OCR

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Thursday 12 June 2014 – Morning

GCSE GATEWAY SCIENCE
BIOLOGY B

B732/02 Biology modules B4, B5, B6 (Higher Tier)

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)

Duration: 1 hour 30 minutes

B732/02

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

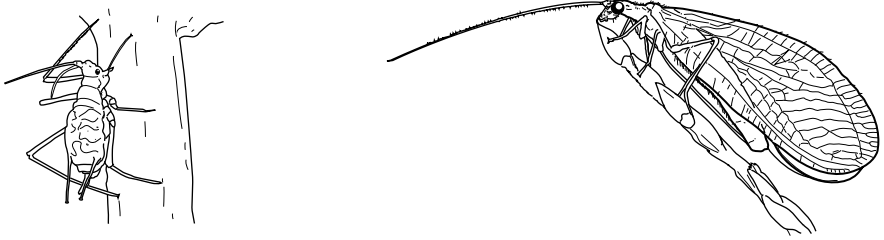
- The quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **85**.
- This document consists of **32** pages. Any blank pages are indicated.

Answer **all** the questions.

SECTION A – Module B4

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

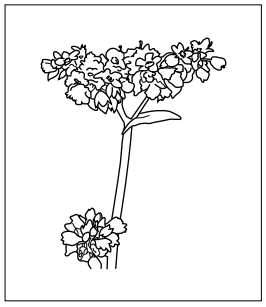
Lacewings are insects that can be used for biological control.



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



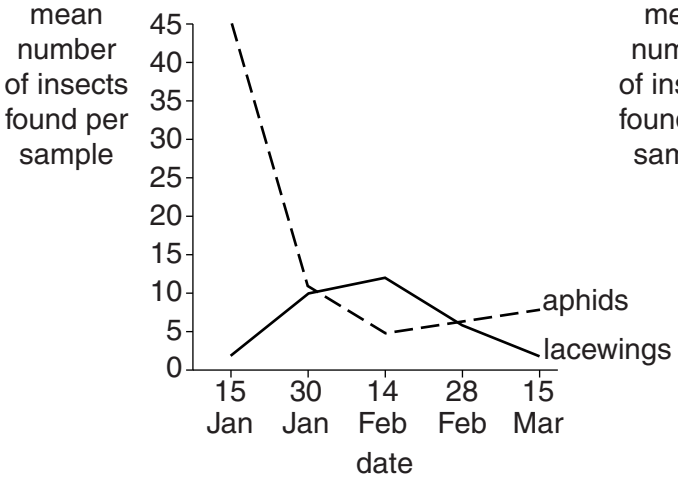
Planting buckwheat alongside your cotton plants will increase your cotton yield.

Buckwheat attracts lacewings because they feed on buckwheat nectar.

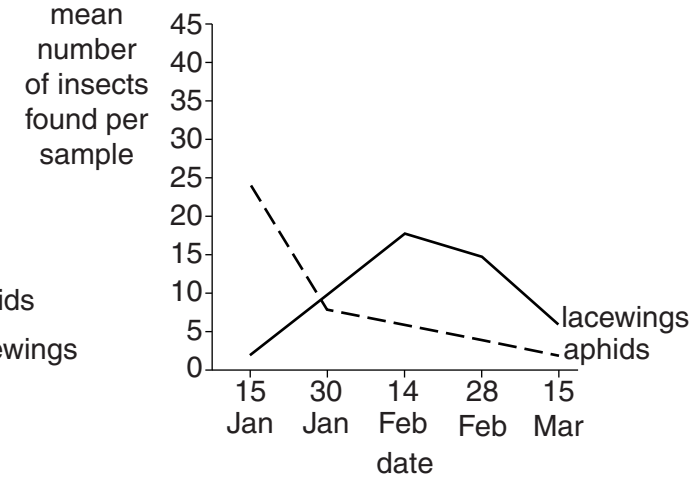
Lacewings are also predators and will control the aphids that damage your cotton plants.

