

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**B732/02**

**GATEWAY SCIENCE  
BIOLOGY B**

**Biology modules B4, B5, B6  
(Higher Tier)**

**THURSDAY 12 JUNE 2014: Morning**

**DURATION: 1 hour 30 minutes  
plus your additional time allowance**

**MODIFIED ENLARGED 24pt**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**Candidates answer on the Question Paper.  
A calculator may be used for this paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Pencil**

**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

**Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**

**Use black ink. HB pencil may be used for graphs and diagrams only.**

**Answer ALL the questions.**

**Read each question carefully. Make sure you know what you have to do before starting your answer.**

**Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**

## **INFORMATION FOR CANDIDATES**

**The quality of written communication is assessed in questions marked with a pencil (✎).**

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

**The total number of marks for this paper is 85.**

**Any blank pages are indicated.**

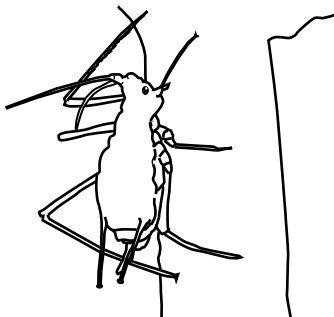
**Answer ALL the questions.**

## **SECTION A – Module B4**

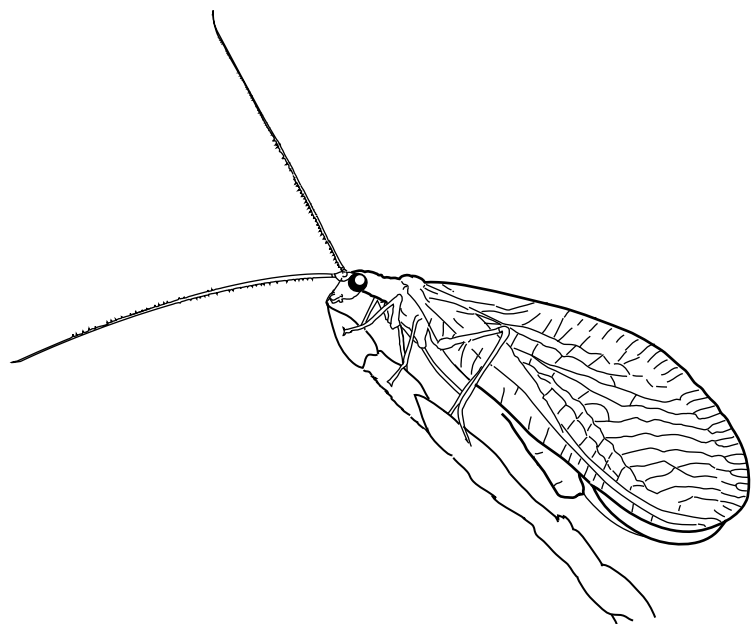
- 1 Aphids are small insects that feed on plants and damage crops.**

**Lacewings are insects that are larger than aphids and can be used for biological control.**

**APHID**



**LACEWING**



- (a) A seed company wants to sell buckwheat seeds to cotton farmers. Look at their advert.**

## **Planting buckwheat seeds increases your cotton crop yield**

**Planting buckwheat alongside your cotton plants will increase your cotton yield.**

**Buckwheat attracts lacewings because they feed on buckwheat nectar.**

**Lacewings are also predators and will control the aphids that damage your cotton plants.**

The graphs show the effect of planting buckwheat:

