QUESTION FIVE

Tasmanian tigers are similar to Tasmanian devils. Tasmanian tigers became extinct in the 20th century.

The picture shows a Tasmanian tiger.



Scientists are trying to create living Tasmanian tigers. They are using cells from the well-preserved remains of a pregnant Tasmanian tiger. They are trying several methods.

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

A sexual reproduction

B tissue culture

C embryo transplants

D adult cell cloning

	Description
1	Splitting cells from the Tasmanian tiger embryo and transplanting them into the womb of a Tasmanian devil.
2	Joining female gametes from the Tasmanian tiger with male sperm cells from a Tasmanian devil.
3	Growing small groups of cells in a special nutrient solution.
4	Transferring the nucleus from a Tasmanian tiger skin cell into a Tasmanian devil egg cell. After the cell is given an electric shock, it is transferred to the womb of a female Tasmanian devil.

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Turn over for the next question

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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

Evolution may result in entirely new species over a period of time.

6A Simple life forms first evolved about . . .

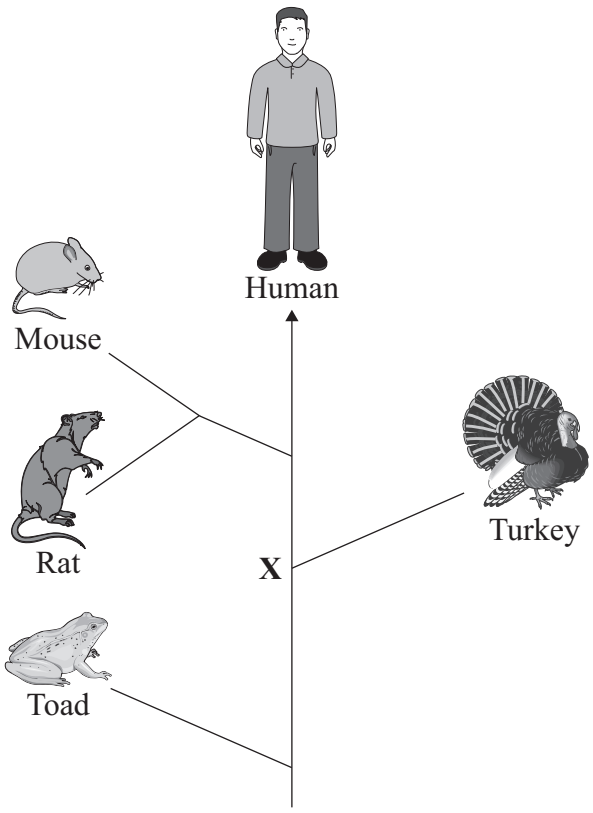
1 3 hundred years ago.

2 3 thousand years ago.

3 3 million years ago.

4 3 billion years ago.

The diagram shows an evolutionary tree.



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6B The differences between the rat and the mouse are due to differences in their . . .

1 genes.

2 environment.

3 survival.

4 food.

6C The point labelled **X** represents a common ancestor for . . .

1 turkey, human, mouse and rat.

2 toad, turkey, rat and mouse.

3 toad, human, rat and mouse.

4 turkey, toad, human and rat.

6D The two animals on this diagram that are most closely related are the . . .

1 mouse and rat.

2 turkey and toad.

3 human and mouse.

4 rat and turkey.

Turn over for the next question

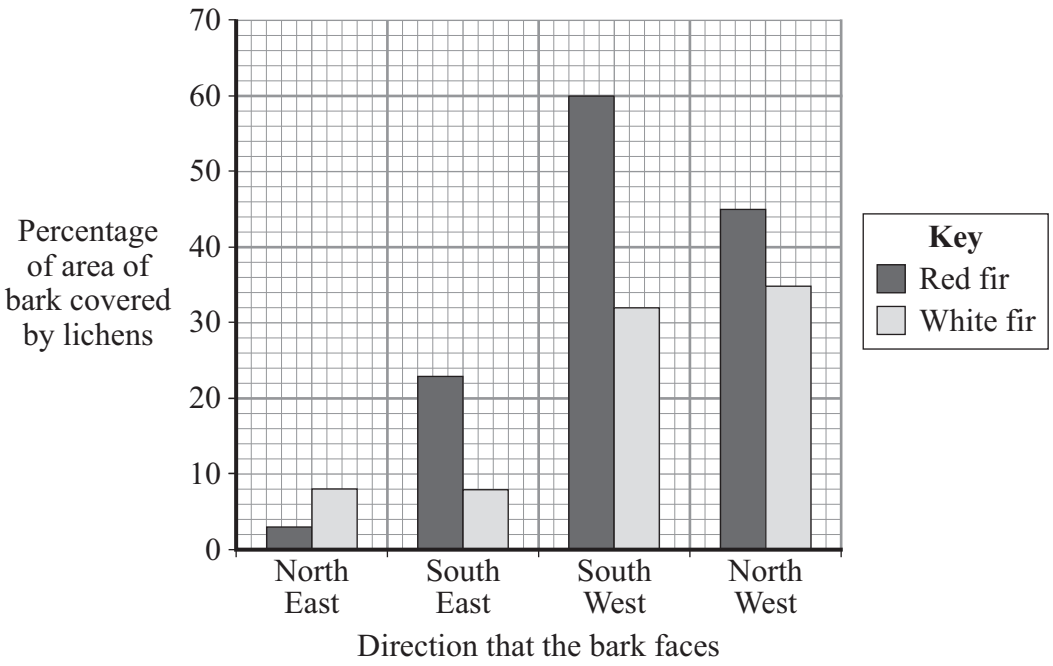
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QUESTION SEVEN

Lichens are indicators of sulfur dioxide pollution.

Scientists investigated the area of bark covered by lichens on two species of fir tree in a forest.

The bar chart shows their results.



7A Which piece of apparatus could the scientists use to estimate the area of bark covered by lichen?

1 compass

2 protractor

3 quadrat

4 thermometer

7B The side of the trees with the greatest percentage of the bark covered by lichens faced . . .

1 North East.

2 South East.

3 South West.

4 North West.

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7C The wind blows air polluted by sulfur dioxide from factories into the forest.

What is the main direction from which the polluted air blows?

1 North East

2 South East

3 South West

4 North West

7D From the data on the bar chart, which would be the best indicator of sulfur dioxide pollution?

1 lichen on red fir because it is most affected by sulfur dioxide

2 lichen on white fir because it is most affected by sulfur dioxide

3 lichen on red fir because it is least affected by sulfur dioxide

4 lichen on white fir because it is least affected by sulfur dioxide

Turn over for the next question

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QUESTION EIGHT

This question is about the way in which new varieties of plants are produced.

8A Genetically identical individuals are known as . . .

1 embryos.

2 gametes.

3 species.

4 clones.

People can now buy a purple variety of cauliflower.



These purple cauliflowers have been produced as a result of careful selection.

8B How can new varieties of plants be produced?

1 tissue culture

2 asexual reproduction

3 sexual reproduction

4 cloning

8C The purple colour of the first purple cauliflower was due to . . .

1 genetic engineering.

2 a mutation.

3 embryo transplantation.

4 gene transfer.

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8D At first there was only one purple cauliflower.

How could large numbers of purple cauliflowers be produced from this first one?

1 interbreeding purple and white cauliflowers

2 taking small groups of cells from the purple cauliflower and then growing them

3 genetic modification of white cauliflowers

4 'cutting out' the gene for the purple colour and transferring it into white cauliflowers

Turn over for the next question

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QUESTION NINE

Some plants produce poisonous chemicals for protection.

- The Bullshorn acacia does not have poisonous chemicals to defend itself.
- The Bullshorn acacia compete with poisonous acacia plants that grow in the same area.
- The Bullshorn acacia has ants living at the base of its thorns.
- The ants eat a sugary substance from the Bullshorn acacia and also eat insects that feed on the acacia.

9A The most likely reason for the presence of ants on the Bullshorn acacia is that . . .

1 the Bullshorn acacia does not have to produce poisonous substances.

2 the ants are able to find food easily.

3 the Bullshorn acacia can use the extra sugar for growth.

4 the ants reduce competition between acacia plants.

A scientist removed the ants from one plant and left another plant with its ants. He then measured the growth rate of the plants. The results are shown in the table below.

Date plants measured	**Increase in Bullshorn acacia height (cm)**	
	With ants	Without ants
May	0	0
June	29	7
July	91	14

9B What was the hypothesis being tested in this investigation?

1 The presence of ants increases the growth rate of the Bullshorn acacia.

2 The Bullshorn acacia protects ant species.

3 The ants help in the sexual reproduction of the Bullshorn acacia.

4 The Bullshorn acacia uses the carbon dioxide from the ants for photosynthesis.

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9C The scientist's data might be unreliable because . . .

1 only two plants were used in the experiment.

2 there is little difference between the growth of the two plants.

3 readings were taken on only three occasions.

4 the actual height of the plants is not recorded.

9D Using all the information in this question, which row in the table suggests the best conditions for the Bullshorn acacia to grow successfully?

	Poisonous acacia	**Ants**
1	not present	not present
2	present	not present
3	not present	present
4	present	present

END OF TEST

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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

Tasmanian tigers are similar to Tasmanian devils. Tasmanian tigers became extinct in the 20th century.

The picture shows a Tasmanian tiger.



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

A sexual reproduction

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D adult cell cloning

	Description
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Turn over for the next question

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QUESTION TWO

Bristlecone pines are some of the oldest known trees.



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

A The trees' leaves live for about 30 years.

B The trees can grow new bark.

C The trees have needle-shaped leaves.

D The trees grow far apart.

1	The tree trunks can survive being struck by lightning.
2	There is little competition for minerals between the trees.
3	The trees can survive long periods of drought.
4	The trees need few minerals each year for growth.

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Turn over for the next question

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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

This question is about the way in which new varieties of plants are produced.

3A Genetically identical individuals are known as . . .

1 embryos.

2 gametes.

3 species.

4 clones.

People can now buy a purple variety of cauliflower.



These purple cauliflowers have been produced as a result of careful selection.

3B How can new varieties of plants be produced?

1 tissue culture

2 asexual reproduction

3 sexual reproduction

4 cloning

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3C The purple colour of the first purple cauliflower was due to . . .

1 genetic engineering.

2 a mutation.

3 embryo transplantation.

4 gene transfer.

3D At first there was only one purple cauliflower.

How could large numbers of purple cauliflowers be produced from this first one?

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2 taking small groups of cells from the purple cauliflower and then growing them

3 genetic modification of white cauliflowers

4 'cutting out' the gene for the purple colour and transferring it into white cauliflowers

Turn over for the next question

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QUESTION FOUR

Some plants produce poisonous chemicals for protection.

- The Bullshorn acacia does not have poisonous chemicals to defend itself.
- The Bullshorn acacia compete with poisonous acacia plants that grow in the same area.
- The Bullshorn acacia has ants living at the base of its thorns.
- The ants eat a sugary substance from the Bullshorn acacia and also eat insects that feed on the acacia.

4A The most likely reason for the presence of ants on the Bullshorn acacia is that . . .

1 the Bullshorn acacia does not have to produce poisonous substances.

2 the ants are able to find food easily.

3 the Bullshorn acacia can use the extra sugar for growth.

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A scientist removed the ants from one plant and left another plant with its ants. He then measured the growth rate of the plants. The results are shown in the table below.

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2 The Bullshorn acacia protects ant species.

3 The ants help in the sexual reproduction of the Bullshorn acacia.

4 The Bullshorn acacia uses the carbon dioxide from the ants for photosynthesis.

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4C The scientist's data might be unreliable because . . .

1 only two plants were used in the experiment.

2 there is little difference between the growth of the two plants.

3 readings were taken on only three occasions.

4 the actual height of the plants is not recorded.

4D Using all the information in this question, which row in the table suggests the best conditions for the Bullshorn acacia to grow successfully?

	Poisonous acacia	**Ants**
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2	present	not present
3	not present	present
4	present	present

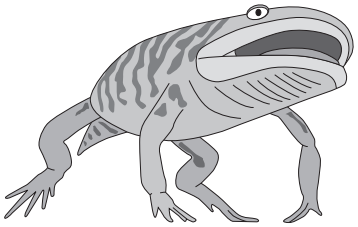
Turn over for the next question

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QUESTION FIVE

A new fossil find may be an evolutionary missing link in the amphibian family tree.

The drawing shows an artist's impression of a frogamander.



The 290 million year old fossil, nicknamed 'frogamander', was first collected in Texas by a scientist in the mid-1990s. It was rediscovered in a museum in 2004.

'It had a look of both frogs and salamanders', said the scientist who led a new study of the fossil. 'But I also recognised some primitive features, and I thought that this would be a critical piece of evidence in trying to work out the origins of modern amphibians.'

5A The frogamander needed pools of fresh water in order to breed. It is now extinct.

Which is the most likely cause of its extinction?

1 It was a small animal.

2 It could not run very fast.

3 It fed on small insects.

4 The climate became warmer.

5B Frogs and salamanders are different types of living amphibians.

The different characteristics of frogs and salamanders are directly due to . . .

1 new competitors.

2 changes to the diseases that affect them.

3 changes in their genes.

4 new predators.

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5C Evolution is brought about by natural selection.

Natural selection always involves the survival of the . . .

1 oldest individuals.

2 most intelligent individuals.

3 individuals most suited to the environment.

4 individuals who can eat the widest range of food.

5D Scientists have not completed the evolutionary tree for amphibians yet because . . .

1 frogamanders have primitive features.

2 no-one has ever seen a frogamander.

3 there is not enough fossil evidence.

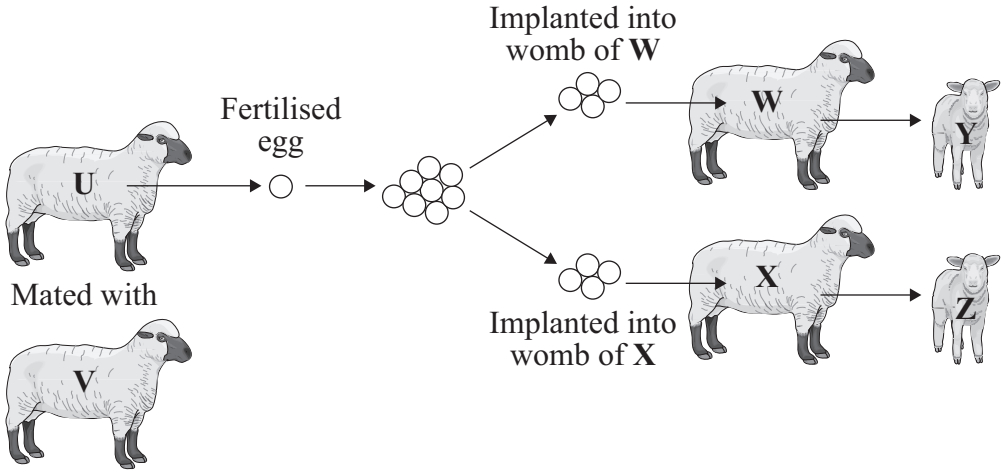
4 scientists do not know the mechanism of inheritance in amphibians.

Turn over for the next question

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QUESTION SIX

The diagrams illustrate one method of reproducing sheep.



6A The cells of the embryo which develops from the fertilised egg will contain genetic information . . .

1 from both sheep **U** and sheep **V**.

2 from sheep **U** only.

3 from sheep **V** only.

4 from neither sheep **U** nor sheep **V**.

6B The genetic information in the cells of the embryos that develop in sheep **W** and sheep **X** will be . . .

1 from sheep **U** only.

2 from sheep **V** only.

3 from both sheep **U** and sheep **V** but not identical.

4 identical.

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6C For **Y** and **Z**, the only thing we can be certain about is that both will be . . .

1 female.

2 male.

3 the same sex.

4 the same sex as sheep **V**.

6D Which sheep are clones?

1 **U** and **V**

2 **W** and **X**

3 **Y** and **Z**

4 **W**, **X**, **Y** and **Z**

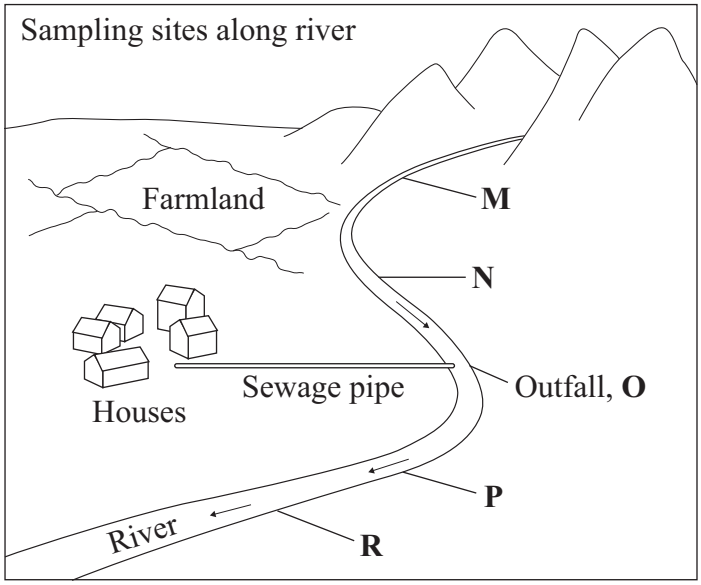
Turn over for the next question

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QUESTION SEVEN

Oxygen is used in respiration by organisms. The amount of oxygen in a river can give information about the health of a river.

The oxygen content of a river was measured by scientists at a series of locations, **M** to **R**, including where sewage entered the river.



7A The oxygen meter that the scientists used gave values in whole numbers. The readings at each location were all the same.

The most likely explanation for this is that . . .

1 the meter was not reliable.

2 any differences in the oxygen content were less than the sensitivity of the meter.

3 the oxygen content does not matter to the health of the river.

4 there was no difference in the oxygen content of the water at the different locations.

7B A different type of oxygen meter was then used.

The oxygen content of the river just below the sewage outfall was found to be lower than that above the outfall.

The most likely reason for this is that . . .

