

Friday 17 June 2016 – Morning

**GCSE GATEWAY SCIENCE
BIOLOGY B**

B732/01 Biology modules B4, B5, B6 (Foundation Tier)

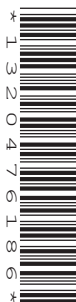
Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 1 hour 30 minutes



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. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.
- 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 **28** pages. Any blank pages are indicated.

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Answer **all** the questions.

SECTION A – Module B4

- 1 (a) Substances enter plants in different places.

Draw a straight line from each **substance** to the **place it enters a plant**.

You can use each place **once, more than once, or not at all**.

substance	place it enters a plant
carbon dioxide	phloem
oxygen	root hairs
water	stomata
	xylem

[3]

- (b) By what process does each substance enter a plant?

Put **one** tick (✓) in **each** row of the table to show your answers.

Substance	Diffusion	Osmosis
carbon dioxide		
oxygen		
water		

[2]

[Total: 5]

- 2 Jo buys an apple tree and plants it in the middle of her garden.

She does **not** do anything else to it and leaves it for a month.

The first picture shows the tree when she first plants it.

The second picture shows the tree a month later.



apple tree when first planted



apple tree one month later

- (a) (i) Describe what happened to the tree a month after planting.

..... [1]

- (ii) Describe what she should do to help the tree recover.

..... [1]

- (b) Jo now decides to give the tree some fertiliser.

Explain why fertiliser will help the tree.

.....

 [2]

- (c) Jo also puts some fine netting over the tree to protect the apples.

Suggest what she is protecting the apples from.

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 [2]

- (d) Jo planted the tree away from the house so it was **not** in the shade.

Explain why this is important for the tree.

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..... [2]

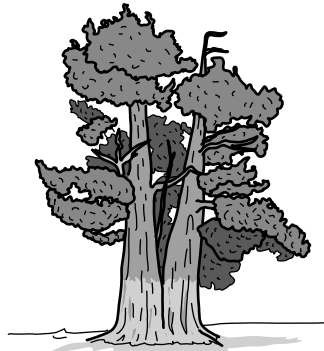
[Total: 8]

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- 3** Bristlecone pine trees are among the longest living things on Earth.

One of them, called Methuselah, is in California and is over 4800 years old.



Methuselah

- (a)** Bristlecone pine trees live high up in the mountains.

The temperature, dry soil and strong wind make them grow very slowly.

Explain why these extreme conditions make the bristlecone pine trees grow very slowly.



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

..... [6]

- (b) When bristlecone pine trees die the wood does **not** rot.

The wood is full of thick sap called resin, which means that almost no air can get in.

Suggest why this stops the dead wood from rotting.

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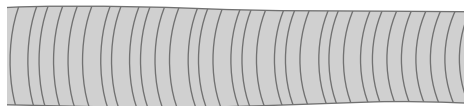
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- (c) Scientists worked out Methuselah's age.

They drilled a narrow core from the trunk and then counted the rings.

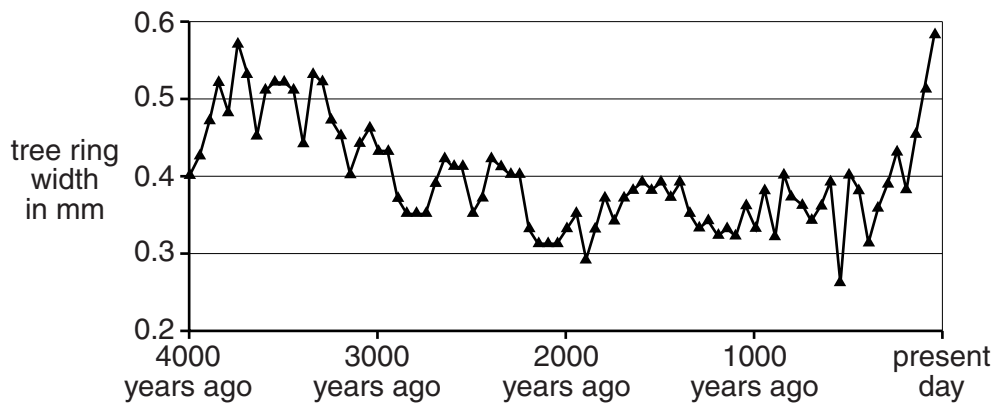
Each ring shows one year's growth.

