

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier and Higher Tier
November 2010

Science A
Unit Biology B1b (Evolution and Environment)
Biology
Unit Biology B1b (Evolution and Environment)

BLY1BP
F&H

Thursday 11 November 2010 Afternoon Session

For this paper you must have:

- a black ball-point pen
 - an objective test answer sheet.
- You may use a calculator.

Time allowed

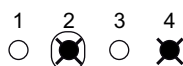
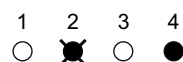
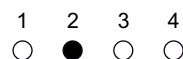
- 30 minutes

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**.

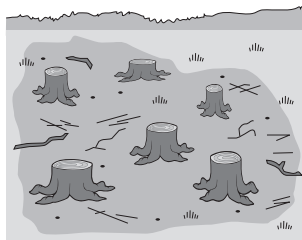
Use **each** answer only **once**.

Mark your choices on the answer sheet.

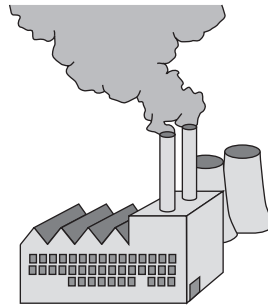
QUESTION ONE

The drawings show four ways in which our activities affect the environment.

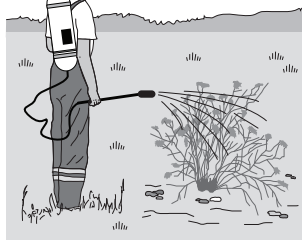
1



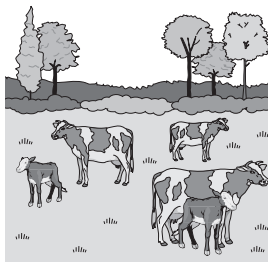
2



3



4

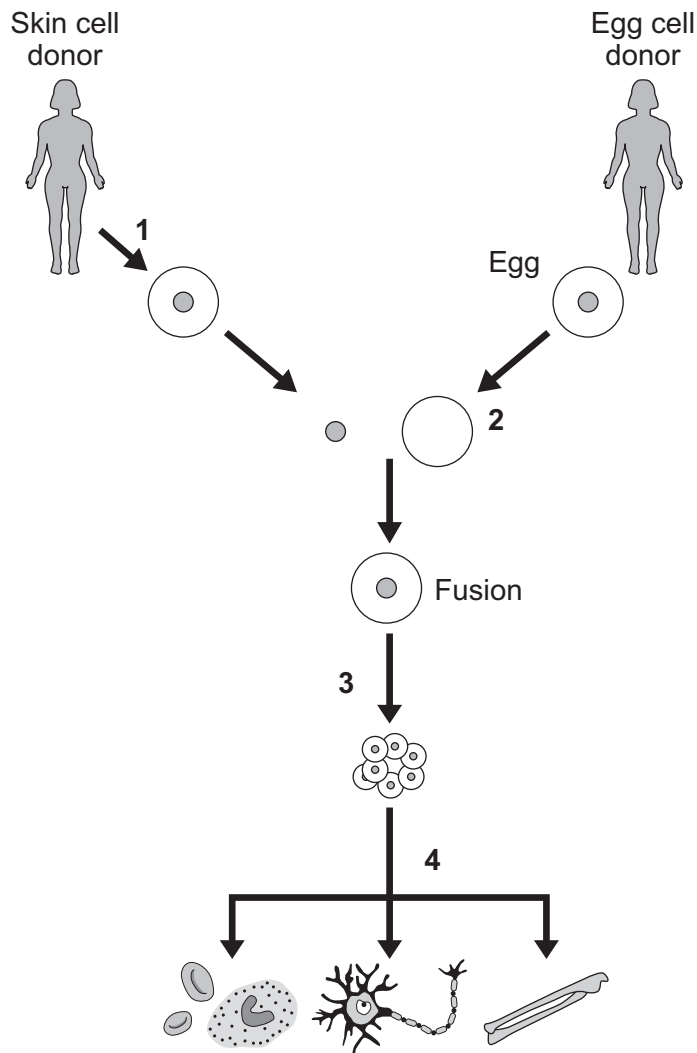


Match statements, **A**, **B**, **C** and **D**, with the drawings **1–4**.

- A** causes acid rain
- B** causes less carbon dioxide to be taken out of the atmosphere
- C** may pollute farmland with poisonous chemicals
- D** produces methane

QUESTION TWO

Fusion cell cloning can make different types of body cell. The diagram shows one way of doing this.



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

- A** A skin cell is taken from a donor.
- B** The new cell divides to make a group of similar cells.
- C** Different types of body cell are produced.
- D** The nucleus is removed, leaving cytoplasm.

Turn over ►

QUESTION THREE

Living things have evolved on Earth over billions of years.

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

- A** extinction
- B** mutation
- C** natural selection
- D** variation

1	a sudden change in a gene or chromosome
2	the range of differences in the characteristics of a species
3	the survival of organisms best suited to the environment
4	the death of all organisms of a species

QUESTION FOUR

These young kittens look like their parents.

Kittens look like their parents because information is passed from the parents to their young. The information is about characteristics such as fur colour.



