Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

General Certificate of Secondary Education
Foundation Tier and Higher Tier
November 2009

Science A
Unit Biology B1b (Evolution and Environment)

Biology
Unit Biology B1b (Evolution and Environment)

BLY1BP

F&H

Thursday 19 November 2009 Morning Session

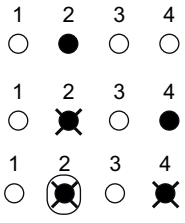
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

Time allowed
- 30 minutes

Instructions
- Fill in the boxes at the top of this page.
- Check that your name, candidate number and centre number are printed on the separate answer sheet.
- Check that the separate answer sheet has the title 'Biology Unit 1b' printed on it.
- Attempt **one Tier only**, **either** the Foundation Tier **or** the Higher Tier.
- Make sure that you use the correct side of the separate answer sheet; the Foundation Tier is printed on one side and the Higher Tier on the other.
- Answer **all** the questions for the Tier you are attempting.
- Record your answers on the separate answer sheet only.
- Do all rough work in this book, **not** on your answer sheet.

Instructions for recording answers
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown.
- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown.
- If you change your mind about an answer you have crossed out and now want to choose it, draw a ring around the cross as shown.



Information
- The maximum mark for this paper is 36.

Advice
- Do **not** choose more responses than you are asked to. You will lose marks if you do.
- Make sure that you hand in both your answer sheet and this question paper at the end of the test.
- If you start to answer on the wrong side of the answer sheet by mistake, make sure that you cross out **completely** the work that is not to be marked.

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.
The Higher Tier starts on page 16 of this booklet.

FOUNDATION TIER

SECTION ONE

Questions **ONE** to **FIVE**.

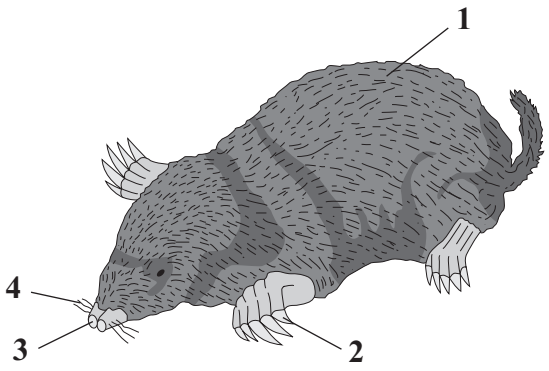
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows a mole. It lives underground in tunnels.



Match words, **A**, **B**, **C** and **D**, with labels **1–4** on the drawing.

A helps the mole to detect its prey in the burrow

B helps the mole to dig through the soil

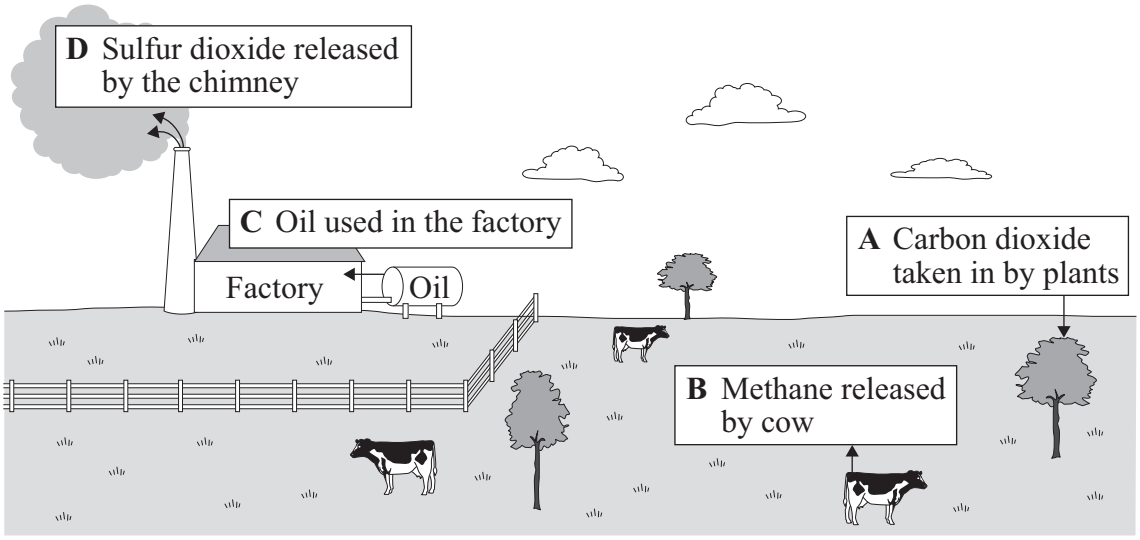
C helps to stop the mole from losing heat

D helps the mole to sense the size of the tunnel

QUESTION TWO

The diagram shows some of the processes occurring at a farm and the factory close by.

Match processes, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.



	Effect
1	increases global warming
2	may form acid rain
3	reduces the amount of greenhouse gas in the air
4	uses up a fuel

Turn over for the next question

QUESTION THREE

This question is about reproduction in animals and plants.

Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

A clones

B cuttings

C gametes

D variations

Sexual reproduction involves the joining of . . . **1** . . . .

The offspring from sexual reproduction are a mixture of genetic information from two parents.

This leads to . . . **2** . . . .

Asexual reproduction involves genetic information from only one parent.

The offspring are genetically identical to the parent and are known as . . . **3** . . . .

An asexual method of producing plants is by taking . . . **4** . . . .

QUESTION FOUR

Organisms have changed since life began on Earth.

Match terms, **A**, **B**, **C** and **D**, with the descriptions **1–4** in the table.

