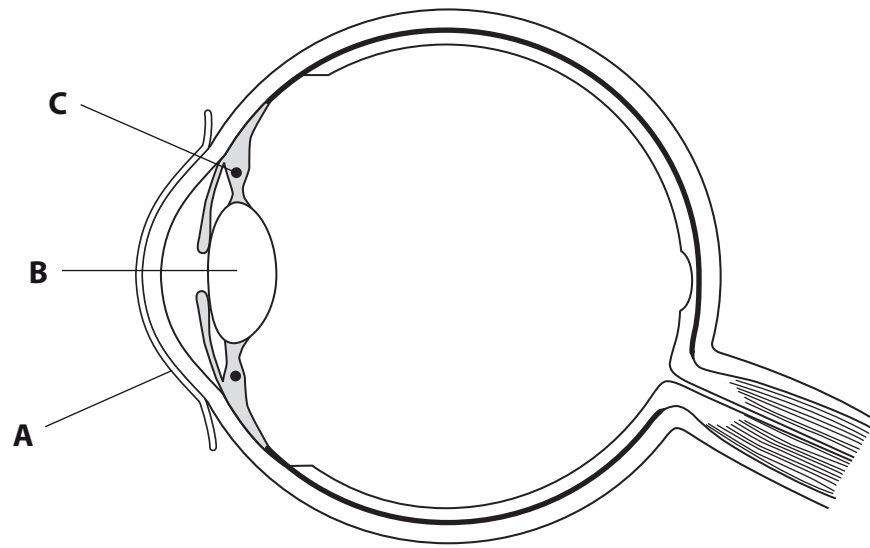


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2 The diagram shows a section through the human eye.



(a) Name the structures labelled **A**, **B** and **C**.

(3)

A

B

C

(b) Explain the changes that take place in structures **B** and **C** when a person focuses on a nearby object.

(2)

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(c) Structures in the eye respond to stimuli by means of reflex actions.

(i) Describe **one** reflex action that occurs in the eye.

(2)

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(ii) Give a reason for this reflex action.

(1)

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(iii) Human responses are also controlled by hormones.

For **one** named example of a hormone, give its site of production and its effect.

(3)

Hormone

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Site of production

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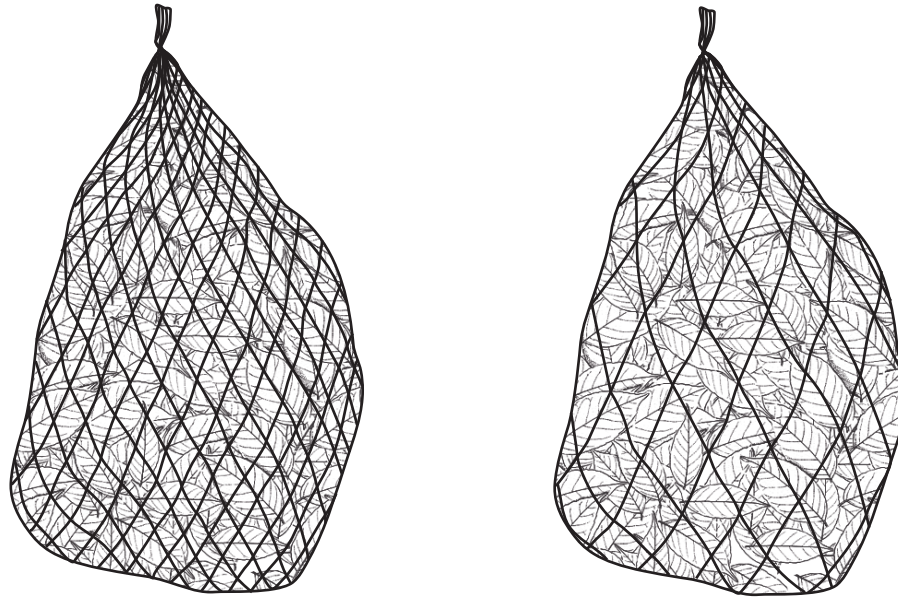
Effect

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(Total for Question 2 = 11 marks)



- 3 Scientists in Malaysia studied the rate of decomposition of leaf discs placed in bags in the soil. Leaf discs from a forest tree were placed in bags of two different mesh sizes. At intervals of four weeks, some of the bags were removed from the soil and the dry mass of the leaves was measured. The experiment was continued over a period of 20 weeks.



