

Centre Number						Candidate Number				
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Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
June 2014

Science A
Unit Biology B1

Biology
Unit Biology B1

Friday 6 June 2014 1.30 pm to 2.30 pm

For this paper you must have:

- a ruler.
- You may use a calculator.

Time allowed

- 1 hour

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 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 9 should be answered in continuous prose.
In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

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

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
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7	
8	
9	
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TOTAL	

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BL1FP

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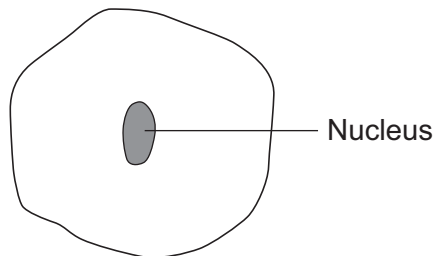
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ANSWER IN THE SPACES PROVIDED**



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

1 **Figure 1** shows a cell.

Figure 1



1 (a) Draw a ring around the correct answer to complete each sentence.

1 (a) (i) In the nucleus of a cell, genes are part of

chromosomes.

membranes.

receptors.

[1 mark]

1 (a) (ii) Different genes control different

characteristics

gametes

nuclei

of an organism.

[1 mark]

1 (a) (iii) Studying the similarities and differences between organisms allows us to

classify

clone

grow

the organisms.

[1 mark]

1 (b) Complete the following sentence.

[1 mark]

Living things can be grouped into animals, microorganisms and

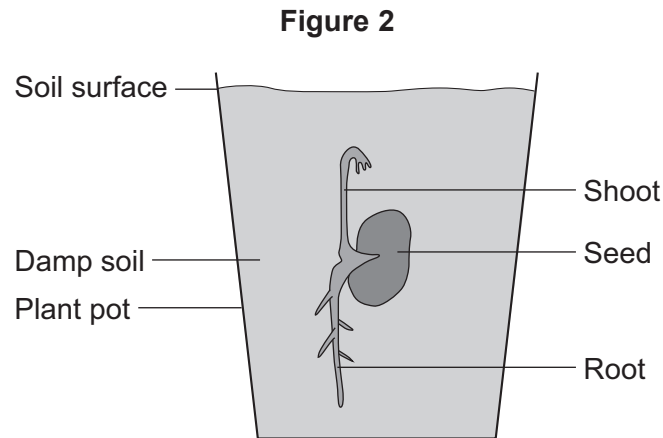


2 A student investigated growth in plants.

The student:

- planted a seed in damp soil in a plant pot
- put the plant pot in a dark cupboard.

Figure 2 shows the result after 5 days.



2 (a) Draw a ring around the correct answer to complete each sentence.

2 (a) (i) After the 5 days, the root had grown

away from water.

in the direction of the force of gravity.

towards light.

[1 mark]

2 (a) (ii) After the 5 days, the shoot had grown

against the force of gravity.

away from light.

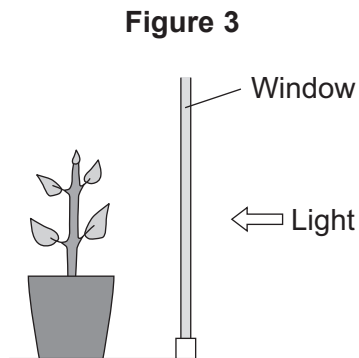
towards water.

[1 mark]



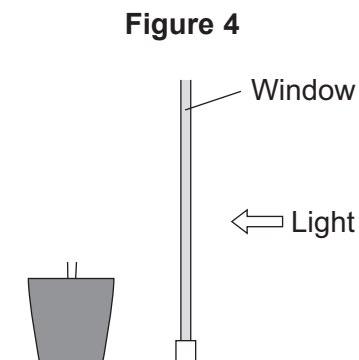
- 2 (b)** After the plant had grown, the student put the plant pot by a window with lots of light.

Figure 3 shows this.



- 2 (b) (i)** Complete **Figure 4** to show the appearance of the student's plant after 20 days by the window.