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

- A** chromosomes
- B** clones
- C** gametes
- D** genes

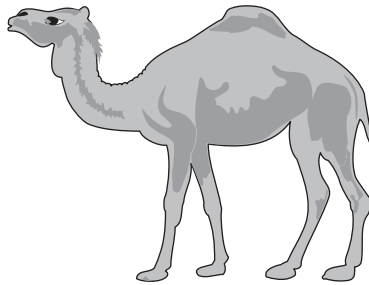
1	are kittens with identical characteristics
2	control one characteristic, eg fur colour
3	are sex cells
4	are thread-like structures carrying the information

Turn over for the next question

Turn over ►

QUESTION FIVE

Camels live in deserts. Deserts are dry and hot in the day, but can be very cold at night. Camels have adaptations. These adaptations help camels to survive in desert conditions.



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

- A** the wind blows sand around
- B** very cold nights
- C** soft ground
- D** dry conditions

	Adaptation
1	camels produce very little sweat
2	camels have feet with a large surface area
3	camels can shut their nostrils
4	camels have thick fur to trap air

Turn over for the next question

Turn over ►

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

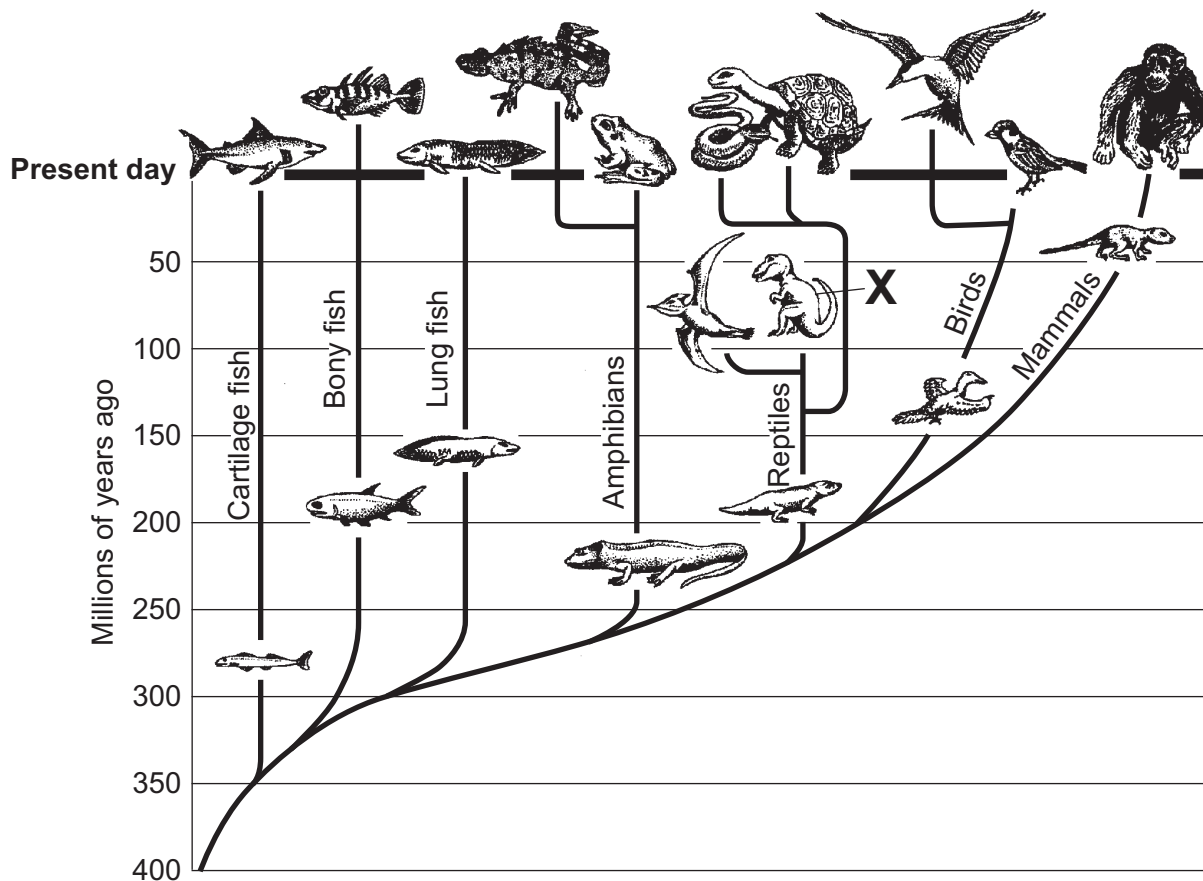
This question is about evolution.

6A Approximately how long ago did the first simple life-forms appear on Earth?

- 1 300 000 years
- 2 3 million years
- 3 300 million years
- 4 3 billion years

The diagram shows an evolutionary tree for some groups of animals.

All the species below the line for present day are extinct.



6B Which group of animals shown on the diagram evolved first?

- 1 mammals
- 2 birds
- 3 reptiles
- 4 cartilage fish

6C Which two groups of animals evolved at nearly the same time?

- 1 cartilage fish and bony fish
- 2 reptiles and birds
- 3 mammals and birds
- 4 reptiles and amphibians

6D The animal labelled **X** has been extinct for over 50 million years.

How do we know that animal **X** once lived?