1 the river was running faster just below the sewage outfall.

2 less oxygen was dissolving from the air just below the sewage outfall.

3 dissolved oxygen was used up for respiration by microorganisms from the sewage.

4 toxic chemicals from the sewage outfall were polluting the river.

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There was a change in the species of animal that lived in the river further downstream past the sewage outfall.

The table shows the relative numbers of each type of organism from each sampling point along the river.

	Upstream		Sewage outfall	Downstream	
Sample position along river	**M**	**N**	**O**	**P**	**R**
Stonefly larvae	5	6	0	0	2
Water snail	20	15	10	12	12
Caddisfly larvae	7	8	1	2	6
Bloodworms	4	3	30	25	12

7C Which organism was found in greatest numbers in water with low oxygen levels?

1 stonefly larvae

2 water snails

3 caddisfly larvae

4 bloodworms

7D In the past year, the concentration of oxygen in the river downstream past the sewage outfall has decreased.

This is most likely to have been caused by . . .

1 a decrease in water temperature all along the river.

2 increased use of toxic chemicals in the surrounding farms that drain into the river.

3 an increase in the human population in the area.

4 fewer fish inhabiting the river.

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QUESTION EIGHT

The Lua tribe of the Philippines rely on 'slash and burn' agriculture. They cut down and burn an area of forest big enough to grow their crops. After about two years they move on to use another area of the forest. The Lua tribe has survived in the same region for many years. Their agriculture has to be managed very carefully.

8A The population of the tribe increased, so they burned a bigger area of the forest in which they lived.

What would be the most likely effect on the species that normally live in the region?

1 The animals would live at a higher population density in the remaining forest.

2 The animals would move away from the farmed area but die in the remaining forest because there would be too much competition.

3 There would be more types of native species because new areas of forest had been cleared.

4 There would be no effect on the native species.

The agricultural methods used by the Lua tribe had little effect on the carbon dioxide concentration in the air.

8B The most likely reason for this is that . . .

1 their population was not growing fast enough.

2 when the Lua tribe burns the forest, oxygen is taken in and carbon dioxide is released.

3 the Lua tribe did not plant rice on the cleared land.

4 the amount of carbon dioxide released by burning was the same as the amount of carbon dioxide reabsorbed by the crops.

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8C A forestry company was given the right to harvest the mature trees in the area, but also burned other areas.

Why was the company accused of increasing the chance of climate change?

1 Cutting down trees causes an increase in the temperature of the atmosphere.

2 Burning trees releases the 'locked up' carbon as carbon dioxide into the atmosphere, which then traps heat.

3 Using the trees for timber releases carbon dioxide into the atmosphere more quickly than photosynthesis can absorb it.

4 Fewer trees in the area allows more space for microorganisms to respire and release carbon dioxide.

8D Deforestation by the forestry company led to a reduction in biodiversity.

Why should society be concerned about this decrease?

1 A greater biodiversity reduces the chance of climate change.

2 The forest food chains would be shorter.

3 Some of the organisms that were lost may have been of future use.

4 There may be an increased use of herbicides in the area.

Turn over for the next question

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QUESTION NINE

Read the passage about the introduction of invasive species.

Birds are important members of forest communities.

Guam, a Pacific island, lost most of its native birds after a predator, the brown tree snake, was introduced by accident. The snake population density is now quite high – estimated at more than 4000 per square kilometre.

Before the introduction of the brown tree snake, Guam had 12 species of native forest birds. Today, 10 of those are extinct on Guam, and the other two species each have fewer than 200 individuals.

9A The main reason for the rapid increase in the population of brown snakes on Guam was probably that . . .

1 the climate on Guam suited them.

2 there was an abundant supply of tree seeds for food for the snakes.

3 the bird population on Guam had decreased rapidly.

4 there were no predators of brown snakes on Guam.

9B The bird populations on Guam fell rapidly after the introduction of the brown snake.

One possible reason for this was that . . .

1 the number of trees on Guam declined rapidly.

2 the birds on Guam did not recognise the brown snake as a predator.

3 there was competition between the snake and the birds for food.

4 the number of insects on Guam declined rapidly.

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A scientist investigated seed dispersal in forests on Pacific islands. She set seed traps beneath and near trees on Guam and on the nearby island of Saipan. Saipan does not have brown tree snakes.

On Saipan, the scientist found seeds in nearly every trap at each location. But on Guam, the seeds appeared only in traps directly under the trees.

Use all the information in this question to answer the following two questions.

9C The scientist's results suggest that . . .

1 seeds on Guam are mainly dispersed by birds.

2 seeds on Guam are mainly dispersed by wind.

3 the distance that seeds on Guam are dispersed depends mainly on their mass.

4 fewer seeds are produced by the trees on Guam than on Saipan.

9D Overall, the most serious long-term effect of the introduction of brown snakes into Guam is likely to be . . .

1 a reduction in the number of birds.

2 a reduction in the number of trees.

3 a reduction in biodiversity.

4 a reduction in sustainable development.

END OF TEST

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Question 2H Jupiter Images

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Version 1:0: 09/04/10

ASSESSMENT and QUALIFICATIONS ALLIANCE

GCSE

Science A (4461)

Specification A

BLY1BP, BL1BSF & BL1BSH

Mark Scheme

2010 Examination – March Series

The blank answer sheet for this component can be found at the end of this document.

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This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

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GCSE
SCIENCE A (4461)/BIOLOGY (4411)
Objective Test Answer Key
BLY1BP (Evolution and Environment)
March 2010
Foundation Tier

Question	Key		
One	**A**	Excellent eyesight	**3**
	B	Sharp beak	**4**
	C	Strong powerful claws	**2**
	D	Powerful wings	**1**
Two	**A**	biodiversity	**2**
	B	pollution	**4**
	C	global warming	**3**
	D	deforestation	**1**
Three	**A**	genes	**2**
	B	gametes	**1**
	C	characteristics	**4**
	D	nucleus	**3**
Four	**A**	spiral wrack	**3**
	B	bladder wrack	**2**
	C	serrated wrack	**4**
	D	kelp	**1**
Five	**A**	sexual reproduction	**2**
	B	tissue culture	**3**
	C	embryo transplants	**1**
	D	adult cell cloning	**4**

	A	B	C	D
Six	**4**	**1**	**1**	**1**
Seven	**3**	**3**	**1**	**1**
Eight	**4**	**3**	**2**	**2**
Nine	**2**	**1**	**1**	**3**

GCSE
SCIENCE A (4461)/BIOLOGY (4411)
Objective Test Answer Key
BLY1BP (Evolution and Environment)
March 2010
Higher Tier

Question	*Key*		
One	**A**	sexual reproduction	**2**
	B	tissue culture	**3**
	C	embryo transplants	**1**
	D	adult cell cloning	**4**
Two	**A**	The trees' leaves live for about 30 years.	**4**
	B	The trees can grow new bark.	**1**
	C	The trees have needle-shaped leaves.	**3**
	D	The trees grow far apart.	**2**

	A	**B**	**C**	**D**
Three	**4**	**3**	**2**	**2**
Four	**2**	**1**	**1**	**3**
Five	**4**	**3**	**3**	**3**
Six	**1**	**4**	**3**	**3**
Seven	**2**	**3**	**4**	**3**
Eight	**2**	**4**	**2**	**3**
Nine	**4**	**2**	**1**	**3**

AQA

Unit : BLY1BP BIOLOGY UNIT 1B

Centre :

Candidate Number : **UCI :**

Candidate Name :

Series : 3G10

03-MAR-10

For completion by the Examination Invigilator. **Please fill this circle if the candidate is absent:** ○

HIGHER TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

Questions **ONE** to **NINE** Choose one response **1 - 4** for each of the parts **A - D**

QUESTION ONE		1	2	3	4
1A	sexual reproduction	○	○	○	○
1B	tissue culture	○	○	○	○
1C	embryo transplants	○	○	○	○
1D	adult cell cloning	○	○	○	○

QUESTION TWO		1	2	3	4
2A	The trees' leaves live for about 30 years.	○	○	○	○
2B	The trees can grow new bark.	○	○	○	○
2C	The trees have needle-shaped leaves.	○	○	○	○
2D	The trees grow far apart.	○	○	○	○

QUESTION THREE	1	2	3	4
3A	○	○	○	○
3B	○	○	○	○
3C	○	○	○	○
3D	○	○	○	○

QUESTION FOUR	1	2	3	4
4A	○	○	○	○
4B	○	○	○	○
4C	○	○	○	○
4D	○	○	○	○

QUESTION FIVE	1	2	3	4
5A	○	○	○	○
5B	○	○	○	○
5C	○	○	○	○
5D	○	○	○	○

QUESTION SIX	1	2	3	4
6A	○	○	○	○
6B	○	○	○	○
6C	○	○	○	○
6D	○	○	○	○

QUESTION SEVEN	1	2	3	4
7A	○	○	○	○
7B	○	○	○	○
7C	○	○	○	○
7D	○	○	○	○

QUESTION EIGHT	1	2	3	4
8A	○	○	○	○
8B	○	○	○	○
8C	○	○	○	○
8D	○	○	○	○

QUESTION NINE	1	2	3	4
9A	○	○	○	○
9B	○	○	○	○
9C	○	○	○	○
9D	○	○	○	○

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FOUNDATION TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

Questions **ONE** to **NINE** Choose one response **1 - 4** for each of the parts **A - D**

QUESTION ONE	1	2	3	4
1A Excellent eyesight	○	○	○	○
1B Sharp beak	○	○	○	○
1C Strong powerful claws	○	○	○	○
1D Powerful wings	○	○	○	○

QUESTION TWO	1	2	3	4
2A biodiversity	○	○	○	○
2B pollution	○	○	○	○
2C global warming	○	○	○	○
2D deforestation	○	○	○	○

QUESTION THREE	1	2	3	4
3A genes	○	○	○	○
3B gametes	○	○	○	○
3C characteristics	○	○	○	○
3D nucleus	○	○	○	○

QUESTION FOUR	1	2	3	4
4A spiral wrack	○	○	○	○
4B bladder wrack	○	○	○	○
4C serrated wrack	○	○	○	○
4D kelp	○	○	○	○

QUESTION FIVE	1	2	3	4
5A sexual reproduction	○	○	○	○
5B tissue culture	○	○	○	○
5C embryo transplants	○	○	○	○
5D adult cell cloning	○	○	○	○

QUESTION SIX	1	2	3	4
6A	○	○	○	○
6B	○	○	○	○
6C	○	○	○	○
6D	○	○	○	○

QUESTION SEVEN	1	2	3	4
7A	○	○	○	○
7B	○	○	○	○
7C	○	○	○	○
7D	○	○	○	○

QUESTION EIGHT	1	2	3	4
8A	○	○	○	○
8B	○	○	○	○
8C	○	○	○	○
8D	○	○	○	○

QUESTION NINE	1	2	3	4
9A	○	○	○	○
9B	○	○	○	○
9C	○	○	○	○
9D	○	○	○	○

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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

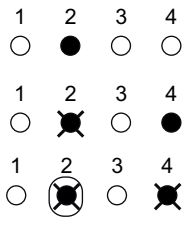
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

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**.

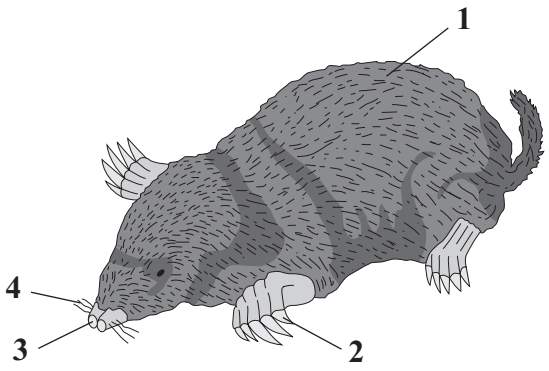
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

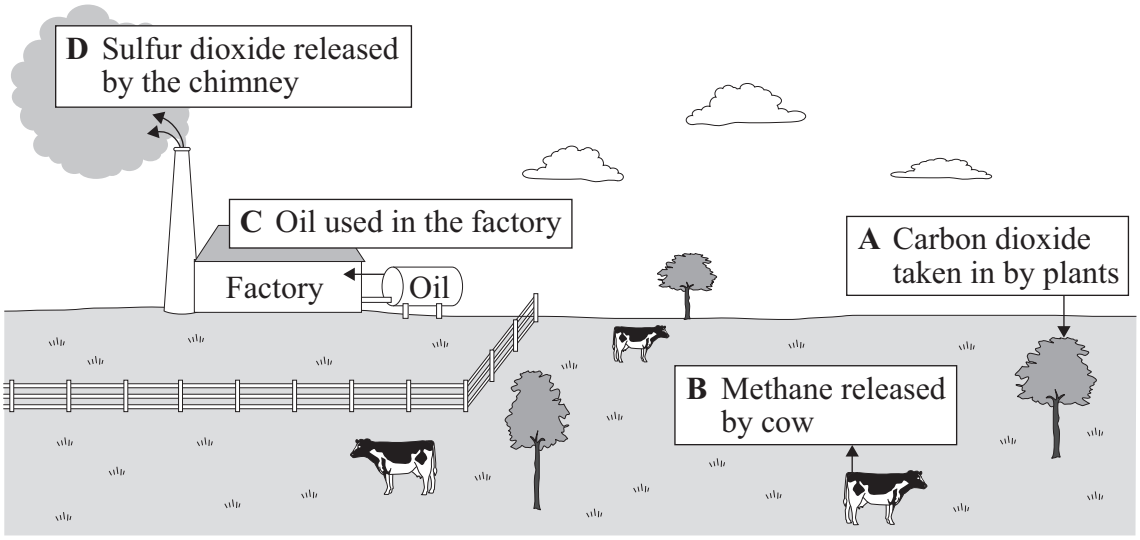
D helps the mole to sense the size of the tunnel

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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

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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** . . . .

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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

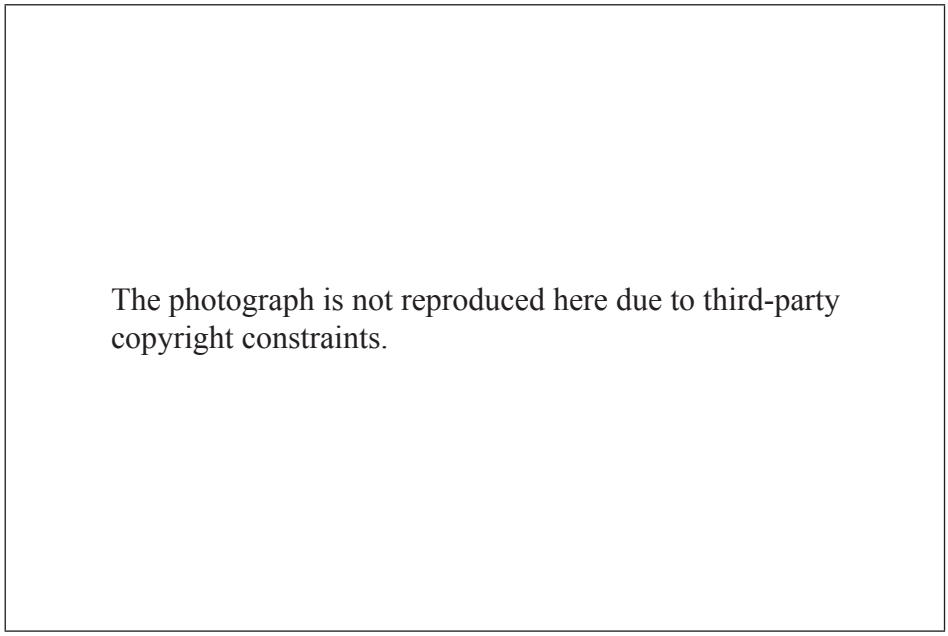
1	the theory that all living species developed from simple life forms over billions of years
2	genes being passed on from one generation to the next
3	a species dying out
4	organisms that are most suited to their environment survive to breed

Turn over for the next question

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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

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Turn over for the next question

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SECTION TWO

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

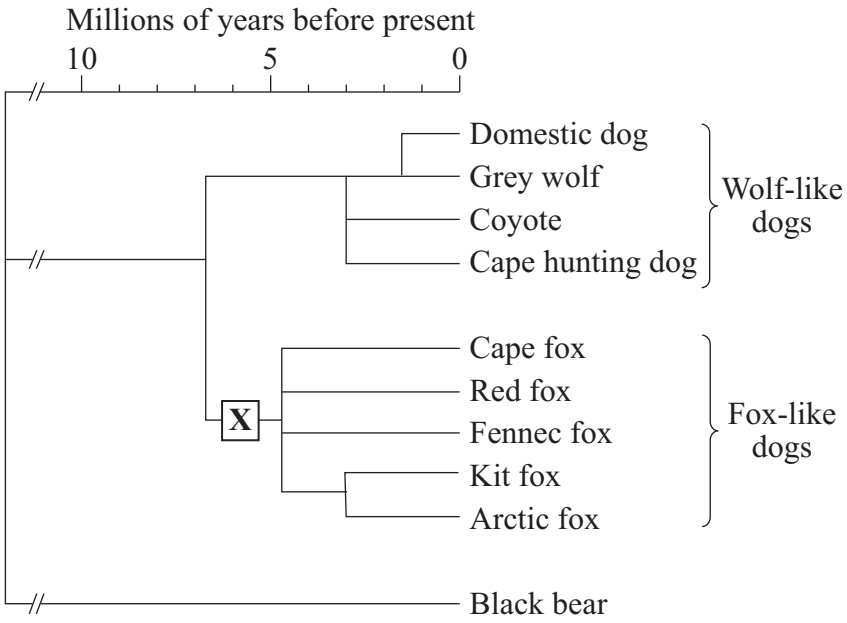
Each of these questions has four parts.