The wider a ring, the more growth in that year.



core showing tree rings

The graph shows the average tree ring widths from a sample of bristlecone pine trees in California.



- (i) A scientist concludes that the graph shows an increase in tree ring width.

Look at the graph.

How well does the data support the scientist's conclusion?

Explain your answer.

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..... [2]

- (ii) Many factors affect the width of the tree rings.

One of these factors is temperature. Higher temperatures mean wider rings.

The scientist says, "The data from this sample **proves** global warming has happened".

Do you agree?

Explain your answer.

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..... [2]

[Total: 12]

10
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SECTION B – Module B5

4 This question is about reproduction.

(a) Draw straight lines to join the **process** with the correct **description**.

process	description
fertilisation	breaking down of the uterus lining
menstruation	release of an egg from the ovary
ovulation	joining of egg and sperm

[2]

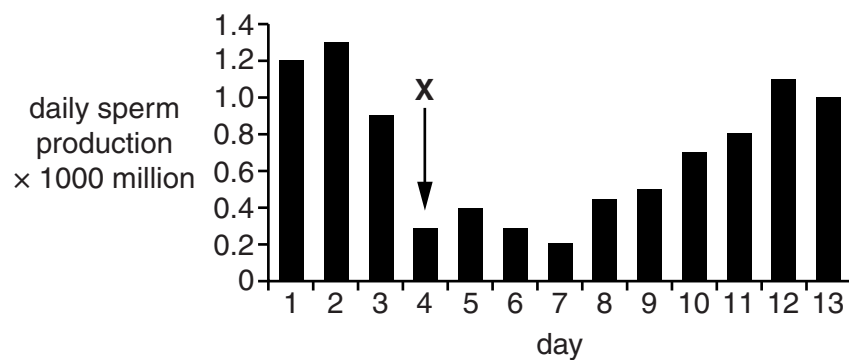
(b) Sperm production occurs in the testes and is affected by changes in external temperature.

Body temperature is usually much higher than the external temperature.

The graph shows the effect of a very large increase in the external temperature on day 4.

This made the external temperature the same as the body temperature.

This increase is marked by X.



The testes that make sperm are inside the scrotum.

Use the graph to explain why having the testes in the scrotum is important.

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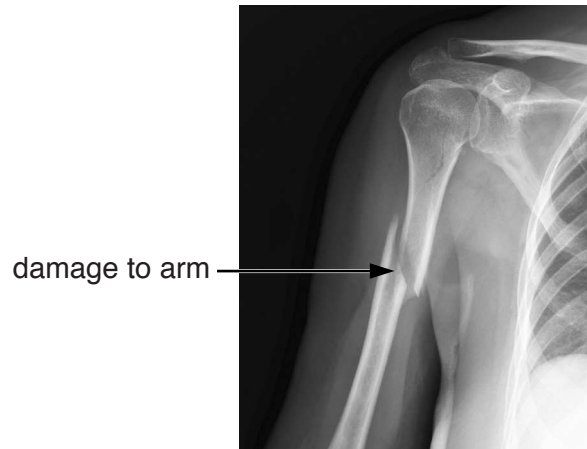
..... [3]

[Total: 5]
Turn over

- 5 Elderly people are much more likely to get osteoporosis.

The bone in Victoria's arm is damaged.

This is an X-ray of the damage.



- (a) Describe the damage to the bone in Victoria's arm.

.....

.....

..... [2]

- (b) Victoria is concerned that she might get similar damage to one of her legs.

The table shows the risk of having this type of damage.

		body mass in kg							
		40–44	45–49	50–54	55–59	60–64	65–69	70–74	75–79
age in years	45–49								
	50–54						low risk		
	55–59								
	60–64								
	65–69			moderate risk					
	70–74								
	75–79	high risk							
	80–84								
	85–89								

- (i) Victoria is 72 years old and has a body mass of 67 kg.

Put a ring around her level of risk.

low

moderate

high

[1]

- (ii) Describe how and suggest why the risk changes with age.