- 1 Drawings of the animal were made when the animal was alive.
- 2 Fossils of the animal have been found in rocks.
- 3 People were alive to see the animal.
- 4 Reptiles are alive today.

Turn over for the next question

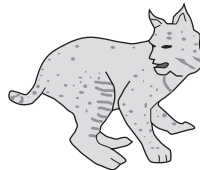
Turn over ►

QUESTION SEVEN

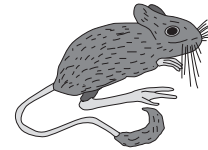
The drawings are of animals and plants that live in a hot, dry environment.



Fennec fox



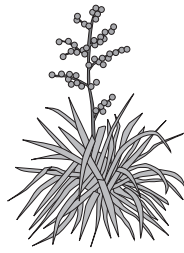
Bobcat



Jerboa



Antelope squirrel



Yucca



Prickly pear cactus

7A Which two of the above organisms might compete for water?

- 1 fennec fox and yucca
- 2 jerboa and prickly pear cactus
- 3 yucca and prickly pear cactus
- 4 antelope squirrel and yucca

7B All the animals above probably compete for . . .

- 1 light.
- 2 oxygen.
- 3 carbon dioxide.
- 4 territory.

7C When the plants grow close together, the plants above do **not** compete for . . .

- 1 prey.
- 2 water.
- 3 light.
- 4 space.

7D To help it to lose heat, the fennec fox has . . .

- 1 forward facing eyes.
- 2 camouflaged fur.
- 3 sharp claws.
- 4 large ears.

Turn over for the next question

Turn over ►

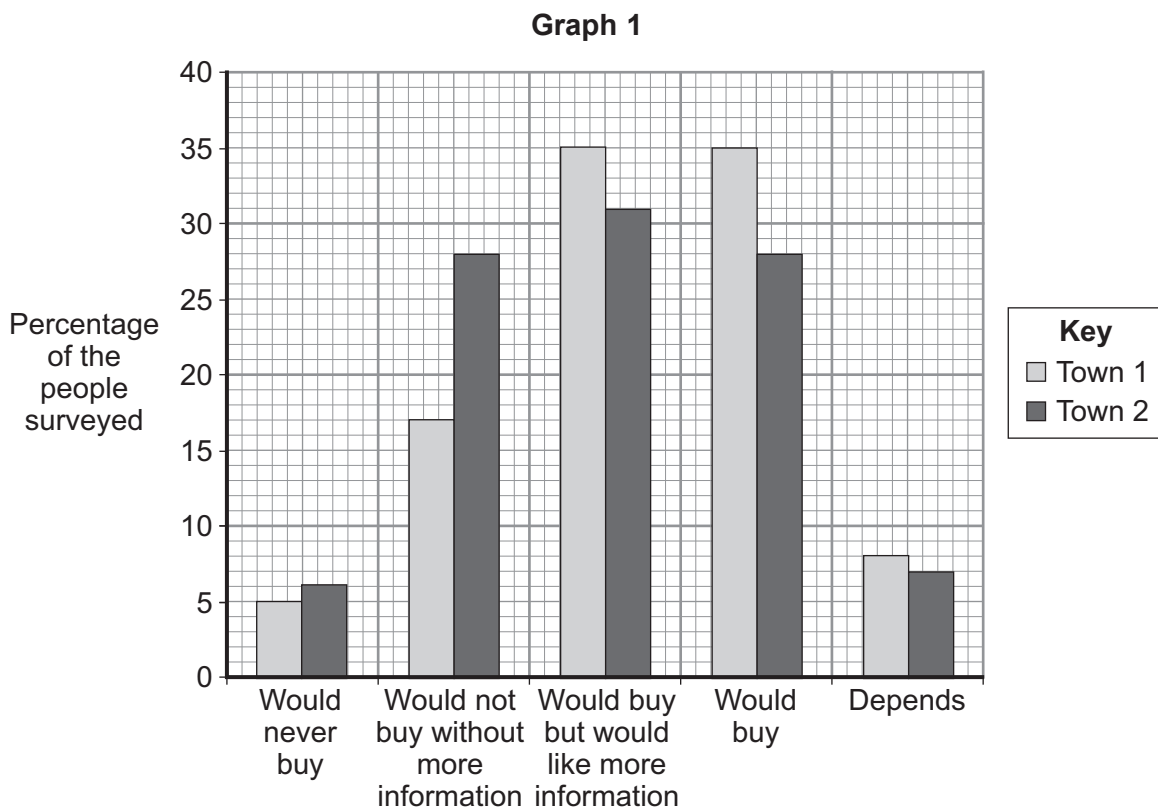
QUESTION EIGHT

Some foods are produced from genetically modified (GM) crops. Genetic engineering produces GM plants.

8A What is *genetic engineering*?

