

Surname	Centre Number	Candidate Number
Other Names		0



GCSE
4483/02
BIOLOGY
BIOLOGY 3
HIGHER TIER

A.M. TUESDAY, 13 May 2014

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	9	
3.	9	
4.	6	
5.	8	
6.	4	
7.	6	
8.	6	
9.	6	
Total	60	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

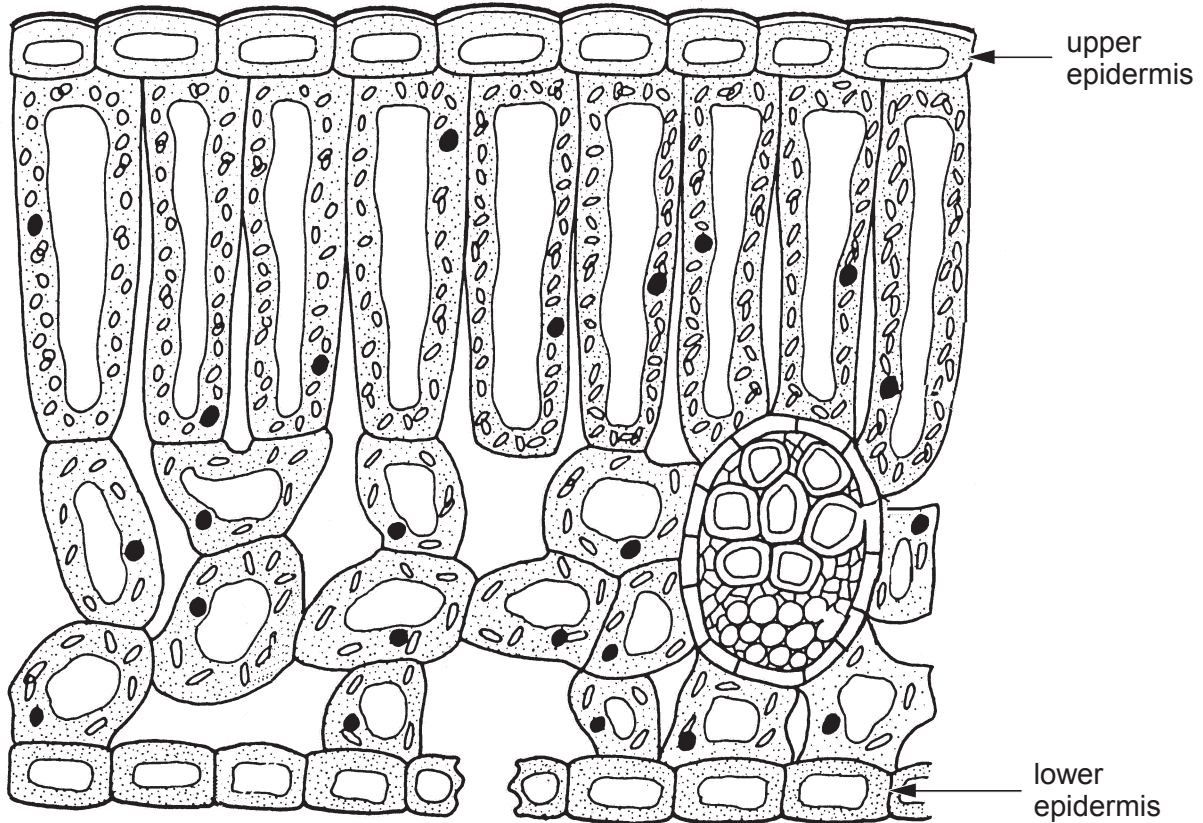
INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answer to question **3(b)** and **9**.

Answer all questions.

1. (a) The diagram below shows a leaf in section.



- (i) State the name of the tissue in a leaf that transports sugar. [1]

- (ii) On the diagram above, label this tissue with the letter **A**. [1]
- (b) Complete the following sentence. [1]
 Sugar cannot be stored in a plant, it has to be converted into
 for storage.

- (c) (i) Ethanol can be made by reacting sugar with yeast.
State the name of the reaction between sugar and yeast that produces ethanol. [1]

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- (ii) Ethanol is a biofuel. The area of farmland used only to grow crops for the production of biofuel could double over the next 15 years.