A evolution

B extinction

C natural selection

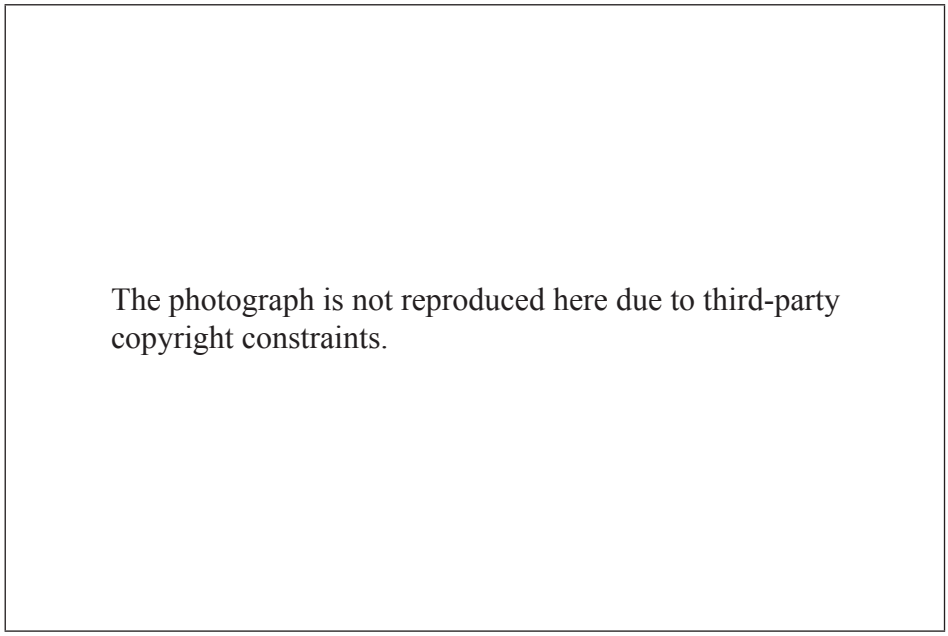
D reproduction

1	the theory that all living species developed from simple life forms over billions of years
2	genes being passed on from one generation to the next
3	a species dying out
4	organisms that are most suited to their environment survive to breed

Turn over for the next question

QUESTION FIVE

The photograph shows Joshua trees growing in a desert.



Match adaptations, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A has needle-shaped leaves

B has a shallow root system spread over a wide area

C stores water in bulbs on its roots

D produces large numbers of seeds

1	enables the tree to spread to more parts of the desert
2	enables the tree to survive for long periods without rain
3	reduces evaporation of water from the tree into the atmosphere
4	helps the tree to collect as much water as possible after a rain shower

Turn over for the next question

SECTION TWO

Questions **SIX** to **NINE**.

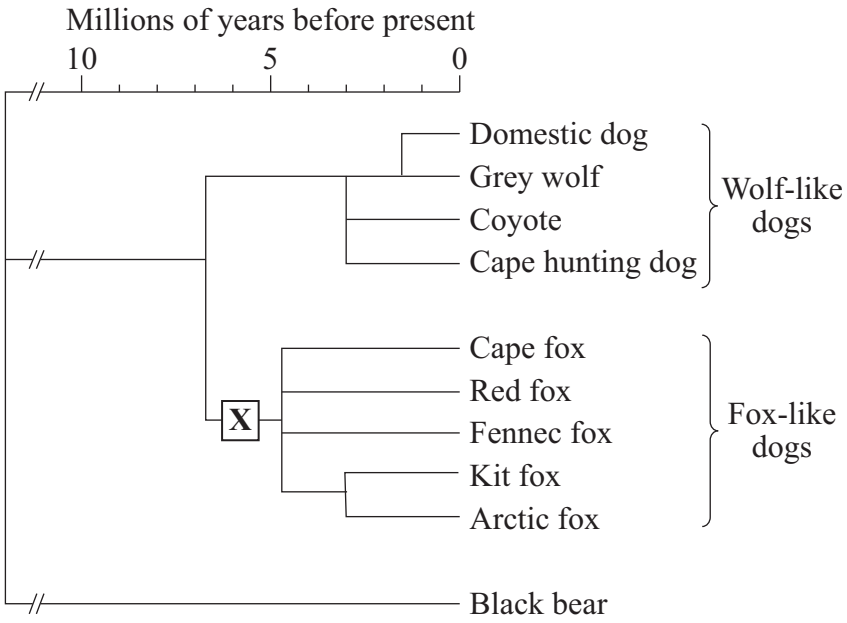
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION SIX

The evolutionary tree shows how different species of dog have evolved.



6A How many million years ago did the domestic dog become a separate species?

1 1.6

2 3.9

3 6.8

4 10

6B Which animal is most closely related to the Arctic Fox?

1 Black bear

2 Kit fox

3 Cape fox

4 Fennec fox

6C The letter **X** in the diagram refers to . . .

1 an extinct animal that had characteristics similar to those of the fox-like dogs.

2 a living animal that is a cross between a fox and a dog.

3 an extinct animal with characteristics similar to a domestic dog.

4 an endangered species.

6D One reason why Darwin's theory of evolution was only gradually accepted was that . . .

1 natural selection had not been discovered.

2 there were no fossils.

3 it went against the idea that God made all of the animals and plants.

4 Darwin had no evidence for evolution.

Turn over for the next question

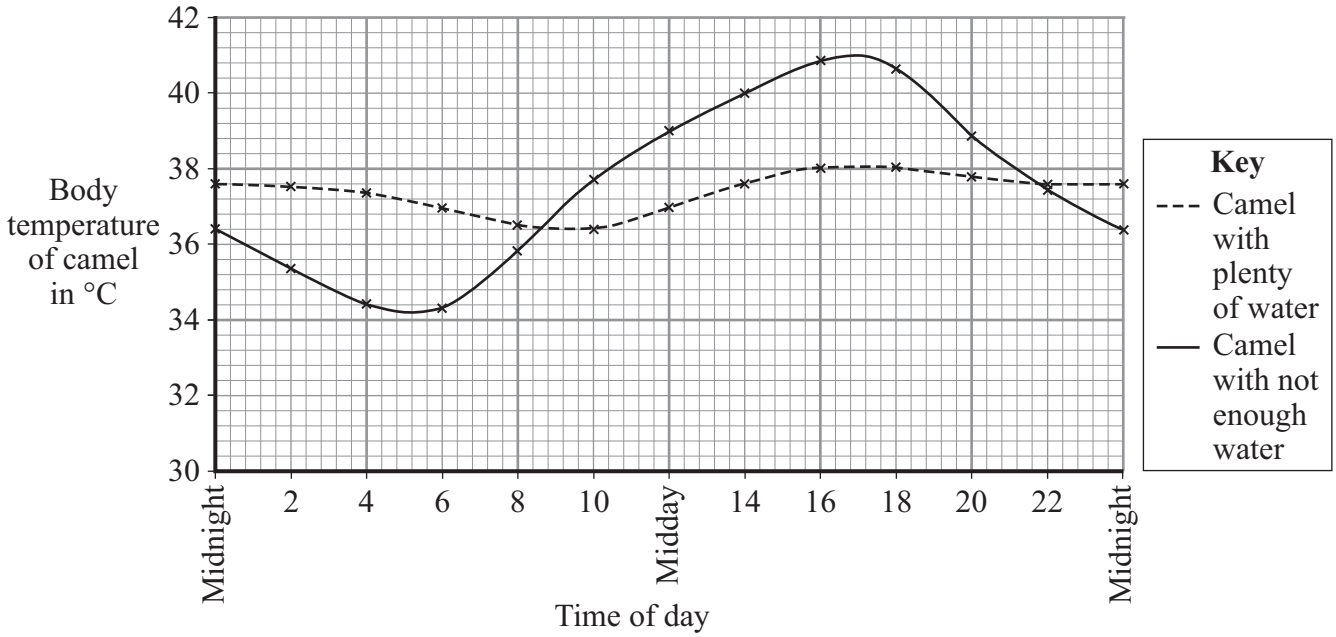
QUESTION SEVEN

Camels live in the desert and are adapted to cope with dry conditions and high temperatures.