- 1 asexual reproduction
- 2 transferring new genes to organisms
- 3 causing mutations in organisms
- 4 developing disease resistant bacteria

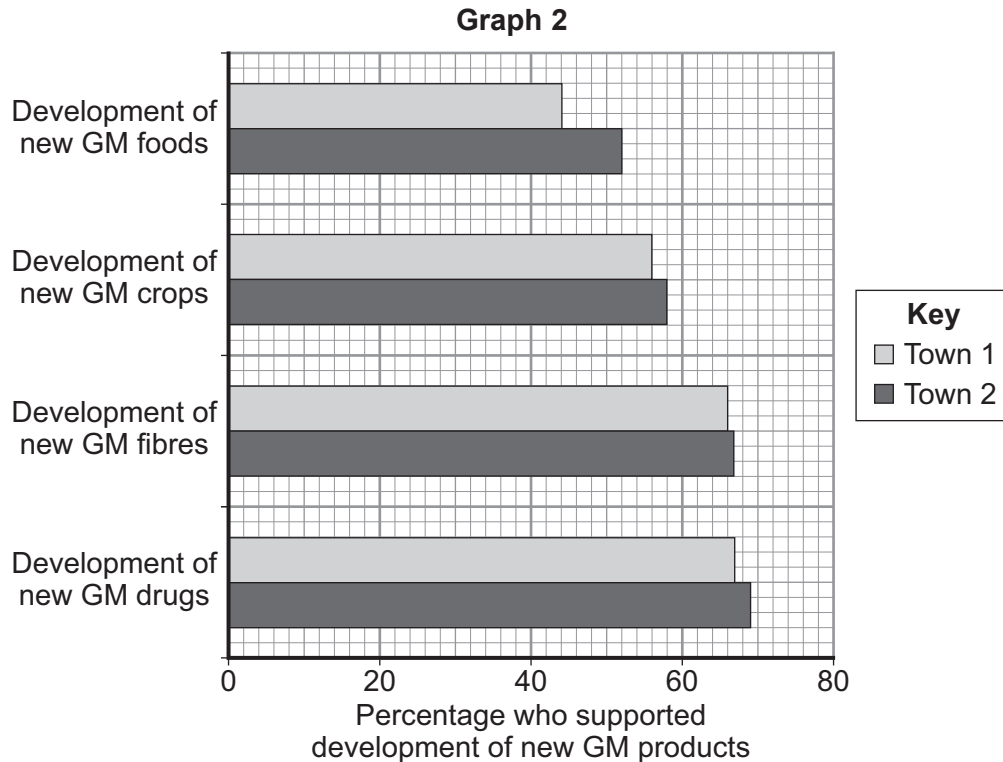
8B Graph 1 shows what people in **Town 1** and **Town 2** think about GM labelled foods.



In **graph 1**, what percentage of the people surveyed in **Town 1** would buy GM foods, but would like more information about them?

- 1 28 %
- 2 31 %
- 3 35 %
- 4 66 %

- 8C** **Graph 2** shows the amount of support among people in the two towns for the development of new GM products.



Graph 2 shows that . . .

- 1 more people in **Town 1** than in **Town 2** support the development of new GM foods.
 - 2 more people in **Town 2** than in **Town 1** support the development of new GM crops.
 - 3 the same number of people in **Town 1** and in **Town 2** support the development of new GM foods.
 - 4 more people in **Town 1** than in **Town 2** support the development of new GM drugs.
- 8D** Some people in England have protested against GM crops being grown and GM foods being sold in shops.

The most likely reason for the protests is that . . .

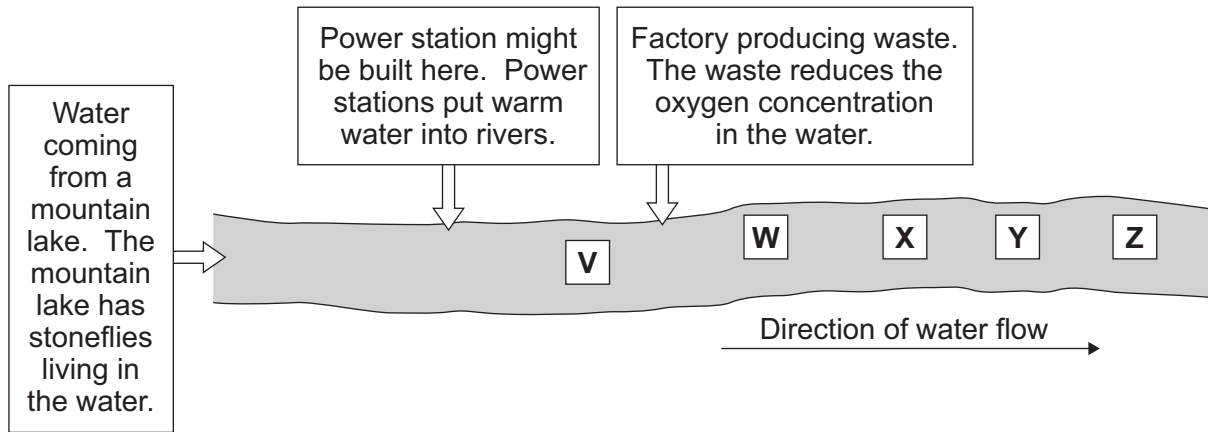
- 1 scientists have increased crop yields.
- 2 people think that GM crops will damage farmland.
- 3 farmers do not want to grow crops which are resistant to insect attack.
- 4 people think that GM foods may be a risk to human health.

Turn over ►

QUESTION NINE

Scientists surveyed the invertebrate species found downstream from the place where a power station might be built.

They took samples from five sites, **V–Z**.



This table shows the species surveyed and the oxygen concentration which the species need to survive.