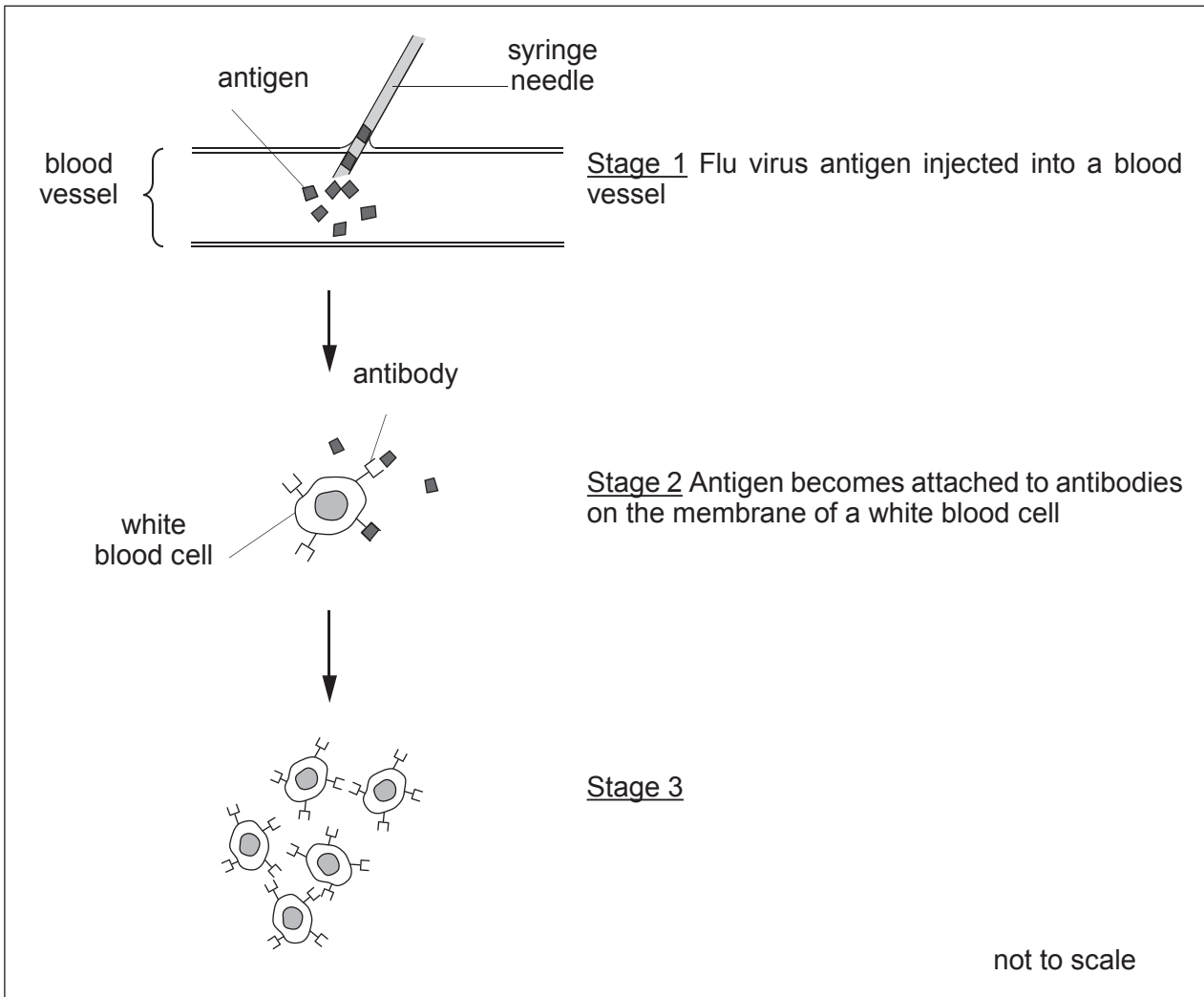
Suggest **two** reasons why many people have concerns about using so much farmland for this purpose. [2]

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2. The diagram below shows stages in the response by one type of white blood cell to a flu virus vaccination.



(a) (i) Name the type of white blood cell that produces antibodies. [1]

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(ii) Describe the process that has taken place between stages 2 and 3. [2]

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(iii) State the importance of stage 3 in protecting the body from the flu virus. [1]

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(b) New forms of flu virus appear almost every year in the UK.
Suggest why a government report recommends that flu vaccines should be given every year. [2]

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(c) Name the English doctor who first used vaccination to treat a patient in the UK. [1]

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(d) After an injection, blood clots at the site of the wound.
Suggest why it is important for blood to clot at the site of a wound. [2]