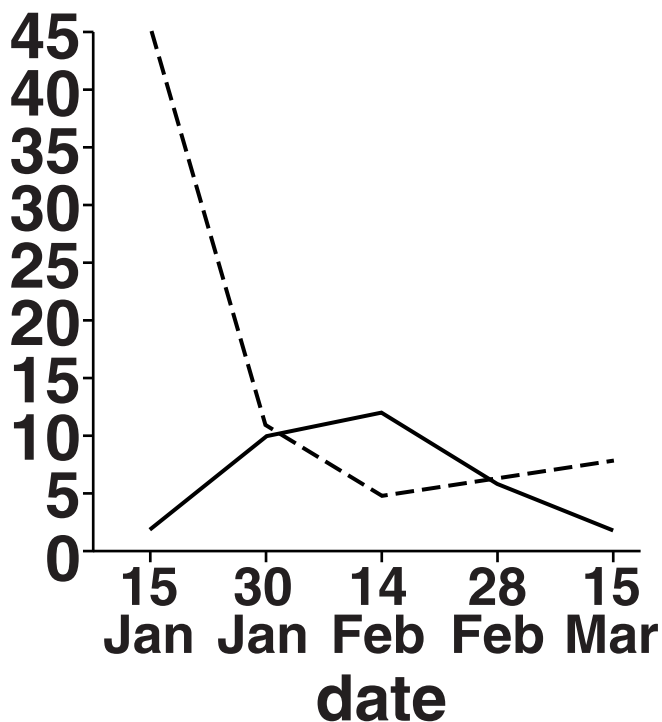
**Key**

---- aphids

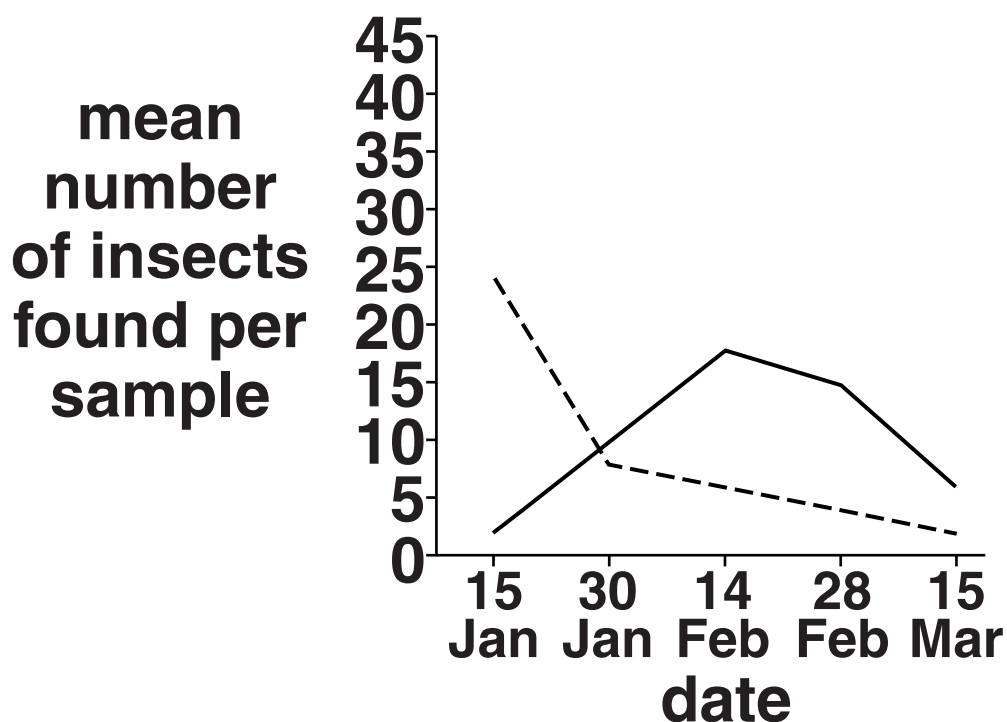
— lacewings

mean  
number  
of insects  
found per  
sample

**GRAPH A  
NO BUCKWHEAT**



**GRAPH B  
WITH BUCKWHEAT**



**(i) Look at graph A.**

**Describe and explain the relationship between the numbers of aphids and lacewings when there is NO buckwheat.**

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**[2]**

**(ii) The advert claims that growing buckwheat attracts lacewings and increases crop yield.**

**Discuss whether the graphs support this claim.**

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[3]



**(b) To produce the graphs in the advert, scientists needed to collect aphids and lacewings.**

**They did this several times and calculated the mean (average) number per sample.**

**Increasing the number of samples increases the accuracy of the mean.**

**Explain why.**

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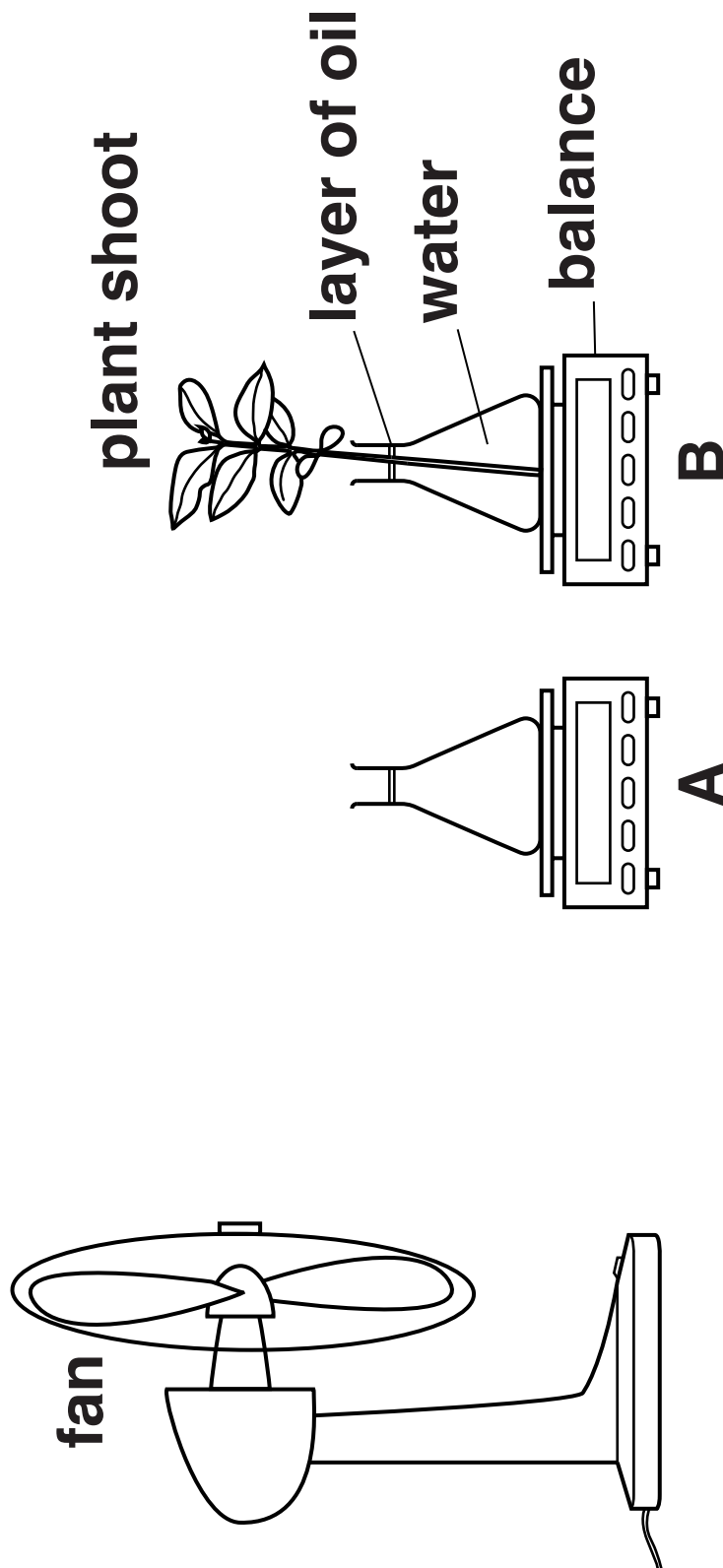
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[1]

**[TOTAL: 6]**

- 2 Liz wants to investigate how air movement affects the rate of transpiration.**



**She turns the fan on and measures how the readings on the balances change every five minutes.**

**Describe and explain the overall expected results for A and B.**



**The quality of written communication will be assessed in your answer to this question.**

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[6]

**[6]**

**[TOTAL: 6]**

- 3 Mangroves are trees that grow on the coasts of many tropical countries.**

**Mangroves grow in mud.**

**The mud is low in oxygen and nutrients.**

- (a) (i) Suggest why the lack of oxygen makes the nutrient content low.**

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[2]

**(ii) Some mangroves grow structures from their roots to absorb oxygen from the air for respiration.**

**Why do mangrove roots need to respire?**

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**[3]**

**(b) Mangroves absorb water from sea water (salt water).**

**Most plants CANNOT absorb water from sea water.**

**Mangroves have high levels of salts in their roots.**

**Suggest why.**

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**[2]**

**(c) Mangrove forests show zonation.**

<b>sea</b>	<b>front zone of mangrove forest</b>	<b>mid zone of mangrove forest</b>
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<b>back zone of mangrove forest</b>	<b>dry land</b>
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**(i) Different mangrove species are found in each zone of mangrove forest.**