[1 mark]



- 2 (b) (ii)** Explain the advantage to the plant of growing in the way that you have drawn in part **(b)(i)**.

[2 marks]

.....

.....

.....

.....



3 A healthy diet contains the right balance of different foods and the right amount of energy.

3 (a) An unbalanced diet can lead to health problems.

One problem caused by an unbalanced diet is being overweight.

Name **one** health problem, other than being overweight, that is linked to an unbalanced diet.

[1 mark]

.....

3 (b) Sugar is a type of carbohydrate.

3 (b) (i) Eating too much sugar can make a person overweight.

Suggest why.

[1 mark]

.....

.....

3 (b) (ii) Which other substance in food is linked to people being overweight?

Draw a ring around the correct answer.

[1 mark]

fat

mineral ions

vitamins



- 3 (c)** Sugar substitutes taste sweet.
Taking sugar substitutes helps to reduce the chance of becoming overweight.

Table 1 gives information about four sugar substitutes, **A**, **B**, **C** and **D**.

Table 1

Sugar substitute	Number of times sweeter than sugar	Effects on health
A	x 200	Harmful to some people
B	x 250	Not known
C	x 600	Not known
D	x 500	None

- 3 (c) (i)** Which sugar substitute, **A**, **B**, **C** or **D**, is the sweetest?

[1 mark]

- 3 (c) (ii)** A person is advised to use sugar substitute **D** and **not** sugar substitutes **A**, **B** or **C**.

Suggest a reason why.

[1 mark]

.....

.....

- 3 (c) (iii)** A food has a sugar substitute in it.

Why must it say on the packet which sugar substitute it is?

[1 mark]

.....

.....



4 Drugs affect the human body.

4 (a) Draw **one** line from each drug to the correct information about the drug.

[4 marks]

Drug	Information
Cannabis	Used to boost heart rate
Steroid	Used to treat leprosy
Stimulant	May cause mental illness in some people
Thalidomide	Used to increase muscle growth
	Used to treat measles

4 (b) New drugs must be tested and trialled before being used.

4 (b) (i) New drugs are tested in a laboratory before they are trialled on people.

What are new drugs tested on in a laboratory?

[1 mark]

.....



4 (b) (ii) Why is it important that drugs are trialled before doctors give them to patients?

Tick (✓) **two** boxes.

[2 marks]

To check that the drug works

☐

To check the cost of the drug

☐

To find out if the drug is legal

☐

To find the best dose to use

☐

4 (b) (iii) In a double blind drug trial, only some people know which patients have been given the drug.

Who knows which patients have been given the drug?

Tick (✓) **one** box.

[1 mark]