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

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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

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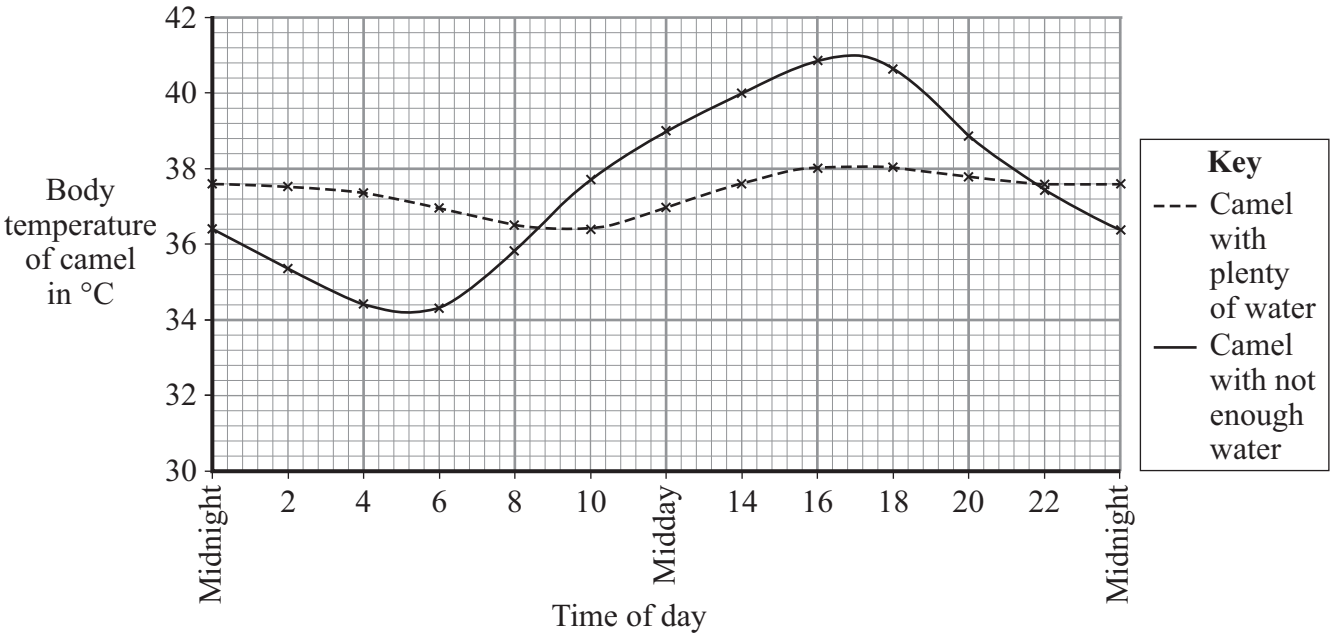
QUESTION SEVEN

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

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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.

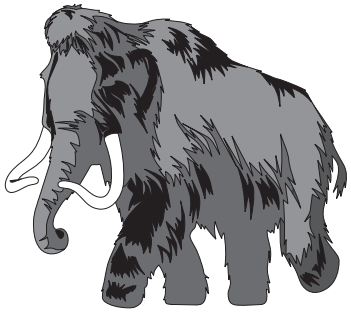
4 the Sun could not get to the hydrated camel as easily as to the dehydrated camel.

Turn over for the next question

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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?

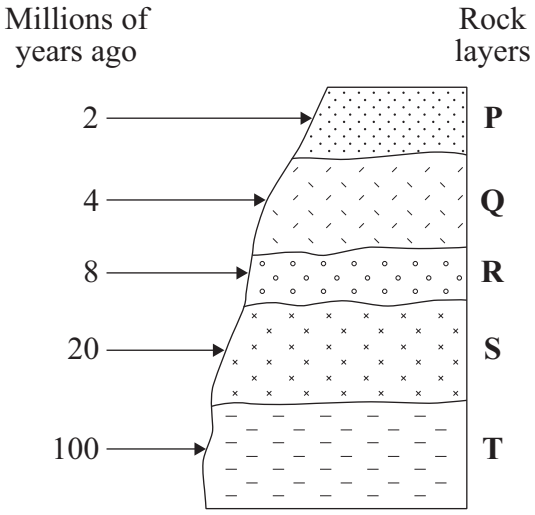
1 continents moving apart

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.



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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

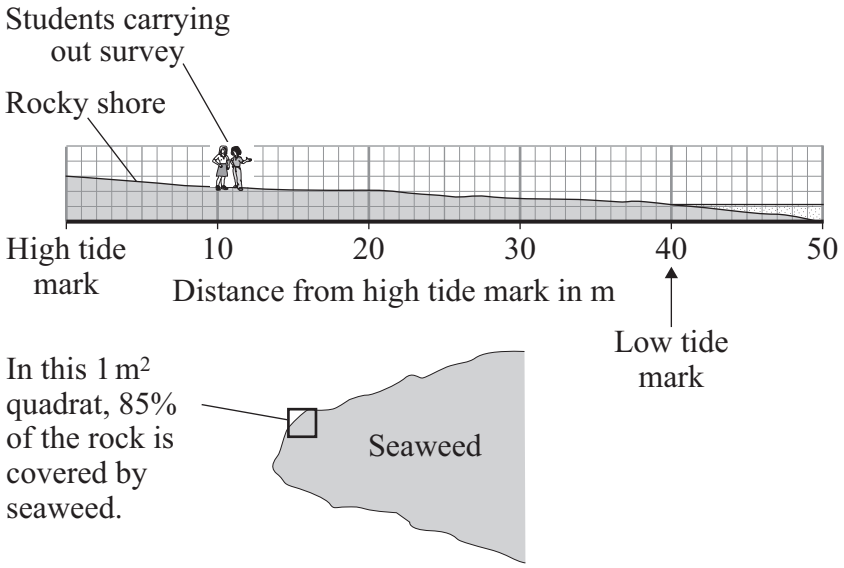
3 adult cell cloning

4 taking cuttings

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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

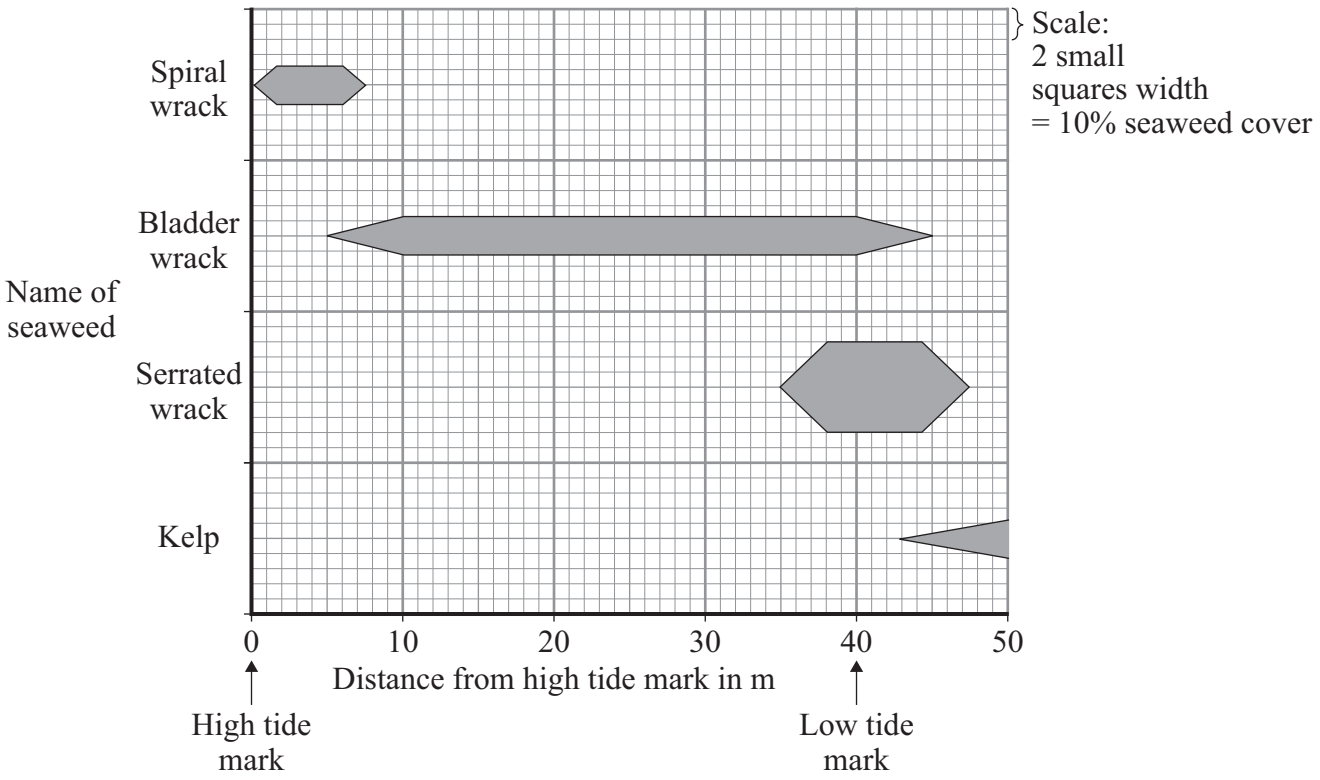
2 sampling every 1 metre from the low tide mark to the high tide mark

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

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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

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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**.

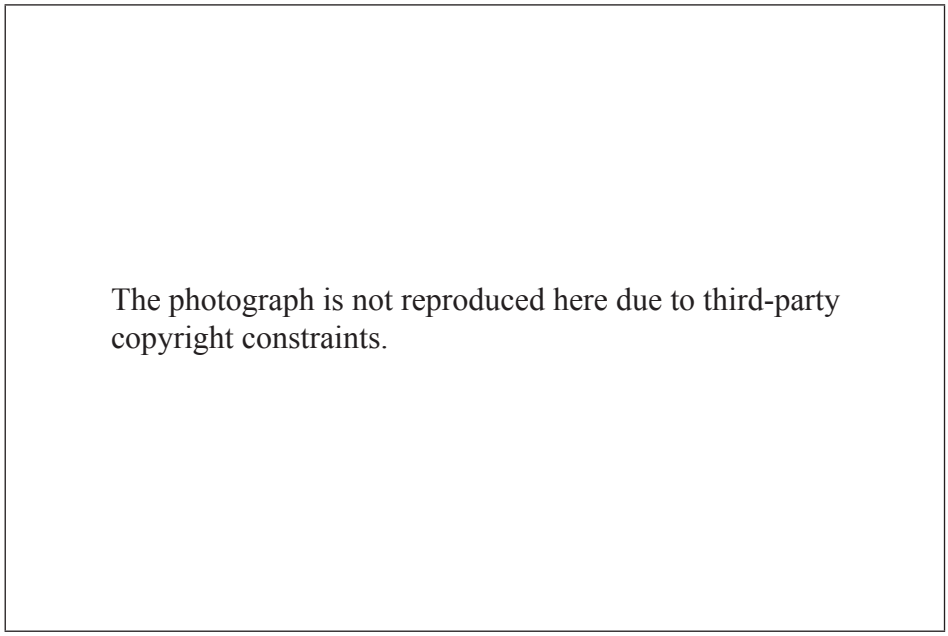
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

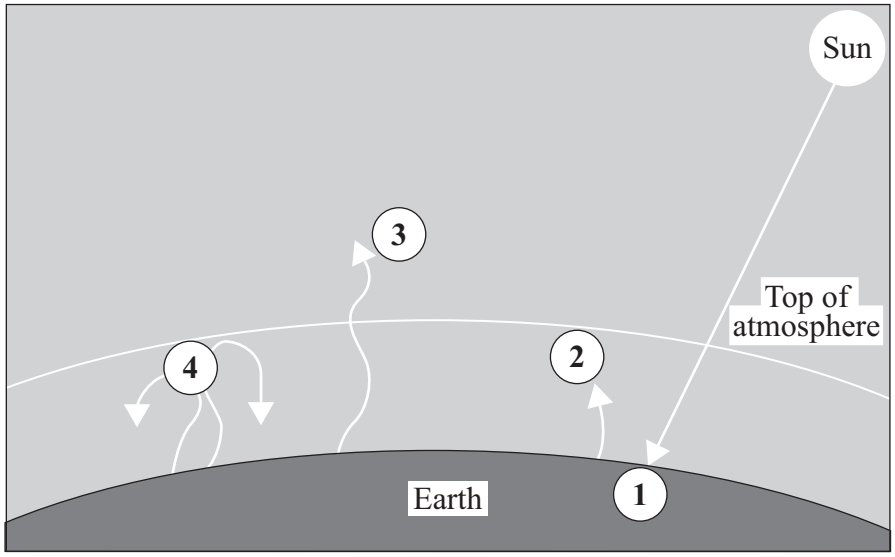
D produces large numbers of seeds

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

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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

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SECTION TWO

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

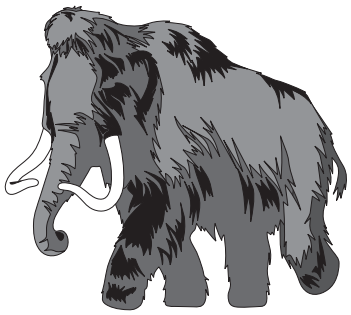
Each of these questions has four parts.

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?

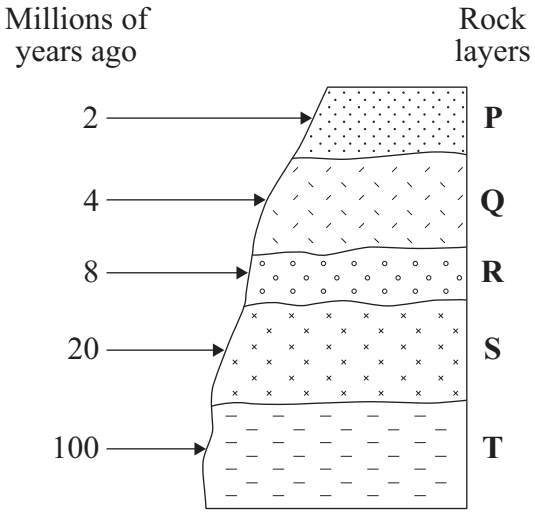
1 continents moving apart

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The times when these rocks were formed are shown.



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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.

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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.

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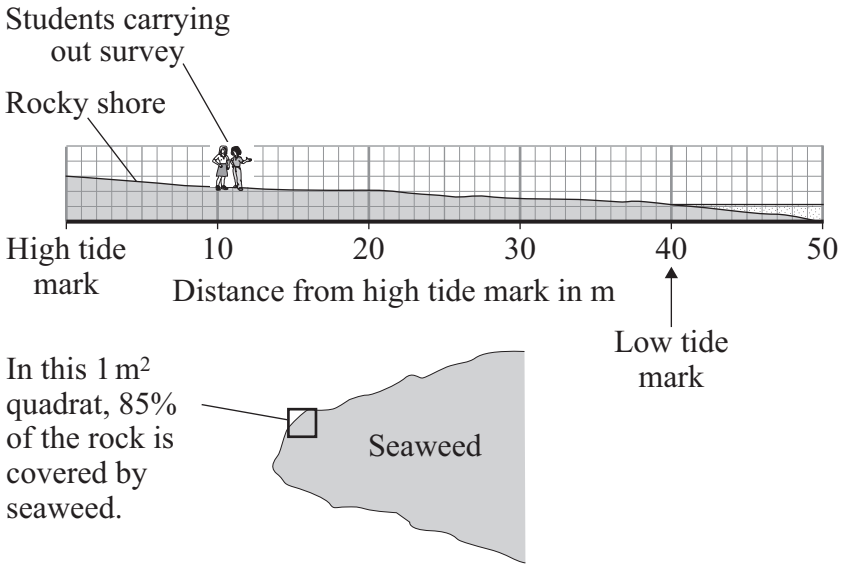
3 adult cell cloning

4 taking cuttings

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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?