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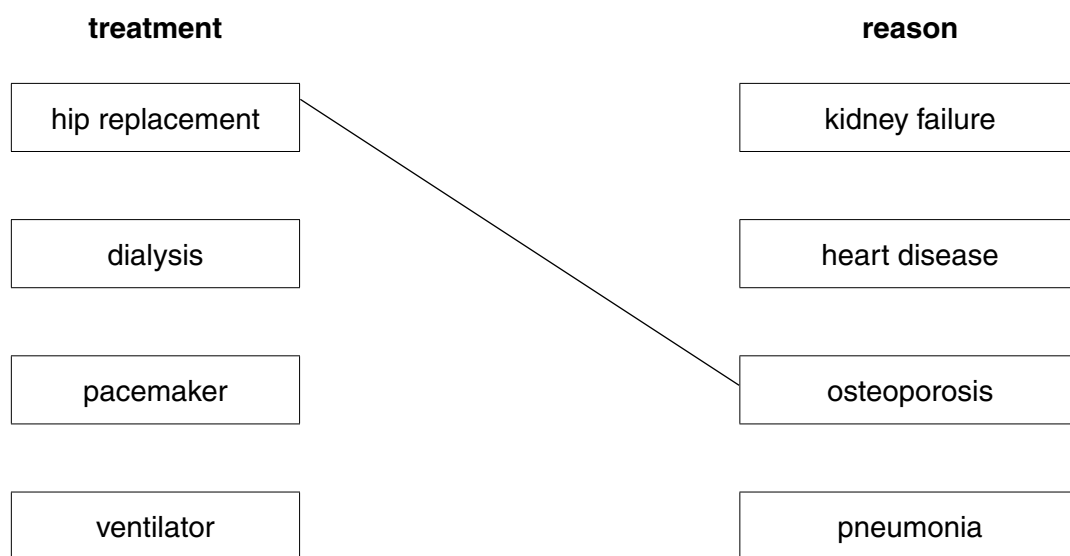
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..... [2]

- (c) Victoria may need a hip replacement in the future.

Draw straight lines to join each **treatment** to a **reason** why they might be needed.

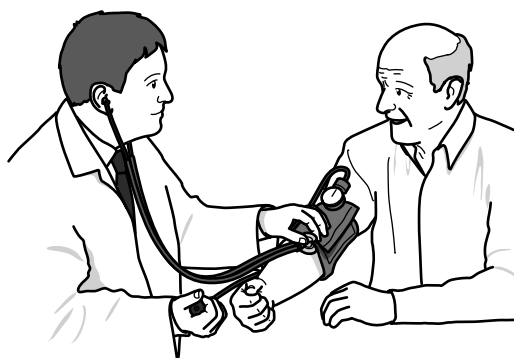
Victoria's treatment has been done for you.



[2]

[Total: 7]

- 6 Tim is seeing a doctor about his heart.



- (a) The doctor says that the muscle in Tim's heart is not getting enough blood.

- (i) Which substances does heart muscle get from the blood?

Put ticks (✓) next to the **two** substances in this list.

carbon dioxide

☐

glucose

☐

oxygen

☐

urea

☐

[1]

- (ii) Which blood vessel supplies the heart muscle with blood?

Choose your answer from this list.

coronary artery

coronary vein

pulmonary artery

pulmonary vein

vena cava

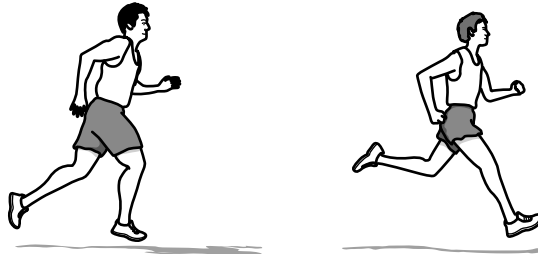
..... [1]

7 The skin is an organ of excretion.

It excretes water from the body in sweat.

Two athletes run in a long race.

They measure their body mass before and after the race.



Leroy

Sanchez

body mass before race (in kg)

90

64

body mass after race (in kg)

88

60

If a person loses too much water it can make them dehydrated.

The level of dehydration can be worked out using this formula and the table.

$$\text{percentage change in body mass} = \frac{\text{mass after the race} - \text{mass before the race}}{\text{mass before the race}} \times 100$$

Percentage change in body mass	Level of dehydration	Symptoms
+1.0 to -1.0	no dehydration	—
-1.1 to -3.0	slightly dehydrated	dry lips, thirsty
-3.1 to -5.0	moderately dehydrated	muscles work less efficiently
-5.1 to -8.0	very dehydrated	muscle spasms and cramps

(a) Leroy works out that his percentage change in body mass was **-2.2%**.

