Specimen Paper

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	

AQA Level 1/2 Certificate in Biology
Specimen Paper

Biology

Paper 1

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 90 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 90.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

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

There are no questions printed on this page

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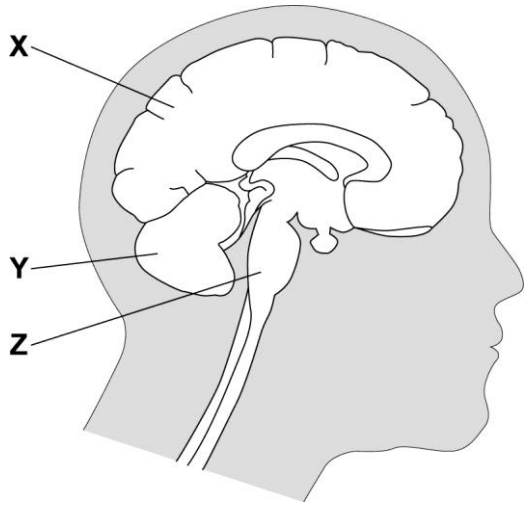
ANSWER IN THE SPACES PROVIDED

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

1 The diagram shows a vertical section through the head, showing the brain.



1 (a) Use words from the box to name the structures labelled **X**, **Y** and **Z** on the diagram.

cerebral cortex	**cerebellum**	**medulla**	**spinal cord**	**synapse**

X .....

Y .....

Z .....

(3 marks)

1 (b) One method of mapping brain function is to observe changes in body functions following a stroke.

1 (b) (i) Give **two** other methods of mapping brain function.

1 .....

2 .....

(2 marks)

1 (b) (ii) Give **one** way in which disruption of the blood supply to part **Y** might affect the functioning of the body.

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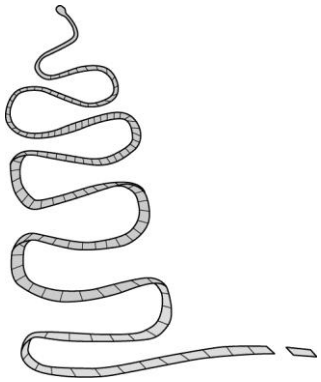
(1 mark)

6

Turn over ▶

2 Parasites are adapted for living on or inside their hosts.

2 (a) The diagram shows a typical tapeworm.



Complete the following sentences.

The tapeworm has hooks to .....

..... .

The flattened shape gives the tapeworm a large .....

for the ..... of soluble food.

A thick outer cuticle protects the tapeworm from ..... .

(4 marks)

2 (b) How is a flea adapted to transfer from one host to another?

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(2 marks)

6

3 Hormones control growth in plants.

3 (a) Give **two** uses of plant growth hormones in horticulture.

1 .....

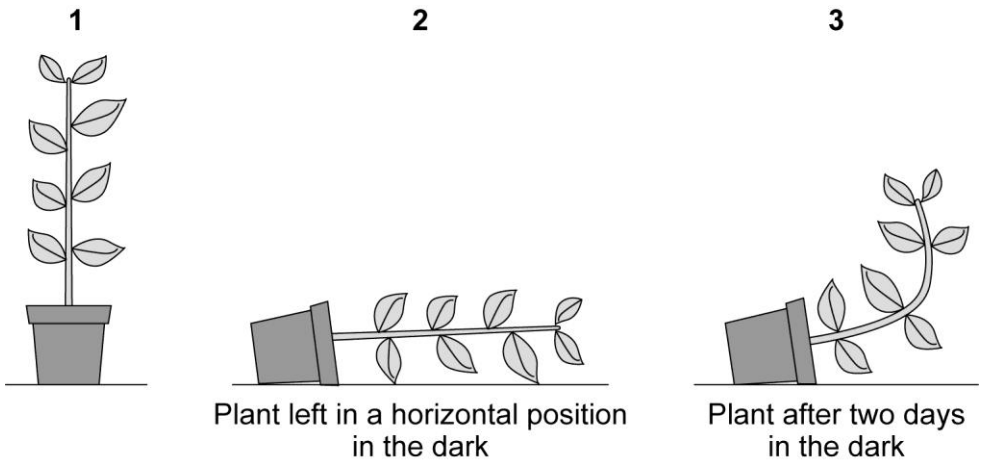
2 .....