The graphs show the effect of planting buckwheat:

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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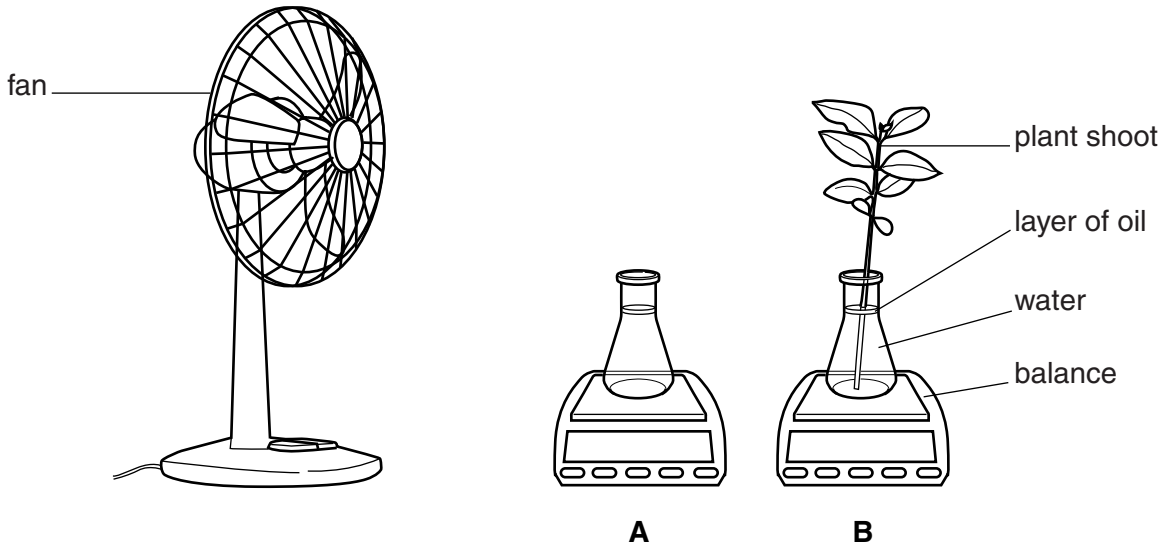
..... **[1]**

[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]**

[Total: 6]

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Question 3 begins on page 6

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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.

sea	**front zone** of mangrove forest	**mid zone** of mangrove forest	**back zone** of mangrove forest	dry land

(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 $C_{55}H_{72}O_5N_4Mg$.

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?

.....

..... **[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]

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Question 5 begins on page 10

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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 shows the natural FSH levels and results of IVF for women of different ages.

(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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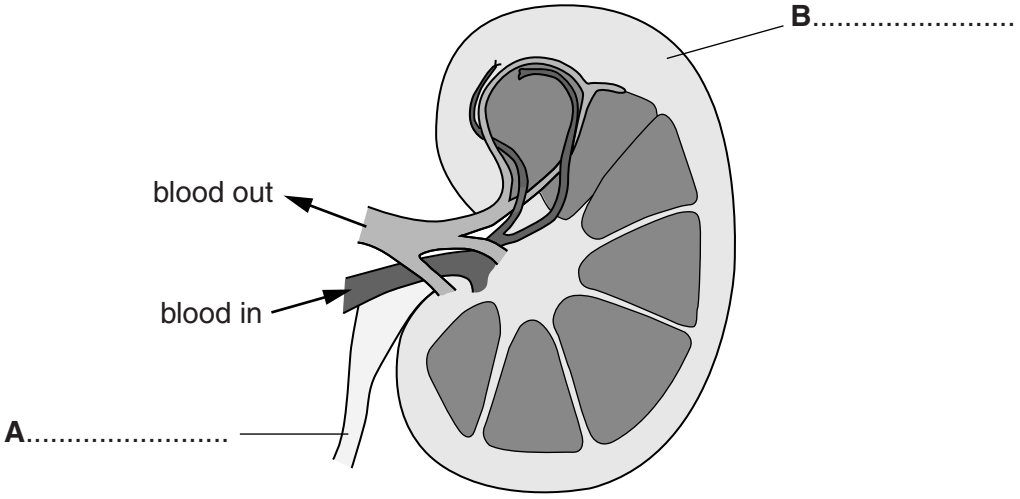
..... **[1]**

