Specimen Paper

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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9	
10	
11	
12	
TOTAL	

General Certificate of Secondary Education
Foundation Tier

Biology

Unit Biology B3

Biology 3F

F

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 60 minutes

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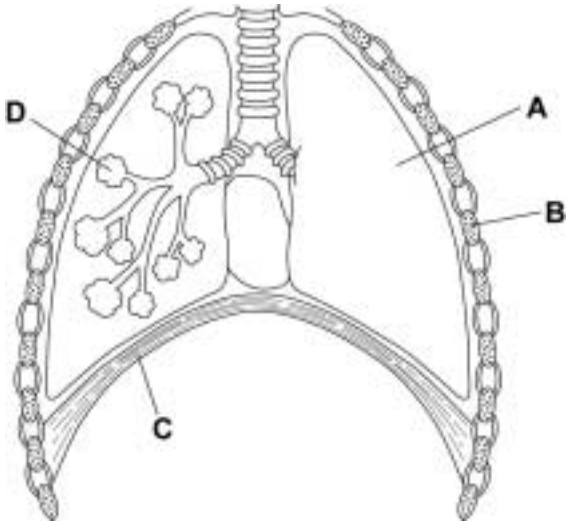
Answer **all** questions in the spaces provided.

1 The diagram shows a section through the chest.



For each question write the correct letter in the box.

Which structure, **A**, **B**, **C** or **D**, is:

1 (a) a rib ☐ *(1 mark)*

1 (b) the diaphragm ☐ *(1 mark)*

1 (c) an alveolus? ☐ *(1 mark)*

1 (d) Complete the following sentences.

1 (d) (i) When we breathe in the rib cage moves ..... and the diaphragm becomes ..... .

(2 marks)

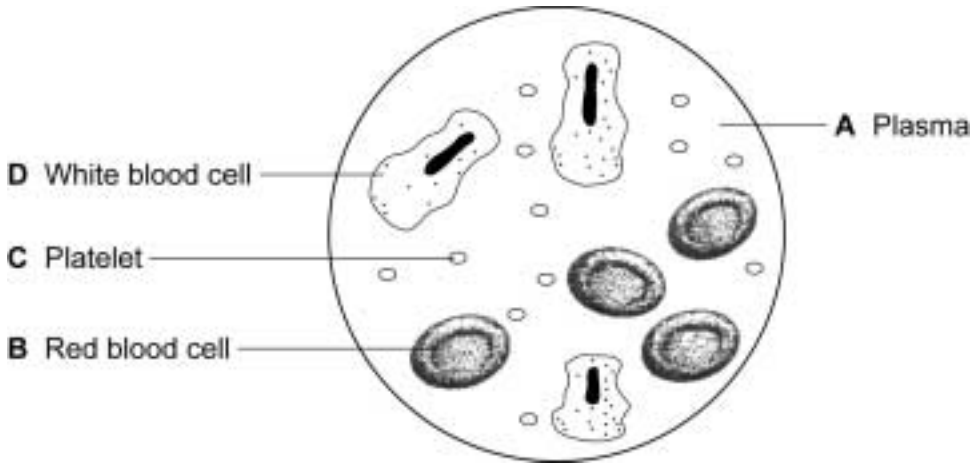
1 (d) (ii) Alveoli are adapted for absorbing .....

(1 mark)

6

Do not write outside the box

2 The diagram shows human blood seen through a microscope.



Write the correct letter, **A**, **B**, **C** or **D**, next to each function.

Function	Part of blood A, B, C or D
Transports oxygen	
Helps blood to clot at the site of a cut	
Transports urea	

(3 marks)

3

Turn over for the next question

Do not write outside the box

3 There are many ways in which we can help the environment.

List A gives four methods of helping the environment.

List B gives the impact of the methods on the environment.

Draw **one** line from each method in **List A** to the impact on the environment in **List B**.

List A **Method**	**List B** **Impact on the environment**
increasing the amount of metal recycled	fewer forests are cut down
using fewer pesticides	less methane is added to the atmosphere
reducing the number of cattle raised for food	less pollution of rivers flowing through farmland
increasing the amount of paper recycled	fewer quarries are dug to provide raw materials
	no energy is wasted

(4 marks)