A scientist investigated the hypothesis that a camel that drinks lots of water can control its body temperature better than a camel that drinks little water.

- He measured the body temperatures of two camels during the same day.
- One camel did not have enough water to drink and the other had plenty of water available.
- The camels had the same living conditions.

The results are shown in the graph.



7A What was the maximum body temperature of the camel with not enough water?

1 34.2 °C

2 36.5 °C

3 38.2 °C

4 41.0 °C

7B In this investigation, the camel with not enough water was a suitable control because . . .

1 water for the camel is essential to life.

2 the comparison shows that camels can keep their body temperature similar in certain conditions.

3 all species of animal can control their body temperatures.

4 the only difference between the two camels was the availability of water.

7C The reliability of the data could be improved by . . .

1 taking more temperature readings during the day.

2 taking more temperature readings from different camels but under the same conditions.

3 using a more accurate thermometer.

4 using a spreadsheet to record and analyse the data.

7D The body temperature of the camel with plenty of water (hydrated) varied less than that of the camel with not enough water (dehydrated) because . . .

1 the dehydrated camel had less water in its body to heat up or cool down.

2 the hydrated camel was able to sweat more to cool it down.

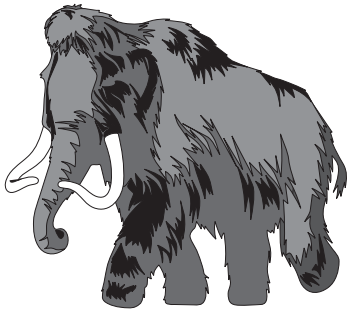
3 the hydrated camel was always in the shade near a water supply.

4 the Sun could not get to the hydrated camel as easily as to the dehydrated camel.

Turn over for the next question

QUESTION EIGHT

Woolly mammoths are extinct mammals that are related to modern elephants.



8A There are several possible reasons for the extinction of the woolly mammoth.

Which one of these was the most likely cause of their extinction?

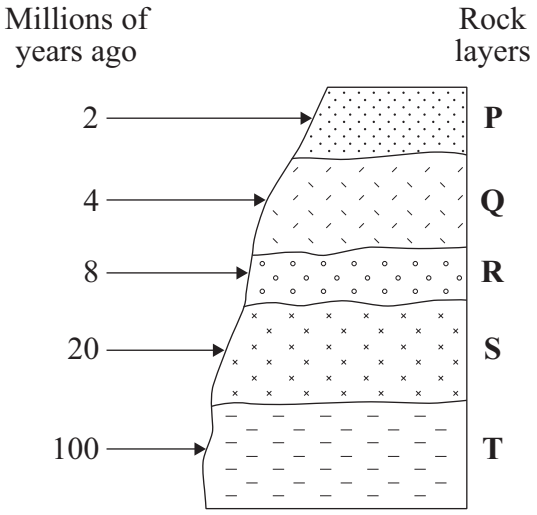
1 continents moving apart

2 an increase in the number of plant species

3 formation of new mountain ranges

4 an increase in the temperature of the Earth

The diagram shows the rocks in a cliff, which were exposed when other rocks wore away.
The times when these rocks were formed are shown.



8B Woolly mammoths lived on Earth between 4.8 million years ago and 4 thousand years ago.

In which layers of rock could woolly mammoth fossils be found?

1 **T** and **S** only

2 **Q** only

3 **R**, **S** and **T** only

4 **P** and **Q** only

8C Living things are thought to have developed over 3 billion years ago. We cannot be sure what these living things looked like.

This is because . . .

1 no rocks were being formed 3 billion years ago, so there are no fossils.

2 geological activity has destroyed many of the fossils.

3 there are no records because humans had not evolved then.

4 scientists are unable to agree on their appearance.

8D Recently, a pregnant female woolly mammoth was discovered preserved in ice. The cells of this mammoth are still in good condition. Scientists plan to transfer the nucleus from a mammoth skin cell into an elephant egg cell from which the nucleus has been removed. After the cell is given an electric shock, it will be transferred to the womb of a female elephant.

What term is used to describe this process?

1 tissue culture

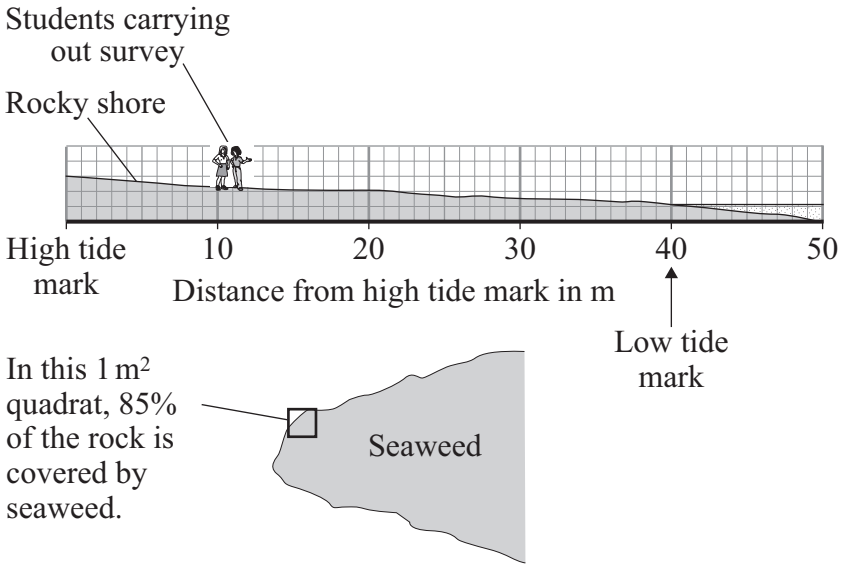
2 sexual reproduction

3 adult cell cloning

4 taking cuttings

QUESTION NINE

A group of students carried out a survey on a rocky sea shore. The students were measuring the distribution of four different seaweeds down the whole shore. They used 1 metre square quadrats. In each quadrat, they measured the percentage abundance of each seaweed.