**Suggest why.**

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**[1]**

**(ii) Compared with a tropical inland rainforest, mangrove forests have a much smaller plant biodiversity.**

**Suggest why.**

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**[1]**

**[TOTAL: 9]**



#### **4 Green plants contain chlorophyll.**

**The molecular formula of chlorophyll is  $\text{C}_{55}\text{H}_{72}\text{O}_5\text{N}_4\text{Mg}$ .**

**Plants get the magnesium (Mg) they need in the form of compounds, such as magnesium sulfate, through their roots.**

**(a) How do plants get the carbon (C) they need to make chlorophyll?**

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**[1]**

**(b) How do plants get the hydrogen (H) they need to make chlorophyll?**

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**[1]**

**(c) How do plants get the oxygen (O) they need to make chlorophyll?**

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[1]

**(d) How do plants get the nitrogen (N) they need to make chlorophyll?**

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[1]

**[TOTAL: 4]**

## **SECTION B – Module B5**

- 5 (a) Reproduction in humans is controlled by hormones.**

**FSH is an important hormone in reproduction.**

- (i) Write down the name of the gland that releases FSH.**

\_\_\_\_\_ **[1]**

- (ii) FSH stimulates eggs to develop.**

**This causes the release of oestrogen.**

**High oestrogen levels then cause less FSH to be released.**

**Write down the name given to this type of control mechanism.**

\_\_\_\_\_ **[1]**

**(b) Women naturally have different levels of FSH in their blood.**

**In vitro fertilisation (IVF) is a method used to treat infertility.**

**Clinics often measure the woman's FSH level before treatment.**

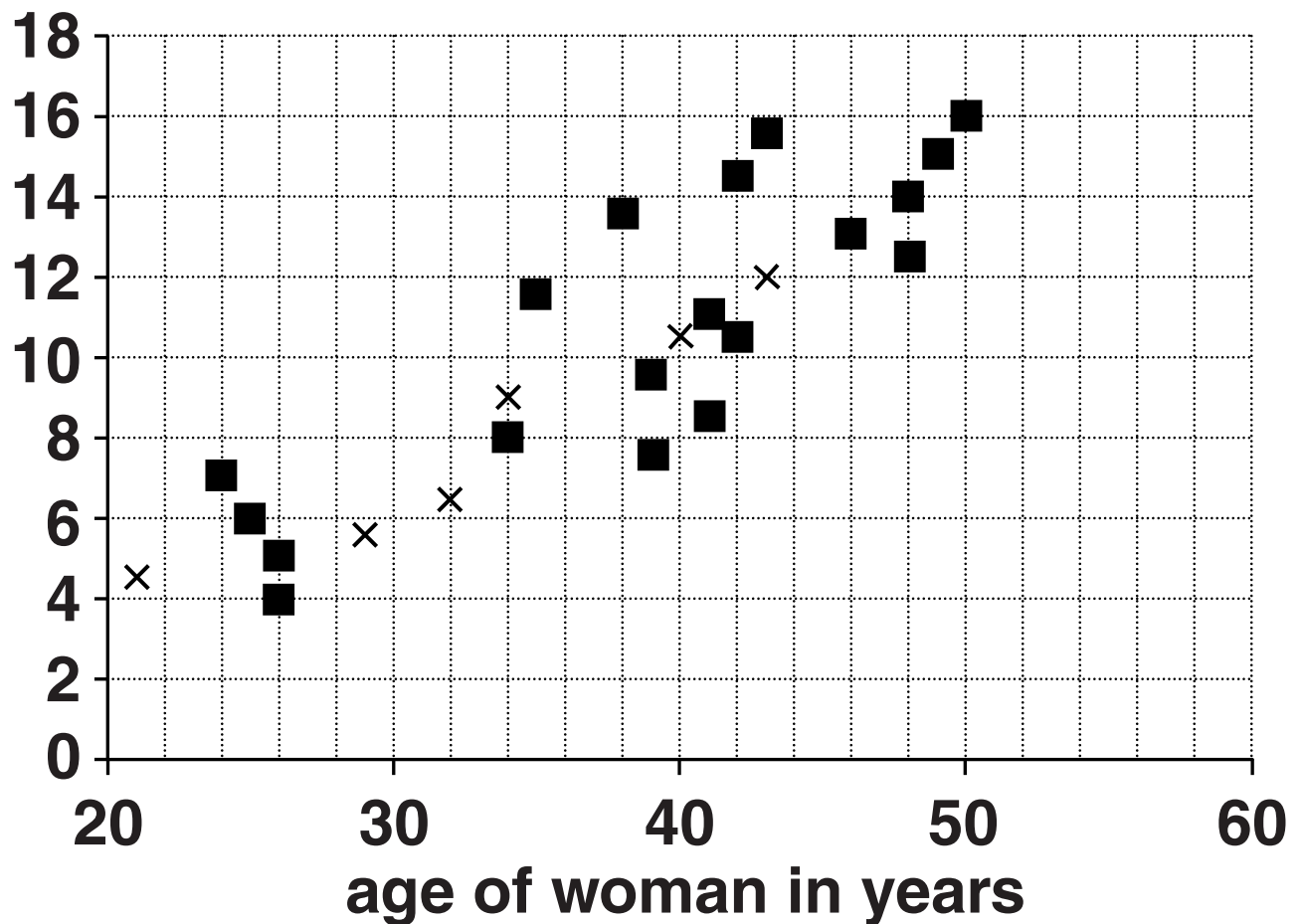
**The graph opposite shows the natural FSH levels and results of IVF for women of different ages.**