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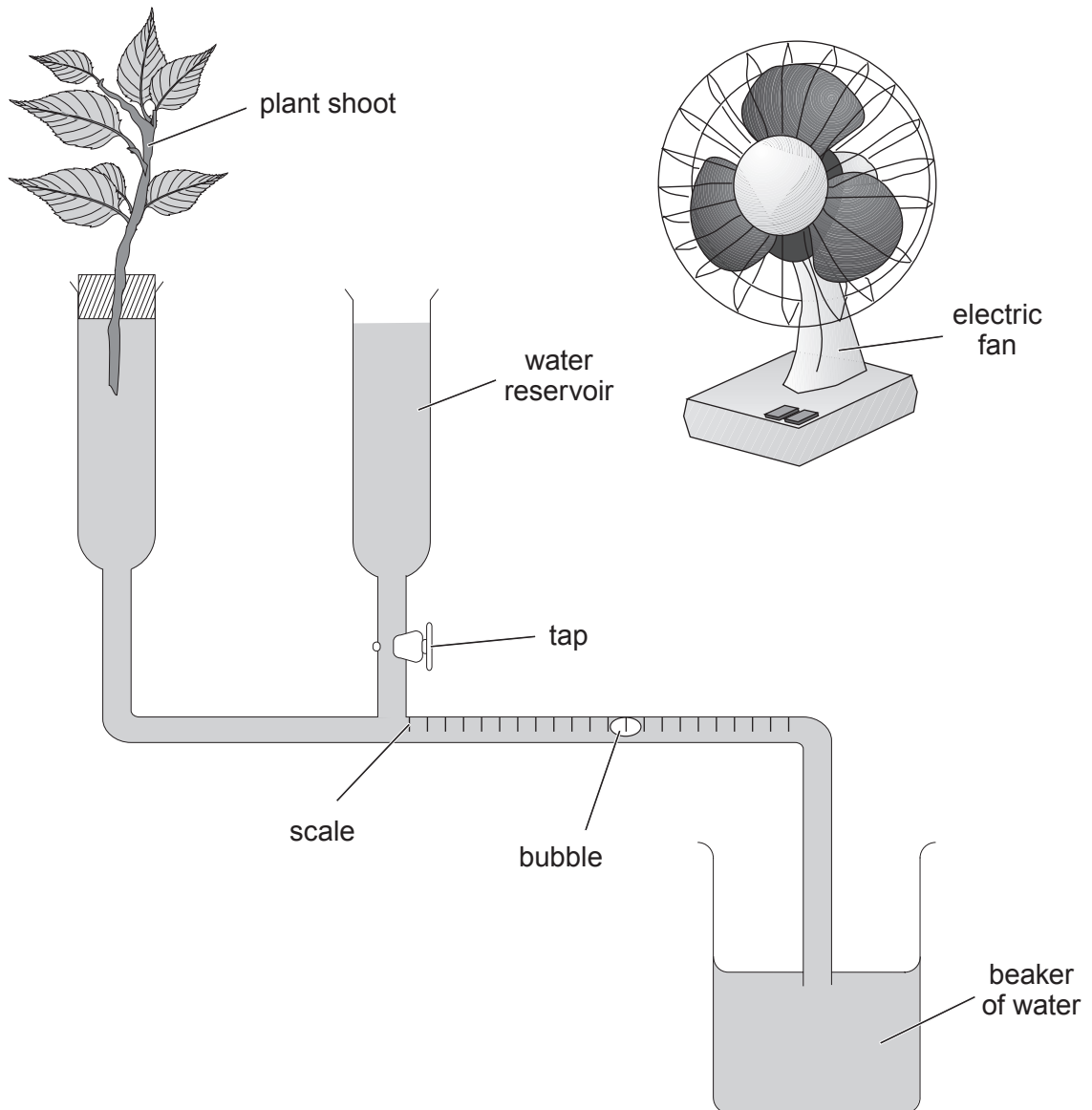
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3. (a) What word is used to describe water loss from the leaves of a plant?

[1]

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The diagram below shows a plant shoot in a simple potometer and an electric fan.



(b) Describe how you would investigate the effect of moving air on the rate of water loss from the shoot using the apparatus shown opposite. [6 QWC]

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(c) Apart from air movement, give **two other** environmental factors that affect the rate of water loss from a plant. [2]

- 1.
- 2.

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4. (a) What is meant by the term excretion? [1]

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(b) The table below shows mean fluid intake and urine produced in astronauts studied before and during space flights.

sampling period	mean water intake (cm ³)	mean urine produced (cm ³)	percentage of mean water intake that passes into the urine (%)
day before flight	3800	2700	71.0
during flight	2500	1700

(i) Calculate the percentage of mean water intake that passes into the urine during a flight. Write your answer in the table above. Use the space below for your working out. [1]

(ii) During space flights, the kidneys remove unusually high levels of salts from the blood.