Work out Sanchez's percentage change.

Use the table to explain which person was most likely to have finished the race.

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[3]

- (b) During the race both athletes made more carbon dioxide than normal.

Why is more carbon dioxide made and why must it be removed from the body?

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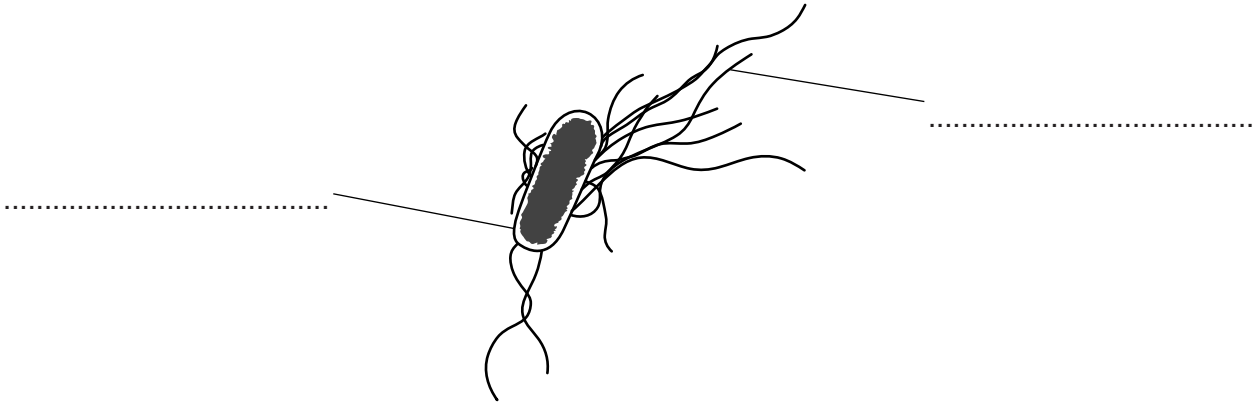
..... [2]

[Total: 5]

SECTION C – Module B6

8 This question is about bacteria.

(a) The diagram shows a type of bacterium called *E. coli*.



Label the diagram.

Choose your labels from:

bud

cell wall

cytoplasm

DNA

flagellum

nucleus

[2]

(b) Some bacteria cause disease.

Look at the list of diseases.

athlete's foot

chicken pox

cholera

influenza

Which of these diseases is caused by bacteria?

..... [1]

(c) Genetically engineered bacteria can make useful products such as insulin.

Put the stages of genetic engineering in the correct order by putting the numbers **1**, **2** and **3** in the boxes.

Insert a gene into an organism.

Remove a gene from an organism.

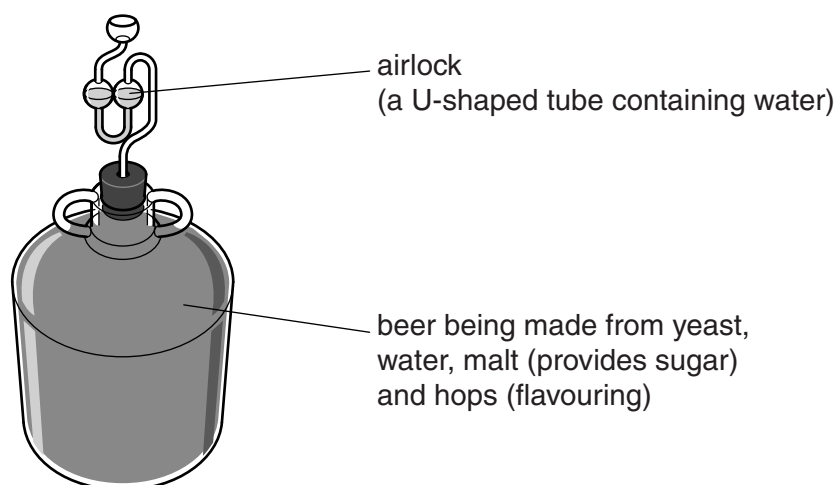
The gene works in the new organism.

[1]

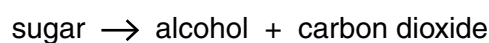
[Total: 4]

- 9 Sam is using yeast to make beer.

Look at the equipment he uses.



Alcohol is made by yeast doing a type of anaerobic respiration called fermentation:



- (a) The airlock lets gases out of the container but stops air from getting in.