(2 marks)

3 (b) A student grew a plant in an upright pot.

Later she put the pot in a horizontal position and left the plant in the dark for two days.

Diagram 3 shows the potted plant after two days in the dark.



Explain fully why the plant responded in this way.

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(4 marks)

6

Turn over ▶

4 The blood system supplies the body tissues with essential materials.

4 (a) Blood contains red blood cells, white blood cells and platelets.

4 (a) (i) Give the function of white blood cells.

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(1 mark)

4 (a) (ii) Give the function of platelets.

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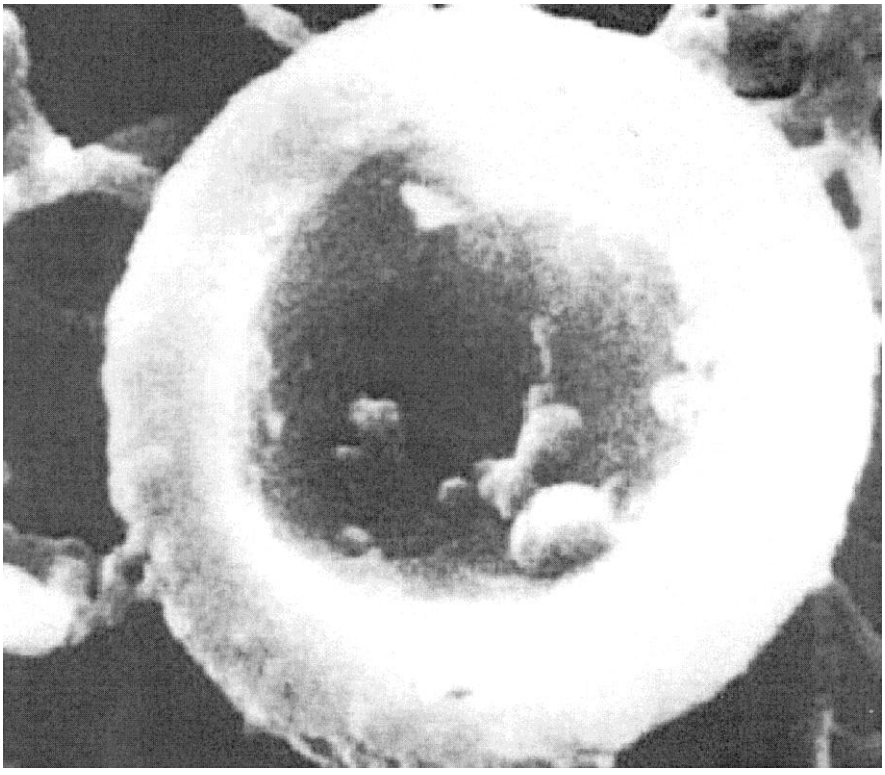
(1 mark)

4 (a) (iii) The photograph shows a magnified red blood cell.



The average diameter of a real red blood cell is 0.008 millimetres.

On the photograph, the diameter of the red blood cell is 100 millimetres.

Use the formula below to calculate the magnification of the photograph.

diameter on photograph = real diameter × magnification

.....

.....

Magnification = ...

(2 marks)

4 (a) (iv) Some blood capillaries have an internal diameter of approximately 0.01 millimetres.

Use information given in part **4(a)(iii)** to explain why only one red blood cell at a time can pass through a capillary.

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(2 marks)

4 (a) (v) Red blood cells transport oxygen.

Describe how oxygen is moved from the lungs to the tissues.