Oxygen concentration needed	Invertebrate indicator species
Low ↓ High	blood worms
	midge larvae
	hoglice
	shrimps
	stoneflies
	mayflies

9A Which row in the table shows the species most commonly found at each of the sites.

	V	W	X	Y	Z
1	stoneflies	blood worms	midge larvae	hoglice	shrimps
2	stoneflies	midge larvae	hoglice	shrimps	blood worms
3	stoneflies	hoglice	blood worms	midge larvae	shrimps
4	stoneflies	shrimps	hoglice	midge larvae	blood worms

A student used a thermometer and an oxygen meter to analyse four samples of river water.

Temperature of water in °C	23	15	6	15
Oxygen dissolved in water in mg per dm ³	1.9	6.5	8.0	6.1

9B Which of the following best describes the relationship between the temperature of the water and the amount of oxygen dissolved in the water?

- 1 The higher the temperature, the more oxygen is dissolved.
- 2 Oxygen concentration is directly proportional to temperature.
- 3 The higher the temperature, the less oxygen is dissolved.
- 4 There is no relationship between temperature and the oxygen dissolved in the water.

9C The new power station will release water into the river at a temperature of 23°C.

If the new power station is built, stoneflies near to this warm water would probably. . .

- 1 increase in numbers.
- 2 be replaced by mayflies.
- 3 be replaced by shrimps.
- 4 not be affected.

9D The survey carried out using indicator species was more useful than the survey carried out using oxygen meters.

This is because the meters . . .

- 1 only sampled the water once at each site.
- 2 are not very accurate.
- 3 are not very reliable.
- 4 cannot be calibrated.

END OF TEST

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

HIGHER TIER

Section One

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

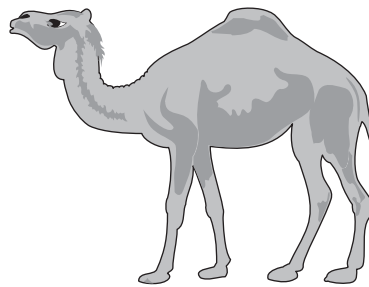
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

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QUESTION ONE

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

- A** the wind blows sand around
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	Adaptation
1	camels produce very little sweat
2	camels have feet with a large surface area
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4	camels have thick fur to trap air

QUESTION TWO

There are several different techniques used to clone plants and animals.

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

- A** adult cell cloning
- B** taking cuttings
- C** embryo transplants
- D** tissue culture

The type of cloning used by gardeners is usually . . . **1**

Scientists who want to quickly grow large numbers of plants from one very expensive plant would use . . . **2**

Scientists who want to produce several identical cows from two parents would use . . . **3**

Scientists who want to produce a cow identical to the cow that had won a national show would use . . . **4**

Turn over for the next question

Turn over ►

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.

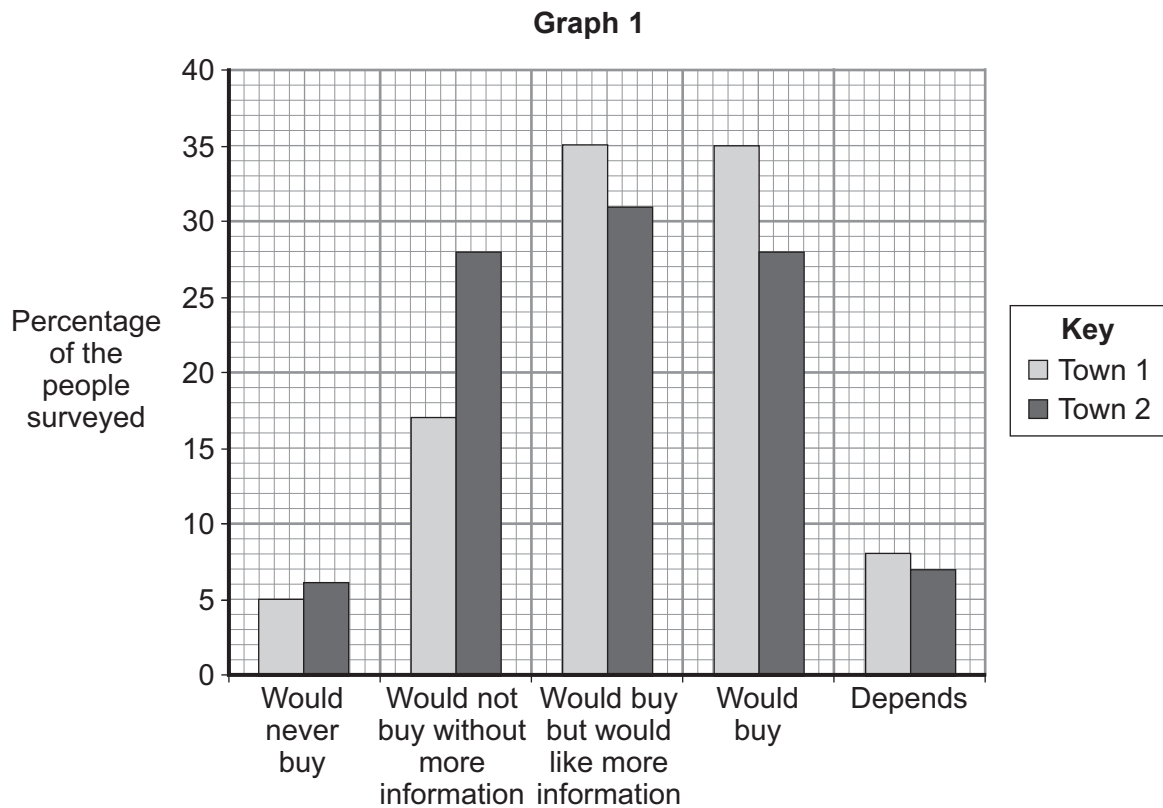
QUESTION THREE

Some foods are produced from genetically modified (GM) crops. Genetic engineering produces GM plants.