Suggest why this is important.

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..... [2]

- (b) Sam has been told he should leave the equipment at a temperature of about 20 °C.

However, Sam thinks that if he increases the temperature he will speed up fermentation.

Sam leaves his equipment at a temperature of 50 °C.

He does **not** get much alcohol.

Suggest why.

.....

..... [1]

[Total: 3]

10 Landfill rubbish dumps produce biogas which contains mainly methane.

The biogas can be dangerous if it is **not** removed.

The biogas is either released into the air, burned off or used to provide energy.

(a) Describe how the biogas is produced.

.....

.....

.....

..... [2]

(b) Why is the biogas dangerous if it is **not** removed from the rubbish dump?

.....

..... [1]

(c) Which is the best way of removing the biogas?

Choose from:

- A** releasing it into the air
- B** burning it off
- C** using it to provide energy.

Explain why your choice is better than the other two ways.

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.....

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..... [3]

[Total: 6]

The graph shows the seasonal cycle of phytoplankton and zooplankton biomass. The y-axis is labeled 'biomass' and the x-axis is labeled 'months of the year' with ticks for each month from January to December. The phytoplankton biomass (solid line) peaks in July. The zooplankton biomass (dashed line) peaks in August, following the phytoplankton peak.

Month	Phytoplankton Biomass (Relative)	Zooplankton Biomass (Relative)
January	Low	Low
February	Low	Low
March	Low	Low
April	Low	Low
May	Low	Low
June	High	Low
July	Very High	Low
August	High	High
September	Low	High
October	Low	Low
November	Low	Low
December	Low	Low

Describe how they are similar and different **and** suggest why they change in this way.



..... [6

[Total: 6]

12 The enzyme invertase (sucrase) breaks down sucrose sugar into glucose and fructose sugars.

Glucose and fructose taste sweeter than sucrose and are used in the food industry.

Scientists have investigated what the best conditions are for using invertase in a food factory.

They tested invertase that had been **immobilised**, as well as invertase that was **free** (not immobilised).

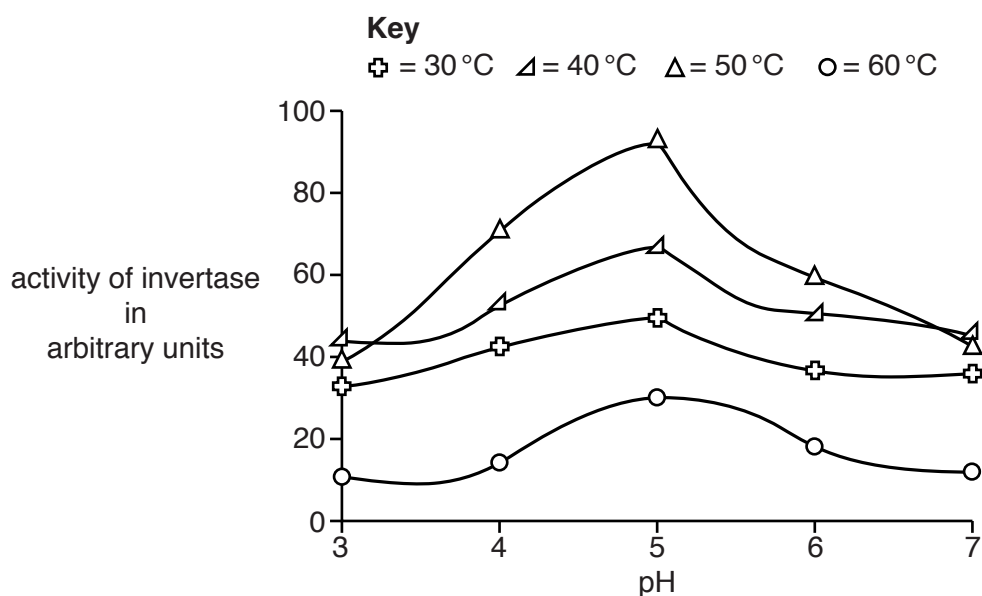
(a) Write down **one** way enzymes can be immobilised.

..... [1]

(b) Look at **Graph 1**.

It shows the activity of **immobilised** invertase at different pHs and temperatures.