9A Which of the following sampling methods would provide the most reliable results?

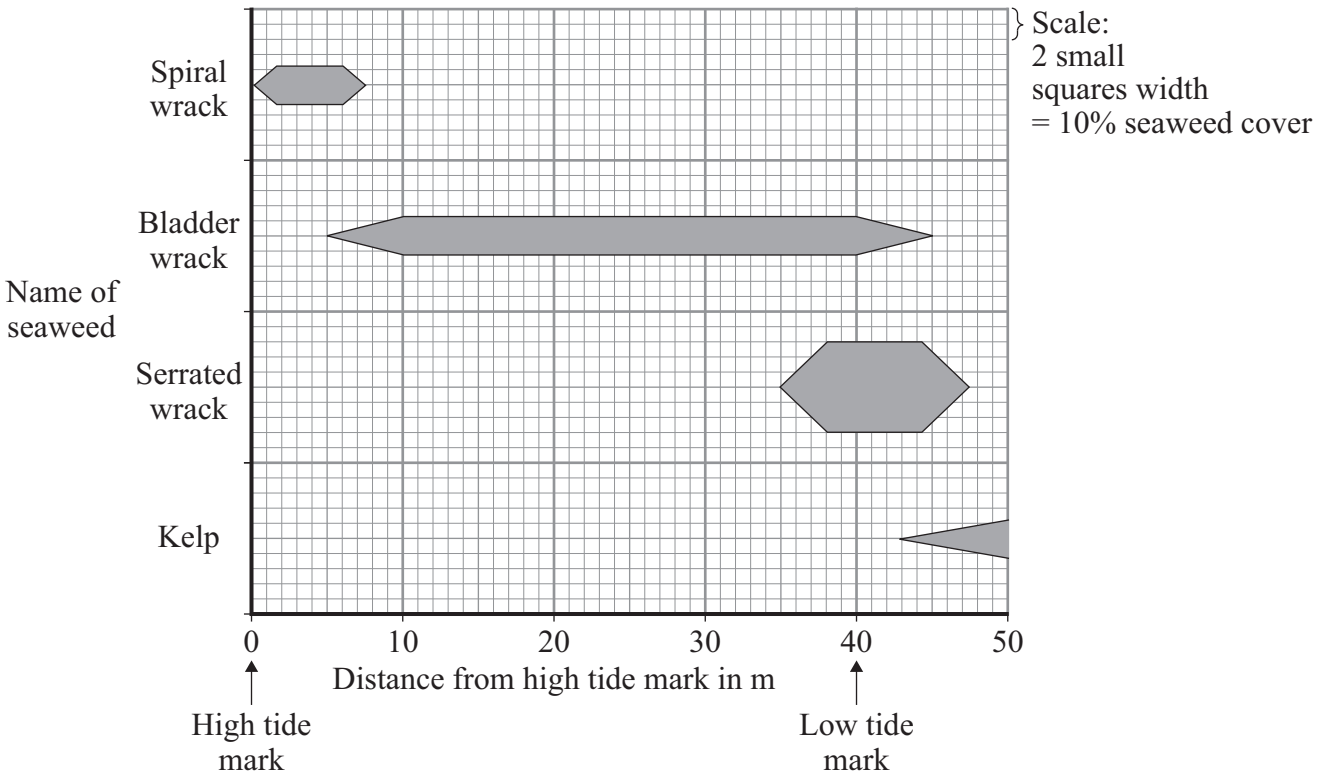
1 sampling every 5 metres from the low tide mark to the high tide mark

2 sampling every 1 metre from the low tide mark to the high tide mark

3 sampling every 1 metre from the high tide mark for 20 metres down the rocky shore

4 sampling every 5 metres from the low tide mark for 20 metres up the rocky shore

The diagram shows the students' results.



9B What is the distribution range of bladder wrack on the rocky shore?

1 0 to 8 metres

2 5 to 45 metres

3 35 to 48 metres

4 43 to 50 metres

9C What is the percentage cover of serrated wrack at the low tide mark?

1 20

2 30

3 50

4 60

9D Which seaweed is likely to be able to survive the driest conditions?

1 Spiral wrack

2 Bladder wrack

3 Serrated wrack

4 Kelp

END OF TEST

You must do **one Tier** only, **either** the Foundation Tier **or** the Higher Tier.
The Foundation Tier is earlier in this booklet.

HIGHER TIER

SECTION ONE

Questions **ONE** and **TWO**.

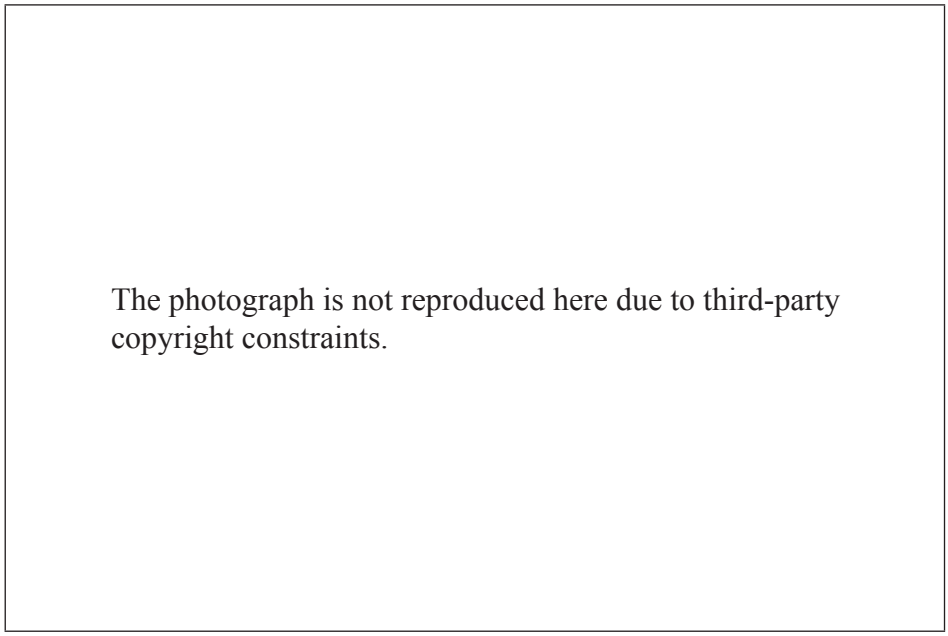
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

Use **each** answer only **once**.

Mark your choices on the answer sheet.