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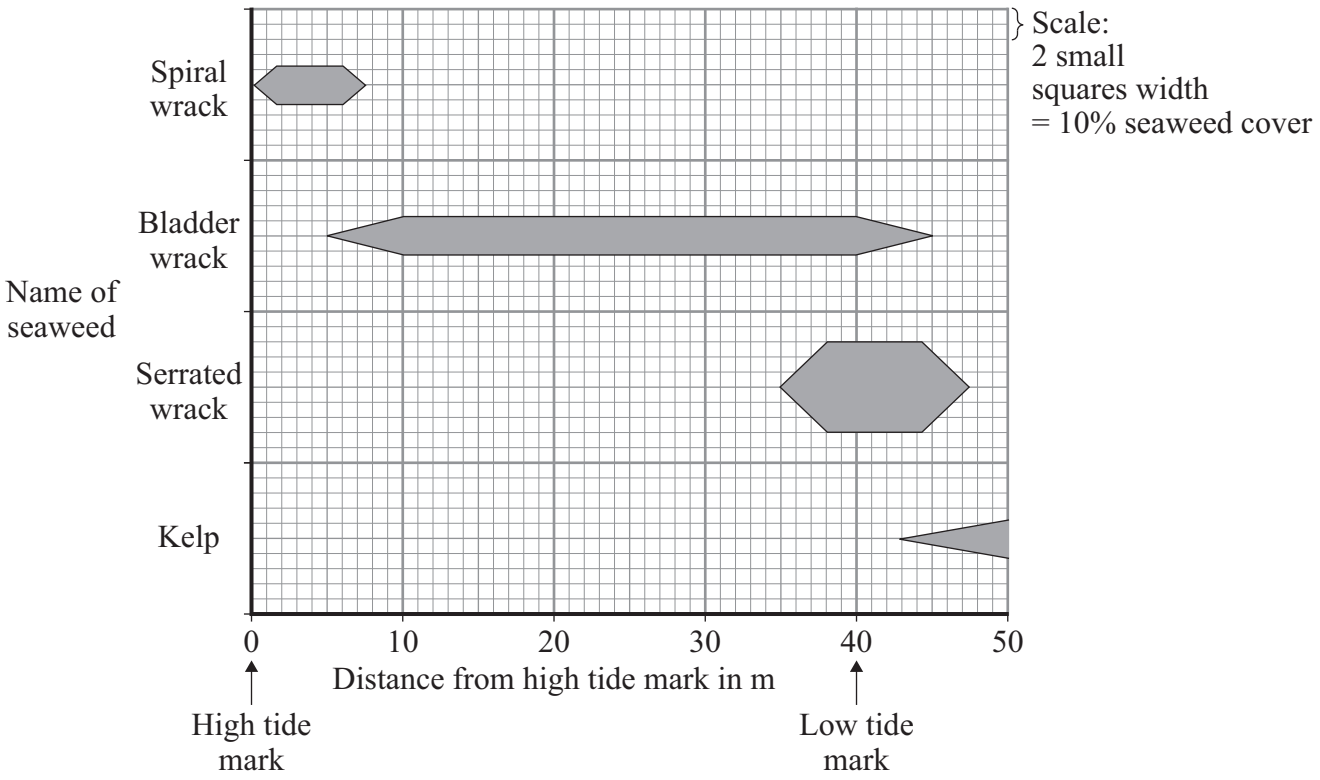
2 sampling every 1 metre from the low tide mark to the high tide mark

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

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

1 Spiral wrack

2 Bladder wrack

3 Serrated wrack

4 Kelp

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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

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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

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QUESTION SIX

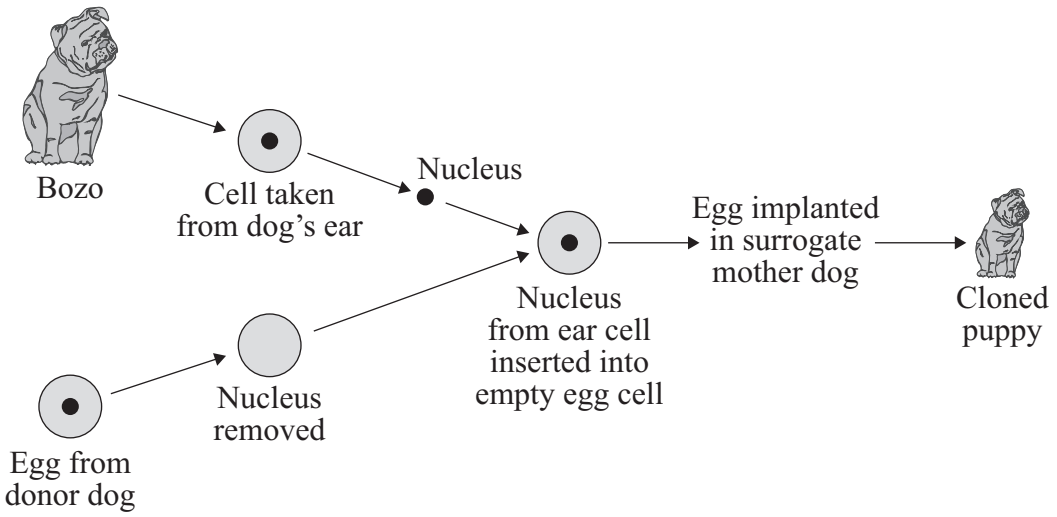
Woman gets 5 cloned puppies of her pet dog

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.

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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.

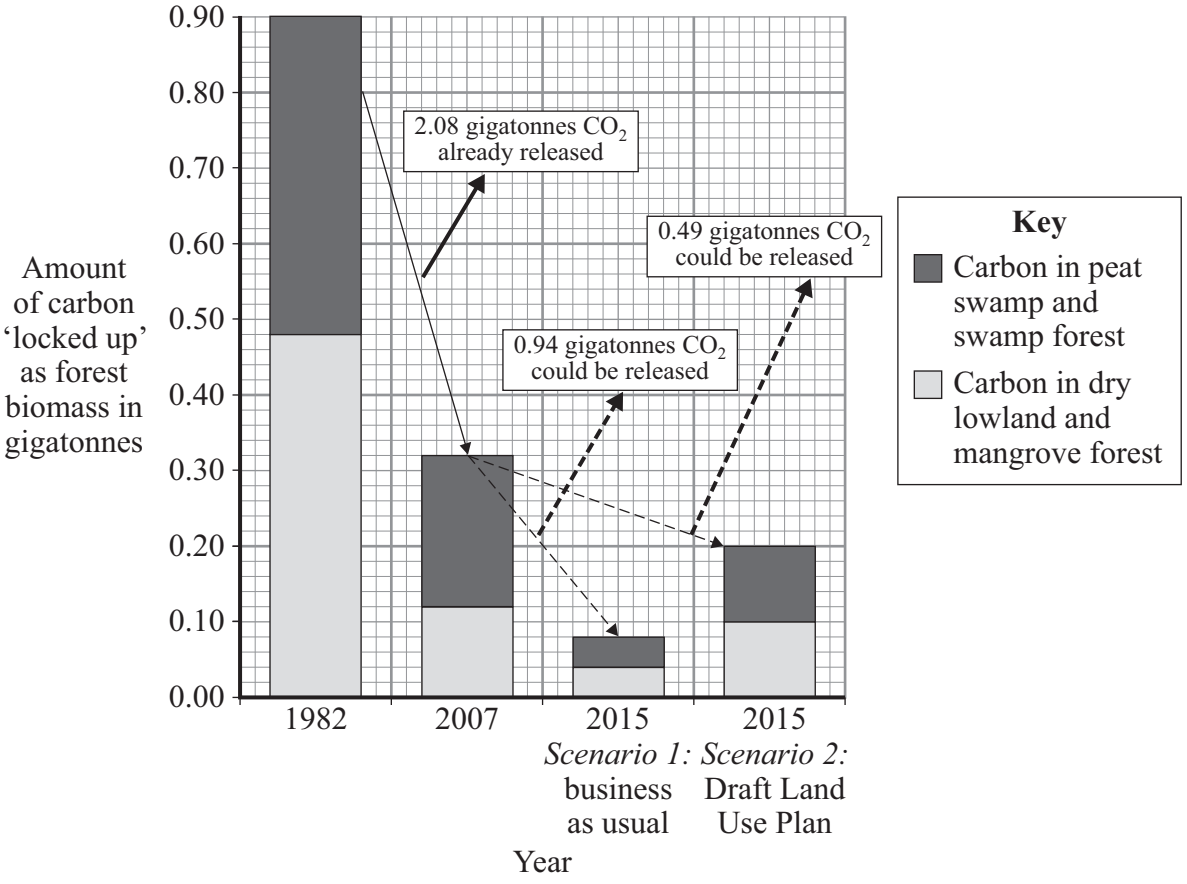
Turn over for the next question

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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

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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.

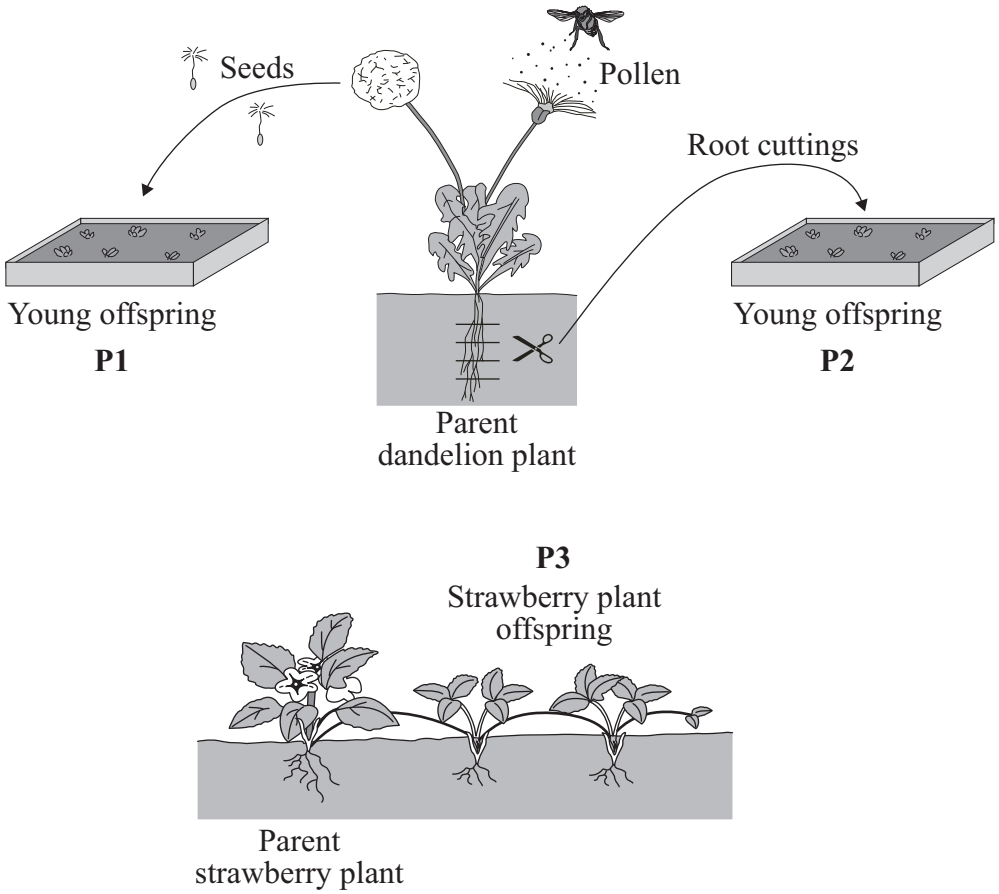
4 sustainable development.

Turn over for the next question

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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**

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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.

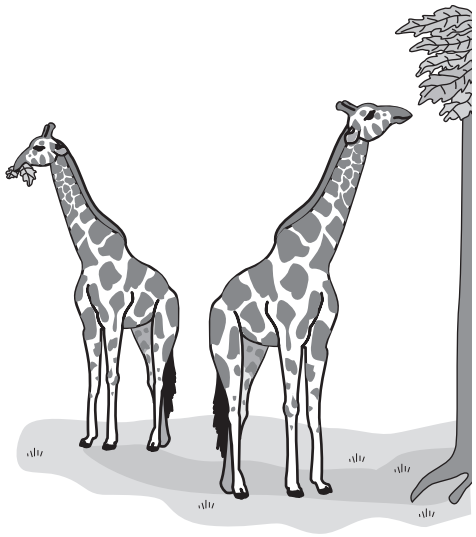
Turn over for the next question

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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.

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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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There are no questions printed on this page

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Version 1:0: 21/11/09

ASSESSMENT and QUALIFICATIONS ALLIANCE

GCSE

Science A (4461)

Specification A

BLY1BP, BL1BSF & BL1BSH

Mark Scheme

2009 Examination – November Series

The blank answer sheet for this component can be found at the end of this document.

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This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

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GCSE
SCIENCE A (4461)/BIOLOGY (4411)
Objective Test Answer Key
BLY1BP (Evolution and Environment)
November 2009
Foundation Tier

Question	Key		
One	**A**	helps the mole to detect its prey in the burrow	**3**
	B	helps the mole to dig through the soil	**2**
	C	helps to stop the mole from losing heat	**1**
	D	helps the mole to sense the size of the tunnel	**4**
Two	**A**	Carbon dioxide taken in by plants	**3**
	B	Methane released by cow	**1**
	C	Oil used in the factory	**4**
	D	Sulfur dioxide released by the chimney	**2**
Three	**A**	clones	**3**
	B	cuttings	**4**
	C	gametes	**1**
	D	variations	**2**
Four	**A**	evolution	**1**
	B	extinction	**3**
	C	natural selection	**4**
	D	reproduction	**2**
Five	**A**	has needle-shaped leaves	**3**
	B	has a shallow root system spread over a wide area	**4**
	C	stores water in bulbs on its roots	**2**
	D	produces large numbers of seeds	**1**

	A	B	C	D
Six	**1**	**2**	**1**	**3**
Seven	**4**	**4**	**2**	**2**
Eight	**4**	**4**	**2**	**3**
Nine	**2**	**2**	**2**	**1**

GCSE
SCIENCE A (4461)/BIOLOGY (4411)
Objective Test Answer Key
BLY1BP (Evolution and Environment)
November 2009
Higher Tier

Question	Key		
One	**A**	has needle-shaped leaves	**3**
	B	has a shallow root system spread over a wide area	**4**
	C	stores water in bulbs on its roots	**2**
	D	produces large numbers of seeds	**1**
Two	**A**	Some heat energy escapes into space.	**3**
	B	Heat energy is re-radiated by greenhouse gases.	**4**
	C	Heat energy is radiated into the atmosphere.	**2**
	D	Solar radiation warms the Earth's surface.	**1**

	A	**B**	**C**	**D**
Three	**4**	**4**	**2**	**3**
Four	**2**	**2**	**2**	**1**
Five	**3**	**1**	**4**	**1**
Six	**3**	**1**	**2**	**2**
Seven	**2**	**3**	**3**	**4**
Eight	**3**	**2**	**3**	**4**
Nine	**2**	**1**	**2**	**2**

AQA

Unit : BLY1BP BIOLOGY UNIT 1B

Centre :

Candidate Number : **UCI :**

Candidate Name :

Series : BG09

19-NOV-09

For completion by the Examination Invigilator. **Please fill this circle if the candidate is absent:** ○

HIGHER TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

Questions **ONE** to **NINE** Choose one response **1 - 4** for each of the parts **A - D**

QUESTION ONE		1	2	3	4
1A	has needle-shaped leaves	○	○	○	○
1B	has a shallow root system spread over a wide area	○	○	○	○
1C	stores water in bulbs on its roots	○	○	○	○
1D	produces large numbers of seeds	○	○	○	○

QUESTION TWO		1	2	3	4
2A	Some heat energy escapes into space.	○	○	○	○
2B	Heat energy is re-radiated by greenhouse gases.	○	○	○	○
2C	Heat energy is radiated into the atmosphere.	○	○	○	○
2D	Solar radiation warms the Earth's surface.	○	○	○	○

QUESTION THREE	1	2	3	4
3A	○	○	○	○
3B	○	○	○	○
3C	○	○	○	○
3D	○	○	○	○

QUESTION FOUR	1	2	3	4
4A	○	○	○	○
4B	○	○	○	○
4C	○	○	○	○
4D	○	○	○	○

QUESTION FIVE	1	2	3	4
5A	○	○	○	○
5B	○	○	○	○
5C	○	○	○	○
5D	○	○	○	○

QUESTION SIX	1	2	3	4
6A	○	○	○	○
6B	○	○	○	○
6C	○	○	○	○
6D	○	○	○	○

QUESTION SEVEN	1	2	3	4
7A	○	○	○	○
7B	○	○	○	○
7C	○	○	○	○
7D	○	○	○	○

QUESTION EIGHT	1	2	3	4
8A	○	○	○	○
8B	○	○	○	○
8C	○	○	○	○
8D	○	○	○	○

QUESTION NINE	1	2	3	4
9A	○	○	○	○
9B	○	○	○	○
9C	○	○	○	○
9D	○	○	○	○

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FOUNDATION TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

Questions **ONE** to **NINE** Choose one response **1 - 4** for each of the parts **A - D**

QUESTION ONE	1	2	3	4
1A helps the mole to detect its prey in the burrow	○	○	○	○
1B helps the mole to dig through the soil	○	○	○	○
1C helps to stop the mole from losing heat	○	○	○	○
1D helps the mole to sense the size of the tunnel	○	○	○	○

QUESTION TWO	1	2	3	4
2A Carbon dioxide taken in by plants	○	○	○	○
2B Methane released by cow	○	○	○	○
2C Oil used in the factory	○	○	○	○
2D Sulfur dioxide released by the chimney	○	○	○	○

QUESTION THREE	1	2	3	4
3A clones	○	○	○	○
3B cuttings	○	○	○	○
3C gametes	○	○	○	○
3D variations	○	○	○	○

QUESTION FOUR	1	2	3	4
4A evolution	○	○	○	○
4B extinction	○	○	○	○
4C natural selection	○	○	○	○
4D reproduction	○	○	○	○

QUESTION FIVE	1	2	3	4
5A has needle-shaped leaves	○	○	○	○
5B has a shallow root system spread over a wide area	○	○	○	○
5C stores water in bulbs on its roots	○	○	○	○
5D produces large numbers of seeds	○	○	○	○

QUESTION SIX	1	2	3	4
6A	○	○	○	○
6B	○	○	○	○
6C	○	○	○	○
6D	○	○	○	○

QUESTION SEVEN	1	2	3	4
7A	○	○	○	○
7B	○	○	○	○
7C	○	○	○	○
7D	○	○	○	○

QUESTION EIGHT	1	2	3	4
8A	○	○	○	○
8B	○	○	○	○
8C	○	○	○	○
8D	○	○	○	○

QUESTION NINE	1	2	3	4
9A	○	○	○	○
9B	○	○	○	○
9C	○	○	○	○
9D	○	○	○	○

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Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature								

General Certificate of Secondary Education
June 2009

SCIENCE A **BLY1BP**
Unit Biology B1b (Evolution and Environment)

BIOLOGY
Unit Biology B1b (Evolution and Environment)

Monday 22 June 2009 Morning Session

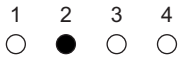
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

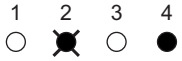
Time allowed: 30 minutes

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.

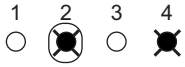
Instructions for recording answers
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- 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**.

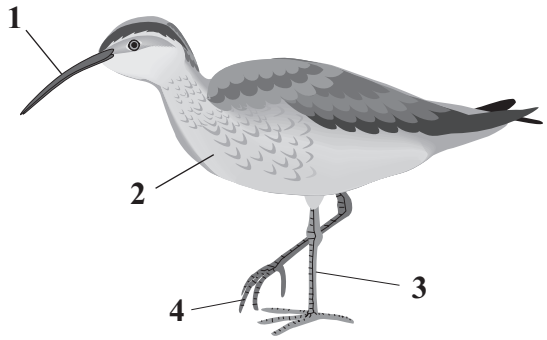
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

The picture shows a bird which lives on sandy beaches. It feeds on animals that burrow into the sand.