[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]**

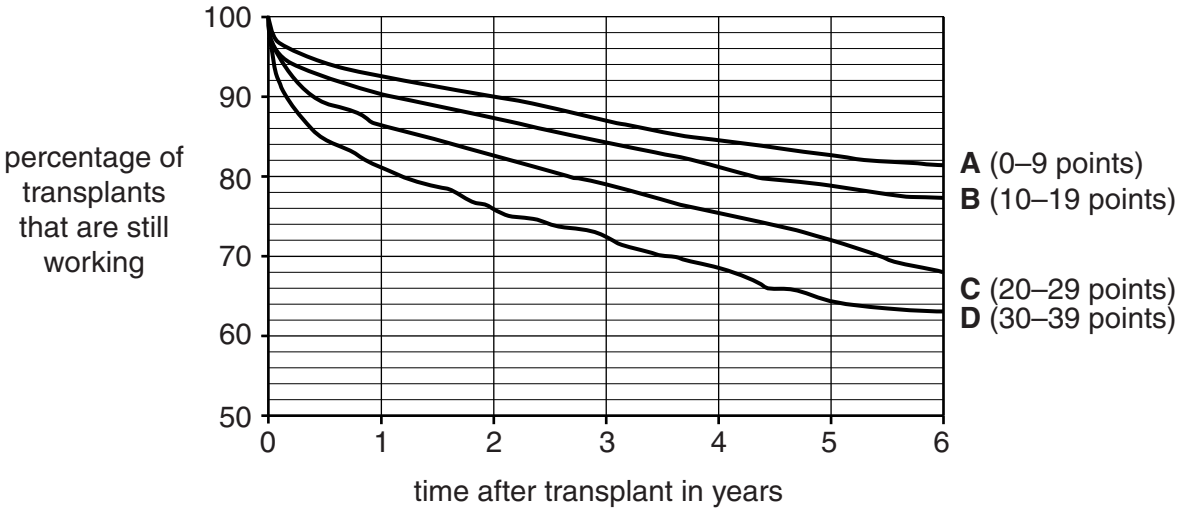
(b) A person may donate one of their kidneys.

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 shows the effect of the grade on the success of a transplant.



Describe the patterns shown in the graph.

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..... **[2]**

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

These are their donor score sheets.

Manjit

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

Georgina

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

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.

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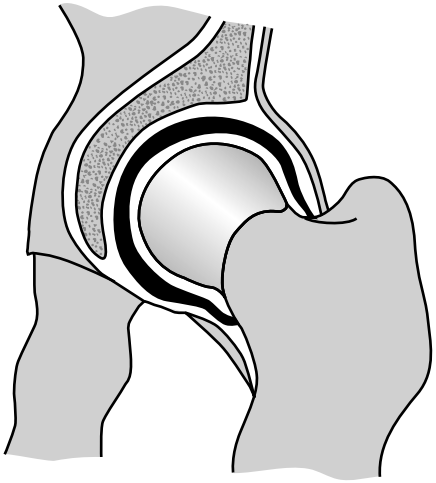
..... **[2]**

[Total: 7]

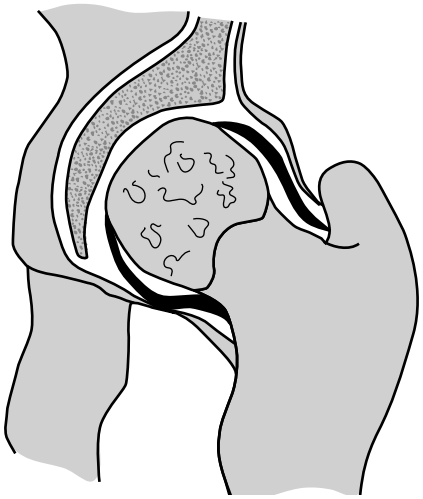
7 Norman can move his left leg normally.

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.

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

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..... **[6]**

[Total: 6]

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Question 8 begins on page 16

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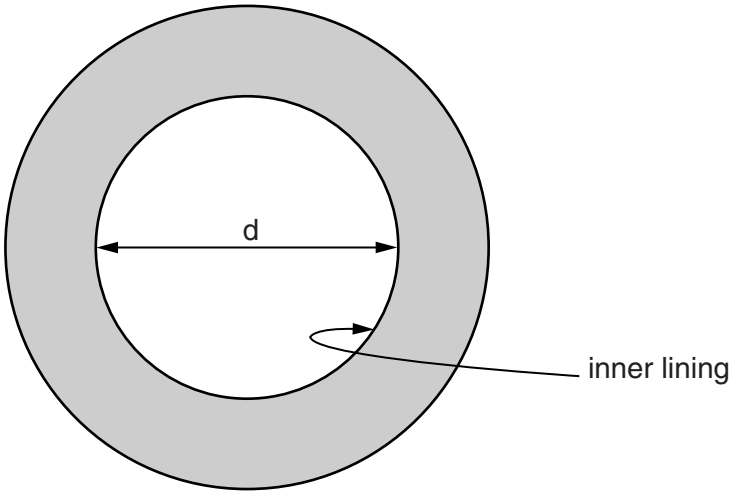
8 **(a)** The diagram represents a section through the human small intestine.