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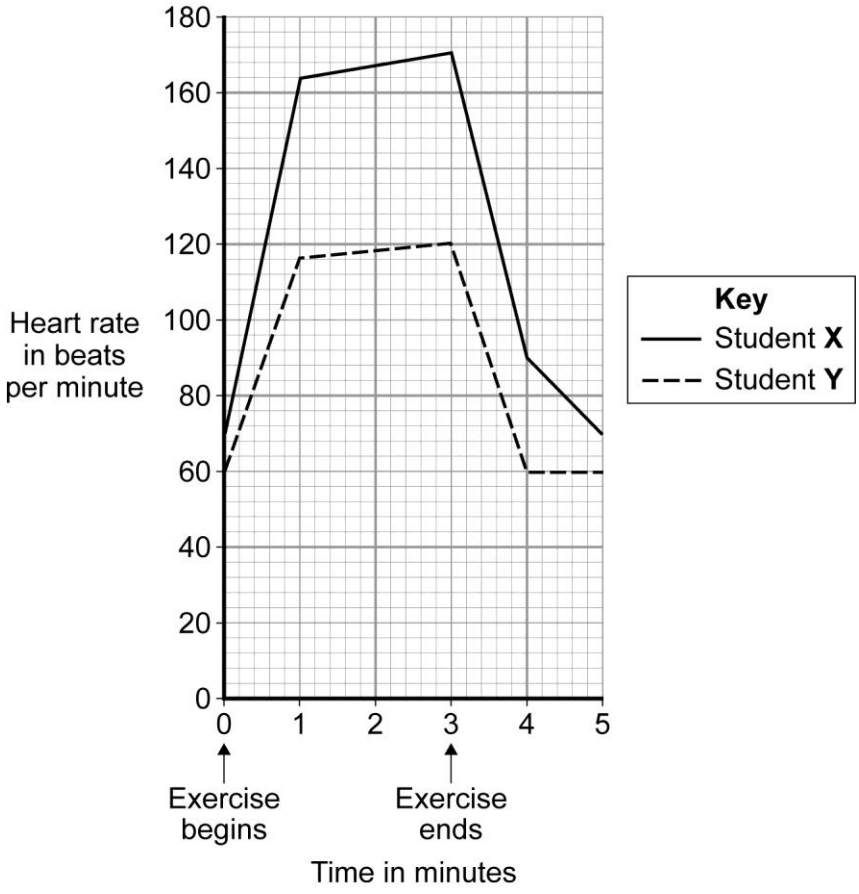
(3 marks)

Question 4 continues on the next page

4 (b) Two students did the same step-up exercise for 3 minutes.

One of the students was fit. The other student was unfit.

The graph shows how the students' heart rate changed during the exercise and after the exercise.



4 (b) (i) Use the information in the graph to suggest which student was the fitter.

Explain your choice.

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(3 marks)

4 (b) (ii) Explain the advantage to the students of the change in heart rate during exercise.

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(4 marks)

16

Turn over for the next question

5 An oak wood contained the following:

- 200 oak trees
- 150 000 primary consumers
- 120 000 secondary consumers.

5 (a) Draw and label a pyramid of biomass for **this** wood.

(2 marks)

5 (b) A scientist estimated the total amount of energy flow through each level of the pyramid per year.

The results are shown in the table.

	Energy in kJ per m^2 per year
Energy absorbed by oak trees	4 600 000
Energy in sugar produced by trees	44 000
Energy transferred to primary consumers	2 920
Energy transferred to secondary consumers	700

5 (b) (i) Calculate the proportion of the energy absorbed by the trees that is transferred to sugar by photosynthesis.

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Answer .....

(2 marks)

5 (b) (ii) Suggest **two** reasons why a large proportion of the energy absorbed by the trees is **not** transferred to sugar.

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(2 marks)

5 (b) (iii) Explain why some of the energy in the primary consumers is **not** passed on to the secondary consumers.

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(3 marks)

5 (c) Conditions may change considerably during the course of a summer's day.

Suggest how different factors interact to determine the rate of photosynthesis at different times of the day.

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(3 marks)

Question 5 continues on the next page

5 (d) In autumn, the leaves fall from the oak trees. The fallen leaves contain carbohydrates.

Explain how the carbon in these carbohydrates is made available for the oak trees to use again.

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(3 marks)

15

6 (a) The body responds to infections.

Use words from the box to complete the sentences.

antibiotics	**antitoxins**	**cells**	**pathogens**	**toxins**

Bacteria and viruses are known as ..... .

Bacteria produce ..... that make us feel ill.

Viruses live inside body ..... .

(3 marks)

6 (b) Describe how immunisation protects us from a disease.

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(3 marks)

Question 6 continues on the next page

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

Hepatitis B vaccine contains proteins that are identical to the hepatitis antigen. These proteins are produced using genetically engineered bacteria.

Explain how the genetically engineered bacteria are able to produce the hepatitis antigen.