4

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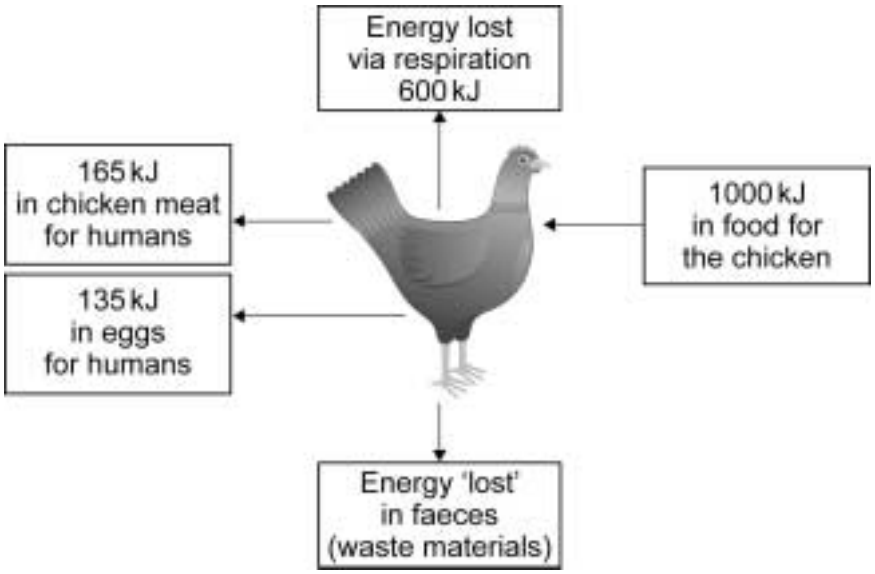
4 The diagram shows how energy supplied in food to a chicken is transferred.



4 (a) How much energy is transferred by the chicken into food for humans?

Amount of energy transferred to humans ..... kJ

(1 mark)

4 (b) Calculate the amount of energy 'lost' in faeces.

.....

Amount of energy 'lost' in faeces ..... kJ

(1 mark)

4 (c) Calculate the proportion of the energy supplied to the chicken in food that is 'lost'.

.....

Proportion of energy supplied to chicken that is lost.....

(1 mark)

4 (d) On many farms chickens are kept inside in small cages.

Complete the following sentence.

Compared with chickens kept outside, chickens kept inside in cages lose less energy

because they .....

(1 mark)

4

Turn over ▶

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5 A marathon runner loses a lot of sweat during a race.

5 (a) Complete the following sentence.

Sweat contains water and .....

(1 mark)

5 (b) The table shows the concentration of glucose, ions and protein in four sports drinks, **A**, **B**, **C** and **D**.

Runners drink sports drinks to replace the water lost in sweating. Replacing water is called rehydration.

Scientists have shown that the ratio of the glucose concentration, in g per dm^3, to the ion concentration, in mg per dm^3, in a drink affects the rate of rehydration.

The nearer this ratio is to 1:1, the faster the body rehydrates.

Drink	Glucose in g per dm^3	Ions in mg per dm^3	Protein in g per dm^3	Glucose to ion ratio
A	110	22	1.2	5:1
B	64	96	0.0	2:3
C	72	80	0.0	…….
D	138	23	0.2	…….

5 (b) (i) Which drink, **A**, **B**, **C** or **D**, would give the runner most energy? ☐

(1 mark)

5 (b) (ii) Calculate the glucose to ion ratios for drinks **C** and **D**.

Write your answers in the table.

(2 marks)

5 (b) (iii) Which drink, **A**, **B**, **C** or **D**, would rehydrate the runner the fastest? ☐

(1 mark)

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5 (c) The kidney controls the amount of water in the runner's body.

The table shows:

- the volume of water filtered from the blood
- the volume of urine produced in one day.

	Volume per day in dm^3
Water filtered from blood	180
Urine produced	2

Calculate the volume of water reabsorbed into the blood in one day.

.....

Volume of water that is reabsorbed .....dm^3

(1 mark)

5 (d) On a hot sunny afternoon:

- man **A** sat in the shade, drinking beer
- man **B** went jogging in the desert.

Man **A**

Man **B**

Complete the table to compare the volume and concentration of urine produced by the kidneys of the two men.

Tick (✓) **one** box on each row.

Compared with Man A	**The same**	**Higher**	**Lower**
the volume of urine produced by man **B** would be			
the concentration of urine produced by man **B**'s kidneys would be			

(2 marks)

8

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6 In fish and chip shops, potatoes are cut into chips several hours before the chips are cooked.

The amount of water in the chips must be kept constant during this time.

To keep the water in the chips constant, the chips are kept in salt solution.

A student investigated the effect of different concentrations of salt solution on the mass of five chips.

- He weighed each one of five chips.
- He placed each chip into a different concentration of salt solution.
- After one hour he removed the chips from the salt solutions and then reweighed the chips.