The patient and the doctor

☐

Only the doctor

☐

Only scientists at the drug company

☐

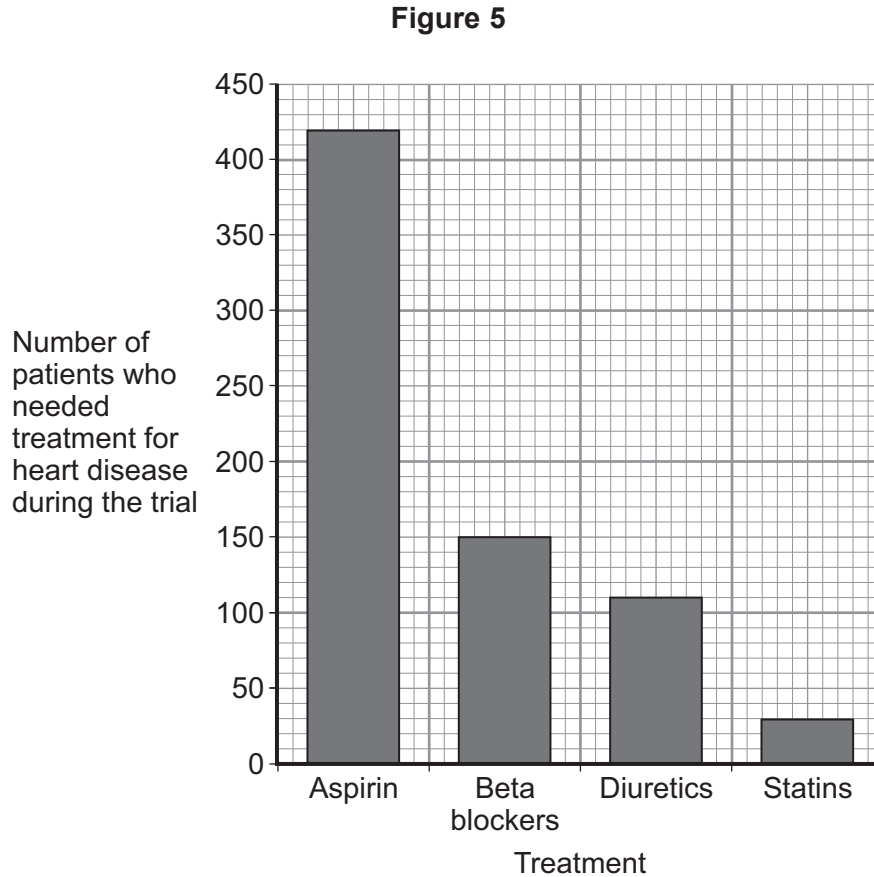
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- 4 (c)** Doctors trialled four different treatments for reducing the risk of heart disease. Each treatment was trialled on the same number of patients for 5 years. The patients did **not** have heart disease at the start of the trial.

Figure 5 shows the results.



- 4 (c) (i)** How many patients who took aspirin needed treatment for heart disease during the trial?

[1 mark]

Number of patients =

- 4 (c) (ii)** Based **only** on the evidence in **Figure 5**, which would be the best treatment to reduce the risk of developing heart disease?

[1 mark]

.....

- 4 (c) (iii)** Suggest **one** other factor that a doctor might consider before deciding which treatment to use for a patient.

[1 mark]

.....



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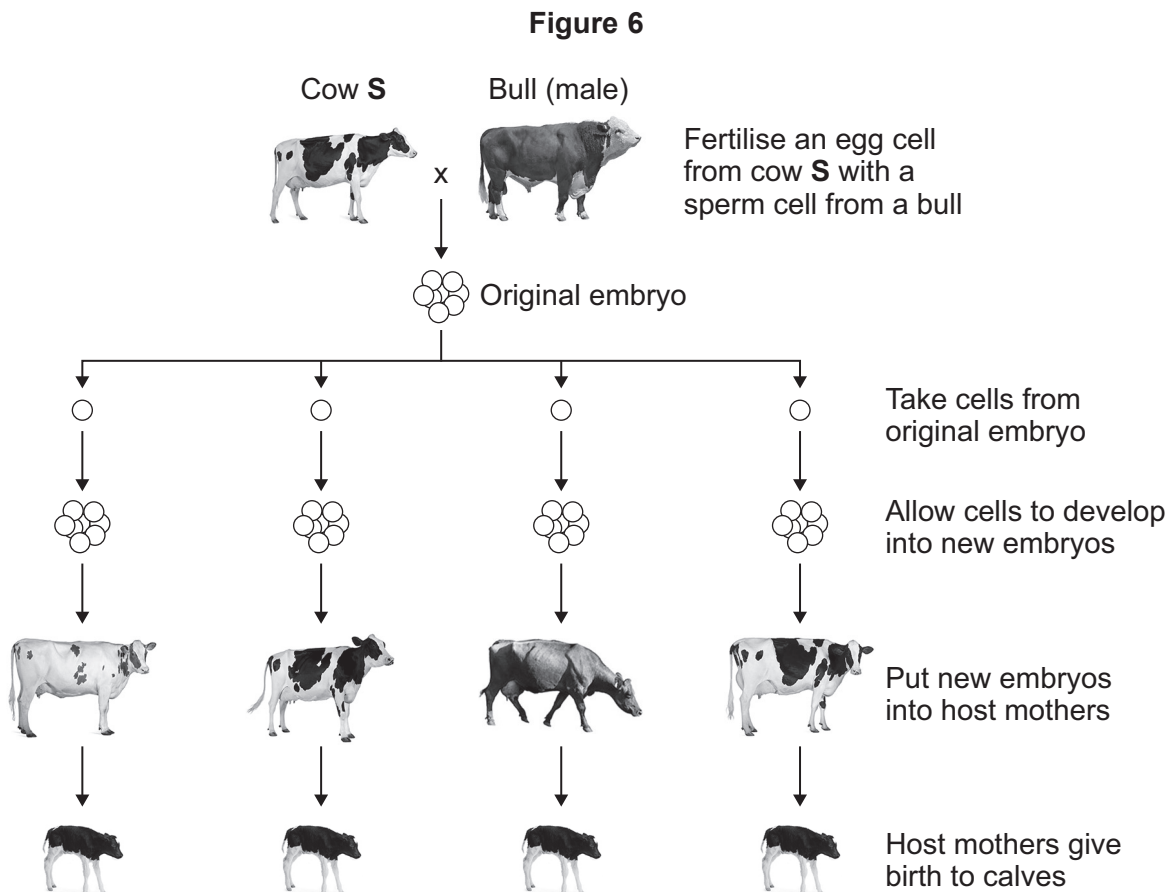
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- 5** Most cows produce milk with a fat content of 3.4%.
- Cow **S** produces milk with a fat content of 1.2%.
- Only cow **S** has the gene to produce this low-fat milk.