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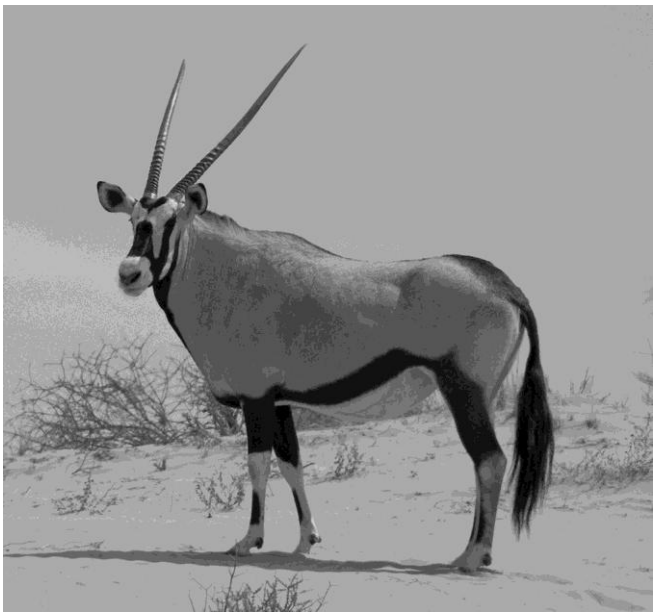
(6 marks)

12

7 The gemsbok is a large herbivore that lives in herds in desert areas of South Africa. Gemsboks feed on plants that are adapted to living in dry conditions. There are not many rivers, lakes or ponds that can provide drinking water for the animals. The desert areas are hot during the day but cool at night.



7 (a) A few lions live in the desert areas. They hunt and feed on the gemsboks.

Use information from the photograph of the gemsbok to suggest and explain **two** ways in which the gemsbok could avoid being killed by lions.

1 .....

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2 .....

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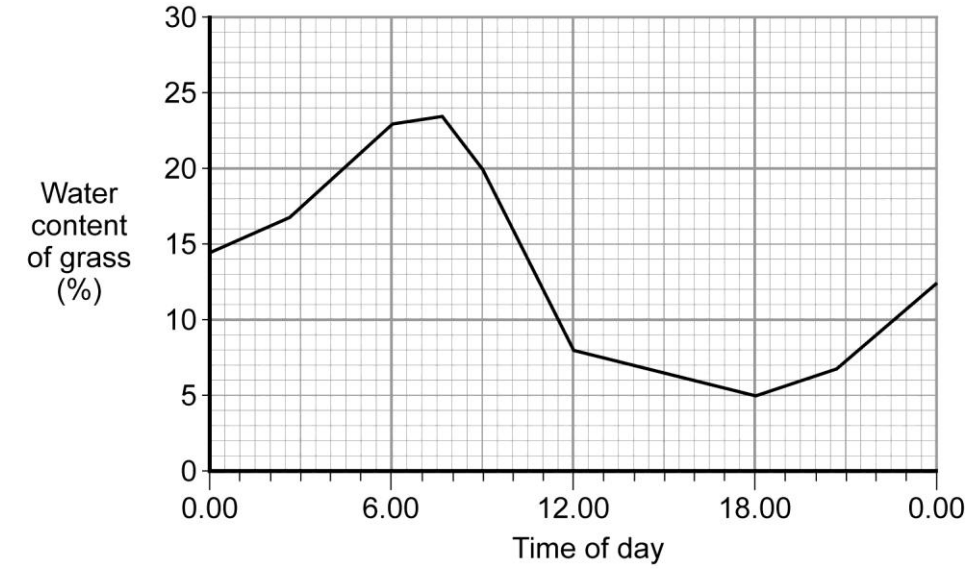
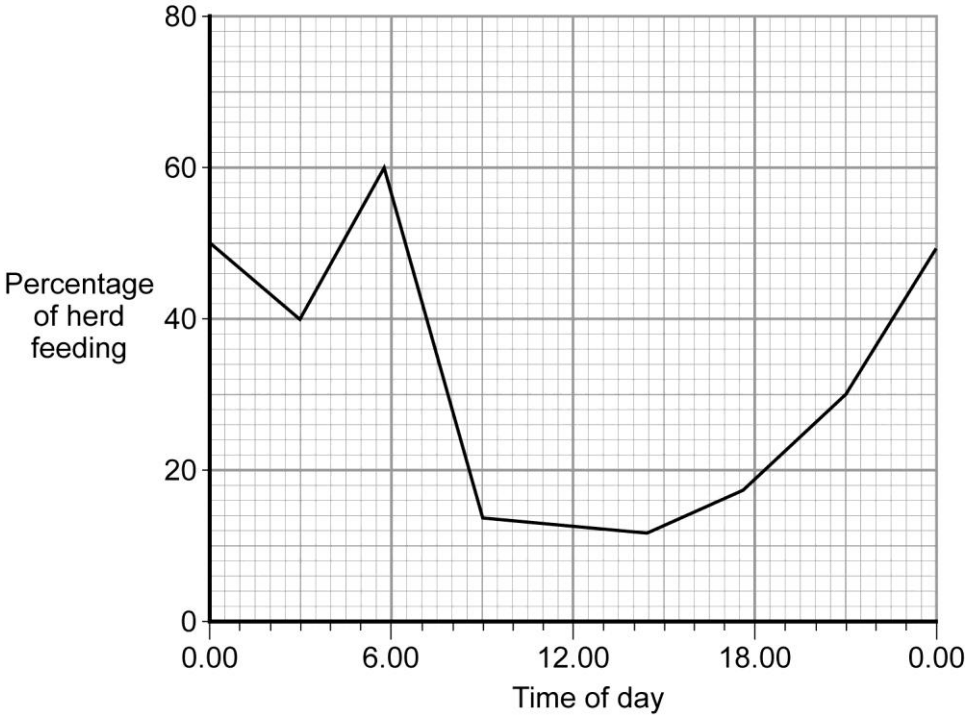
(2 marks)