## Key

× woman becomes pregnant

■ woman does NOT become pregnant

FSH level in blood  
in arbitrary units



- (i) A clinic wants to increase the percentage of women who become pregnant.**

**They decide to only offer certain women IVF treatment.**

**Use the graph to suggest how the clinic decides which women to treat.**

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**[2]**

- (ii) There are other reasons why the clinic may NOT treat certain women.**

**Suggest ONE reason why.**

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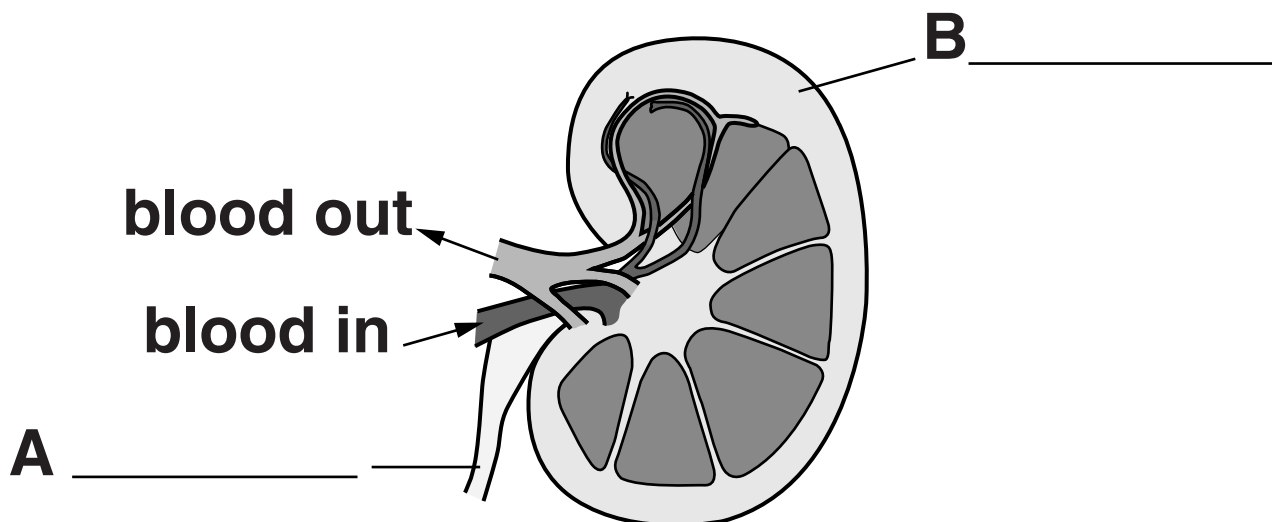
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**[1]**

**[TOTAL: 5]**

**6 Kidneys are important organs in excretion.**

**(a) The diagram shows a section through a kidney.**



**(i) Finish the diagram by adding the names of parts A and B. [2]**

**(ii) It is important that the blood entering the kidney is at high pressure.**

**Write down why this is important for the correct working of the kidney.**

\_\_\_\_\_ **[1]**

**(b) A person may donate one of their kidneys.**

**Before they do this they are marked on a Donor Scoring System.**

**This gives them points for different factors such as their age.**

**The points are added up and turned into a grade A, B, C or D.**

**The graph opposite shows the effect of the grade on the success of a transplant.**

**Describe the patterns shown in the graph.**

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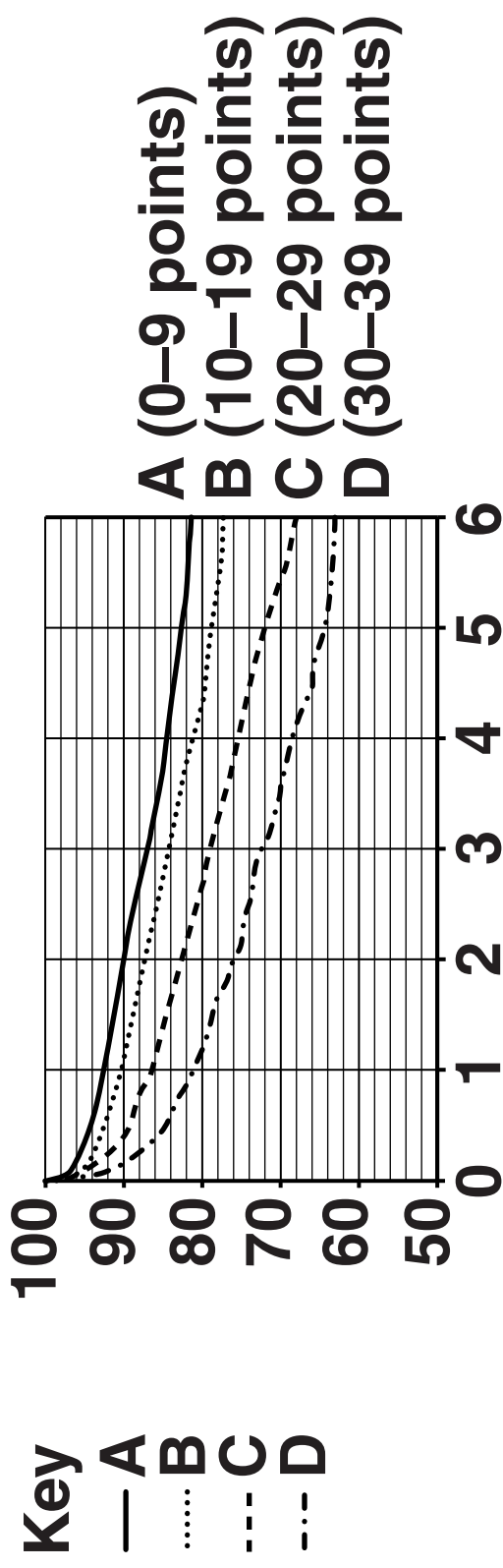
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[2]



percentage of transplants  
that are still working



**(c) Manjit and Georgina are each going to donate a kidney.**

**These are their donor score sheets.**

**Manjit**

<b>Feature</b>	<b>Points scored</b>
<b>43 years old</b>	<b>10</b>
<b>renal function</b>	<b>2</b>
<b>blood pressure</b>	<b>3</b>
<b>tissue antigens</b>	<b>2</b>
<b>body mass 65 kg</b>	<b>0</b>
<b>Total points</b>	<b>17</b>

**Georgina**

<b>Feature</b>	<b>Points scored</b>
<b>52 years old</b>	<b>15</b>
<b>renal function</b>	<b>2</b>
<b>blood pressure</b>	<b>3</b>
<b>tissue antigens</b>	<b>2</b>
<b>body mass 95 kg</b>	<b>1</b>
<b>Total points</b>	

**Georgina and Manjit both donate a kidney.**

**After 5 years, their donated kidneys have a different percentage chance of still working.**

**What is the difference between these two percentages?**

**Use the tables and information in the graph on page 25.**

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[2]

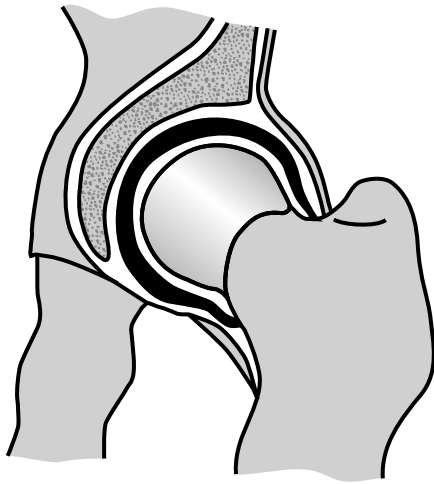
**[TOTAL: 7]**

**7 Norman can move his left leg normally.**

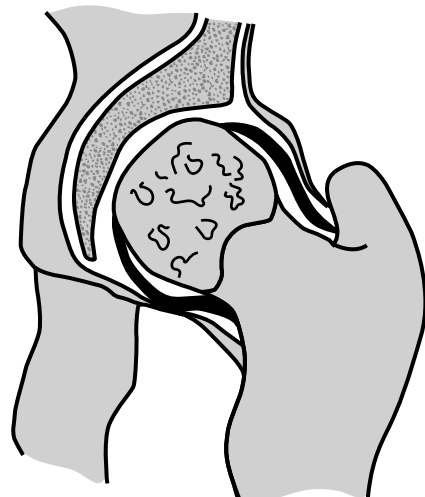
**His friend Arthur cannot move his left leg very much and is in pain.**