I. What happens to salts removed from the blood by the kidneys? [1]

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II. Use data in the table and the information above to describe and explain how the concentration of urine changes during a space flight. [2]

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(iii) Suggest why astronauts are given drinks containing high levels of salts when they return to Earth. [1]

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5. The presence of protein in the urine is a symptom of a kidney disease called nephrotic syndrome. The drug endaravone is used as a treatment for this disease. Rats with nephrotic syndrome were used to investigate the effects of endaravone. A control group of healthy rats was also used in the investigation.

The results are shown in the table:

group of rats	protein in urine (mg/day/rat)
control	0
with nephrotic syndrome	350
after treatment with endaravone	0.5

- (a) (i) What was the purpose of the control group? [1]

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- (ii) Give a reason for the absence of protein in the urine of rats which do not show nephrotic syndrome (control group). [1]
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- (b) State **three** factors which must be kept the same in this investigation. [3]

- (i)
- (ii)
- (iii)

- (c) How would you increase the strength of evidence in this investigation? [1]
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- (d) How does this evidence suggest that endaravone might be useful in the treatment of nephrotic syndrome in humans but is not a **cure**? [2]
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6. (a) In the list below, which **two** letters represent pathways taken by nerve impulses in reflex actions? [2]

- A motor neurone → brain → sensory neurone
- B sensory neurone → spinal cord → motor neurone
- C sensory neurone → spinal cord → receptor
- D retina → brain → eyelid

Letters and

(b) Name an example of each of the two reflex actions given as your answer to (a). [2]

(i) Letter

Example

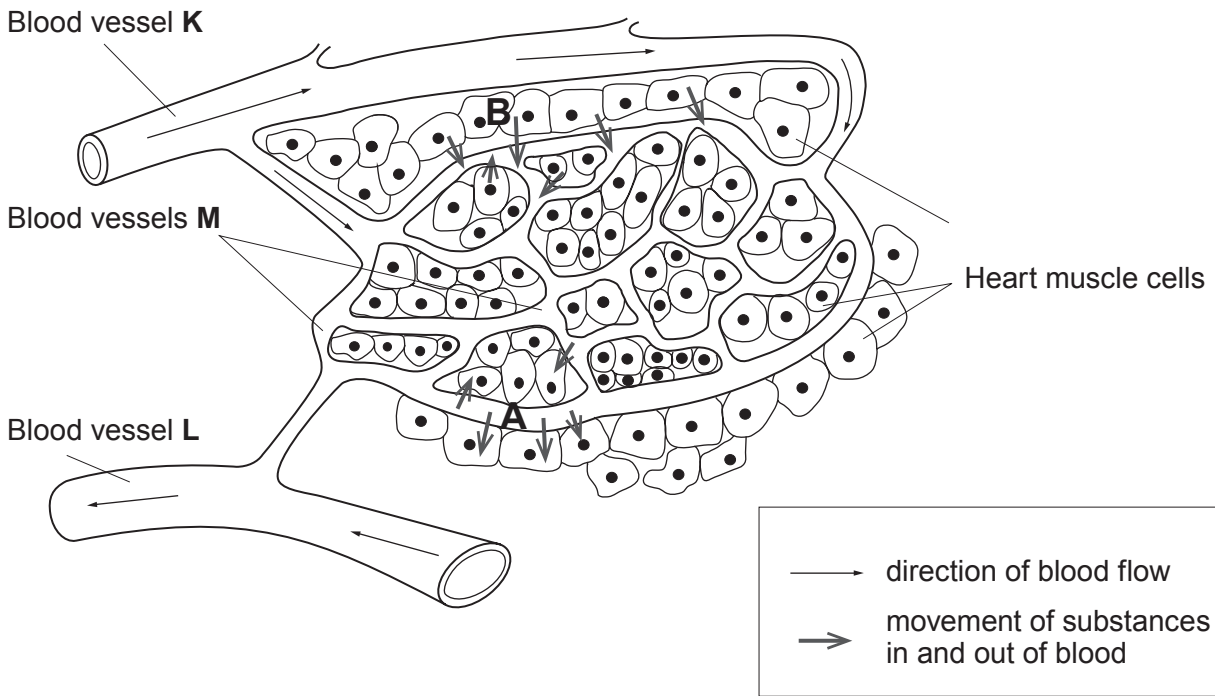
(ii) Letter

Example

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7. (a) The diagram below shows a small part of the blood system supplying the muscle cells of the heart. The direction of blood flow is shown by the arrows on the blood vessels.