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

A wide, to stop the bird from sinking into the sand

B long, to reach animals buried deep in the sand

C long, to help the bird to see predators approaching

D thick, to provide an insulating layer

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QUESTION TWO

There are many ways in which we can help the environment.

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

A increasing the amount of glass and metal recycled

B increasing the amount of paper recycled

C improving insulation in homes

D extending the railway network

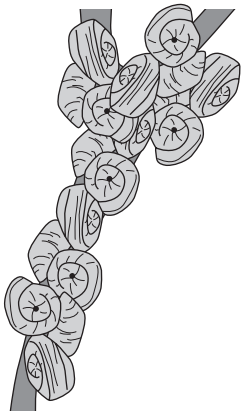
	Impact on the environment
1	fewer forests are cut down
2	fewer quarries are dug to provide raw materials
3	fewer car journeys are made
4	less electricity is used

Turn over for the next question

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QUESTION THREE

Banded snails live in woodland and grassland.



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

A evolution

B mutation

C selection

D variation

Banded snails have a wide range of different colours on their shells.

This wide range of colours is an example of . . . **1** . . . .

A change in a gene that gives a different colour is caused by . . . **2** . . . .

Birds only eat certain coloured snails. This is an example of . . . **3** . . . .

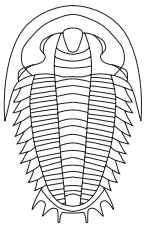
Over a long period of time, new species of snails develop. This is an example of . . . **4** . . . .

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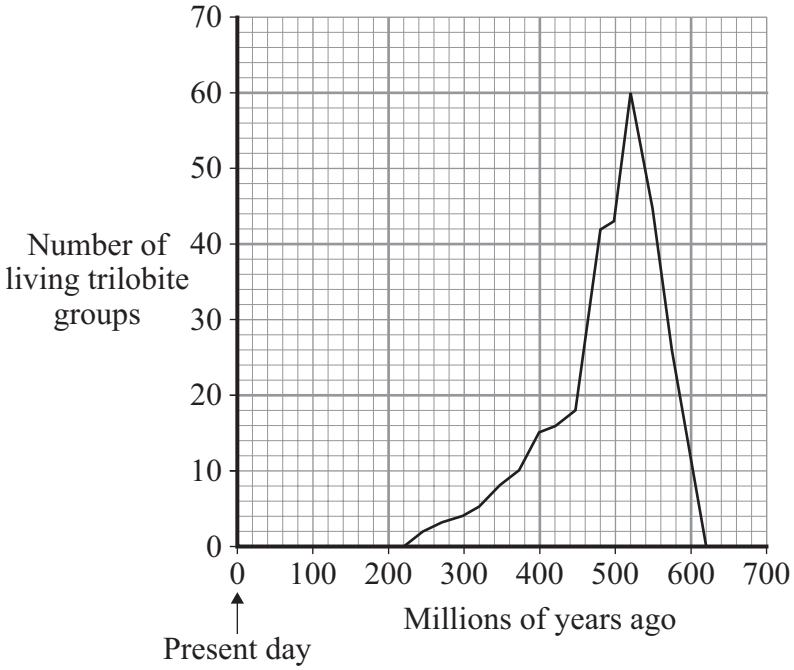
QUESTION FOUR

Trilobites are an extinct family of animals.

The drawing shows one species of trilobite.



The graph shows how the number of different groups of trilobites has changed over time.



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

A when trilobites first appeared on the Earth

B when trilobites had finally become extinct

C when there were most groups of trilobites

D the beginning of the largest scale extinction of trilobite groups.

	Millions of years ago
1	220
2	480
3	520
4	620

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QUESTION FIVE

There are several different methods of cloning animals and plants.

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

A adult cell cloning

B embryo transplants

C taking cuttings

D tissue culture

	Description of method of cloning
1	splitting apart cells from a developing animal and transplanting them into a host mother
2	placing a nucleus from a skin cell into an egg cell with no nucleus
3	using small groups of cells from part of a plant
4	producing many new plants from old plants quickly and cheaply

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Turn over for the next question

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SECTION TWO

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

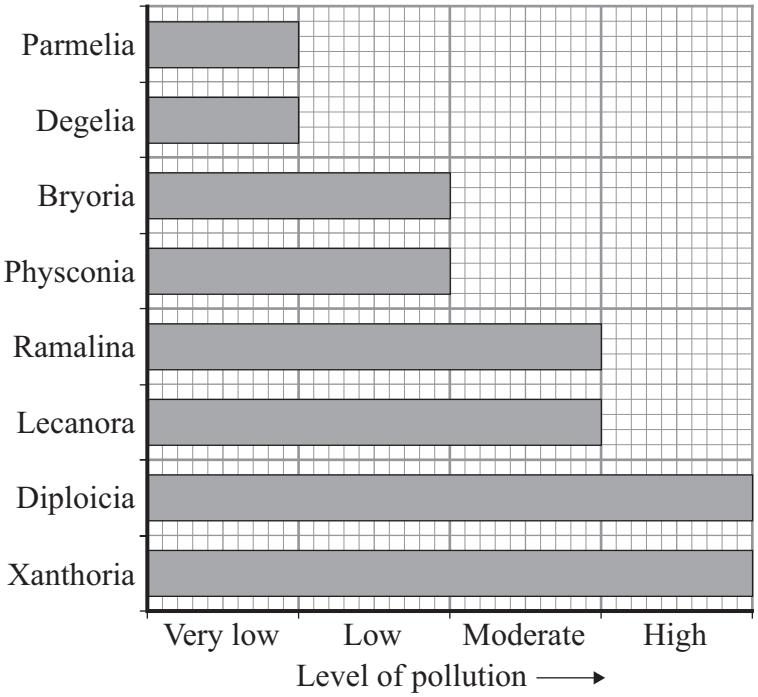
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION SIX

The chart shows how much pollution different lichens can tolerate.



6A Which of the following lichens is most sensitive to pollution?

1 Degelia

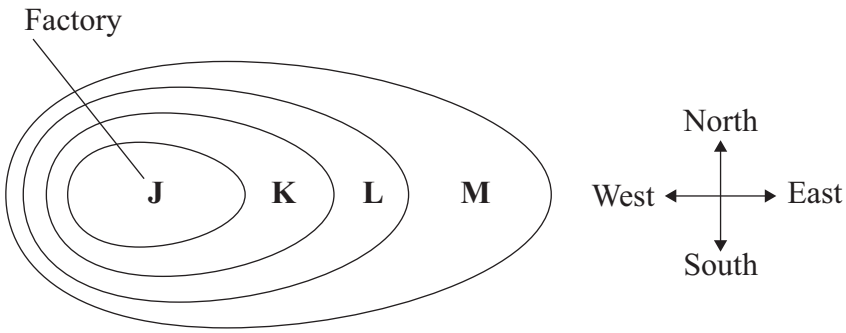
2 Diploicia

3 Physconia

4 Ramalina

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The diagram shows the distribution of lichens around a factory which burns coal.



6B In which direction does the wind blow the pollution?

1 towards the north

2 towards the east

3 towards the south

4 towards the west

6C Which row in the table shows a correct distribution of lichens?

	Lichen in area J	**Lichen in area K**	**Lichen in area L**	**Lichen in area M**
1	Xanthoria	Diploicia	Parmelia	Ramalina
2	Ramalina	Degelia	Bryoria	Physconia
3	Degelia	Bryoria	Lecanora	Xanthoria
4	Xanthoria	Lecanora	Bryoria	Parmelia

6D Lichens can be used to estimate levels of pollution from . . .

1 carbon dioxide.

2 methane.

3 pesticides.

4 sulfur dioxide.

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QUESTION SEVEN

Methane is a greenhouse gas.

7A The methane in the atmosphere is produced mainly by . . .

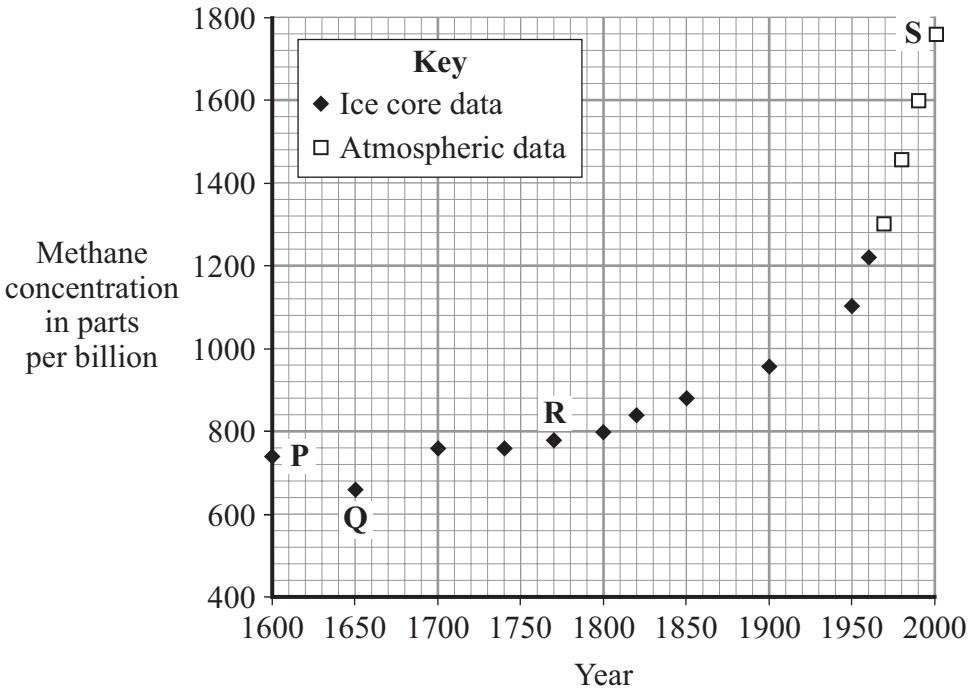
1 grass fields.

2 rice fields.

3 forests.

4 oceans.

The graph shows how the concentration of methane in the atmosphere changed between 1600 and 2000.



7B Which data point on the graph seems to be anomalous?

1 **P**

2 **Q**

3 **R**

4 **S**

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7C Between 1600 and 2000, the concentration of methane in the atmosphere . . .

1 rose then fell.

2 rose at a constant rate.

3 rose slowly at first, then more rapidly.

4 rose rapidly at first, then more slowly.

7D The data for the years before 1970 is from air bubbles trapped in the ice in Antarctica.

The most likely reason that scientists use this data is because . . .

1 before 1970, scientists did not measure atmospheric methane concentration.

2 global warming did not begin until 1970.

3 Antarctica has been polluted in recent years, so measurements are no longer reliable.

4 it is more difficult to measure small concentrations of methane than large concentrations.

Turn over for the next question

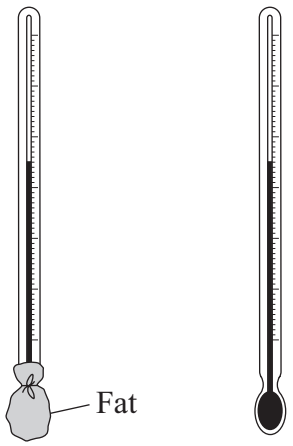
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QUESTION EIGHT

A student investigated fat as an insulator:

- he used two thermometers
- he wrapped fat around one thermometer
- the other thermometer had no fat wrapped around it
- he left both thermometers in a freezer set at –20 °C.

The drawing shows the two thermometers before being put in the freezer.



The table shows his results.

	Temperature before placing in freezer in °C	**Temperature after being in freezer in °C**
Thermometer with no fat	20	–20
Thermometer wrapped in fat	20	7

8A Which idea was the student testing in this investigation?

1 Animals that live in the Arctic are better insulated.

2 Fat reduces heat loss.

3 The thicker the layer of fat, the better the insulation.

4 Animals with fat can survive lower temperatures.

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8B The student wanted to calculate the rate of temperature change of the two thermometers.

To do this, he would also need to measure . . .

1 the temperature of the room.

2 the mass of the piece of fat.

3 the length of time that the thermometers were in the freezer.

4 the temperature of the freezer.

8C A scientist decided to investigate whether there was a link between where polar bears live and the thickness of their body fat.

To obtain reliable results, the scientist should survey . . .

1 polar bears of the same age.

2 polar bears and brown bears.

3 only polar bears living in the coldest temperatures.

4 polar bears at different times of the year.

8D Which one of the following would you expect the scientist to find in this survey?

1 There is no link between thickness of body fat and environmental temperature.

2 Lower environmental temperatures cause polar bears to put on weight.

3 The colder the environmental temperature, the thicker the layer of fat.

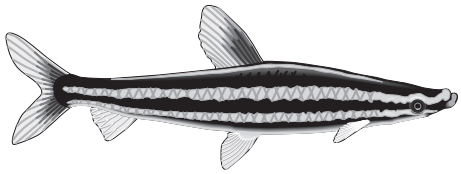
4 The warmer the environmental temperature, the thicker the layer of fat.

Turn over for the next question

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QUESTION NINE

Zebra fish are small freshwater fish that can tolerate a wide range of environmental conditions. Scientists want to use zebra fish as an indicator species for different types of water pollution.



9A Scientists have extracted 'glow' genes from a jellyfish and transferred them into the eggs of a zebra fish.

What term describes this process?

1 cloning

2 genetic engineering

3 tissue culture

4 embryo transplant

9B Genes from jellyfish are transferred into zebra fish eggs by . . .

1 using a small pair of sharp scissors.

2 using enzymes.

3 mixing the gametes of jellyfish and zebra fish.

4 taking cytoplasm from a jellyfish egg and placing it into a zebra fish egg.

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Zebra fish created by this process would glow with different colours, depending on the type of chemical pollution in the water. The table shows how this would work.

Colour	Type of chemical pollution			
	Pesticides	**Fertilisers**	**Acidity**	**Herbicides**
Red	✓			
Green			✓	
Yellow		✓		
Orange				✓

9C Zebra fish would glow green because of . . .

1 an increase in the sulfur dioxide content of the atmosphere.

2 a reduction in the carbon dioxide content of the atmosphere.

3 an increase in the methane content of the atmosphere.

4 an increase in the amount of chemicals used in agriculture.

9D In one river, different zebra fish glow red and orange.

This indicates that the river is polluted by . . .

1 chemicals released from industry.

2 smoke released from power stations.

3 chemicals washed off farmland.

4 sewage leaking from drains.

END OF TEST

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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

There are several different methods of cloning animals and plants.

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

A adult cell cloning

B embryo transplants

C taking cuttings

D tissue culture

	Description of method of cloning
1	splitting apart cells from a developing animal and transplanting them into a host mother
2	placing a nucleus from a skin cell into an egg cell with no nucleus
3	using small groups of cells from part of a plant
4	producing many new plants from old plants quickly and cheaply

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QUESTION TWO

There are several theories of how new species of plants and animals have developed.

The statements below outline four of these theories.

- Creationism: Each organism is made independently.
  Evolution does not occur.
  Gaps in the fossil record support this idea.
- Intelligent Design: Living things work in too complex a way for them to have evolved by chance.
  A higher being has designed all living things.
- Lamarckism: Changes occur during the lifetime of an individual.
  These changes can be passed on to offspring.
- Darwinism: Variation exists between members of a population.
  Only the organisms best suited to a habitat survive.
  Survivors pass on their advantages to their offspring.

Use the above information and your own knowledge and understanding to answer this question.

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

A Creationism

B Intelligent Design

C Lamarckism

D Darwinism

The idea that Manx cats, which have no tails, are the offspring of a cat which originally lost its tail in an accident could be used to support . . . **1** . . . .

Unsuccessful competitors die and so do not reproduce, is part of the theory of . . . **2** . . . .

The complicated way in which cells work can be used to support . . . **3** . . . .

The observation that fossils of all the different kinds of animals appear suddenly in the rocks, with no evidence of ancestors, supports . . . **4** . . . .

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SECTION TWO

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

Each of these questions has four parts.

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

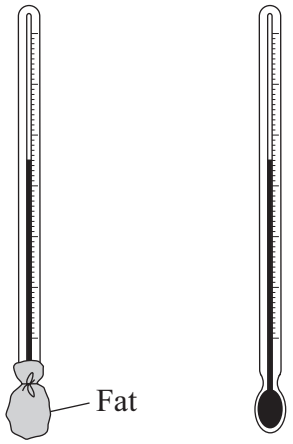
Mark your choices on the answer sheet.

QUESTION THREE

A student investigated fat as an insulator:

- he used two thermometers
- he wrapped fat around one thermometer
- the other thermometer had no fat wrapped around it
- he left both thermometers in a freezer set at –20 °C.

The drawing shows the two thermometers before being put in the freezer.



The table shows his results.

	Temperature before placing in freezer in °C	**Temperature after being in freezer in °C**
Thermometer with no fat	20	–20
Thermometer wrapped in fat	20	7

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3A Which idea was the student testing in this investigation?

1 Animals that live in the Arctic are better insulated.

2 Fat reduces heat loss.

3 The thicker the layer of fat, the better the insulation.

4 Animals with fat can survive lower temperatures.

3B The student wanted to calculate the rate of temperature change of the two thermometers.

To do this, he would also need to measure . . .

1 the temperature of the room.

2 the mass of the piece of fat.

3 the length of time that the thermometers were in the freezer.

4 the temperature of the freezer.

3C A scientist decided to investigate whether there was a link between where polar bears live and the thickness of their body fat.

To obtain reliable results, the scientist should survey . . .

1 polar bears of the same age.

2 polar bears and brown bears.

3 only polar bears living in the coldest temperatures.

4 polar bears at different times of the year.

3D Which one of the following would you expect the scientist to find in this survey?

1 There is no link between thickness of body fat and environmental temperature.

2 Lower environmental temperatures cause polar bears to put on weight.

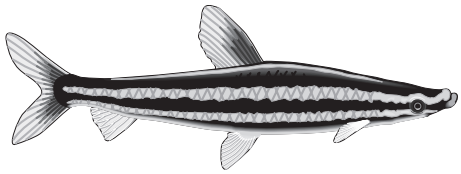
3 The colder the environmental temperature, the thicker the layer of fat.