**The diagrams show the hip joint of each friend.**

**Norman's hip joint**



**Arthur's hip joint**



**Describe the range of movement allowed by Norman's hip joint and explain why this range of movement is reduced in Arthur.**

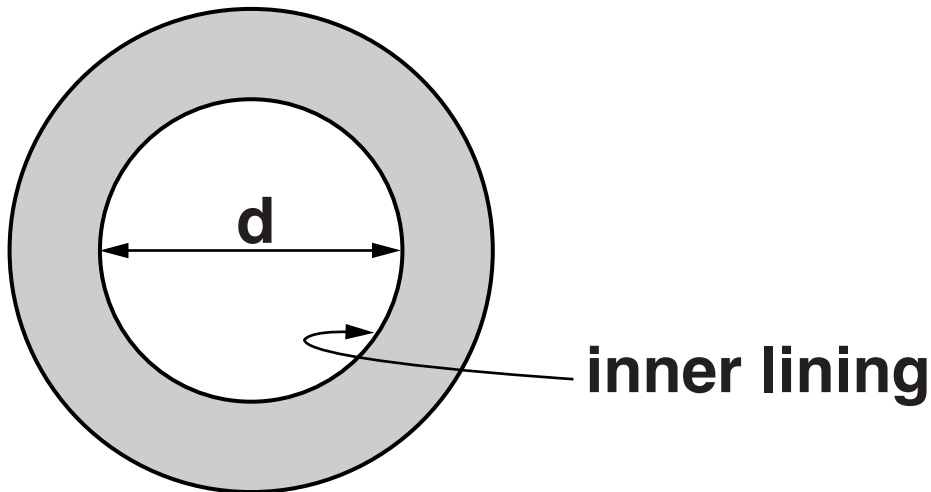


**[6]**

**[TOTAL: 6]**

- 8 (a) The diagram represents a section through the human small intestine.

The magnification of the diagram is  $\times 4$ .



- (i) Use the diagram to find out the actual diameter (d) in a real section.

diameter = \_\_\_\_\_ cm  
[1]

- (ii) The length ( $l$ ) of a human's small intestine is 550 cm.

Work out the total surface area of the inner lining.

Assume the lining is a smooth cylinder.

Use the formula:  $\text{area} = \pi \times d \times l$

( $\pi = 3.14$ )

surface area = \_\_\_\_\_  $\text{cm}^2$  [2]

**(iii) The actual surface area of a human's small intestine is always much greater than the answer produced using the formula in (a)(ii).**

**Explain why.**

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**[2]**

**(b) Scientists have measured the actual surface area in the small intestine of rats.**

**They measured the surface area in non-pregnant female rats.**

**They also measured the surface area in female rats that were feeding their young on breast milk.**



**The table shows their results.**

	<b>Average length of small intestine in cm</b>	<b>Average actual surface area of lining in cm<sup>2</sup></b>
<b>Non-pregnant rats</b>	<b>100</b>	<b>570</b>
<b>Breast-feeding rats</b>	<b>100</b>	<b>970</b>

**Suggest an explanation for the  
scientists' results.**

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[2]

**[TOTAL: 7]**

## **SECTION C – Module B6**

**9 There are many types of microorganisms.**

**(a) Some are useful to humans and some are harmful to humans.**

**Draw straight lines to join each TYPE OF MICROORGANISM, on the left, to its IMPACT ON HUMANS, on the right.**

## TYPE OF MICROORGANISM

## IMPACT ON HUMANS

***Lactobacillus*  
bacteria**

**used in biogas  
production**

**bacteria that rot  
organic material  
releasing methane**

**used in  
yoghurt  
making**

**bacteria that  
produce toxins**

**used in  
production of  
antibiotics**

**fungus producing  
penicillin**

**cause diseases  
such as  
cholera or food  
poisoning**

**[2]**

- (b) Some bacteria live deep in the ocean near hot volcanic vents. The vents give out gases.**

**There are similarities and differences in the way that these bacteria get their food compared to the way that green plants get their food.**

**Write about ONE similarity and ONE difference.**

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**[2]**

**[TOTAL: 4]**

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## **10 Soil contains different components.**

**These include mineral particles and dead material.**

- (a) Write down the name for partially decomposed dead material in soil.**

\_\_\_\_\_ **[1]**

- (b) Percy reads about different soils.**

**He finds out that mineral particles in soil can be sand, silt or clay.**

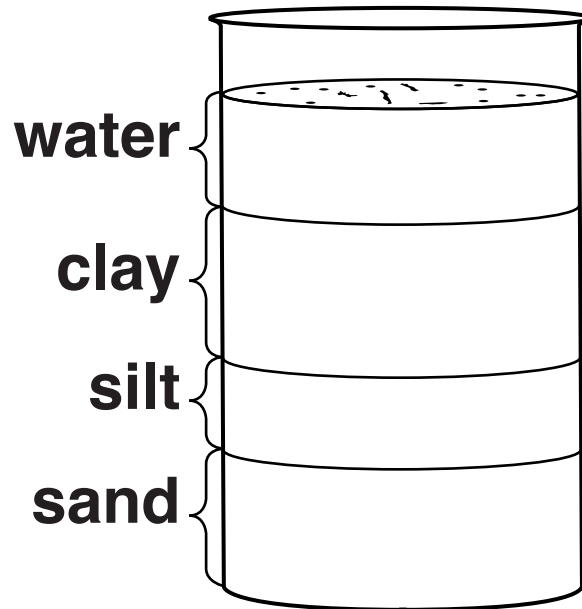
**Each particle is a different size.**

**Sand particles are largest and clay particles are smallest.**

**Percy gets some soil from his garden and shakes it up in a beaker of water.**

**He then lets it settle.**

**Look at the diagram of his results.**



- (i) Suggest why the sand, silt and clay form separate layers as shown in the diagram.**

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[2]

**(ii) Percy uses his ruler to measure the height of the clay layer.**

**The height of the clay layer is 20 mm.**

**The total height of the three mineral layers is 50 mm.**

**He calculates that 40% of the mineral content is clay.**

**Use a ruler to measure the height of the sand layer.**

**Use this to calculate what percentage of the mineral content is sand.**

**sand = \_\_\_\_\_ %**  
**[2]**



**(iii) Percy uses information in this table to work out the type of soil in his garden.**

<b>Type of soil</b>	<b>Range of clay content %</b>	<b>Range of sand content %</b>
<b>clay</b>	<b>&gt;50</b>	<b>&lt;50</b>
<b>loam</b>	<b>10–45</b>	<b>30–70</b>
<b>sandy</b>	<b>&lt;45</b>	<b>&gt;55</b>

**Work out what type of soil Percy has in his garden.**

**Use the percentages in (b)(ii) and the table.**

**Percy's soil type is**

\_\_\_\_\_

**[1]**

**[TOTAL: 6]**

## 11 Jimmy wants to make some wine.

He sees a kit in a shop with the following label on.