The data they obtained are shown in the table.

Weeks	Dry mass of leaves remaining (% of original mass)	
	Small mesh	Large mesh
0	100	100
4	92	88
8	84	78
12	74	66
16	72	60
20	68	58

- (a) Calculate the percentage change in mass in the small mesh bag by week 20.

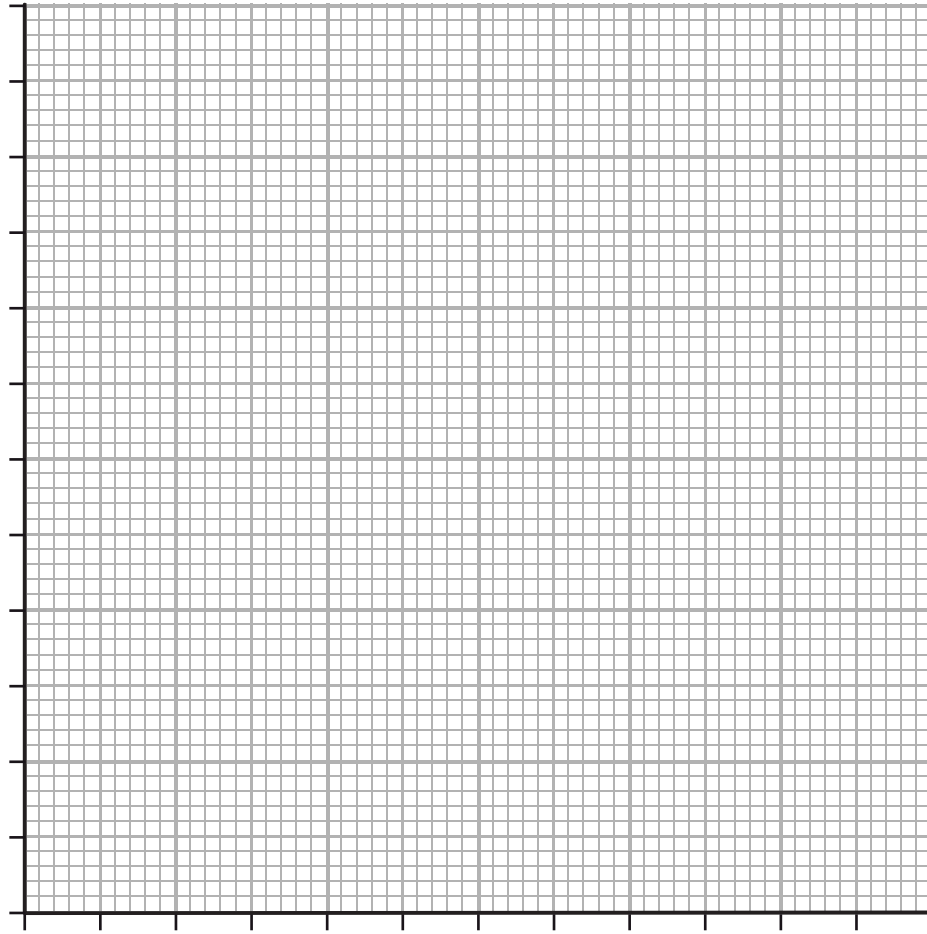
(1)

Answer %



(b) On the grid below plot a graph of the data, using straight lines to join the points.

(5)



(c) Describe how the dry mass of the leaves changed during the 20 week period.

(2)

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(d) The scientists wrote that, 'leaf decomposition by bacteria ensures the release of nitrate ions into the soil'.

Explain how other bacteria can reduce the availability of nitrate ions to plants.