Graph 1



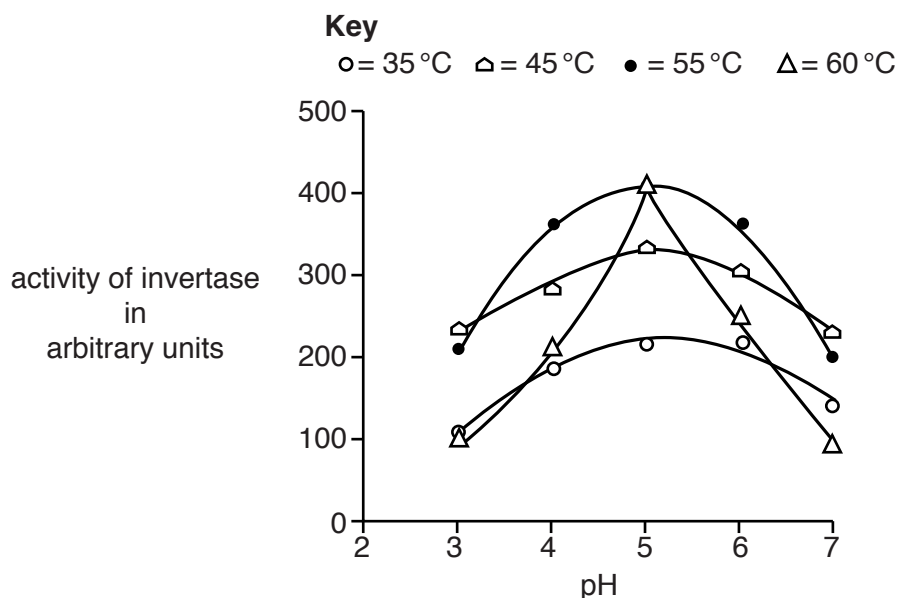
What are the best conditions for immobilised invertase to work?

.....
 [1]

(c) Look at **Graph 2**.

It shows the activity of **free** invertase at different pHs and temperatures.

Graph 2



Graph 2 shows that free invertase at 55 °C at pH5 and free invertase at 60 °C at pH5 both have the same high activity.

The scientists recommend 55 °C and pH5 as the best conditions for free invertase to work at.

Suggest reasons why the scientists recommend 55 °C rather than 60 °C.

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..... [2]

(d) The scientists have to decide whether to use immobilised enzymes or free enzymes in the factory.

Explain an advantage of each type of enzyme.

Use data from **Graph 1** and **Graph 2**, as well as your own biological knowledge.

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..... [2]

[Total: 6]

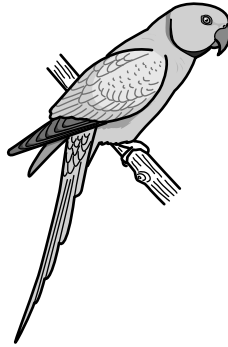
Turn over

SECTION D

- 13 (a) The ring-necked parakeet is originally from Africa and Asia.

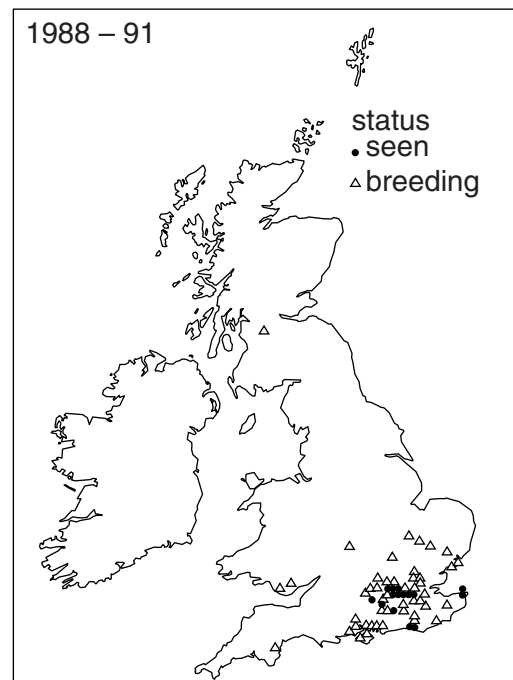
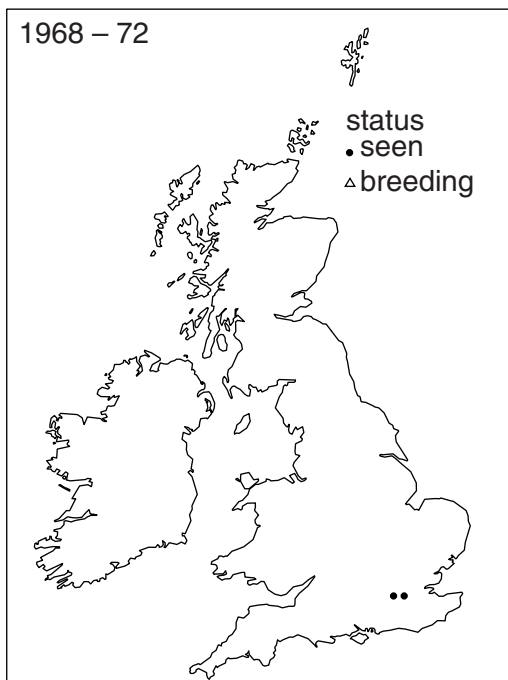
It is often kept as a pet in the UK.