QUESTION ONE

The photograph shows Joshua trees growing in a desert.



Match adaptations, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A has needle-shaped leaves

B has a shallow root system spread over a wide area

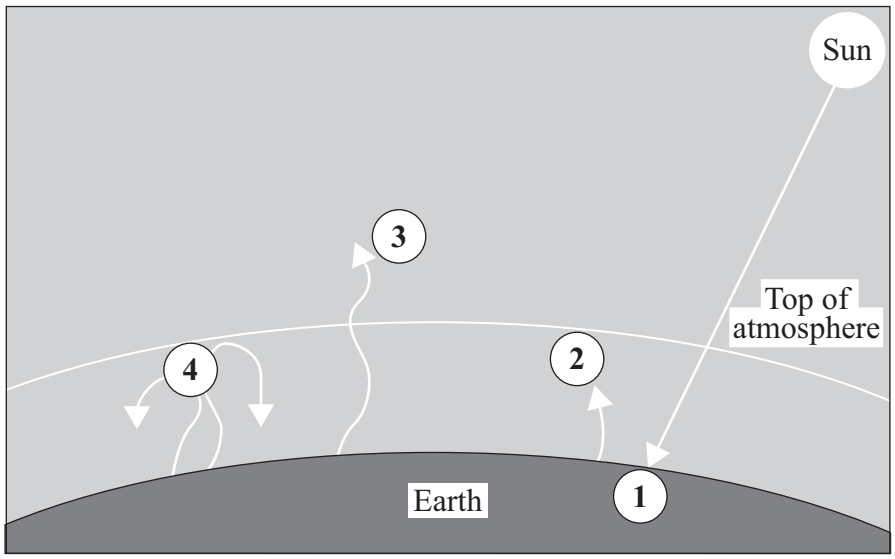
C stores water in bulbs on its roots

D produces large numbers of seeds

1	enables the tree to spread to more parts of the desert
2	enables the tree to survive for long periods without rain
3	reduces evaporation of water from the tree into the atmosphere
4	helps the tree to collect as much water as possible after a rain shower

QUESTION TWO

The diagram represents the greenhouse effect.



Match statements, **A**, **B**, **C** and **D**, with the labels **1–4** on the diagram.

A Some heat energy escapes into space.

B Heat energy is re-radiated by greenhouse gases.

C Heat energy is radiated into the atmosphere.

D Solar radiation warms the Earth's surface.

Turn over for the next question

SECTION TWO

Questions **THREE** to **NINE**.

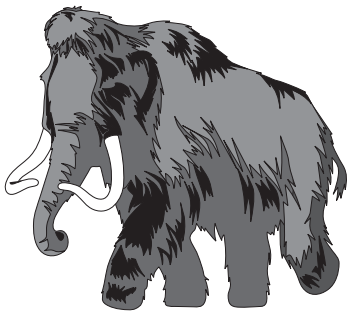
Each of these questions has four parts.

In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION THREE

Woolly mammoths are extinct mammals that are related to modern elephants.



3A There are several possible reasons for the extinction of the woolly mammoth.

Which one of these was the most likely cause of their extinction?

1 continents moving apart

2 an increase in the number of plant species

3 formation of new mountain ranges

4 an increase in the temperature of the Earth

The diagram shows the rocks in a cliff, which were exposed when other rocks wore away.
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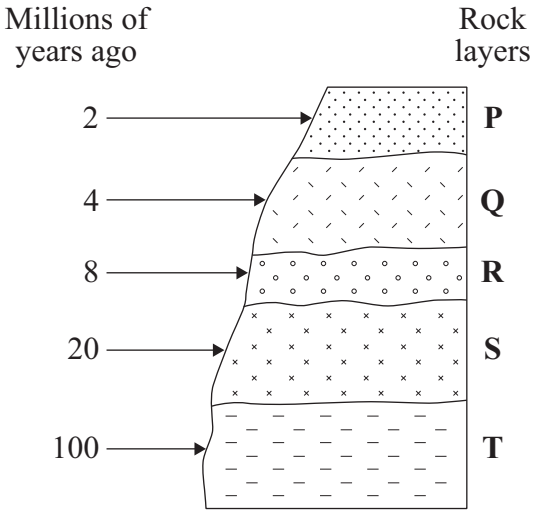


3B Woolly mammoths lived on Earth between 4.8 million years ago and 4 thousand years ago.

In which layers of rock could woolly mammoth fossils be found?

1 **T** and **S** only

2 **Q** only

3 **R**, **S** and **T** only

4 **P** and **Q** only

3C Living things are thought to have developed over 3 billion years ago. We cannot be sure what these living things looked like.

This is because . . .

1 no rocks were being formed 3 billion years ago, so there are no fossils.

2 geological activity has destroyed many of the fossils.

3 there are no records because humans had not evolved then.

4 scientists are unable to agree on their appearance.

3D Recently, a pregnant female woolly mammoth was discovered preserved in ice. The cells of this mammoth are still in good condition. Scientists plan to transfer the nucleus from a mammoth skin cell into an elephant egg cell from which the nucleus has been removed. After the cell is given an electric shock, it will be transferred to the womb of a female elephant.

What term is used to describe this process?

1 tissue culture

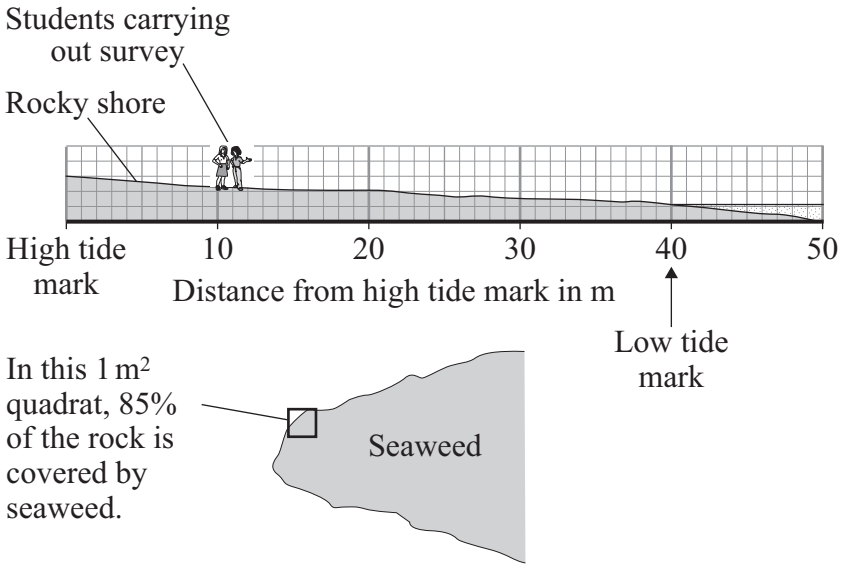
2 sexual reproduction

3 adult cell cloning

4 taking cuttings

QUESTION FOUR

A group of students carried out a survey on a rocky sea shore. The students were measuring the distribution of four different seaweeds down the whole shore. They used 1 metre square quadrats. In each quadrat, they measured the percentage abundance of each seaweed.