- 5 (a)** A farmer plans to develop more cows like cow **S**.

Figure 6 shows how the farmer plans to do this.



- 5 (a) (i)** An egg cell from cow **S** is fertilised by a sperm cell from a bull. This is part of sexual reproduction.

What is the scientific name for sex cells such as egg cells and sperm cells?

[1 mark]

.....



5 (a) (ii) After fertilisation, cells are taken from the original embryo.

These cells develop into new embryos.

Which part of the host mother's body should each new embryo be put into?

[1 mark]

.....

5 (b) (i) The calves born to all of the host mothers are genetically identical to each other.

Draw a ring around the correct answer to complete the sentence.

[1 mark]

The calves are genetically identical to each other because

they	are formed from the same original embryo.
	have the same host mother.
	have the same two parents.

5 (b) (ii) What term is used to describe the method of producing calves shown in **Figure 6**?

Tick (✓) **one** box.

[1 mark]

Adult cell cloning

☐

Embryo transplantation

☐

Genetic modification

☐

5 (b) (iii) Why are the calves born to the host mothers **not** genetically identical to cow **S**?

[1 mark]

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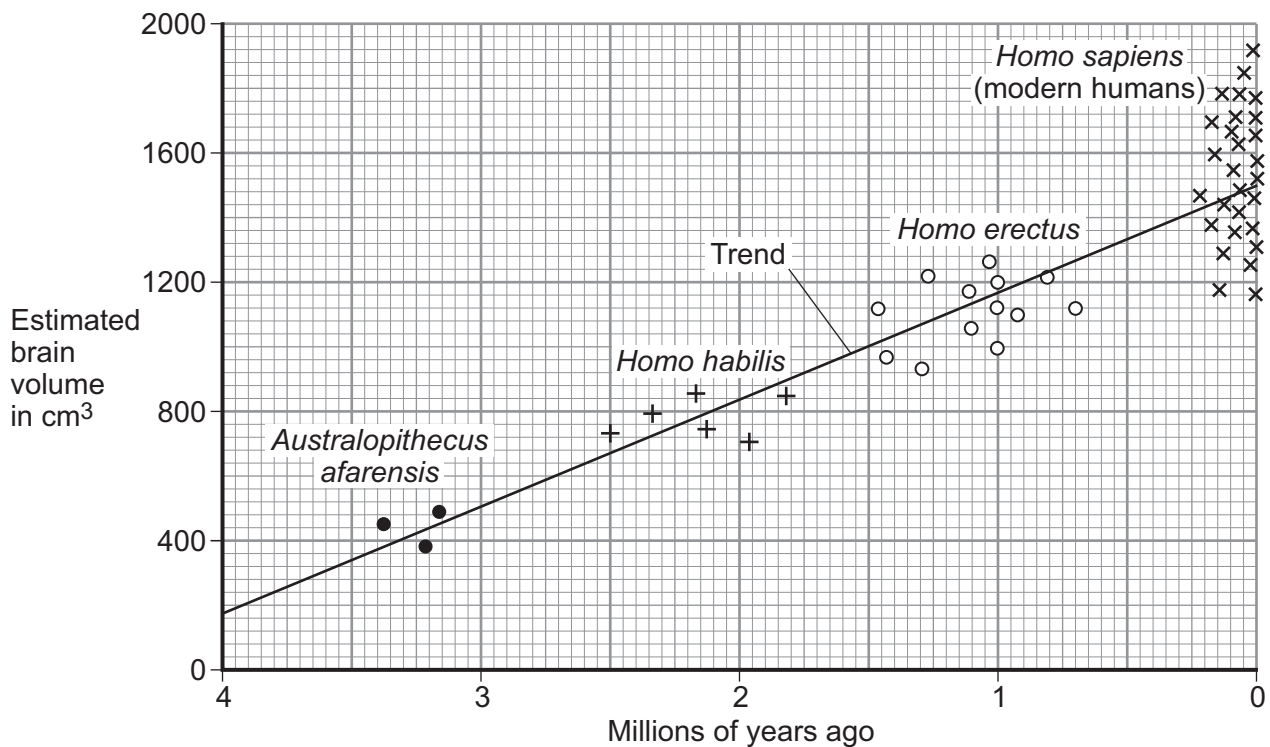
6 This question is about evolution in humans.

Figure 7 shows:

- the estimated brain volume of different species of humans