(i) Name the blood vessel which supplies the heart muscle with blood. [1]

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(ii) Explain why the action of platelets in this blood vessel could be a problem. [2]

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(iii) Name the type of blood vessels labelled M. [1]

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(b) The table below compares the contents of the blood in blood vessels **K** and **L**.

contents	vessel K (a.u.)	vessel L (a.u.)
glucose	120	90
oxygen	100	40
carbon dioxide	30	44

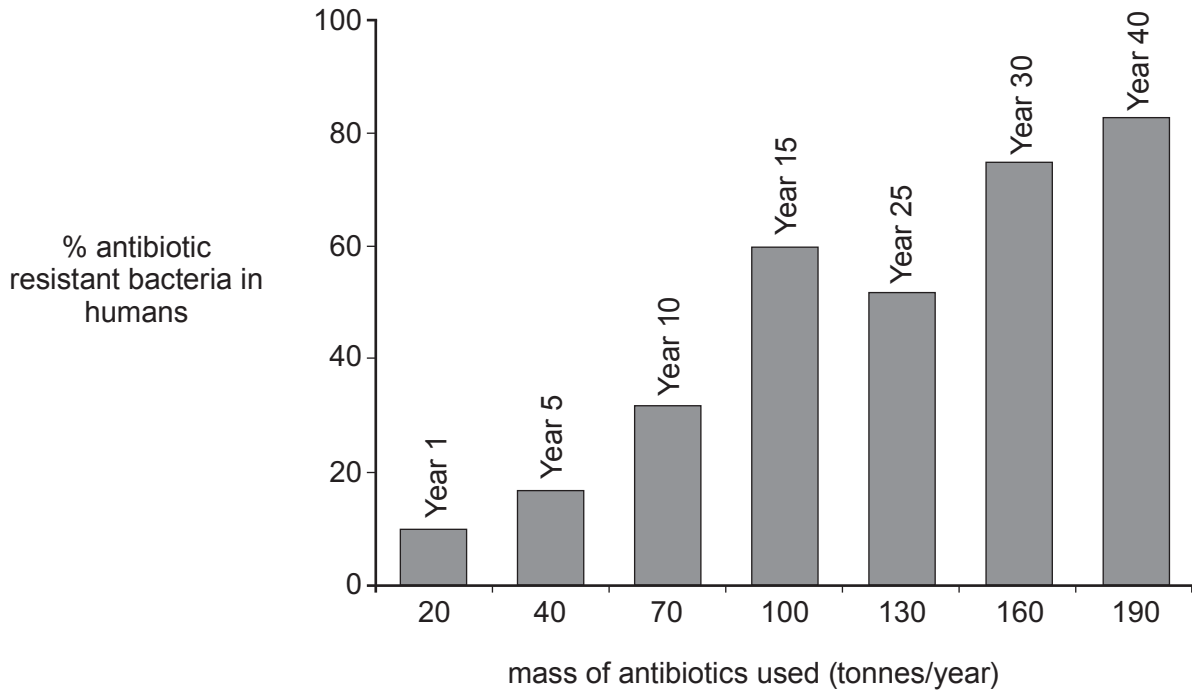
- (i) Use the data in the table to calculate how much carbon dioxide will pass from the muscle cells into the blood shown by the arrows **B**. [1]

..... a.u.

- (ii) Choose **one** substance from the table above which will pass from blood vessel **M** to the muscle cells in the direction shown by the arrows **A**. [1]

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8. The bar chart below shows the percentage of antibiotic resistant bacteria found in humans. The bar chart also shows the mass of antibiotics used during a period of 40 years in Britain.



- (a) Describe the relationship between the percentage of antibiotic resistant bacteria in humans and the mass of antibiotics used. [1]

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- (b) During the 20th century, antibiotics were often added to cattle food to increase the production of meat. Explain why this practice has now been banned in most countries. [2]

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- (c) Bacteria from humans were grown on nutrient agar in four Petri dishes labelled **A**, **B**, **C** and **D**. These bacteria were tested for antibiotic resistance. Dish **A** was a control, **B**, **C** and **D** had different antibiotics added. The Petri dishes were incubated for equal times. The results are shown in the table below.

	Petri dish			
	A	B	C	D
name of antibiotic	no antibiotic present	ampicillin	tetracycline	ampicillin + tetracycline
number of bacterial colonies	250	157	203	150

- (i) Name the antibiotic which is least effective. [1]

- (ii) Calculate the percentage of bacteria resistant to **both** ampicillin and tetracycline when they are used together. Show **clearly** your working and answer. [2]

Answer %

6

9. Describe how you would carry out an investigation into the number of bacteria present in boiled milk **and** milk that had been left at room temperature for five days using a basic aseptic technique and agar plates. In your description, state the expected results. [6 QWC]

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