4 The warmer the environmental temperature, the thicker the layer of fat.

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QUESTION FOUR

Zebra fish are small freshwater fish that can tolerate a wide range of environmental conditions. Scientists want to use zebra fish as an indicator species for different types of water pollution.



4A Scientists have extracted 'glow' genes from a jellyfish and transferred them into the eggs of a zebra fish.

What term describes this process?

1 cloning

2 genetic engineering

3 tissue culture

4 embryo transplant

4B Genes from jellyfish are transferred into zebra fish eggs by . . .

1 using a small pair of sharp scissors.

2 using enzymes.

3 mixing the gametes of jellyfish and zebra fish.

4 taking cytoplasm from a jellyfish egg and placing it into a zebra fish egg.

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Zebra fish created by this process would glow with different colours, depending on the type of chemical pollution in the water. The table shows how this would work.

Colour	Type of chemical pollution			
	Pesticides	**Fertilisers**	**Acidity**	**Herbicides**
Red	✓			
Green			✓	
Yellow		✓		
Orange				✓

4C Zebra fish would glow green because of . . .

1 an increase in the sulfur dioxide content of the atmosphere.

2 a reduction in the carbon dioxide content of the atmosphere.

3 an increase in the methane content of the atmosphere.

4 an increase in the amount of chemicals used in agriculture.

4D In one river, different zebra fish glow red and orange.

This indicates that the river is polluted by . . .

1 chemicals released from industry.

2 smoke released from power stations.

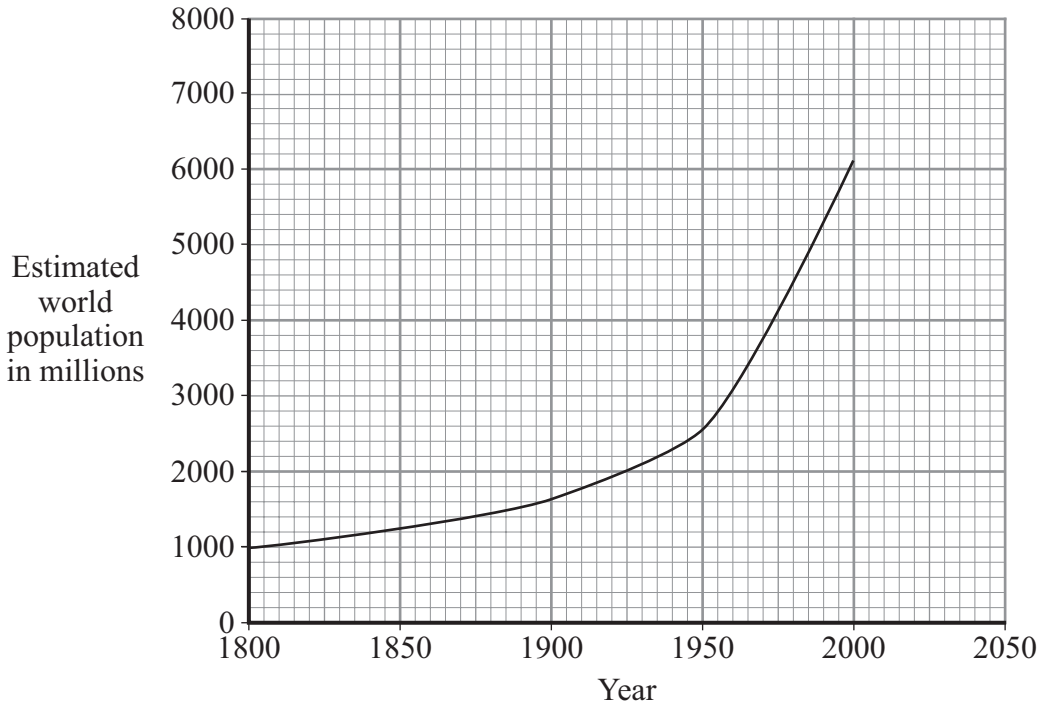
3 chemicals washed off farmland.

4 sewage leaking from drains.

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QUESTION FIVE

The graph shows changes in the estimated population of the world between 1800 and 2000.



5A During which time period was the growth in the human population most rapid?

1 1840 to 1880

2 1880 to 1920

3 1920 to 1960

4 1960 to 2000

5B One scientist suggested that if the population continued to increase at this rate, by 2025 it would be 8000 million.

This is an example of . . .

1 a conclusion.

2 a hypothesis.

3 a prediction.

4 evidence.

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5C As the human population increases, more food is required.

To improve crop production, farmers may use herbicides on their crops.

What are herbicides used for?

1 to kill insects

2 to improve the quality of the soil

3 to provide nutrients for the crop plants

4 to kill weeds

5D We need to provide enough food for the increasing population of the world without damaging the environment and compromising future generations.

This is an example of . . .

1 intensive farming.

2 organic farming.

3 sustainable development.

4 genetic engineering.

Turn over for the next question

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QUESTION SIX

Read the extract from a newspaper.

Huge chunks of polar ice shelf breaking up

A chunk of ice the size of the Isle of Man has started to break away from Antarctica in what scientists say is further evidence of a warming climate.

6A The British Antarctic Survey (BAS) monitors the Antarctic ice shelves.

In 1993, a scientist predicted that this area of the ice shelf would be lost within 30 years if global temperatures continued to rise. He now says that it is happening more quickly than he expected.

What is the most likely reason for his inaccurate prediction?

1 He was biased.

2 He did not have enough evidence.

3 He made many errors when recording his data.

4 He did not want to alarm the public.

6B Which row in the table correctly indicates the human activities that contribute to global warming?

	Burning fossil fuels	Deforestation	Increasing the number of cattle reared for food	Increased recycling of paper
1	✓		✓	✓
2	✓	✓	✓	
3		✓	✓	✓
4	✓	✓		✓

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6C What is the cause of global warming?

1 The Sun is getting hotter.

2 The hole in the ozone layer is letting more heat in.

3 Gases in the atmosphere absorb heat and radiate it back to Earth.

4 More heat is being released from power stations.

6D An increase in the Earth's temperature by only a few degrees will cause . . .

1 more volcanic eruptions.

2 more earthquakes.

3 more acid rain.

4 widespread flooding.

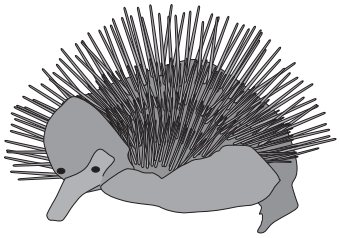
Turn over for the next question

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QUESTION SEVEN

The pictures show an echidna and a hedgehog.

Echidna



Hedgehog



Read the information about echidnas and hedgehogs.

- Echidnas and hedgehogs look similar, but they are unrelated species.
- Echidnas live in Australia; hedgehogs live in many countries, including Britain.
- Both echidnas and hedgehogs are covered with sharp spines.
- Echidnas lay eggs; hedgehogs give birth to live babies.
- There is no evidence that echidnas have ever lived in Britain.
- There is no evidence that hedgehogs have ever lived in Australia.

7A The information above indicates that echidnas and hedgehogs . . .

1 have a similar diet.

2 have a similar life expectancy.

3 evolved from the same ancestor.

4 evolved spines completely independently of each other.

7B The information above suggests that echidnas and hedgehogs . . .

1 are adapted to similar environments.

2 have spines of the same length.

3 are the same colour.

4 have bodies that allow them to curl up into a ball.

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7C The outer covering of echidnas and hedgehogs is an adaptation for . . .

1 attracting mates.

2 camouflage.

3 defence.

4 insulation.

7D The outer covering of the echidna and the hedgehog developed initially . . .

1 in response to changes in their environments.

2 as a result of being attacked by predators.

3 as a result of mutations.

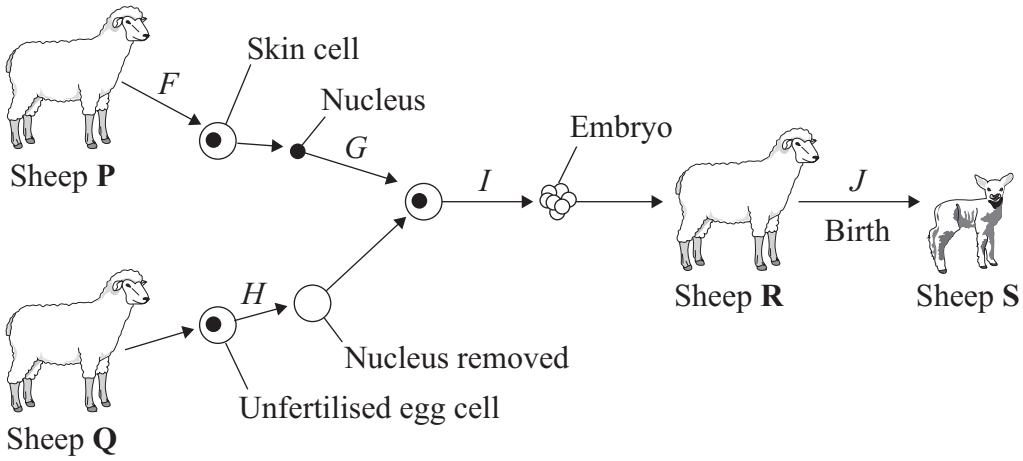
4 as a result of variation.

Turn over for the next question

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QUESTION EIGHT

The diagram shows one way of producing sheep with the characteristics we prefer.



8A During this process, an electric shock is used in . . .

1 stage *F* only.

2 stage *G* and stage *H* only.

3 stage *I* only.

4 stage *I* and stage *J* only.

8B This method of producing sheep involves . . .

1 asexual reproduction.

2 sexual reproduction.

3 taking cuttings.

4 tissue culture.

8C Which sheep are genetically identical?

1 **P** and **R**

2 **Q** and **S**

3 **P** and **S**

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

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8D This process is not carried out on humans because . . .

1 it is unethical to select the characteristics with which a human is born.

2 it is more expensive than treating women with hormones.

3 it would reduce the number of genes in the human population.

4 humans have more complicated genetic information than sheep.

Turn over for the next question

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QUESTION NINE

Organic foods have become popular in recent years. They are grown without the use of pesticides and artificial fertilisers. But a government report in 2007 showed that the production of some organic foods is more damaging to the environment than their non-organic equivalents. However, supporters of organic farming claim that it is better than non-organic farming in conserving biodiversity and is better for the soil.

9A Biodiversity is . . .

1 the ability of plants and animals to adapt to a wide variety of different environments.

2 the ability of two plants or animals to live alongside each other for their mutual benefit.

3 the existence of a wide variety of plants and animals.

4 the existence of two different environmental adaptations of the same species of plant.

The table compares some of the effects of non-organic and organic food production on the environment.

Environmental effect and units	Amount in kg of production on farm					
	Sheep meat		Chicken		Milk	
	Non-organic	Organic	Non-organic	Organic	Non-organic	Organic
Energy used in MJ	23	18	12	16	2.5	1.6
Global warming potential in grams of CO_2 equivalent	17 400	10 100	4750	6680	1060	1230
Freshwater pollution by fertiliser potential in grams of phosphate equivalent	200	584	49	86	6.3	10.3
Acidification potential in grams of sulfur dioxide equivalent	380	1510	173	264	16.2	26.4
Land use in hectares	0.0014	0.003	0.64	1.4	0.001	0.002

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9B The information in the table indicates that . . .

1 all organic food production uses more energy than non-organic farming methods.

2 changing completely to organic methods will at least double the amount of land used for food production.

3 organic food production improves the environment.

4 organic farming reduces the amount of pollution resulting from sulfur dioxide.

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9C A change from non-organic farming methods to the organic production of chicken and milk may . . .

1 contribute to an increase in acid rain.

2 help to reduce pollution of freshwater.

3 help to reduce global warming.

4 reduce the amount of energy consumed in the production of the food.

9D Which of the foods in the table is responsible for the greatest increase in environmental pollution when it is produced organically rather than non-organically?

1 sheep meat

2 chicken

3 milk

4 it is impossible to tell from this data

END OF TEST

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There are no questions printed on this page

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Question 9A – Data from report on "Determining the environmental burdens and resource use in the production of agricultural and historical commodities" by Cranfield University on behalf of DEFRA.

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Version 1:0: 21/07/09

ASSESSMENT and QUALIFICATIONS ALLIANCE

GCSE

Science A (4461)

Specification A

BLY1BP, BL1BSF & BL1BSH

Mark Scheme

2009 Examination – June Series

The blank answer sheet for this component can be found at the end of this document.

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This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

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GCSE

SCIENCE A (4461)/BIOLOGY (4411)

Objective Test Answer Key

BLY1BP (Evolution and Environment)

June 2009

Foundation Tier

Question	Key	
One	**A** wide, to stop the bird sinking into the sand	**4**
	B long, to reach animals buried deep in the sand	**1**
	C long, to help the bird to see predators approaching	**3**
	D thick, to provide an insulating layer	**2**
Two	**A** increasing the amount of glass and metal recycled	**2**
	B increasing the amount of paper recycled	**1**
	C improving insulation in homes	**4**
	D extending the railway network	**3**
Three	**A** evolution	**4**
	B mutation	**2**
	C selection	**3**
	D variation	**1**
Four	**A** when trilobites first appeared on the Earth	**4**
	B when trilobites had finally become extinct	**1**
	C when there were most groups of trilobites	**3**
	D the beginning of the largest scale extinction of trilobite groups	**2**
Five	**A** adult cell cloning	**2**
	B embryo transplants	**1**
	C taking cuttings	**4**
	D tissue culture	**3**

	A	B	C	D
Six	**1**	**2**	**4**	**4**
Seven	**2**	**2**	**3**	**1**
Eight	**2**	**3**	**1**	**3**
Nine	**2**	**2**	**1**	**3**

GCSE

SCIENCE A (4461)/BIOLOGY (4411)

Objective Test Answer Key

BLY1BP (Evolution and Environment)

June 2009

Higher Tier

Question	*Key*	
One	**A** adult cell cloning	**2**
	B embryo transplants	**1**
	C taking cuttings	**4**
	D tissue culture	**3**
Two	**A** Creationism	**4**
	B Intelligent Design	**3**
	C Lamarckism	**1**
	D Darwinism	**2**

	A	**B**	**C**	**D**
Three	**2**	**3**	**1**	**3**
Four	**2**	**2**	**1**	**3**
Five	**4**	**3**	**4**	**3**
Six	**2**	**2**	**3**	**4**
Seven	**4**	**1**	**3**	**3**
Eight	**3**	**1**	**3**	**1**
Nine	**3**	**2**	**1**	*

* This question has been removed

AQA

Unit : BLY1BP BIOLOGY UNIT 1B

Centre :

Candidate Number : **UCI :**

Candidate Name :

Series : 6M09

22-JUN-09

For completion by the Examination Invigilator. **Please fill this circle if the candidate is absent:** ○

HIGHER TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

Questions **ONE** to **NINE** Choose one response **1 - 4** for each of the parts **A - D**

QUESTION ONE

		1	2	3	4
1A	adult cell cloning	○	○	○	○
1B	embryo transplants	○	○	○	○
1C	taking cuttings	○	○	○	○
1D	tissue culture	○	○	○	○

QUESTION TWO

		1	2	3	4
2A	Creationism	○	○	○	○
2B	Intelligent Design	○	○	○	○
2C	Lamarckism	○	○	○	○
2D	Darwinism	○	○	○	○

QUESTION THREE

	1	2	3	4
3A	○	○	○	○
3B	○	○	○	○
3C	○	○	○	○
3D	○	○	○	○

QUESTION FOUR

	1	2	3	4
4A	○	○	○	○
4B	○	○	○	○
4C	○	○	○	○
4D	○	○	○	○

QUESTION FIVE

	1	2	3	4
5A	○	○	○	○
5B	○	○	○	○
5C	○	○	○	○
5D	○	○	○	○

QUESTION SIX

	1	2	3	4
6A	○	○	○	○
6B	○	○	○	○
6C	○	○	○	○
6D	○	○	○	○

QUESTION SEVEN

	1	2	3	4
7A	○	○	○	○
7B	○	○	○	○
7C	○	○	○	○
7D	○	○	○	○

QUESTION EIGHT

	1	2	3	4
8A	○	○	○	○
8B	○	○	○	○
8C	○	○	○	○
8D	○	○	○	○

QUESTION NINE

	1	2	3	4
9A	○	○	○	○
9B	○	○	○	○
9C	○	○	○	○
9D	○	○	○	○

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FOUNDATION TIER

Instructions on how to complete this answer sheet are given on the question paper. Please make sure you follow them carefully.

Questions **ONE** to **NINE** Choose one response **1 - 4** for each of the parts **A - D**

QUESTION ONE

		1	2	3	4
1A	wide, to stop the bird from sinking into the sand				
1B	long, to reach animals buried deep in the sand				
1C	long, to help the bird to see predators approaching				
1D	thick, to provide an insulating layer				

QUESTION TWO

		1	2	3	4
2A	increasing the amount of glass and metal recycled				
2B	increasing the amount of paper recycled				
2C	improving insulation in homes				
2D	extending the railway network				

QUESTION THREE

		1	2	3	4
3A	evolution				
3B	mutation				
3C	selection				
3D	variation				

QUESTION FOUR

		1	2	3	4
4A	when trilobites first appeared on the Earth				
4B	when trilobites had finally become extinct				
4C	when there were most groups of trilobites				
4D	the beginning of the largest scale extinction...				

QUESTION FIVE

		1	2	3	4
5A	adult cell cloning				
5B	embryo transplants				
5C	taking cuttings				
5D	tissue culture				

QUESTION SIX

	1	2	3	4
6A				
6B				
6C				
6D				

QUESTION SEVEN

	1	2	3	4
7A				
7B				
7C				
7D				

QUESTION EIGHT

	1	2	3	4
8A				
8B				
8C				
8D				

QUESTION NINE

	1	2	3	4
9A				
9B				
9C				
9D				

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Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature								

General Certificate of Secondary Education
March 2009

SCIENCE A **BLY1BP**
Unit Biology B1b (Evolution and Environment)

BIOLOGY
Unit Biology B1b (Evolution and Environment)

Wednesday 4 March 2009 Morning Session

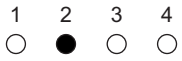
For this paper you must have:
- a black ball-point pen
- an objective test answer sheet.