Some of these pet birds escaped in 1969 and later started breeding in the wild.



The maps show the results of surveys made by many birdwatchers.

They show the places where ring-necked parakeets were just seen and where they were breeding.



- (i) Look at the maps.

How did the population of ring-necked parakeets change between the two surveys?

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..... [2]

- (ii) Do the two surveys provide enough evidence to show any trends?

Explain your answer.

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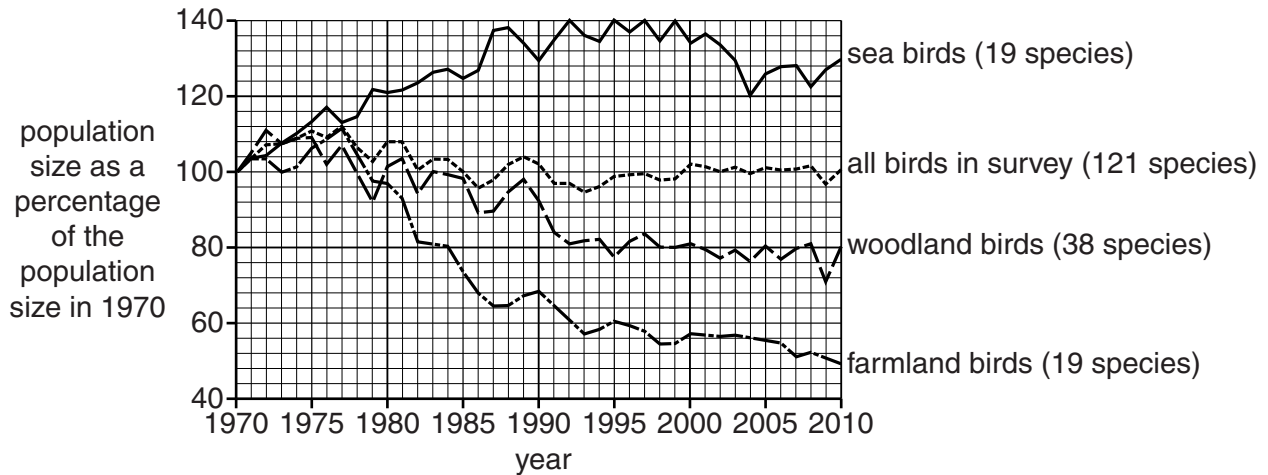
..... [2]

Question 13 continues on page 26

- (b) The graph shows how the population sizes of some groups of birds in the UK have changed.

The population sizes have been recorded as a percentage of their size in 1970.

The numbers in brackets show the number of species in each group.



- (i) The population size of which group of birds changed by the **greatest overall** percentage between 1970 and 2010?

Choose from **sea birds** **woodland birds** **farmland birds**

..... [1]

- (ii) The population size of which group of birds changed by the **least overall** percentage between 1970 and 2010?

Choose from **sea birds** **woodland birds** **farmland birds**

..... [1]

- (iii) Not all bird species in the survey belong to either sea birds, woodland birds or farmland birds.

Explain how you can tell this from the graph.

Use data from the graph in your answer.

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..... [2]

- (iv) Sam says, "The graph shows that from 1970 to 2010 more bird populations decreased in size than increased".

Discuss whether or not Sam is correct. Explain your answer.

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..... [2]

[Total: 10]

END OF QUESTION PAPER

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