4A Which of the following sampling methods would provide the most reliable results?

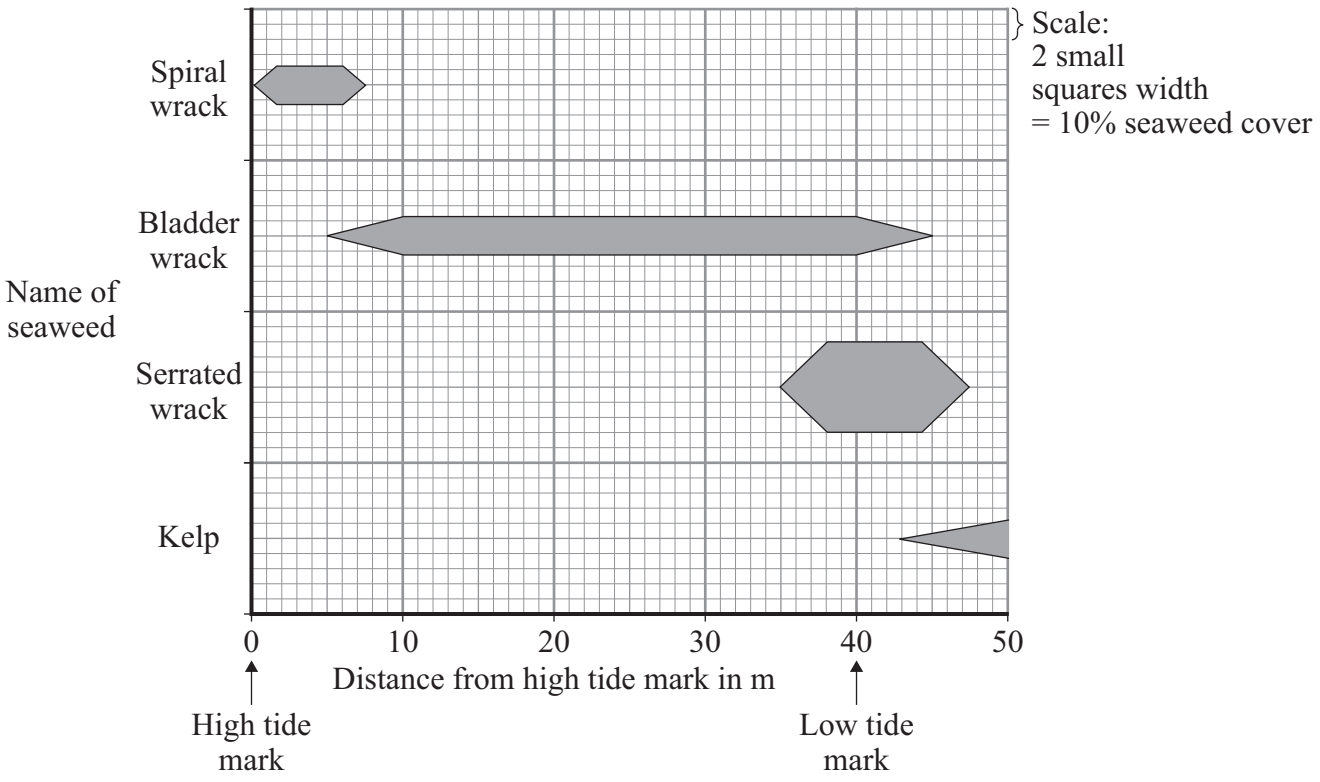
1 sampling every 5 metres from the low tide mark to the high tide mark

2 sampling every 1 metre from the low tide mark to the high tide mark

3 sampling every 1 metre from the high tide mark for 20 metres down the rocky shore

4 sampling every 5 metres from the low tide mark for 20 metres up the rocky shore

The diagram shows the students' results.



4B What is the distribution range of bladder wrack on the rocky shore?

1 0 to 8 metres

2 5 to 45 metres

3 35 to 48 metres

4 43 to 50 metres

4C What is the percentage cover of serrated wrack at the low tide mark?

1 20

2 30

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4 60

4D Which seaweed is likely to be able to survive the driest conditions?

1 Spiral wrack

2 Bladder wrack

3 Serrated wrack

4 Kelp

QUESTION FIVE

This question is about the effect that burning fuels has on the environment.

5A Which of the following are greenhouse gases?

1 sulfur dioxide and carbon dioxide

2 methane and oxygen

3 carbon dioxide and methane

4 methane and sulfur dioxide

A company can extract a fuel from single-celled plants, called algae, which grow on ponds. Fuels such as biodiesel are already produced from palm oil plants. Palm trees are grown where other trees have been cut down. A scientist estimates that the algae could produce 120 000 litres of fuel compared with 6000 litres from palm oil plants in the same area of deforested land. Unlike fuel from palm oil, burning fuel from algae does not produce sulfur dioxide.

5B The company claims that the fuel from algae will **not** contribute to global warming.

This is because . . .

1 algae take in as much carbon dioxide when growing as the fuel releases when burned.

2 burning the fuel releases carbon dioxide.

3 the plant takes in more sulfur when it is growing than is released, as sulfur dioxide, when the fuel burns.

4 the plants remove methane from the atmosphere when growing.

5C What area of land would be needed to make a pond that would produce the same amount of fuel as a 10 000 m^2 field of palm oil plants?

1 20 m^2

2 50 m^2

3 200 m^2

4 500 m^2

5D Using the information given, why might it be an advantage to use algae rather than palm oil to produce fuels?