	Concentration of salt solution				
	0 M	**0.5 M**	**1 M**	**2 M**	**3 M**
Mass of chip at start, in grams	2.6	2.8	2.8	2.5	2.6
Mass of chip after one hour, in grams	2.7	2.8	2.7	2.3	2.1

6 (a) (i) In which concentration of salt solution did the chip gain mass? .....

(1 mark)

6 (a) (ii) Explain why the chip gained mass in this solution.

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(2 marks)

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6 (b) In which concentration of salt solution should the chips be kept in the shop?

Give the reason for your answer.

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(2 marks)

5

Turn over for the next question

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7 Humans damage the environment in many ways, including deforestation.

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

The diagram shows an area where the forest is being cleared.

Describe the reasons why deforestation is taking place and the effects that deforestation has on the environment.

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(6 marks)

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8 Sulfur dioxide produced by human activity pollutes the atmosphere.

8 (a) (i) Name **one** human activity that produces sulfur dioxide.

.....

(1 mark)

8 (a) (ii) What effect does sulfur dioxide have on rainwater?

.....

.....

(1 mark)

8 (b) The table shows the effects that two different concentrations of sulfur dioxide in the air had on the growth of rye grass plants.

	Sulfur dioxide concentration in the air in micrograms per m^3	
	9.0	191.0
Number of leaves per plant	85.6	47.3
Total leaf area in cm^2	417.2	203.6
Dry mass of stubble in grams	0.48	0.22

8 (b) (i) Use information from the table to describe **one** effect of increasing the sulphur dioxide concentration on the leaves of the rye grass plants.

.....

.....

(1 mark)

8 (b) (ii) The stubble consists of the bases of the stems of the plants and the roots left in the soil after harvesting.

Use your answer to part 8(b)(i) to explain why the dry mass of the stubble was lower at the higher concentration of sulphur dioxide.

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(2 marks)

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9 Read the article about sustainable cod fishing.

> Every December the European Commission makes suggestions for cod fishing quotas in European Union (EU) waters. These quotas use data from scientists' investigations.
>
> Scientists calculate what proportion of the cod stock is being caught each year. Scientists do this by working out the numbers in each age-group of cod.
>
> Every year the fishermen say that the scientists are making the danger to the stocks in the North Sea seem worse. The scientists say that the fishermen might lose their jobs because the fishermen are ignoring warnings of the cod numbers going down.
>
> The scientists say that fishermen go only to parts of the sea where there are a lot of cod, so the fishermen get the wrong idea of the number of cod in the whole area.

9 (a) The scientists and the fishermen have different opinions about the size of the cod population.

Explain why.

.....

.....

.....

.....

(2 marks)

9 (b) (i) Give **one** method, **other than** quotas, by which fish stocks can be preserved.

.....

(1 mark)

9 (b) (ii) State how the method you have given in 9(b)(i) helps to preserve fish stocks.

.....

.....

(1 mark)

4

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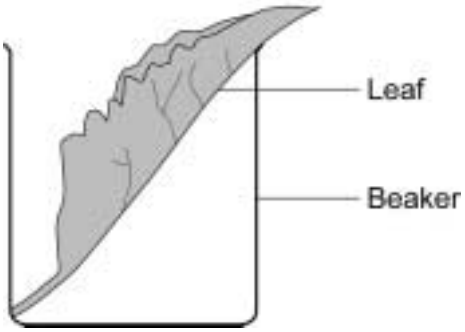
10 Four leaves were removed from the same plant. A waterproofing agent was spread onto some of the leaves, as follows:

- leaf **A** on both surfaces
- leaf **B** on the lower surface only
- leaf **C** on the upper surface only
- leaf **D** on neither surface.