3A What is *genetic engineering*?

- 1 asexual reproduction
- 2 transferring new genes to organisms
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- 4 developing disease resistant bacteria

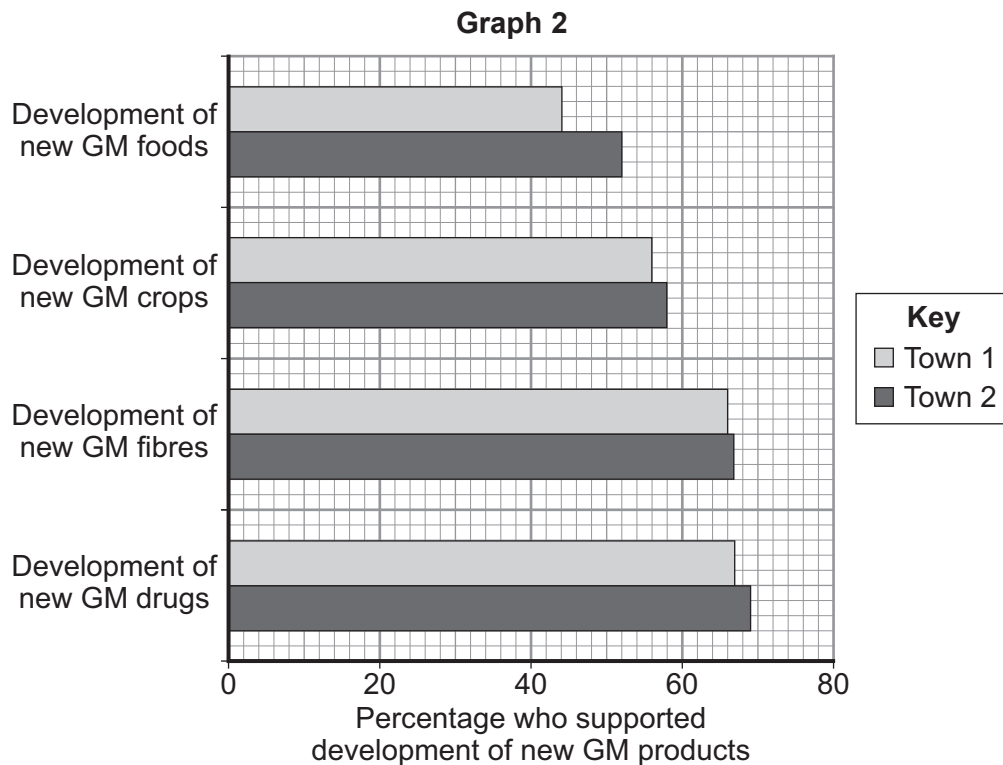
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Graph 2 shows that . . .

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3D Some people in England have protested against GM crops being grown and GM foods being sold in shops.

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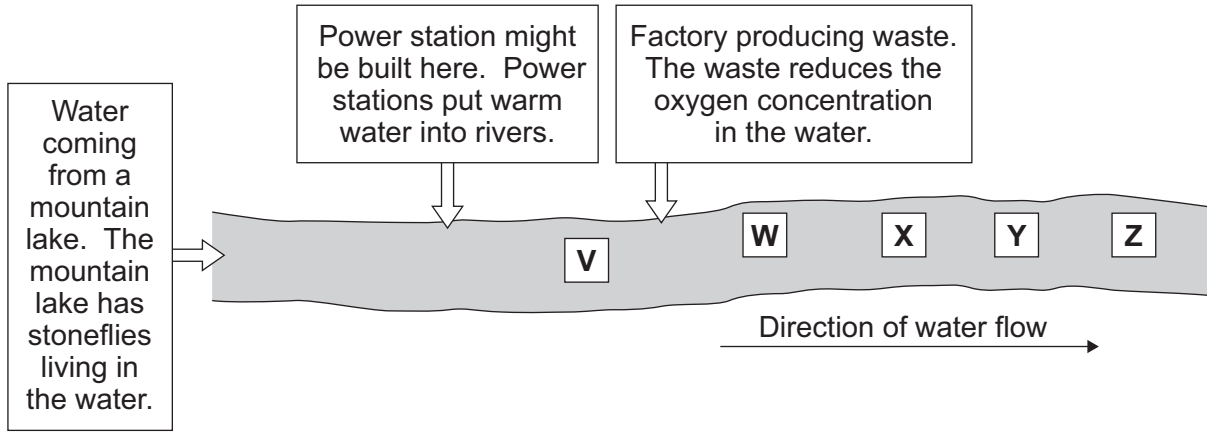
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Turn over ►