1 Burning the fuel from algae results in less acid rain.

2 Producing fuel from algae does **not** require deforestation.

3 Algae grow more quickly than palm oil plants.

4 The fuel produced from algae burns more efficiently than that from palm oil plants.

Turn over for the next question

QUESTION SIX

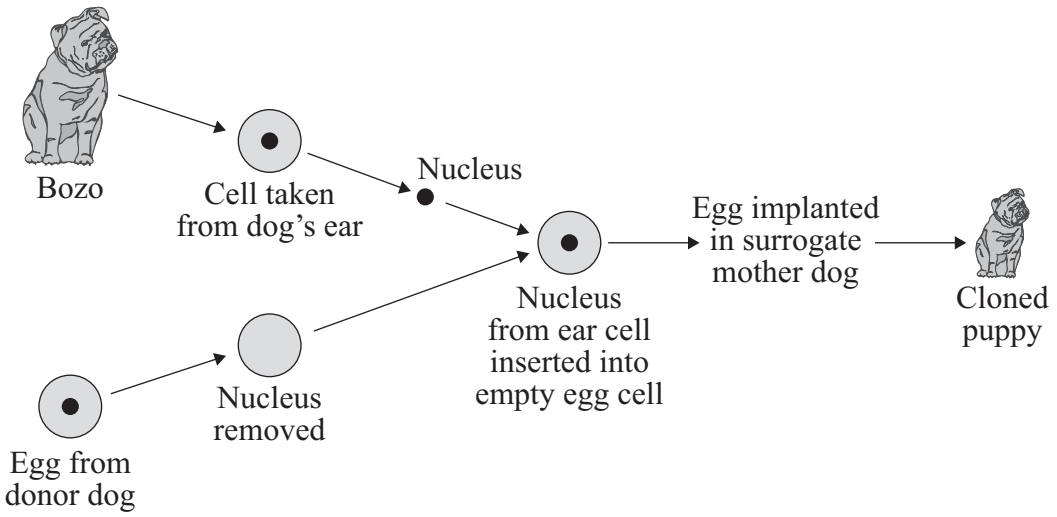
Woman gets 5 cloned puppies of her pet dog

A woman sold her house to raise £25 000 to have her pet dog Bozo cloned before he died of cancer.

The company that cloned the dog said that it could clone 300 dogs a year for pet owners whose dogs have died.

Animal charities condemned the practice as unacceptable.

The diagram shows the cloning process used by the company.



6A The cloned puppy is . . .

1 genetically identical to the surrogate mother dog.

2 genetically identical to the egg donor dog.

3 genetically identical to Bozo.

4 genetically identical to Bozo's parents.

6B The method used to produce the cloned puppies involves . . .

1 asexual reproduction.

2 fertilisation.

3 genetic engineering.

4 sexual reproduction.

6C Some humans are natural clones.

Which method would produce **natural** human clones?

1 two eggs being fertilised by two sperm at the same time

2 a developing embryo splitting to produce two separate embryos

3 an early embryo being split apart and transplanted into two host mothers

4 replacing the nucleus of an egg with the nucleus of an adult cell

6D Cloning puppies is allowed, but the cloning of humans is banned.

This is because . . .

1 no two humans should ever have the same genetic information.

2 there are ethical objections to cloning humans.

3 it would put too big a strain on NHS resources.

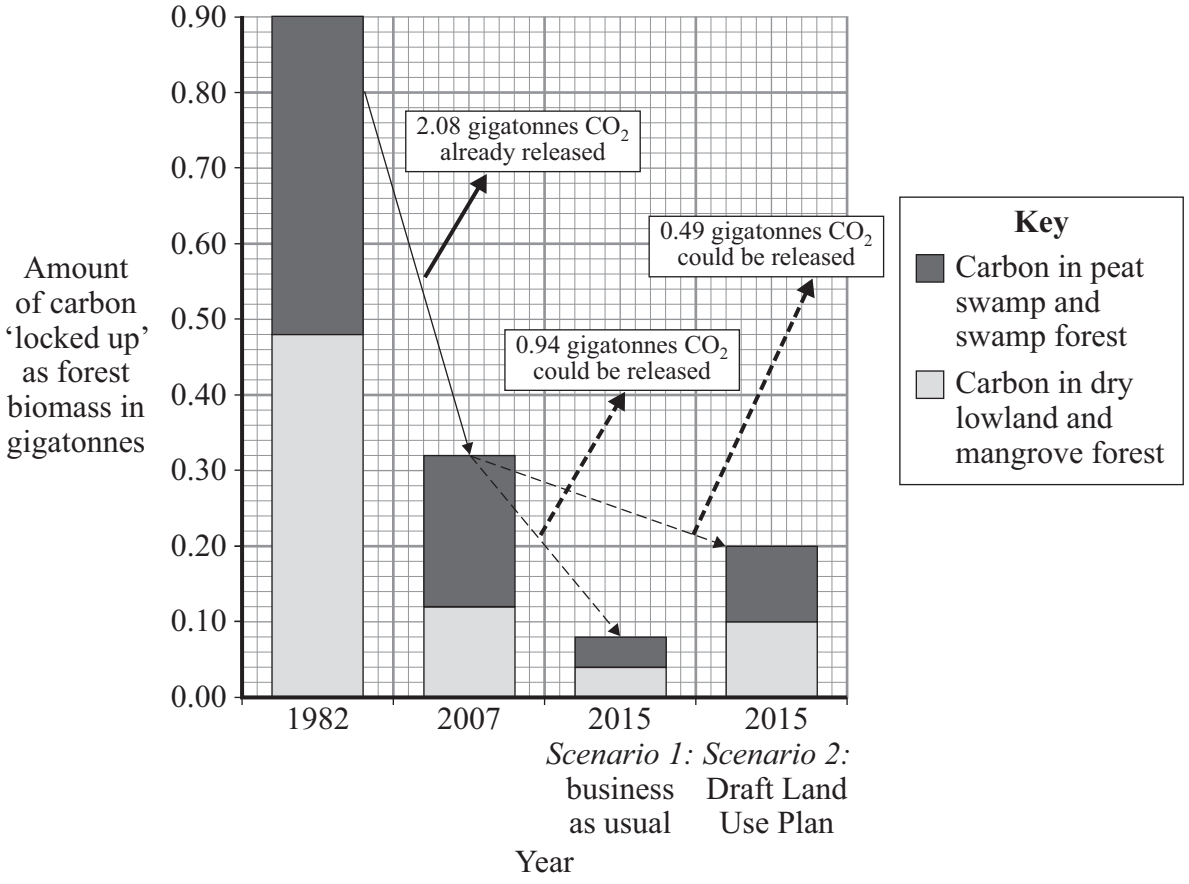
4 cloned children are much more likely to have inherited diseases.

Turn over for the next question

QUESTION SEVEN

Deforestation affects the environment.

The graph shows some possible effects of deforestation in part of Indonesia.



7A By how much did the total amount of carbon 'locked up' in peat swamp and swamp forest decline between 1982 and 2007?