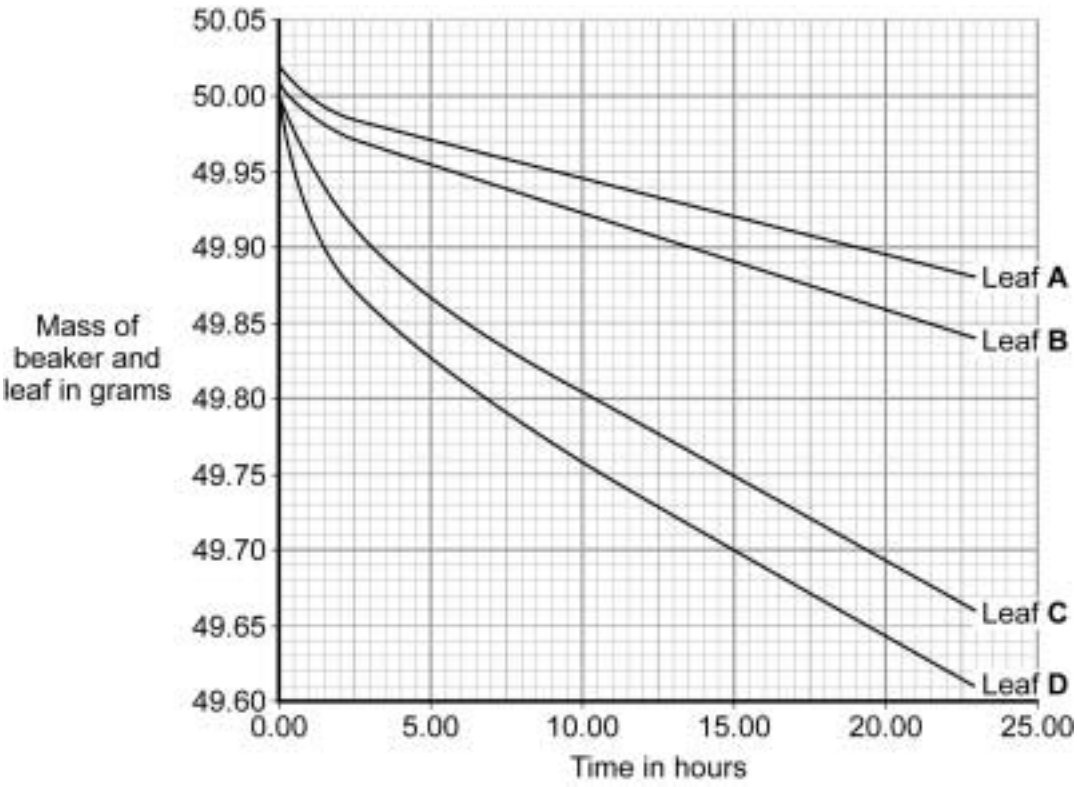
Each leaf was then placed in a separate beaker, as shown in **Diagram 1**.

Diagram 1



Each beaker was weighed at intervals.

The results are shown in the graph.



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10 (a) Give evidence from the graph when answering the following questions.

10 (a) (i) Which leaf, **A**, **B**, **C** or **D**, loses water most rapidly? ☐

Evidence .....

.....

(1 mark)

10 (a) (ii) Is water lost from both surfaces of the leaf?

Draw a ring around your answer. **Yes** / **No**

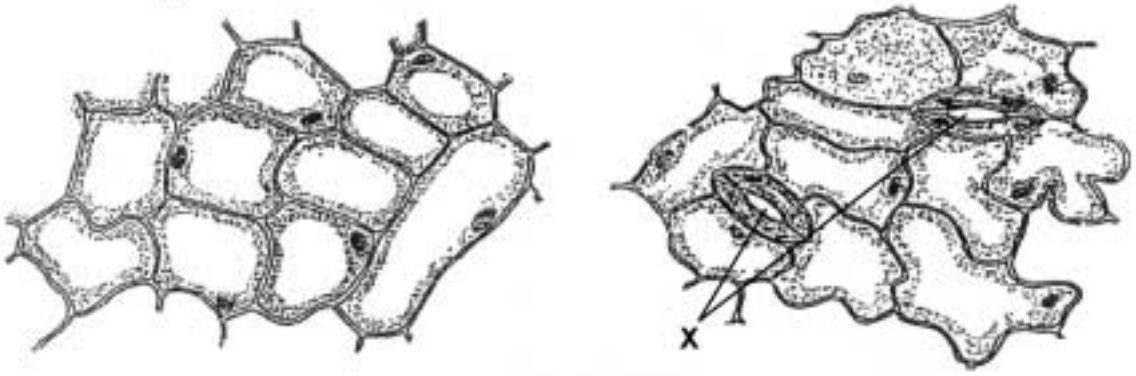
Evidence .....

.....

(1 mark)

10 (b) **Diagram 2** shows the appearance of each surface of the leaf as seen through a microscope.

Diagram 2



10 (b) (i) Name the spaces labelled **X**. ..... *(1 mark)*

10 (b) (ii) Use information in **Diagram 2** to explain why the results are different for leaves **B** and **C**.

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(2 marks)

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11 The food we eat affects how quickly our blood glucose concentration changes.