QUESTION FOUR

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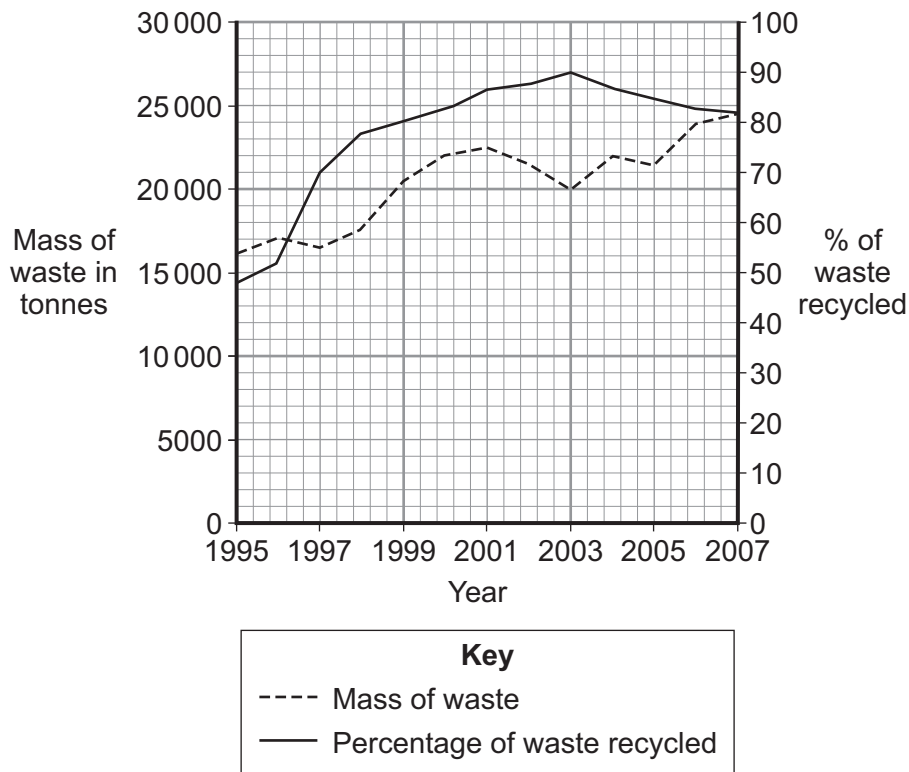
This is because the meters . . .

- 1 only sampled the water once at each site.
- 2 are not very accurate.
- 3 are not very reliable.
- 4 cannot be calibrated.

Turn over ►

QUESTION FIVE

The graph shows how waste is managed at an airport.



5A What mass of waste was **recycled** in 2003?

- 1 2 000 tonnes
- 2 18 000 tonnes
- 3 20 000 tonnes
- 4 22 000 tonnes

5B Which were the most successful years at this airport for waste prevention and recycling?

- 1 1995 to 1997
- 2 1998 to 2000
- 3 2001 to 2003
- 4 2004 to 2006

5C Some waste can be burned.

One **disadvantage** of this method is that the sulfur dioxide produced will add to . . .

- 1 global warming.
- 2 the greenhouse effect.
- 3 climate change.
- 4 acid rain.

5D There are advantages in burning waste.

Burning the waste could . . .

- 1 reduce the use of fossil fuels.
- 2 reduce air pollution.
- 3 increase the amount of carbon dioxide in the air.
- 4 increase the amount of landfill.

Turn over for the next question

Turn over ►

QUESTION SIX

There are about 1.4 million different animal species and 400 000 different plant species known to be alive today.

About 720 000 of these known plant and animal species are found in tropical rainforests.

The extinction rate of tropical forest species is increasing.

6A What percentage of the world's known species of plants and animals is found in tropical rainforests?

- 1 29%
- 2 40%
- 3 51%
- 4 70%

6B What term is used to describe the range of different species in an environment such as a tropical rainforest?

- 1 selection
- 2 variation
- 3 biodiversity
- 4 evolution

6C What is the most likely cause of the extinction of these species in the tropical rainforests?

- 1 acid rain
- 2 the evolution of new predators
- 3 genetically modified (GM) crops
- 4 loss of habitat

6D Extinction happens when all the adults die before . . .

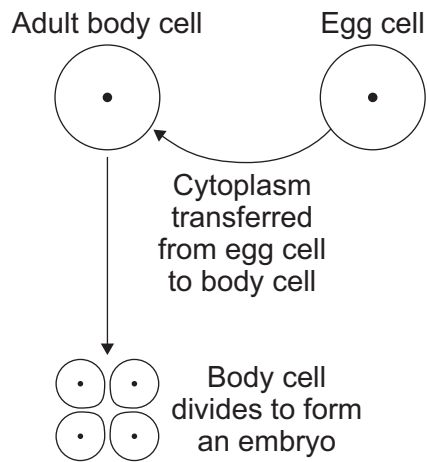
- 1 passing their genes on to the next generation.
- 2 enough fossil evidence is produced.
- 3 it is known what use they can be to humans.
- 4 their genes have been able to mutate.