1 0.16 gigatonnes

2 0.22 gigatonnes

3 0.36 gigatonnes

4 0.58 gigatonnes

7B What mass of carbon dioxide will be released between 1982 and 2015 if *Scenario 2* is adopted?

1 0.49 gigatonnes

2 1.43 gigatonnes

3 2.57 gigatonnes

4 3.02 gigatonnes

7C The graph refers to a *Draft Land Use Plan* for 2015.

How could this plan reduce the amount of carbon dioxide in the atmosphere by 2015?

1 by building more roads

2 by building more houses

3 by replanting forests

4 by giving protected status to more animal species

7D The *Draft Land Use Plan* is an example of . . .

1 biodiversity.

2 increasing the human population.

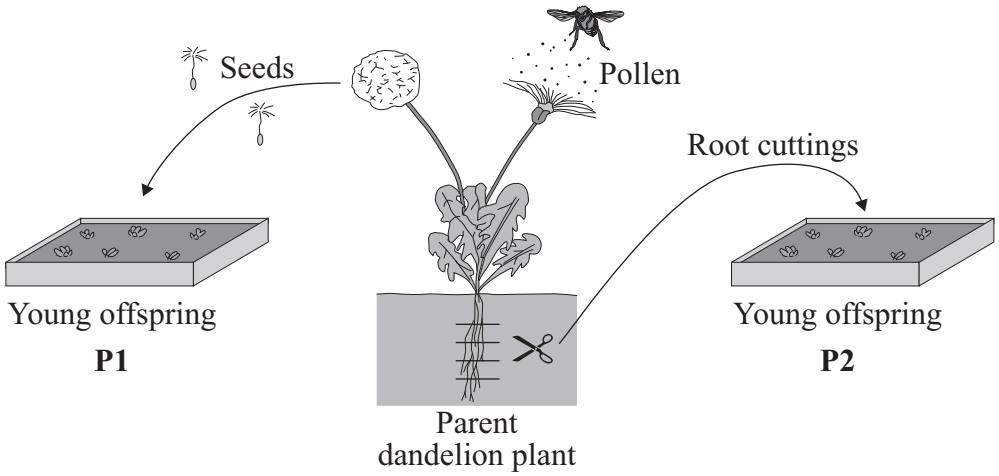
3 recycling.

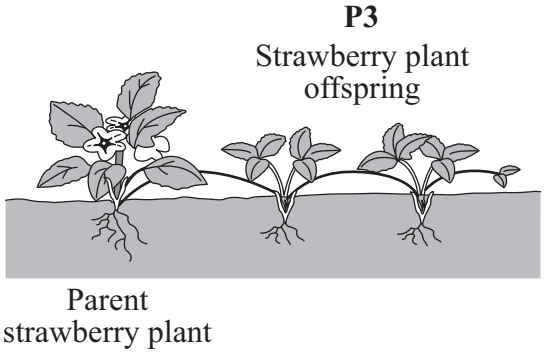
4 sustainable development.

Turn over for the next question

QUESTION EIGHT

The drawings show three ways in which plants can be reproduced.





8A Which new plants would be genetically identical to their parents?

1 **P1** and **P2** only

2 **P1** and **P3** only

3 **P2** and **P3** only

4 **P1**, **P2** and **P3**

8B The seeds from dandelion plants would contain genetic information . . .

1 only from the pollen.

2 from both the parent dandelion plant shown and the pollen.

3 only from the parent dandelion plant shown.

4 identical to that of the parent plant root.

8C Which offspring have been produced naturally?

1 **P2** only

2 **P1** and **P2** only

3 **P1** and **P3** only

4 **P1**, **P2** and **P3**

8D Commercial growers use the method shown to reproduce strawberry plants instead of planting seeds.

This enables growers to . . .

1 eliminate any further use of slug poisons that may have been used previously.

2 create plants that produce progressively bigger and sweeter strawberries.

3 grow more plants in a smaller area.

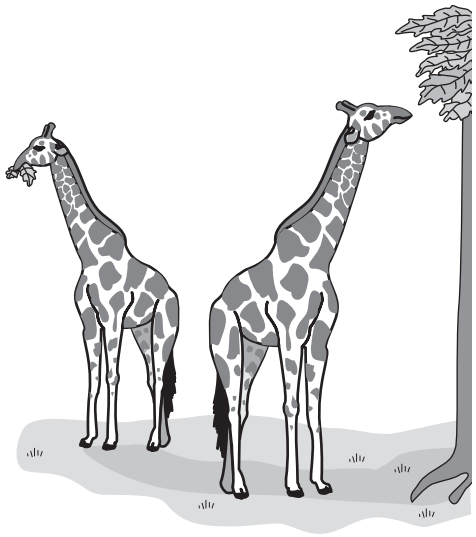
4 produce strawberries with the same taste, over and over again.

Turn over for the next question

QUESTION NINE

Different people have different views about why giraffes have long necks.

The drawing shows giraffes feeding on tree leaves.



You will need to refer to statements **E1** to **E6** to answer the questions.

E1 According to Lamarck (1809), giraffes grew longer necks during their lifetime to reach foliage high up in trees during food shortages, and the longer neck developed was then passed on to offspring.

E2 According to Darwin (1872), some giraffes were born with longer necks than others and they could feed at higher levels than other animals. These survived best and reproduced, passing on the long neck feature to their offspring.

E3 Some research (in Africa) has shown that female giraffes spend up to 75% of their grazing time bent down eating low level bushes during food shortage in periods of dry conditions.

E4 Male giraffes fight with their necks. The ones with the biggest necks dominate other males.

E5 The dominant males mate most frequently with female giraffes.

E6 No fossils of short necked giraffes have yet been found.

9A The theory that long necks evolved through a process of natural selection is supported by . . .

1 **E1** and **E2**.

2 **E2**, **E4** and **E5**.

3 **E3**, **E4** and **E5**.

4 **E6**.

9B The information quoted in **E3** directly contradicts . . .

1 **E2**.

2 **E4**.

3 **E5**.

4 **E6**.

9C The piece of evidence given in **E6** . . .

1 proves that no short-necked giraffes have ever existed.

2 casts doubts on both Darwin's and Lamarck's theories.

3 could be used to support Darwin's theory.

4 could be used to support Lamarck's theory.

9D Lamarck's theory in **E1** is not a correct explanation.

We know this because . . .

1 both parent giraffes would need to have the longer necks for the feature to be inherited by their offspring.

2 characteristics acquired during an animal's lifetime cannot be passed on in its genes to its offspring.

3 male giraffes are about 1 metre taller than females of the same age.

4 the shape of animals cannot alter during their lifetime.

END OF TEST

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