Question 7 continues on the next page

7 (b) The graphs show the water content of the desert grass and the percentage of gemsboks feeding at different times of day.





7 (b) (i) Suggest why the percentage water content of the grass decreases between 7.00 and 18.00.

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(1 mark)

7 (b) (ii) Between which times of day are more than 25 % of the herd feeding?

..... and .....

(1 mark)

7 (b) (iii) Explain **one** advantage to the gemsbok of feeding mainly at these times.

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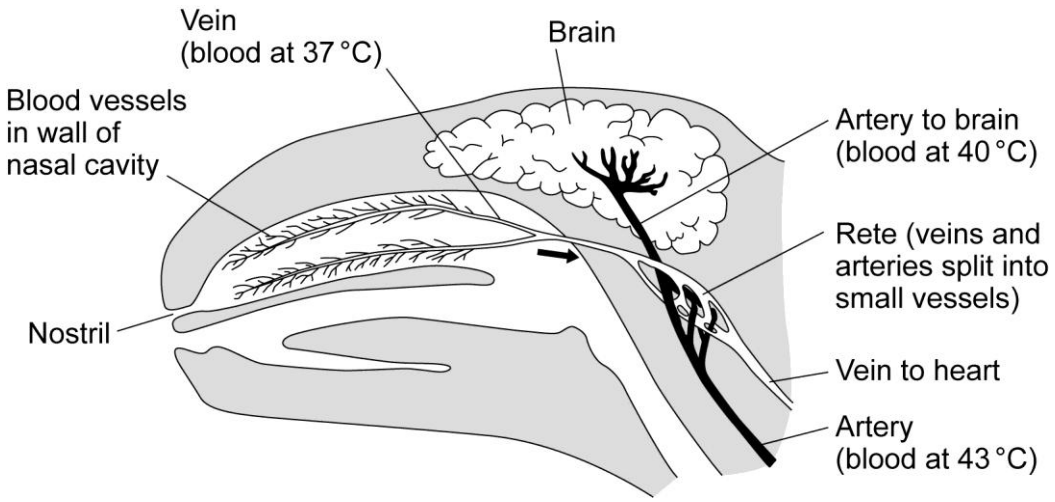
(2 marks)

Question 7 continues on the next page

7 (c) Although the gemsbok lives in hot conditions, it does not sweat. During the day its body temperature can rise, but it is important that blood reaching the brain does not rise above 40 °C.

The diagram shows how the gemsbok's blood system is adapted to cool the blood that flows to the brain.



7 (c) (i) Suggest an advantage to the gemsbok of not sweating.

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(1 mark)

7 (c) (ii) Suggest how the blood is cooled in the cavities of the nose.

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(2 marks)

7 (c) (iii) Suggest how the structure of the rete helps in keeping the brain cool.