You may use a calculator.

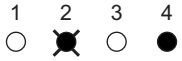
Time allowed: 30 minutes

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.

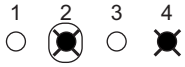
Instructions for recording answers
- Use a **black ball-point pen**.
- For each answer **completely fill in the circle** as shown:



- 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.

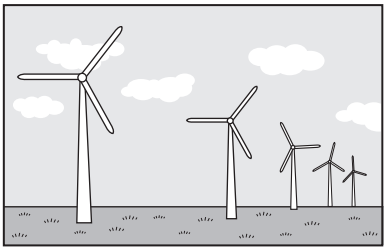
QUESTION ONE

We need to look after the Earth for future generations. Diagrams **1–4** show some ways of doing this.

Glass is made from raw materials from the Earth



1



2

Please switch off the lights when you leave the room

3



4

Match statements, **A**, **B**, **C** and **D**, with diagrams **1–4**.

A conserves forests

B uses a renewable energy source

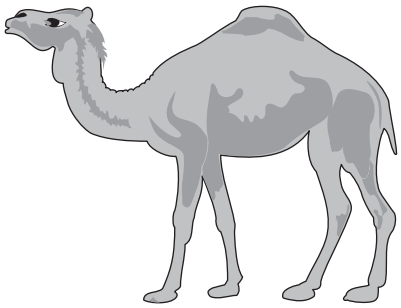
C reduces quarrying

D saves electrical energy

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QUESTION TWO

Camels are adapted for living in hot, dry conditions.



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

A The camel's stomach can hold 200 litres of water.

B The camel produces little urine and does not sweat.

C Camels store fat in a hump.

D Camels can withstand an increase in body temperature of 9 °C without harm.

1	Camels lose very little water each day.
2	It is unlikely for a camel to die from being overheated.
3	Camels can go without drinking water for several days.
4	Camels can go without food for several days.

Turn over for the next question

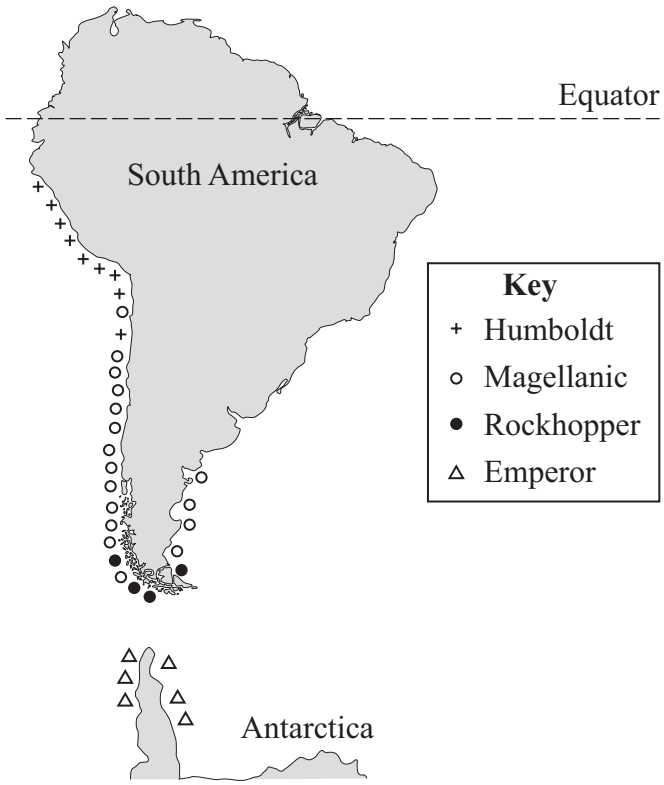
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QUESTION THREE

The table shows information about four species of penguin.

	Species of penguin			
	Humboldt	**Rockhopper**	**Emperor**	**Magellanic**
Average height in cm	65	55	120	70
Average mass in kg	4	2.5	35	5

The map shows the distribution of penguins in South America and part of Antarctica.



Match the species of penguin, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table below.

A Humboldt penguin

B Magellanic penguin

C Rockhopper penguin

D Emperor penguin

1	the tallest penguin
2	the penguin that lives nearest to the equator
3	the penguin with the largest range of habitats
4	the penguin with the lowest average mass compared with its height

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QUESTION FOUR

Insulin is a drug needed by some people suffering from diabetes.

Bacteria can be genetically engineered to produce insulin.

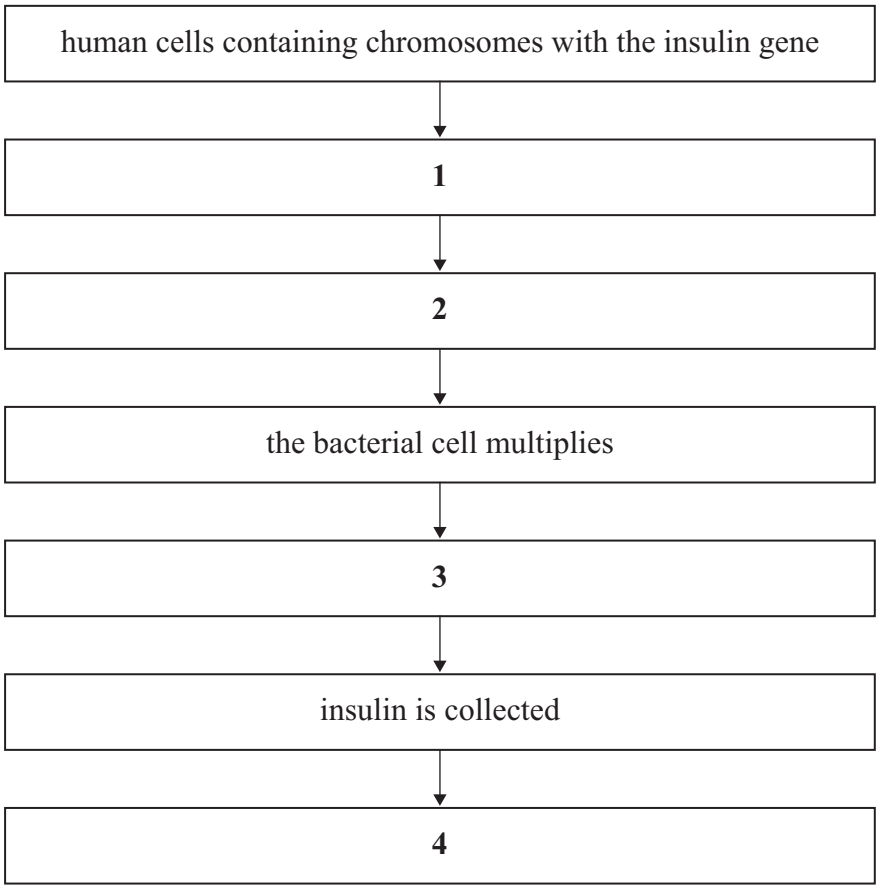
Match statements, **A**, **B**, **C** and **D**, with the labels **1–4** on the flow chart.

A insulin is produced by genetically engineered bacteria

B diabetics inject insulin to control diabetes

C the insulin gene is 'cut out' using enzymes

D the insulin gene is transferred into a bacterium

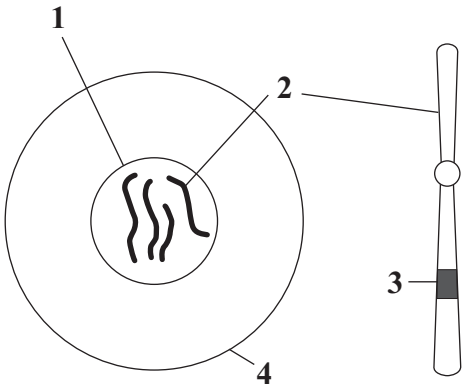


Turn over for the next question

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QUESTION FIVE

The diagram shows a human egg.



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

A cell

B nucleus

C chromosome

D gene

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Turn over for the next question

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SECTION TWO

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

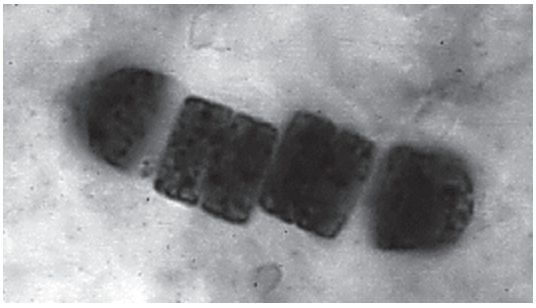
Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION SIX

The photograph shows a fossil which was formed 3 billion years ago.



J.W. Schopf, University of California, *www.ucmp.berkeley.edu*

6A There were probably other types of organism in the area when this fossil was being formed.

Why did these other organisms **not** become fossils?

1 They could move very quickly.

2 They had soft bodies.

3 They evolved.

4 They became extinct.

6B Only a few rocks contain fossils that are more than 3 billion years old.

This is because . . .

1 many fossils have been destroyed.

2 fossils only last for 3 billion years.

3 most of the Earth's rocks are under the oceans.

4 the Earth was created 3 billion years ago.

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6C The species that formed this fossil could have died out because . . .

1 it had no method of reproduction.

2 it was crushed by rocks.

3 its ancestors had not become fossils.

4 its environment changed.

6D The theory of evolution states that all living things . . .

1 have evolved from simple life forms.

2 will become extinct.

3 are genetically different.

4 evolved from apes.

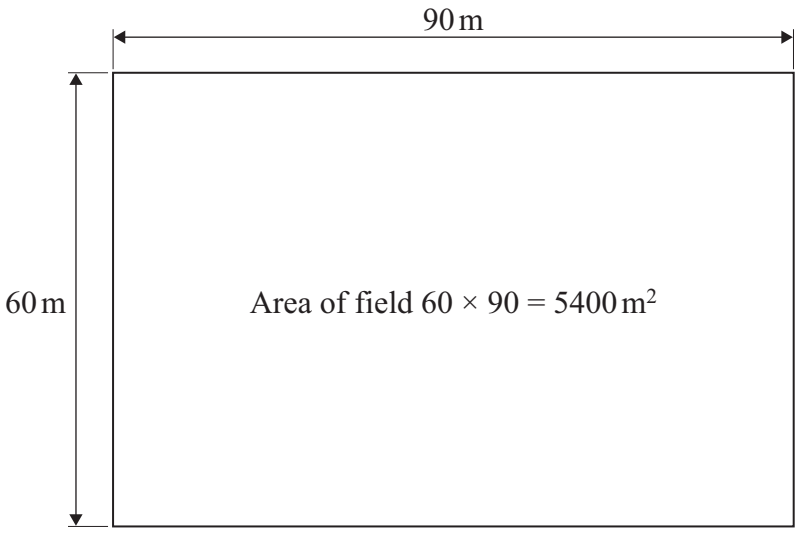
Turn over for the next question

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QUESTION SEVEN

A class of students was set the task of estimating the number of dandelions on the school field.
To do this, they decided to use sampling squares called quadrats.
Each quadrat had an area of 1 m^2.

The diagram shows the dimensions of the school field.



7A They wanted to make their investigation as fair as possible.

Which would be the best way to sample the field?

1 throw all the quadrats near the middle of the field

2 throw the quadrats where there were lots of dandelions to count

3 throw the quadrats randomly around the field

4 make sure all the quadrats had a similar number of dandelions in them

7B Each student collected data by throwing 10 quadrats.

Which would be the best way to improve the reliability of their estimate?

1 count all the dandelions on the field

2 use the results of the student with the highest estimate

3 work out an estimate using all the data collected by all the students

4 use smaller quadrats

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These are the results for one student, Mary.

Quadrat number	Number of dandelions
1	3
2	3
3	6
4	2
5	1
6	2
7	0
8	3
9	2
10	0

7C What was the mean number of dandelions per quadrat counted by Mary?

1 1.7

2 1.8

3 2.0

4 2.2

7D Another student, Sharon, calculated a mean of 2.8 dandelions per quadrat from her results.

Estimate the number of dandelions in the whole field by using:

- the mean of 2.8
- information from the diagram on the opposite page
- the equation below.

Estimated number of dandelions on field	=	mean number of dandelions per quadrat	×	number of quadrats that would fit into the field

1 28

2 420

3 15 120

4 54 000

Turn over ▶

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QUESTION EIGHT

Sulfur dioxide is a pollutant gas.

8A Which environmental problem is caused by sulfur dioxide?

1 global warming

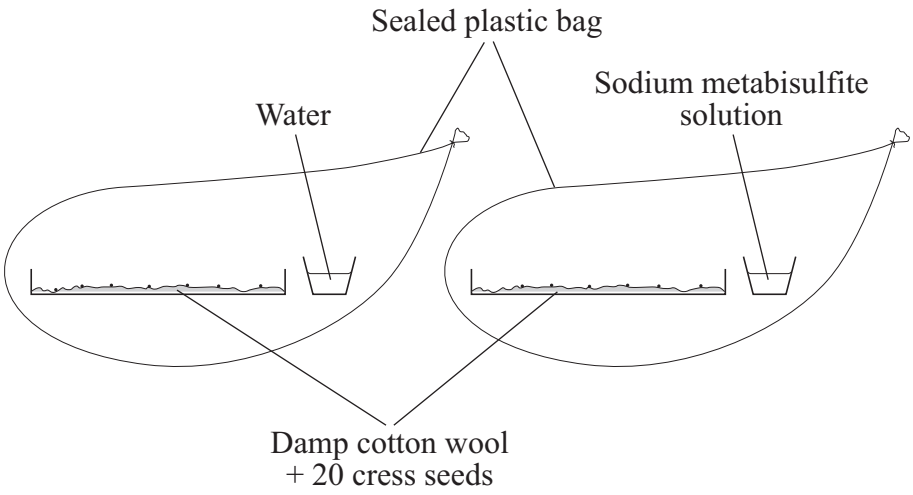
2 acid rain

3 deforestation

4 traffic congestion

A student investigated the effect of sulfur dioxide on the germination of cress seeds.

The diagram shows her apparatus.



- Sodium metabisulfite solution gives off sulfur dioxide.
- Both bags were left in a warm laboratory for 5 days.
- The student then counted the number of seeds that had germinated.

8B The independent variable in this investigation was . . .

1 the number of seeds that germinated.

2 the number of seeds put into each bag.

3 the presence of water or sodium metabisulfite.

4 the temperature in the laboratory.

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8C The main reason for using the plastic bags was . . .

1 to keep the seeds warm.

2 to keep the seeds dry.

3 to keep gases inside.

4 to let light in.

8D The student carried out the investigation five times. The table shows the student's results.

Number of seeds that germinated	
Bag containing water	**Bag containing sodium metabisulfite solution**
17	5
15	8
15	5
16	8
17	9

What conclusion can be drawn from these results?

1 Sodium metabisulfite poisons cress seeds.

2 Sulfur dioxide affects the germination of cress seeds.

3 There is 100% germination of cress seeds when sulfur dioxide is **not** present.

4 Water is toxic to a small number of cress seeds.

Turn over for the next question

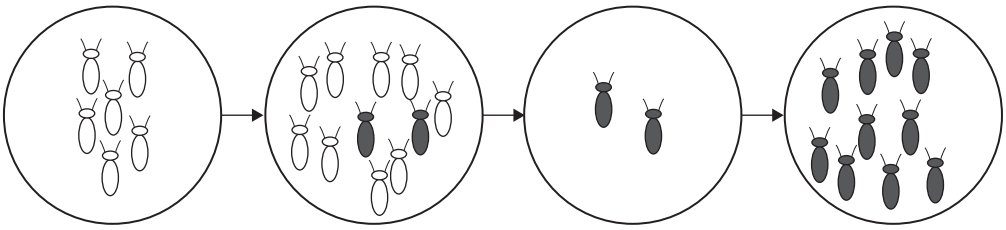
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QUESTION NINE

Head lice are insects that live in human hair. Hair can be treated with special shampoo containing an insecticide that kills head lice.

The diagrams show the development of the population of a new strain of head lice that appeared in the hair of pupils attending the same school.

Each diagram represents the number of head lice that were found in the hair of the pupils of one class at intervals over several months.

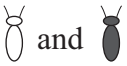


Stage P
Original population of head lice

Stage Q
Offspring of adults from **Stage P**

Stage R
Population after pupils were treated with shampoo containing the insecticide

Stage S
Population one month later

Key:  and represent different strains of head lice.

9A A mutation that produced a new strain of head lice occurred . . .

1 during **Stage R**.

2 between **Stage P** and **Stage Q**.

3 between **Stage Q** and **Stage R**.

4 between **Stage R** and **Stage S**.

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9B The head lice in **Stage R** . . .

1 must be impossible to kill.

2 must be unable to reproduce.

3 have identical genes to those in **Stage P**.

4 must be resistant to the insecticide in the shampoo.

9C The composition of the population of head lice at **Stage R** is due to . . .

1 competition.

2 camouflage.

3 genetic engineering.

4 natural selection.

9D The head lice at **Stage S** will continue to multiply until . . .

1 all of them die through lack of food.

2 all of them change back to the strain shown in **Stage P**.

3 a new insecticide is developed.

4 they suffer from overcrowding.

END OF TEST

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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**.

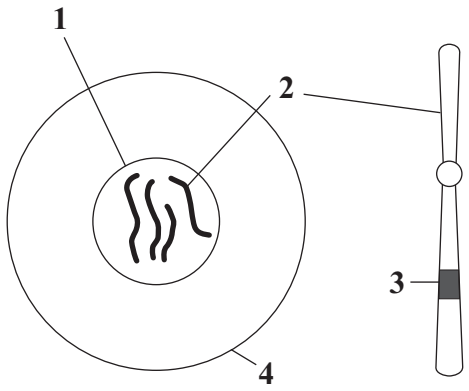
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

The diagram shows a human egg.