The magnification of the diagram is ×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: area = $\pi \times d \times l$

($\pi = 3.14$)

surface area = ... 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.

	Average length of small intestine in cm	**Average actual surface area of lining in cm^2**
Non-pregnant rats	100	570
Breast-feeding rats	100	970

Suggest an explanation for the scientists' results.

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..... **[2]**

[Total: 7]

Question 9 begins on page 18

SECTION C – Module B6

9 There are many types of microorganisms.

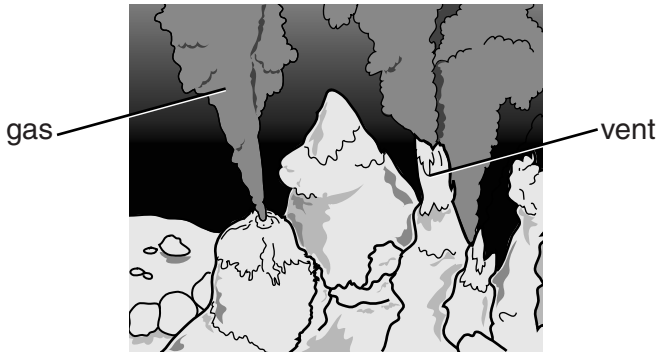
(a) Some are useful to humans and some are harmful to humans.

Draw straight lines to join each **type of microorganism** to its **impact on humans**.

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.



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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Question 10 begins on page 20

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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.

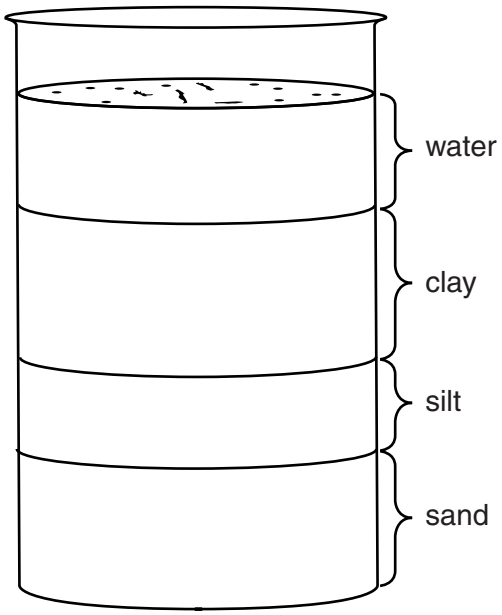
Each particle is a different size.

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.

Type of soil	Range of clay content %	Range of sand content %
clay	>50	<50
loam	10–45	30–70
sandy	<45	>55

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

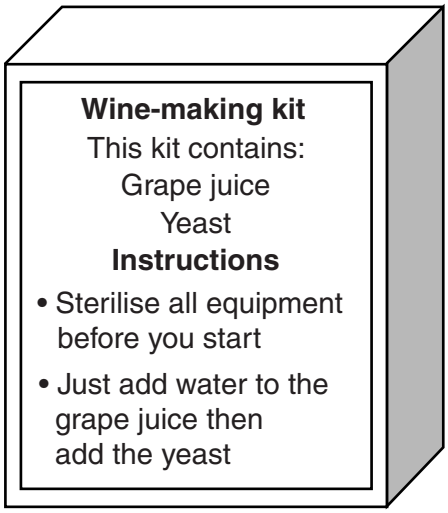
Use the percentages in **(b)(ii)** and the table.

Percy's soil type is ..... **[1]**

[Total: 6]

11 Jimmy wants to make some wine.

He sees a kit in a shop.



(a) Explain why it is important to sterilise all equipment.