<p><b>WINE-MAKING KIT</b></p> <p>This kit contains:</p> <p>Grape juice</p> <p>Yeast</p> <p><b>INSTRUCTIONS</b></p> <p>Sterilise all equipment before you start</p> <p>Just add water to the grape juice then add the yeast</p>
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(a) Explain why it is important to sterilise all equipment.

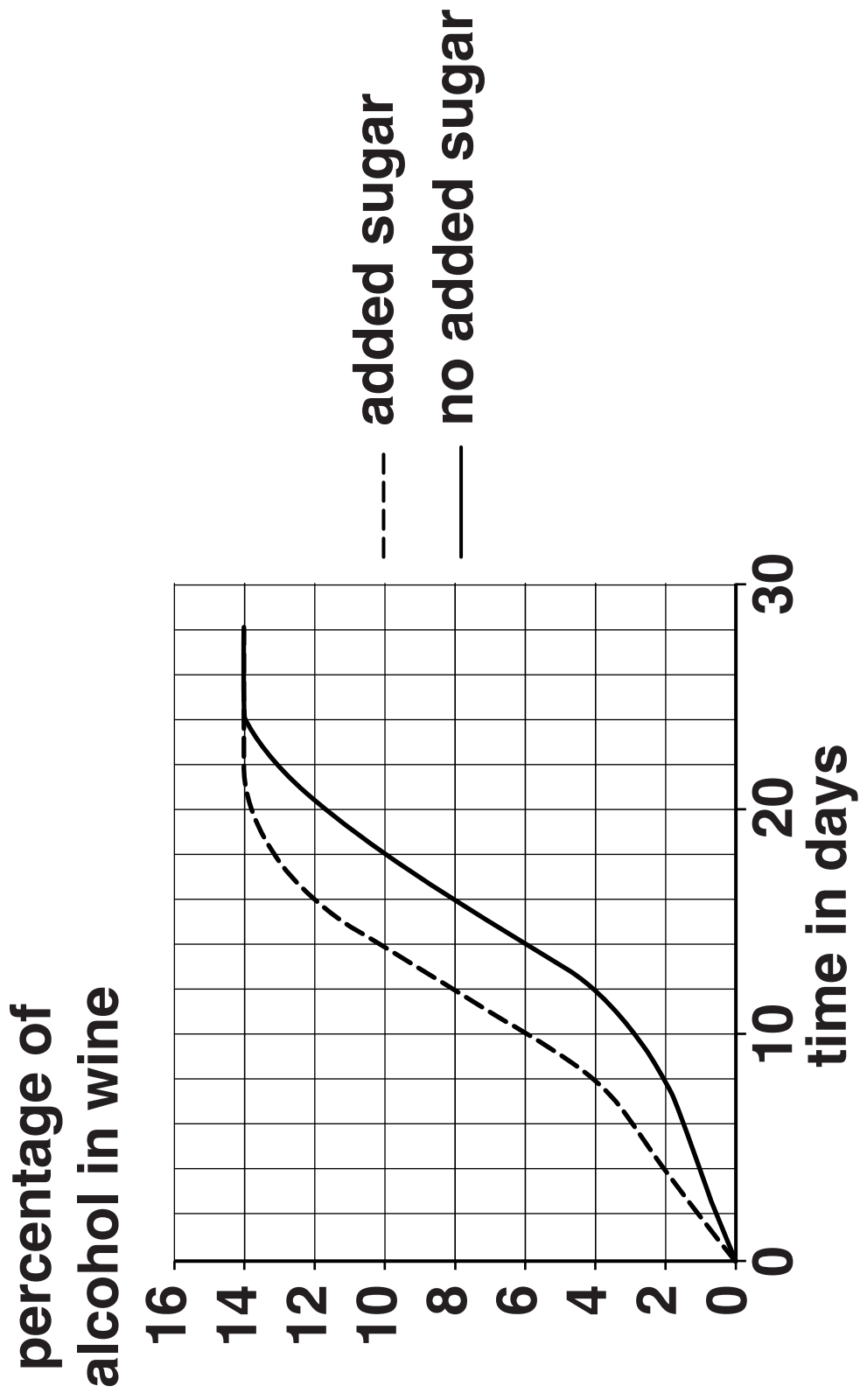
<hr/> <hr/> <hr/>	[2]
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**(b) Jimmy buys two wine kits to make two batches of wine.**