- the time when the different species existed on Earth.

The data is plotted for modern humans (*Homo sapiens*) and for three types of extinct ancestors of humans.

Figure 7



Key

Each point plotted on the graph shows the estimate for one human.

6 (a) (i) As humans evolved, their brain volume changed.

What has happened to human brain volume over the past 4 million years?

[1 mark]

.....

.....



- 6 (a) (ii)** Why is the evidence for estimated brain volume for *Homo sapiens* stronger than the evidence for *Australopithecus afarensis*?

[1 mark]

.....

.....

- 6 (b)** In a book, the brain volume of a different species, *Australopithecus africanus*, is stated to be about 600 cm³.

Use evidence from **Figure 7** to estimate when *Australopithecus africanus* lived on Earth.

[1 mark]

Estimate = million years ago

- 6 (c)** Scientists believe that modern humans evolved by natural selection from *Australopithecus afarensis*.

- 6 (c) (i)** Complete the following sentence.

[1 mark]

In the nineteenth century, the scientist who suggested the theory of evolution by natural selection was Charles

- 6 (c) (ii)** In the nineteenth century, many people did **not** accept this scientist's theory.

Give **one** reason why.

[1 mark]

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5

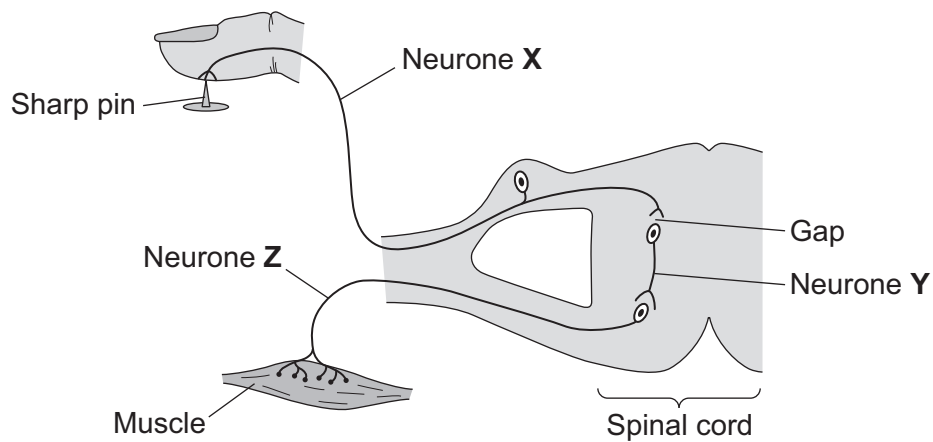
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7 **Figure 8** shows the pathway for a simple reflex action.