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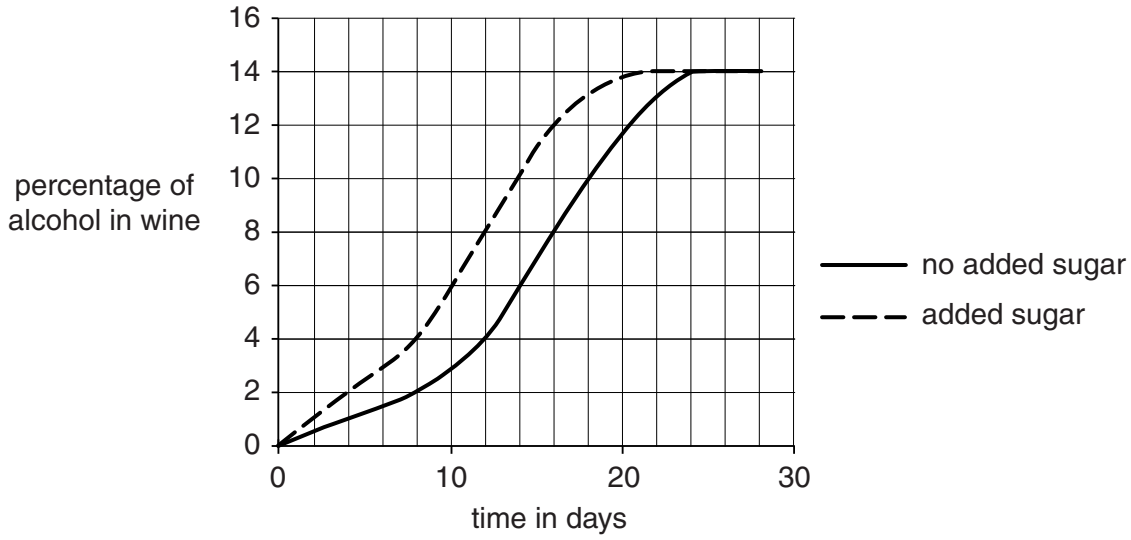
..... **[2]**

(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 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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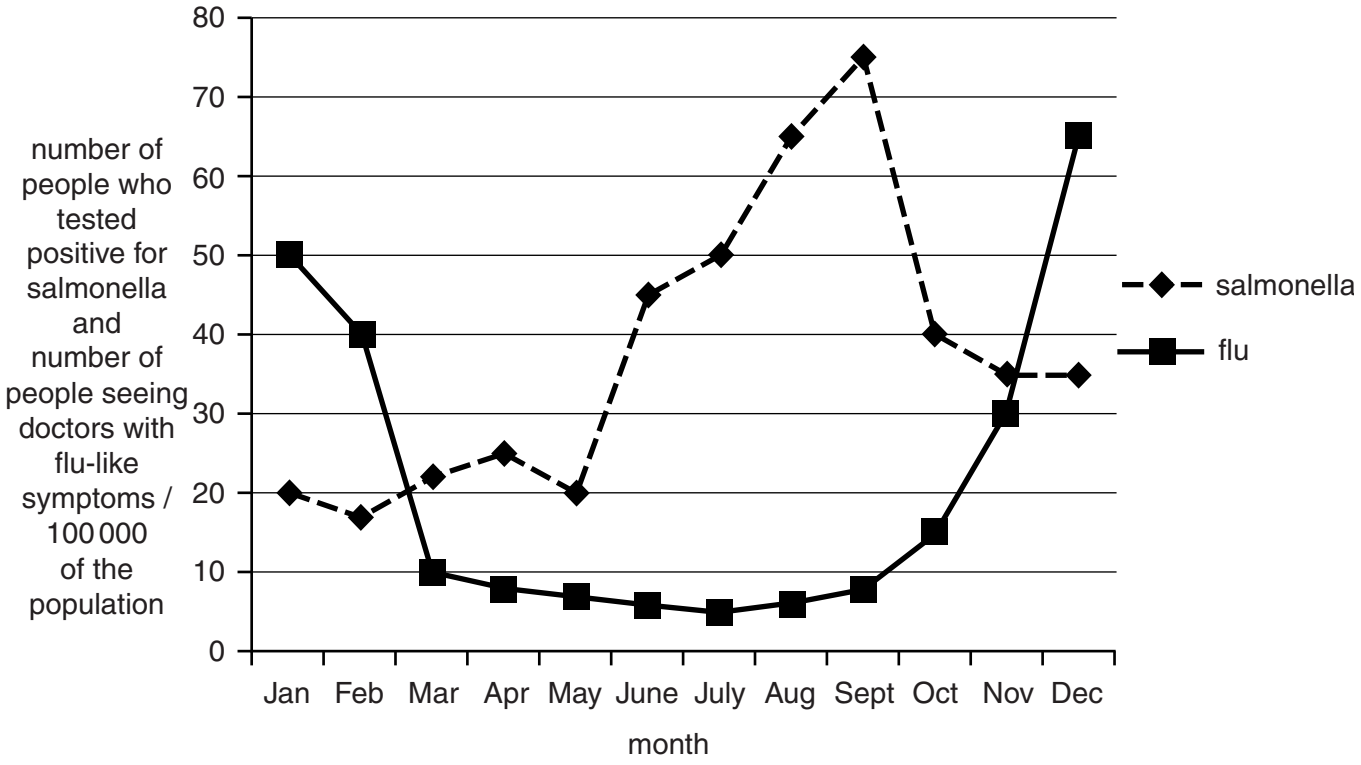
.....