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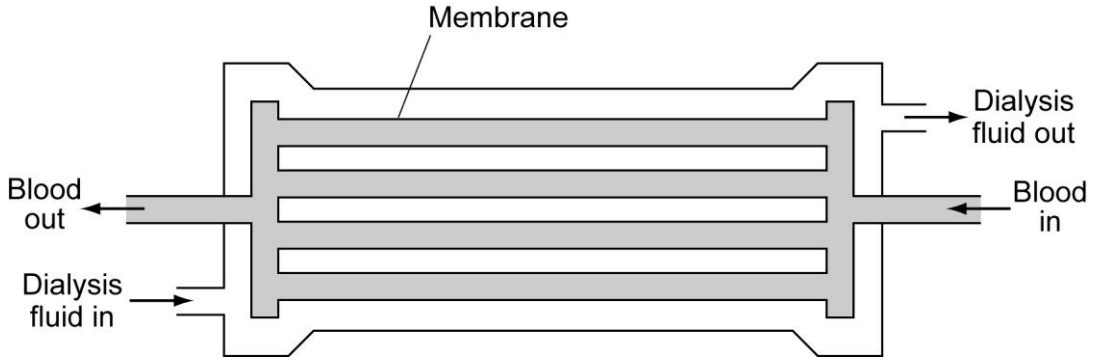
(2 marks)

11

Turn over for the next question

8 A woman suffers a severe infection that affects her kidneys. She is sent to hospital for treatment with a dialysis machine.

A simplified diagram of a dialysis machine is shown below.



8 (a) Some of the components of the woman's blood and of the dialysis fluid entering the machine are shown in the table.

Component	Woman's blood entering machine	Dialysis fluid entering machine
Blood cells	✓	✗
Glucose	✓	✓
Urea	✓	✗

Key: = ✓ present ✗ = absent

Use the information in the table to explain the composition of the dialysis fluid entering the machine.

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(4 marks)

8 (b) One alternative to treatment with a dialysis machine is to have a kidney transplant.

Suggest why a kidney transplant might **not** be suitable for this woman.

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(2 marks)

8 (c) Before dialysis treatment begins the dialysis machine must be filled with blood.

The woman has blood group O.

8 (c) (i) What features of her blood make it group O?

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(2 marks)

8 (c) (ii) Why must blood in the dialysis machine, before her treatment begins, also be blood group O?

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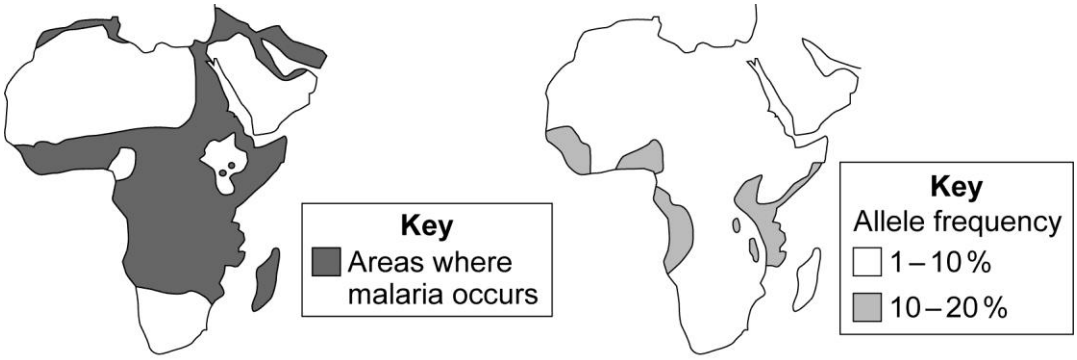
(1 mark)

9

Turn over for the next question

9 The maps show the present distribution of malaria and the sickle-cell allele in Africa.



Distribution of malaria **Distribution of sickle-cell allele**

9 (a) Draw a genetic diagram to show how sickle-cell anaemia can be inherited from parents who do not have the condition.

Key to symbols for alleles:

Hb^A Normal adult haemoglobin
Hb^S Sickle-cell haemoglobin

(4 marks)

9 (b) (i) Explain the link between sickle-cell anaemia, resistance to malaria and the frequency of the Hb^S allele.

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(3 marks)

9 (b) (ii) Select and evaluate the evidence from the maps that accounts for the distribution of the sickle-cell allele and the resistance to malaria in parts of Africa.

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(2 marks)

9

END OF QUESTIONS

There are no questions printed on this page

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