**He makes the first batch of wine by following the instructions.**

**He makes the second batch in the same way except he also adds sugar.**

**The graph on page 44 shows the percentage of alcohol in the two batches of wine as they are being made.**



**Compare the production of alcohol in each batch and suggest explanations for any differences.**



**The quality of written communication will be assessed in your answer to this question.**

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**[6]**

**[TOTAL: 8]**

**12 This question is about microorganisms that cause disease.**

**Flu (influenza) is caused by a virus.**

**Salmonella food poisoning is caused by bacteria.**

**(a) Describe the structure of a virus.**

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**[2]**

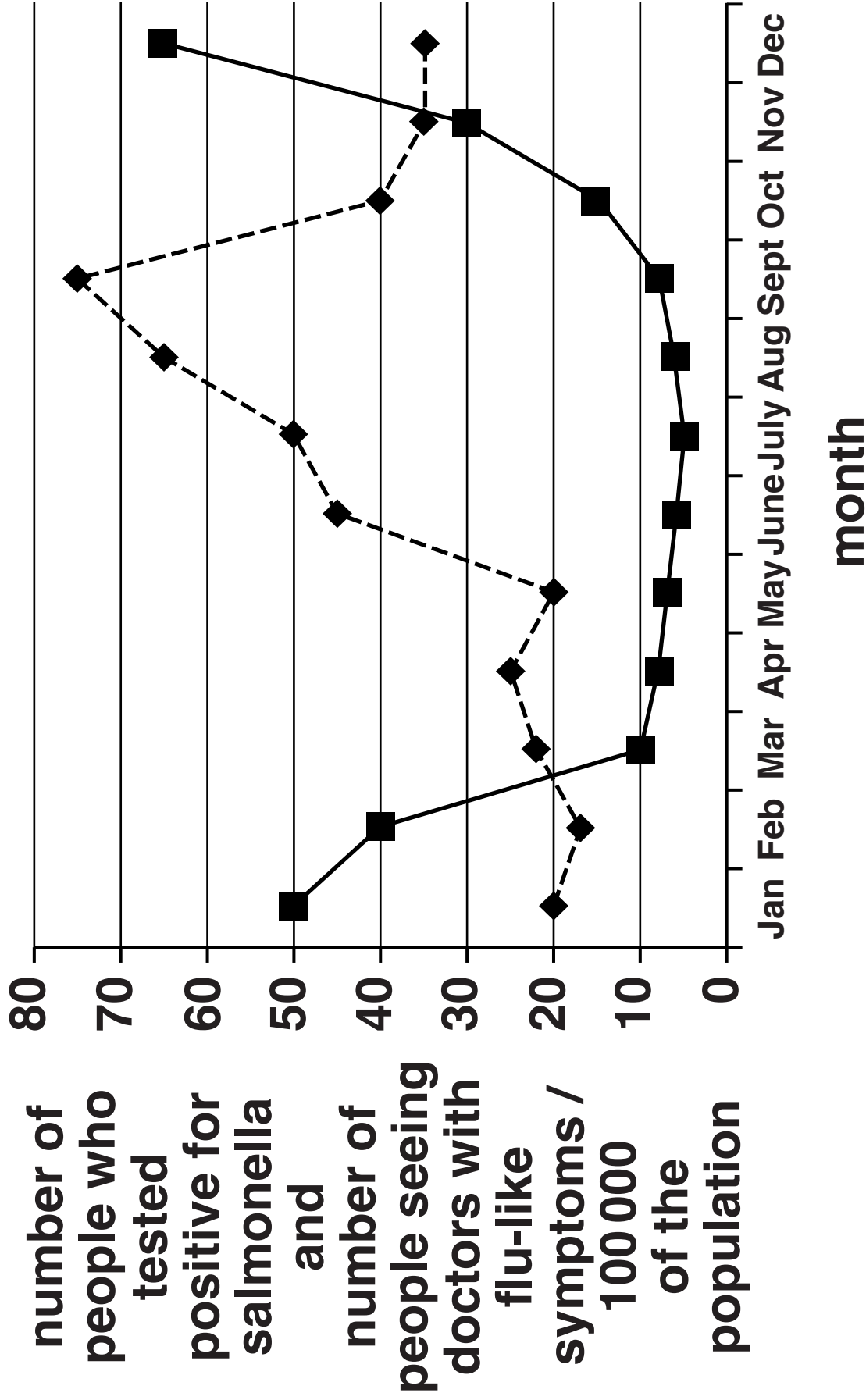
**(b) Look at the graph opposite.**

**It shows the number of people who tested positive each month for salmonella bacteria.**

**It also shows the number of people with flu-like symptoms visiting their doctor each month.**

--◆-- salmonella

—■— flu



- (i) Discuss whether the graph gives the true numbers of people actually having salmonella or flu.**

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 [2]

- (ii) It is thought that the way the diseases are spread will affect WHEN people are more likely to get the disease.**

**Flu is spread by airborne droplets, usually indoors or on crowded buses or trains.**

**Salmonella is spread through food that is not cooked thoroughly or stored at incorrect temperatures.**



**Write about how the way the microorganisms are spread can explain the patterns in the graph.**

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**[3]**

**[TOTAL: 7]**

## **SECTION D**

- 13 (a) Scientists have been trying to estimate the number of different species there are on the Earth.**

**First they counted the number of species that have already been discovered and named.**

**Then they used several ways to estimate the number of species that might actually exist.**

**The table shows their results.**

<b>Kingdom</b>	<b>Number of species already discovered and named in thousands</b>	<b>Number of species estimated to exist in thousands</b>
<b>animals</b>	<b>953</b>	<b>7770</b>
<b>plants</b>	<b>216</b>	<b>298</b>
<b>fungi</b>	<b>43</b>	<b>611</b>
<b>protocists (mostly single-celled)</b>	<b>21</b>	<b>64</b>
<b>prokaryotes (no nucleus in cells)</b>	<b>11</b>	<b>10</b>
<b>Total</b>	<b>1244</b>	<b>8753</b>