..... **[2]**

(b) Look at the graph.

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.



(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]

Question 13 begins on page 26

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.

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

(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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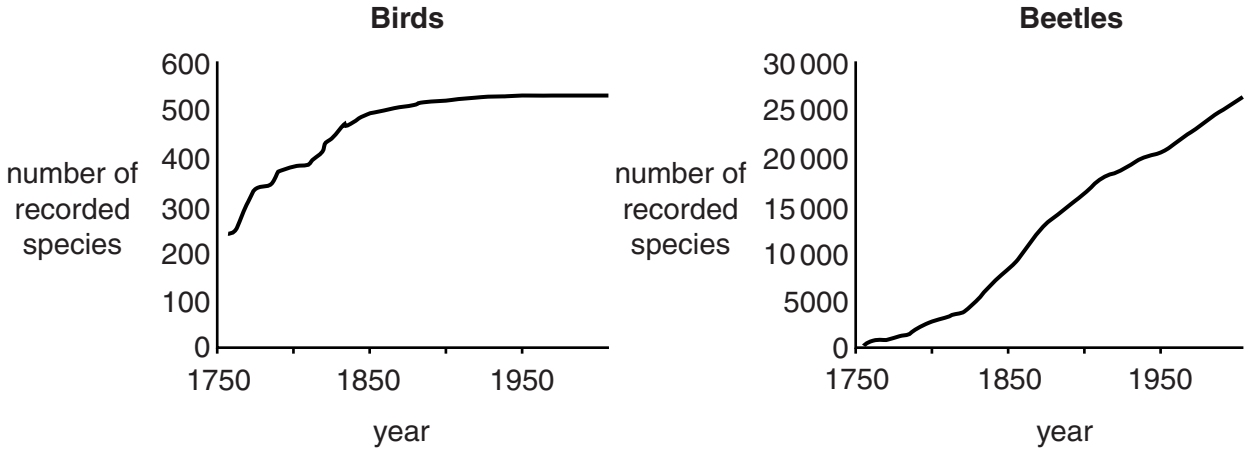
..... **[1]**

(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]**

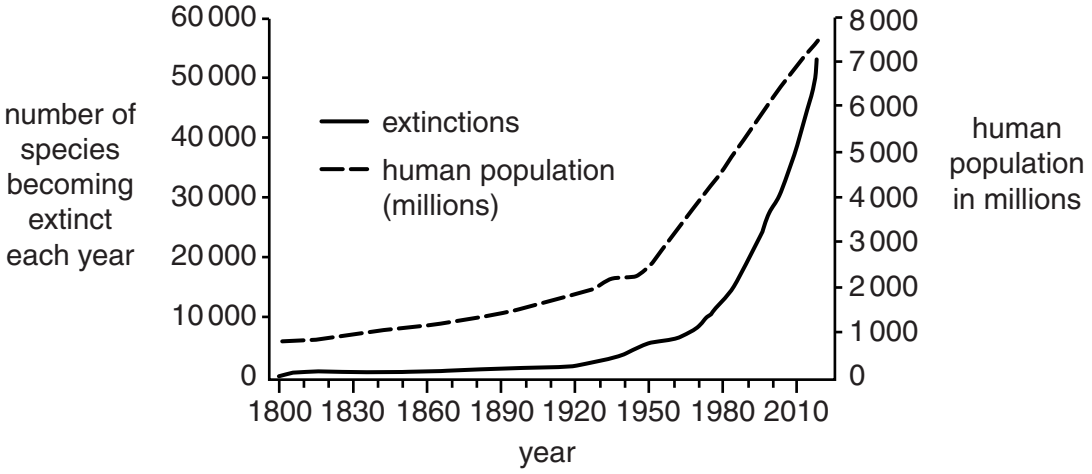
Turn over for the remainder of question 13

(c) Look at the graph.

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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..... **[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]

END OF QUESTION PAPER

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