Turn over for the next question

Turn over ►

QUESTION SEVEN

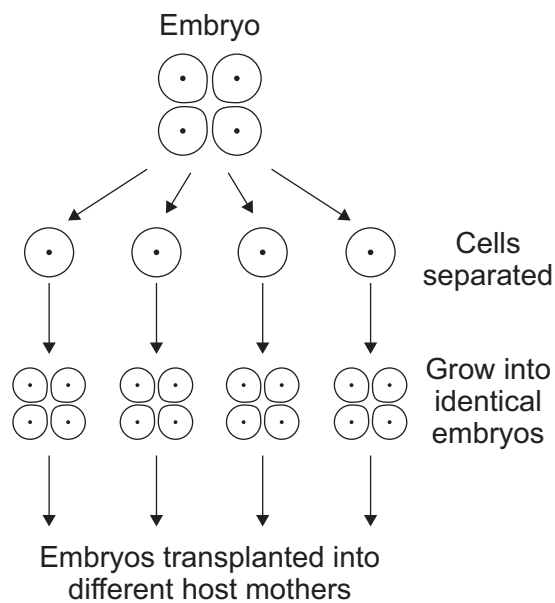
The diagram shows one method of cloning animals.



7A This method of cloning is called . . .

- 1 sexual reproduction.
- 2 embryo transplantation.
- 3 fusion cell cloning.
- 4 tissue culture.

The cells of the embryo can be separated and allowed to grow into identical embryos. The embryos are then implanted into different host mothers.



7B The offspring would . . .

- 1 all look like the animal from which the egg cell was taken.
- 2 all look like the animal from which the adult body cell was taken.
- 3 look like the host mother that they developed inside.
- 4 not look like any of the other animals.

Scientists are carrying out research on human cell cloning to produce unspecialised embryonic cells. Unspecialised embryonic cells could be used to treat incurable diseases. One incurable disease is Parkinson's disease. Parkinson's disease affects the nervous system.

7C Unspecialised embryonic cells are useful in the search for cures for different diseases.

This is because unspecialised embryonic cells . . .

- 1 are nerve cells.
- 2 can grow into human beings.
- 3 are easy to produce.
- 4 can be made to grow into many different types of cell.

7D An ethical argument **against** this type of research is that . . .

- 1 this research will probably not be successful for a long time.
- 2 the research will help only a small number of people.
- 3 embryos are made, and then some of these embryos are destroyed.
- 4 God would not like this research.

QUESTION EIGHT

The Indian government is encouraging sustainable development.

8A Which is the best definition of *sustainable development*?

- 1 using energy in the most efficient way
- 2 bringing modern technology to villages
- 3 improving the quality of life now, but not affecting future generations
- 4 using modern technology in a traditional way

Read the following statements about India.

India is . . .

- U** planning a 30% increase in electrical power output.
- V** giving sunlight-powered lamps to people living in villages that do not have electricity.
- W** changing petrol-driven taxis to battery-operated taxis.
- X** using coal, gas and oil-fuelled power stations to produce 65% of India's electricity.
- Y** producing up to 34 000 barrels of oil per day from a new oil well. This will last for the next 11 years.
- Z** employing people to ride bicycles around villages buying waste for recycling.

8B Which statements describe ways that would help sustainable development in India?

- 1 **U, X and Y**
- 2 **V, X and Z**
- 3 **V, W and Z**
- 4 **W, X and Y**

8C Which statement gives the greatest opportunity for sustainable development in all of India?

- 1 U
- 2 X
- 3 Y
- 4 Z

8D Which of the following is the best summary of the information in statements **U–Z**?

- 1 Most developments in India encourage sustainable development.
- 2 Sustainable development in India is mainly at a local level at the moment.
- 3 Only poor people will benefit from sustainable development.
- 4 Sustainable development can be achieved only by using modern technology.

Turn over for the next question

Turn over ►

QUESTION NINE

The drawings show two different species of butterfly.



Amauris



Hypolimnas

Many types of bird can eat both species.

- *Amauris* is poisonous to birds.
- *Hypolimnas* is **not** poisonous to birds.

There are many other examples of 'pairs' of poisonous species and non-poisonous species that look similar.

9A The most likely explanation for the similarity between poisonous and non-poisonous butterflies is that . . .

- 1 different species interbreed over many generations. This is how different species evolve.
- 2 the products of asexual reproduction can have slight differences. Environmental variation causes these differences.
- 3 non-poisonous species look like the poisonous species, and so the non-poisonous butterflies are more likely to survive and breed.
- 4 poisonous butterflies have evolved a defence mechanism against predators.

9B In the nineteenth century, some people did not accept Darwin's theory of natural selection.

Which of the following was **not** a reason to reject the theory?

- 1 It undermined the idea that God made all animals and plants.
- 2 There was insufficient fossil evidence to convince some scientists.
- 3 The mechanism of inheritance was not known at the time.
- 4 Lamarck's theory that organisms can inherit acquired characteristics was already well established.

- 9C** Fossils of early life-forms are not discovered very often because . . .
- 1 the early life-forms are all now extinct because of evolution.
 - 2 the soft bodies of the early life-forms did not fossilise well.
 - 3 the early life-forms have all evolved into more complex species.
 - 4 the early life-forms are in rocks too deep in the Earth's crust and cannot be found.
- 9D** Which of the following would **not** be a reason for the extinction of a species of butterfly?
- 1 the evolution of a new predator
 - 2 the evolution of a disease organism
 - 3 mutation in one individual butterfly
 - 4 a 2°C rise in atmospheric temperature

END OF TEST

There are no questions printed on this page

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