(2)

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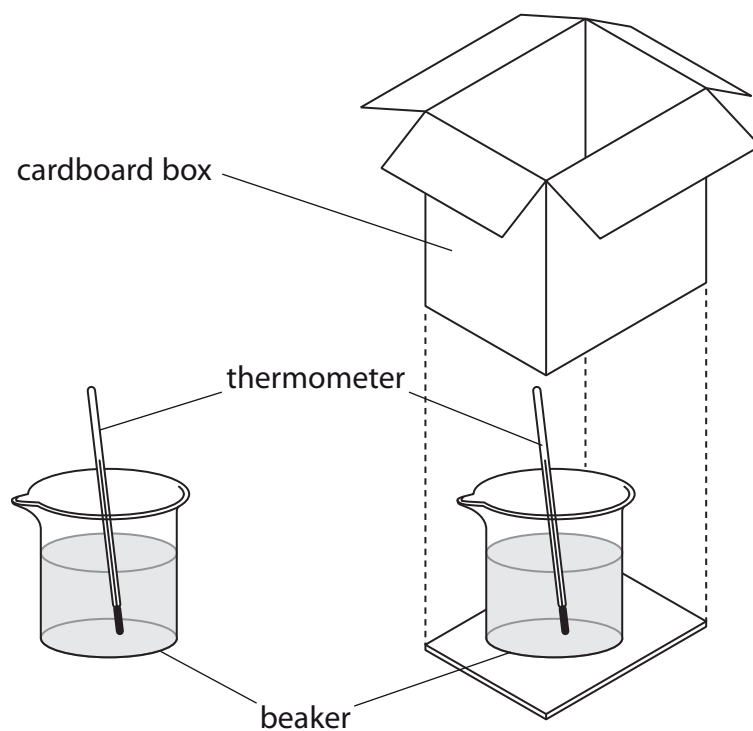
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(Total for Question 3 = 10 marks)



- 4 A student was told that farming animals outdoors was less efficient than keeping them indoors (factory farming). The student investigated this idea, using beakers of hot water to represent the animals, with the apparatus shown below. The cardboard box was used to represent keeping animals indoors.



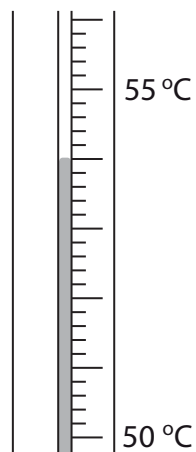
The beakers were filled with the same volume of hot water and the temperature in each beaker was measured at intervals of 10 minutes over a period of 30 minutes. The investigation was repeated five times. The results are shown in the table.

Trial	Temperature in °C for each beaker							
	Outside box				Inside box			
	0 min	10 min	20 min	30 min	0 min	10 min	20 min	30 min
1	70	55	49	44	70	59	51	46
2	68	56	49	43	68	57	52	45
3	62	50	45	20	62	50	45	41
4	70	56	45	38	70	54	48	40
5	67	55	48	43	67	60	53	48



(a) (i) How many times did the student measure the temperature of the water in the beakers outside the box during the investigation? (1)

(ii) The diagram shows one of the temperature readings during the investigation.



Use the diagram and the information in the table to complete the following sentence. (2)

The reading on this thermometer is °C, which suggests the reading was taken from a beaker after minutes kept the box.

(b) (i) What was the independent variable (the variable that the student chose to change) in this investigation? (1)

(ii) What was the dependent variable (the variable measured by the student) in this investigation? (1)

(iii) Explain why the student kept the other variables constant. (2)

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(c) The student tried to make his measurements accurate.

Give **one** way that he could have done this.

(1)

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(d) The results of this investigation suggest that meat production would be less efficient if farmers kept their animals outdoors rather than indoors.

Use the data and your knowledge to explain why.

(3)

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(Total for Question 4 = 11 marks)



5 (a) Describe how micropropagation (tissue culture) can be used to produce large quantities of identical plants.

(6)

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(b) Explain what is meant by the term **genetic modification (GM)** and suggest why a farmer might want to grow a GM crop.

(3)

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(Total for Question 5 = 9 marks)



6 Multicellular organisms have a transport system for nutrients and waste products. In humans this transport system involves the blood.

(a) The table names some components of blood. Complete the table by giving the function of each component and its cell type.

(4)

Component of blood	Function	Cell type
platelet		cell fragment
phagocyte		white cell
lymphocyte		

(b) Suggest the consequence of having too few platelets in the blood.

(2)

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(c) Vaccination causes the body to produce memory cells.

Describe the advantages to the human body of producing memory cells.

(2)

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(Total for Question 6 = 8 marks)

TOTAL FOR PAPER = 60 MARKS