**(i) Which kingdom has the smallest percentage of species that have already been discovered?**

**Calculate this percentage.**

**kingdom** \_\_\_\_\_

**percentage of species that have  
already been**

**discovered** \_\_\_\_\_ **%**  
**[2]**

**(ii) Look at the results for prokaryotes.**

**Prokaryotes include microscopic organisms such as bacteria.**

**More species of prokaryotes have been discovered and named than scientists have estimated to exist.**

**One reason is that the estimate might be incorrect.**

**Suggest ONE OTHER reason why.**

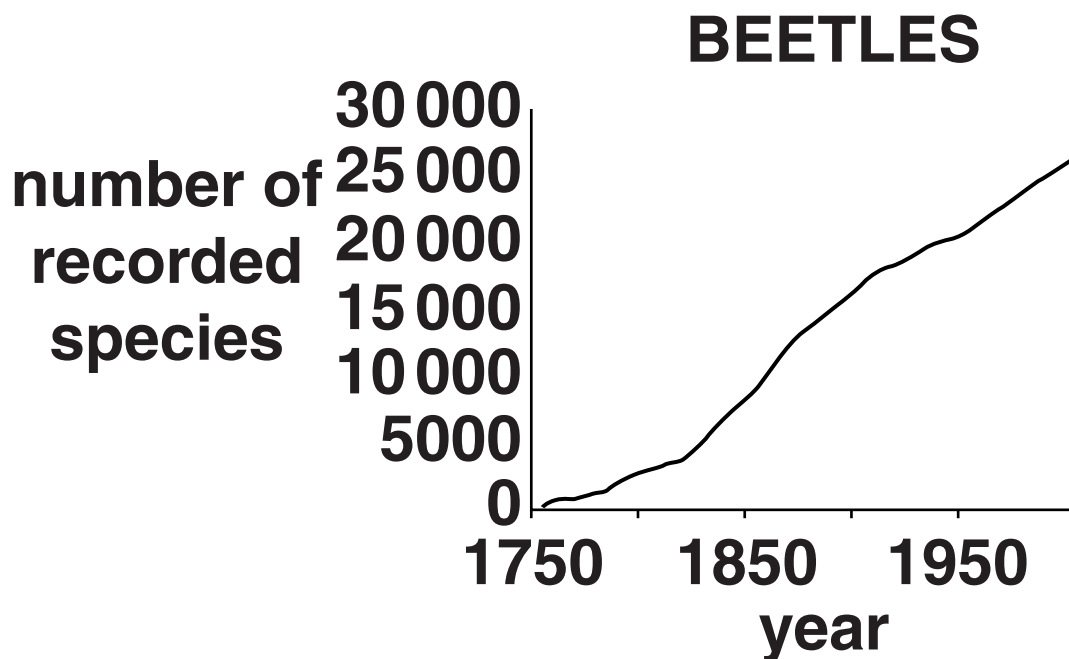
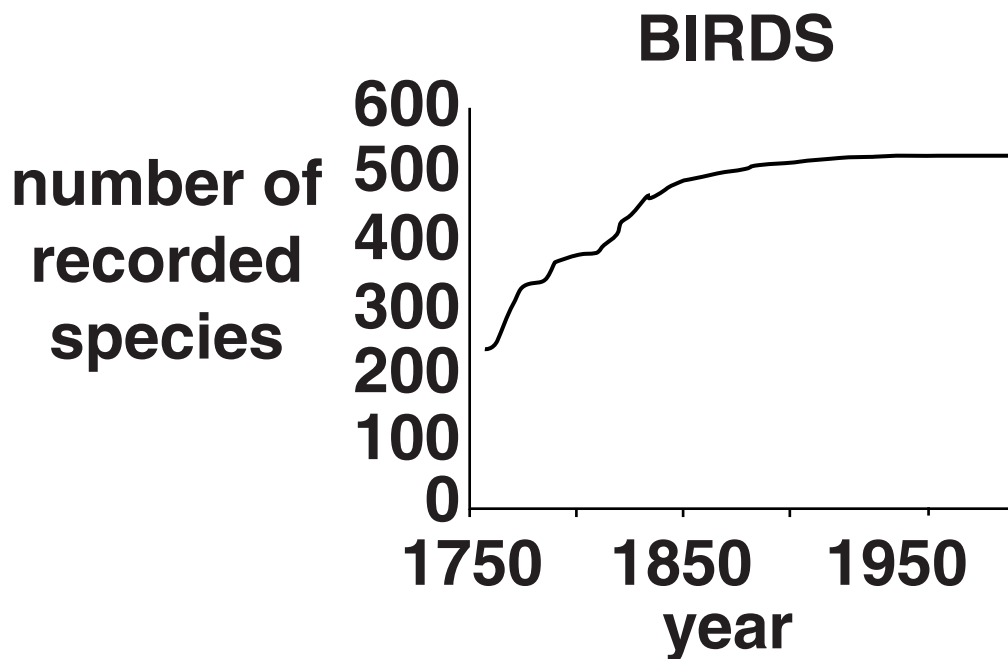
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**[1]**

- (b) The number of species already discovered increases as time goes on.**

**The graphs show the number of species of birds and beetles recorded in Europe since 1750.**



**Look at the two graphs.**

**Suggest WHY the graph for birds  
is DIFFERENT from the graph for  
beetles.**

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[2]

**(c) Look at the graph opposite.**

**It came from a website that is trying to stop species becoming extinct.**

**The graph shows the human population over the last 200 years.**

**It also shows the number of species that has become extinct each year.**

**(i) Does the graph PROVE that humans are causing species to become extinct?**

**Explain your answer.**

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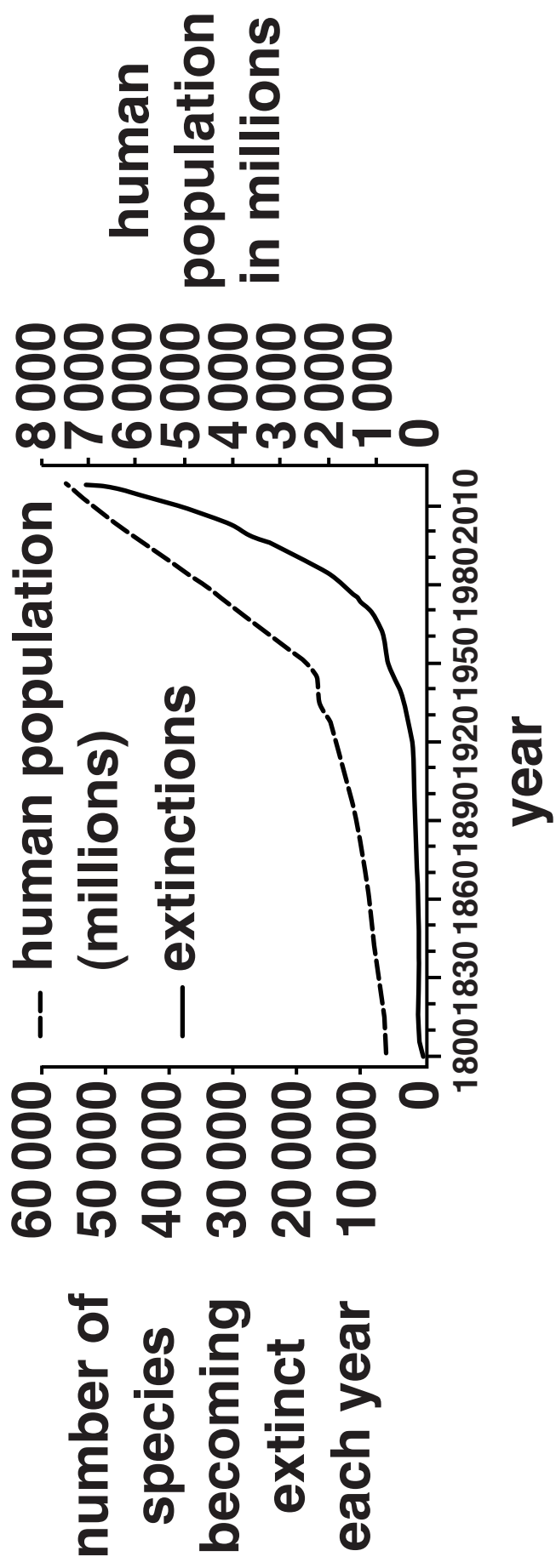
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[2]





- (ii) Suggest why the person who drew the graph chose the two vertical scales as they are.**

**Explain your answer.**

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**[2]**

- (iii) Other evidence could support the idea that humans are causing species to become extinct.**

**Suggest ONE piece of extra evidence that could support this idea.**

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**[1]**

**[TOTAL: 10]**

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