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

A cell

B nucleus

C chromosome

D gene

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QUESTION TWO

Many human activities damage the environment.

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

A oxygen

B sulfur dioxide

C pesticide

D carbon dioxide

1	Lichens can be used as an indicator of this substance.
2	The Kyoto agreement has attempted to control its release.
3	It reduces damage to crop plants by killing invertebrates.
4	Its concentration in freshwater can be assessed by what invertebrates are found.

Turn over for the next question

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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

Sulfur dioxide is a pollutant gas.

3A Which environmental problem is caused by sulfur dioxide?

1 global warming

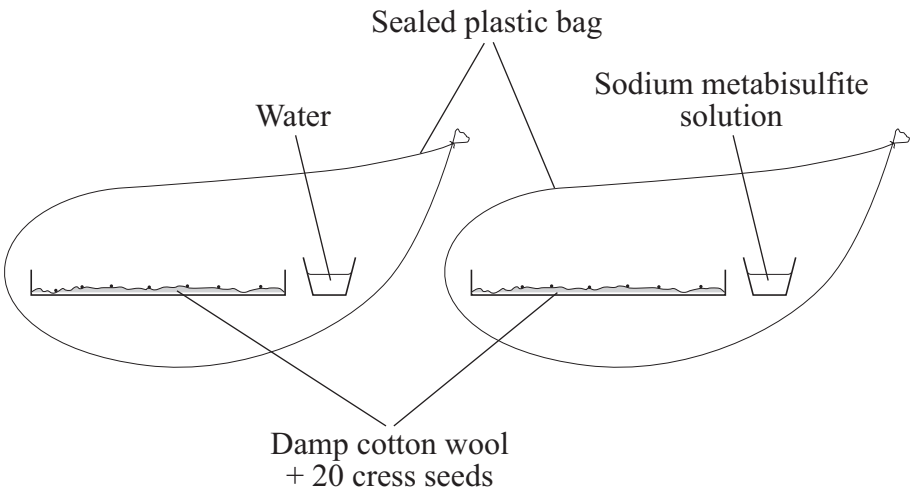
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3 deforestation

4 traffic congestion

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- The student then counted the number of seeds that had germinated.

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3B The independent variable in this investigation was . . .

1 the number of seeds that germinated.

2 the number of seeds put into each bag.

3 the presence of water or sodium metabisulfite.

4 the temperature in the laboratory.

3C The main reason for using the plastic bags was . . .

1 to keep the seeds warm.

2 to keep the seeds dry.

3 to keep gases inside.

4 to let light in.

3D The student carried out the investigation five times. The table shows the student's results.

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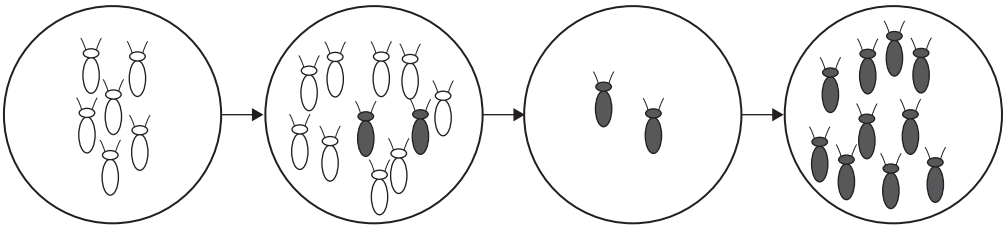
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QUESTION FOUR

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Original population of head lice

Stage Q
Offspring of adults from **Stage P**

Stage R
Population after pupils were treated with shampoo containing the insecticide

Stage S
Population one month later

Key:  and represent different strains of head lice.

4A A mutation that produced a new strain of head lice occurred . . .

1 during **Stage R**.

2 between **Stage P** and **Stage Q**.

3 between **Stage Q** and **Stage R**.

4 between **Stage R** and **Stage S**.

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4B The head lice in **Stage R** . . .

1 must be impossible to kill.

2 must be unable to reproduce.

3 have identical genes to those in **Stage P**.

4 must be resistant to the insecticide in the shampoo.

4C The composition of the population of head lice at **Stage R** is due to . . .

1 competition.

2 camouflage.

3 genetic engineering.

4 natural selection.

4D The head lice at **Stage S** will continue to multiply until . . .

1 all of them die through lack of food.

2 all of them change back to the strain shown in **Stage P**.

3 a new insecticide is developed.

4 they suffer from overcrowding.

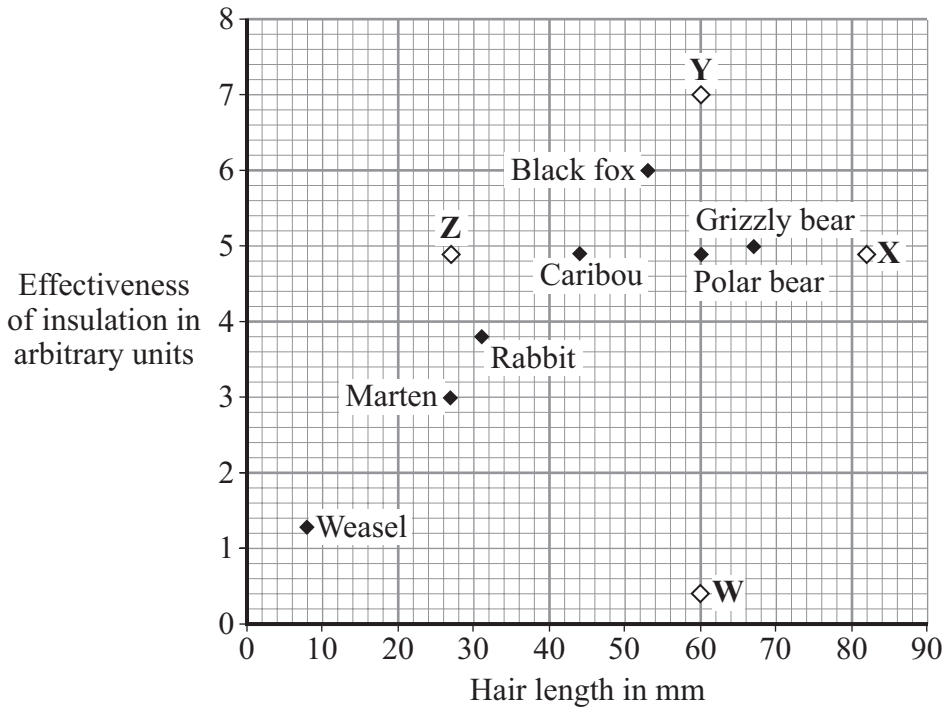
Turn over for the next question

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QUESTION FIVE

Some animals are adapted for life in cold conditions.

The graph shows the association between hair length and the effectiveness of insulation provided by the dry coats of different animals.



5A From the information in the graph, which one of the following animals is best adapted for life in the Arctic?

1 grizzly bear

2 caribou

3 polar bear

4 black fox

An animal loses heat more rapidly when its coat is wet than when its coat is dry.

5B Which letter on the graph indicates data for a polar bear when its coat is wet?

1 **W**

2 **X**

3 **Y**

4 **Z**

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5C Polar bears often swim to catch their food. The black fox lives on land.

Which adaptation would be more suitable for the polar bear than the black fox in reducing the rate of heat loss?

1 larger ears

2 longer hair

3 thicker layer of fat under the skin

4 wider feet

The table compares the grizzly bear with the black bear.

	Grizzly bear	**Black bear**
Hair colour	Varies from black to blonde	Varies from black to white
Ear size	Short	Long
Claw length	10 cm	4 cm
Shoulder muscles	Large	Small

5D Which feature suggests that grizzly bears live in colder regions than black bears?

1 hair colour

2 ear size

3 claw length

4 shoulder muscles

Turn over for the next question

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QUESTION SIX

Biofuels can be produced from crops such as sugar cane. After harvesting, the sugar is converted into alcohol by microorganisms. Alcohol can be used in vehicles either on its own or mixed with petrol. This reduces the need to use crude oil as an energy source.

6A Some people have linked global shortages of food to the increase in biofuel production.

This could be because . . .

1 rainforests provide large amounts of food.

2 land previously used for food crops is being used to grow sugar cane for conversion to alcohol.

3 factories making biofuel are often built on farmland.

4 drilling for crude oil damages large areas of farmland.

6B Supporters of the use of biofuel claim that it is more 'environmentally friendly' than using petrol.

This could be because . . .

1 sugar cane plants take in carbon dioxide from the atmosphere.

2 trees 'lock up' large amounts of carbon, for many years, in wood.

3 fields of sugar cane increase the number of different species of animals in an area.

4 burning alcohol releases about the same amount of carbon dioxide as the plants took in when they were growing.

6C Large areas of rainforest might be cut down to provide land to grow sugar cane.

This may be harmful because . . .

1 biodiversity is reduced.

2 less oxygen will be released into the atmosphere.

3 extra methane is released which causes global warming.

4 more carbon dioxide will be released into the atmosphere.

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6D The land made available by cutting down trees can only be used to grow sugar cane for about three years. After this, the land can be used to raise cattle.

Increased cattle farming leads to increasing atmospheric temperatures on Earth.

This is mainly because cattle release . . .

1 methane which allows more of the Sun's heat to reach Earth.

2 carbon dioxide which absorbs heat and retains it.

3 methane which absorbs heat and radiates it back to Earth.

4 carbon dioxide which allows more of the Sun's heat to reach Earth.

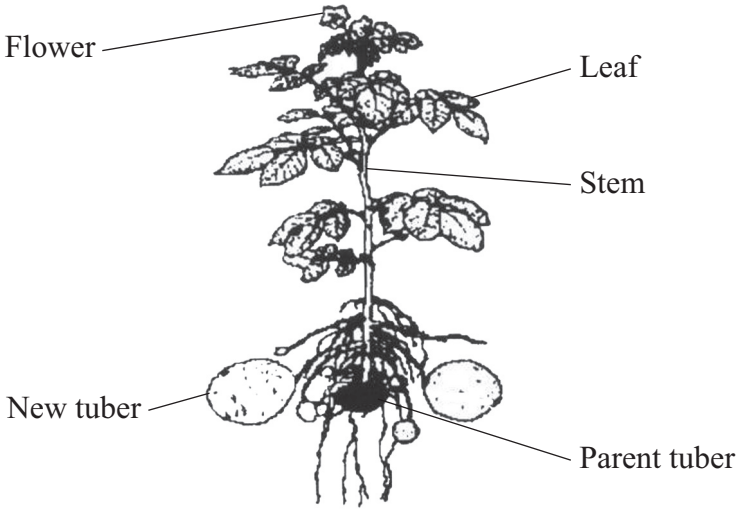
Turn over for the next question

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QUESTION SEVEN

There are many varieties of potato plant, producing tubers with different qualities.

Potato plants can reproduce both sexually and asexually.



7A How could new varieties of potato be produced?

1 taking small groups of cells from a new tuber and growing them

2 taking cuttings from the leaf or stem of the plant and growing them

3 allowing gametes from different potato plants to fuse together

4 allowing new tubers to stay in the ground and to grow next year

7B Scientists wish to create a variety of potato which will tolerate drought conditions.
They have identified the gene which gives a cactus species the ability to survive with very little water.

What would be the best way of producing drought-resistant potatoes?

1 breed ordinary potato plants with cactus plants

2 use enzymes to cut out the gene from the cactus and transfer it to potato cells

3 selectively breed cactus plants which, over many generations, are more like potatoes

4 grow potato plants in low water conditions over many generations

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7C Some people believe that using genetic engineering to develop potatoes that are tolerant to drought conditions should **not** be allowed.

One reason for this is because . . .

1 the new variety of potato may be susceptible to the same diseases as cactus plants.

2 the cost of the technology required outweighs the possible profits.

3 the native potato may compete with the new variety.

4 there are ethical concerns about interfering with natural processes.

7D Herbicide-resistant potatoes have also been produced.

The advantage of this is that . . .

1 old potato plants can easily be killed to make way for new crops.

2 it is easy to kill insects which might feed on the crop.

3 the growth of wild flowers is encouraged, maintaining biodiversity.

4 competition from other plants can be reduced.

Turn over for the next question

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QUESTION EIGHT

Read the passage about controlling rabbit numbers.

Before 1859 there were no rabbits in Australia. 24 rabbits were released in 1859.

In 1926, it was estimated that there were 1 000 000 000 rabbits.

The rabbit is a native of southern Europe where its population remained relatively constant until the introduction of myxomatosis, a viral disease that kills rabbits.
The disease was introduced into the populations of Australian and European rabbits in the 1950s. It killed 99.8 % of all rabbits. In recent years, the rabbit population has recovered a little. It is believed that up to 10 % of the rabbit population is now genetically resistant to the disease. In a few areas of Australia, rabbits have destroyed all the acacia plants. Many farmers in Australia now use poisons to control rabbit numbers.

8A Which is a likely reason for the more rapid increase in rabbit numbers in Australia compared with Europe?

1 The rabbits evolved more rapidly in Australia.

2 Some rabbits in Australia were resistant to myxomatosis.

3 The rabbits could breed more rapidly in Australia.

4 The rabbits faced little competition in Australia.

8B Resistance to myxomatosis in rabbits was caused initially by changes in their . . .

1 competitors.

2 environment.

3 genes.

4 reproductive systems.

8C The European lynx, a natural predator of the rabbit, is an endangered species.

The evidence in the passage suggests that this could have been caused by . . .

1 the increased percentage of resistant rabbits.

2 the use of poisons.

3 the loss of the acacia plants.

4 the introduction of myxomatosis.

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8D Which is the main reason why Australian farmers *now use poisons to control rabbit numbers*?

1 Poisons will selectively kill genetically resistant rabbits.

2 Poisons are cheaper than using myxomatosis.

3 Myxomatosis is not as effective as it once was in killing rabbits.

4 The rabbit is not a native species in Australia.

Turn over for the next question

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QUESTION NINE

There are several theories for the way in which evolution may have happened.

9A Lamarck's theory of evolution was based on the idea that . . .

1 organisms pass on the advantages that they acquire during their lifetime.

2 organisms acquire genes from their parents which may give them advantages.

3 the characteristics that organisms have are controlled by God.

4 offspring have a mixture of their parents' features.

9B In the 1860s there was much opposition to Darwin's theory of evolution.

Which of the following was **not** a reason for this opposition?

1 The theory conflicted with deeply held religious views.

2 Darwin did **not** have sufficient evidence to support his ideas.

3 Darwin was unable to make his ideas known to other scientists.

4 Nobody knew how inheritance worked.

9C When a new island is formed by volcanic action, the environment continues to undergo rapid change for many years. At first there will be no living things present.

A plant seed may be blown to the island by the wind. When this seed begins to grow, the plant may reproduce asexually.

What is the disadvantage of asexual reproduction to the plant species in this case?

1 Only one individual is needed for reproduction.

2 All the offspring will be genetically identical.

3 New plants will be produced quickly.

4 Dense groups of this species will reduce competition from other species.

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9D Darwin's theory of evolution through natural selection was based on a number of events.

These events are outlined below.

- **P** Those individuals which are most suited to the environment survive.
- **Q** There is an increase in variation between members of the species.
- **R** Genes that improve survival chances are passed on to the next generation.
- **S** Mutation results in new forms of genes.

Which is the correct sequence for these events?

1 **P → R → S → Q**

2 **Q → R → P → S**

3 **S → Q → P → R**

4 **R → S → Q → P**

END OF TEST

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Version 1:0: 03/04/09

ASSESSMENT and QUALIFICATIONS ALLIANCE

GCSE

Science A (4461)

Specification A

BLY1BP, BL1BSF & BL1BSH

Mark Scheme

2009 Examination – March Series

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This component is an objective test for which the following list indicates the correct answers used in marking the candidates' responses.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

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GCSE

SCIENCE A (4461)/BIOLOGY (4411)

Objective Test Answer Key

BLY1BP (Evolution and Environment)

March 2009

Foundation Tier

Question	Key		
One	**A**	conserves forests	**4**
	B	uses a renewable energy source	**2**
	C	reduces quarrying	**1**
	D	saves electrical energy	**3**
Two	**A**	The camel's stomach can hold 200 litres of water.	**3**
	B	The camel produces little urine and does not sweat.	**1**
	C	Camels store fat in a hump.	**4**
	D	Camels can withstand an increase in body temperature of 9°C without harm.	**2**
Three	**A**	Humboldt	**2**
	B	Magellanic	**3**
	C	Rockhopper	**4**
	D	Emperor	**1**
Four	**A**	insulin is produced by genetically engineered bacteria	**3**
	B	diabetics inject insulin to control diabetes	**4**
	C	the insulin gene is 'cut out' using enzymes	**1**
	D	the insulin gene is transferred into a bacterium	**2**
Five	**A**	cell	**4**
	B	nucleus	**1**
	C	chromosome	**2**
	D	gene	**3**

	A	**B**	**C**	**D**
Six	**2**	**1**	**4**	**1**
Seven	**3**	**3**	**4**	**3**
Eight	**2**	**3**	**3**	**2**
Nine	**2**	**4**	**4**	**3**

GCSE

SCIENCE A (4461)/BIOLOGY (4411)

Objective Test Answer Key

BLY1BP (Evolution and Environment)

March 2009

Higher Tier

Question	*Key*		
One	**A**	cell	**4**
	B	nucleus	**1**
	C	chromosome	**2**
	D	gene	**3**
Two	**A**	oxygen	**4**
	B	sulfur dioxide	**1**
	C	pesticide	**3**
	D	carbon dioxide	**2**

	A	B	C	D
Three	**2**	**3**	**3**	**2**
Four	**2**	**4**	**4**	**3**
Five	**4**	**1**	**3**	**2**
Six	**2**	**4**	**1**	**3**
Seven	**3**	**2**	**4**	**4**
Eight	**4**	**3**	**4**	**3**
Nine	**1**	**3**	**2**	**3**