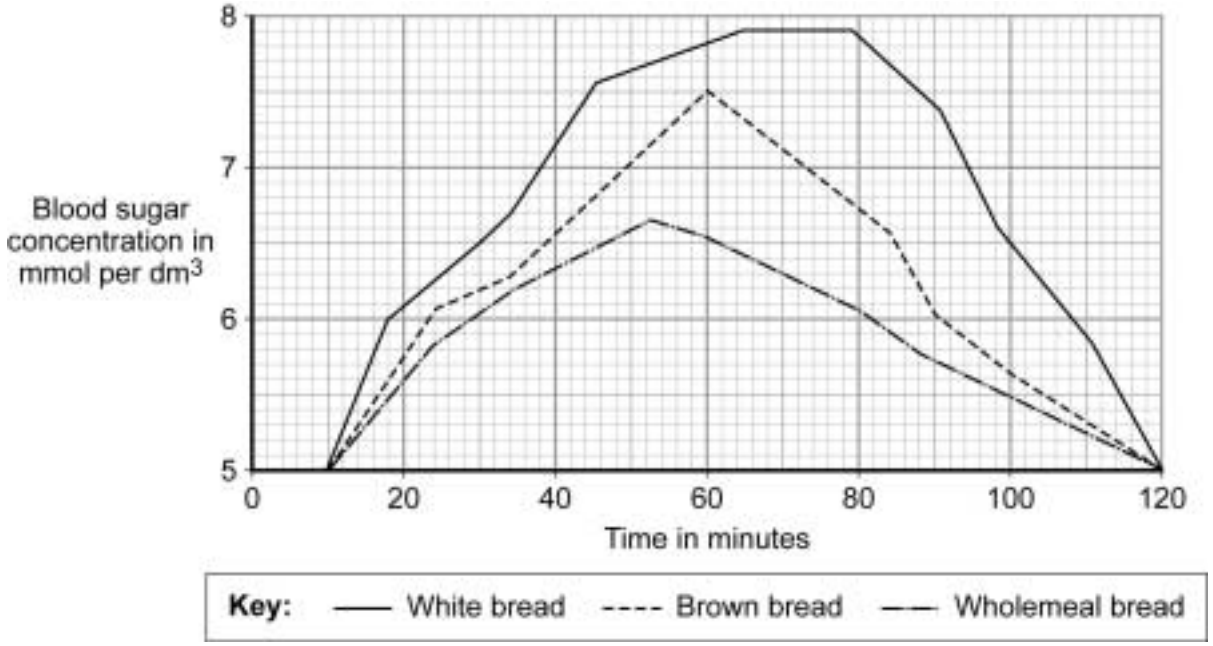
In an experiment a person ate two slices of white bread.

Her blood glucose concentration was recorded over the next 120 minutes.

The experiment was repeated:

- first with two slices of brown bread
- then with two slices of wholemeal bread.

The graph shows the results of the three experiments.



11 (a) Describe the effect of eating two slices of white bread on the person's blood sugar concentration.

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(2 marks)

Turn over ▶

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11 (b) Wholemeal bread would be most suitable for a person with diabetes.

Explain why.

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(3 marks)

5

Turn over for the next question

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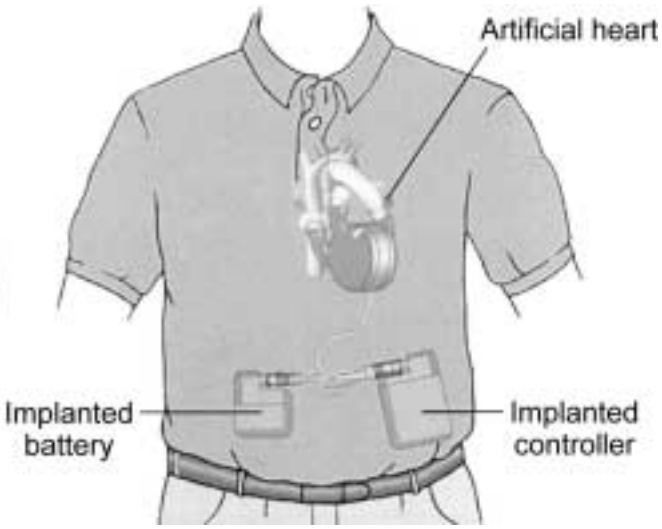
12 The photograph shows one type of artificial heart.

The diagram shows how this artificial heart is fitted inside the body.



Read the information about this artificial heart.

> The first patient to receive the heart lived for 151 days before dying from a stroke.
>
> The second patient was given less than a 20 % chance of surviving 30 days at the time of his surgery. He lived for 512 days after receiving the heart. He died because an internal membrane in the device wore out.

Suggest **advantages** and **disadvantages** of treating patients with this artificial heart.

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(5 marks)

END OF QUESTIONS

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Question 12 Photo: www.heartreplacement.com

Diagram: www.abiomed.com/patients_families/what_is_abiocor.cfm

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