Figure 8



7 (a) What type of neurone is neurone **X**?

Draw a ring around the correct answer.

[1 mark]

motor neurone

relay neurone

sensory neurone

7 (b) There is a gap between neurone **X** and neurone **Y**.

7 (b) (i) What word is used to describe a gap between two neurones?

Draw a ring around the correct answer.

[1 mark]

effector

receptor

synapse

7 (b) (ii) Draw a ring around the correct answer to complete the sentence.

[1 mark]

Information passes across the gap as

a chemical.

an electrical impulse.

pressure.



- 7 (c)** Describe what happens to the muscle when it receives an impulse from neurone **Z**.
How does this reflex action help the body?

[2 marks]

What happens to the muscle

.....

How this helps the body

.....

5

Turn over for the next question

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8 Food chains show the flow of energy through the organisms in a habitat.

8 (a) **Figure 9** shows a food chain.

Figure 9

grass → **sheep** → **human**

The biomass in each stage of the food chain changes as food passes along the food chain.

Draw a pyramid of biomass for this food chain.

Label the pyramid.

[2 marks]



8 (b) Table 2 shows three food chains, **A**, **B** and **C**.

Table 2

	Food chain
A	plants → sheep → human
B	plants → grasshoppers → frogs → trout → human
C	plants → human

8 (b) (i) In which food chain, **A**, **B** or **C**, will the greatest proportion of biomass and energy of the plants be passed to humans?

[1 mark]

8 (b) (ii) Give reasons why the food chain that you chose in part **(b)(i)** passes on the greatest proportion of biomass and energy to humans.

[3 marks]

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6

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6



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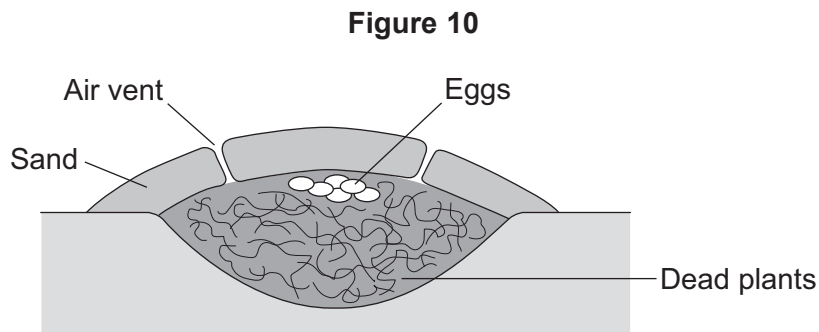


10 Most birds sit on their eggs to keep them warm until they hatch.

Megapode birds:

- dig a large hole in sand
- fill the hole with dead plants
- lay their eggs on top of the dead plants
- cover the surface with a thick layer of sand.

Figure 10 shows a megapode bird's nest.



10 (a) The dead plants in the nest decay. The decaying process helps to keep the eggs warm for many weeks.

Suggest how.

[3 marks]

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.....

.....

.....



10 (b) (i) Megapode birds open and close the air vents of the nest at different times of the day.

Suggest reasons why it is necessary to open and close the air vents.

[3 marks]

.....

.....

.....

.....

.....

.....

10 (b) (ii) The sex of a megapode bird that hatches from an egg depends on the temperature at which the egg was kept.

Use this information to suggest why it is important for megapode birds to control the temperature of their nests.

[1 mark]

.....

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7

END OF QUESTIONS



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Figure 6: © Thinkstock

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