

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

General Certificate of Secondary Education
March 2008

SCIENCE A
Unit Biology B1b (Evolution and Environment)

BLY1BP



BIOLOGY
Unit Biology B1b (Evolution and Environment)

Wednesday 5 March 2008 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

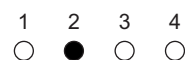
Instructions

- 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

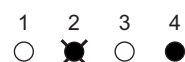
- Use a **black ball-point pen**.

- For each answer **completely fill in the circle** as shown:

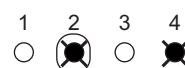


- Do **not** extend beyond the circles.

- 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 14 of this booklet.

FOUNDATION TIER

SECTION ONE

Questions **ONE** to **SIX**.

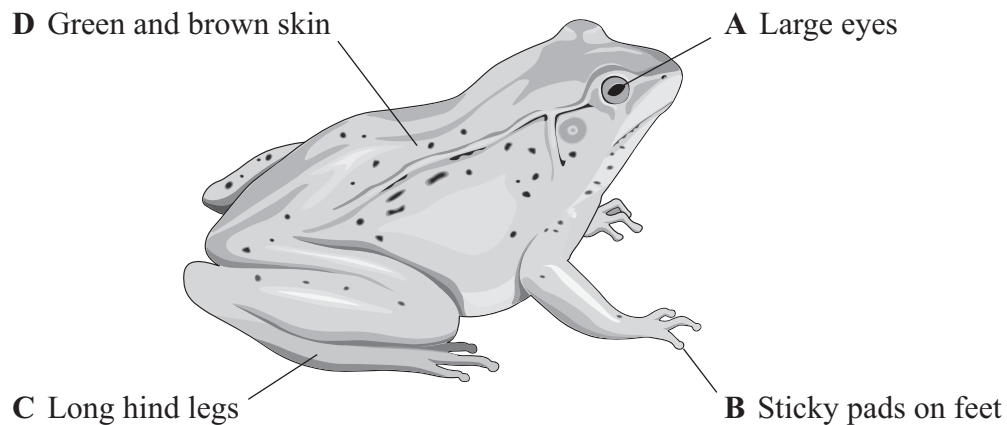
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1–4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows a frog.

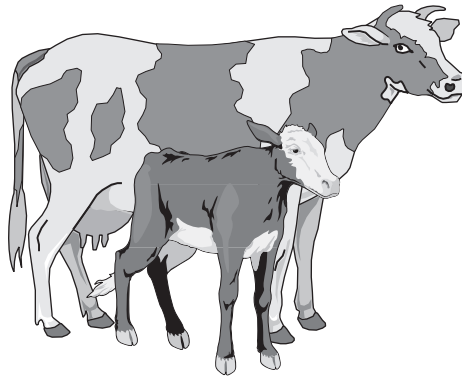


Match features, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

	Feature
1	helps the frog to locate prey in dim light
2	helps the frog to hide from predators
3	helps the frog to jump high
4	helps the frog to hold onto surfaces

QUESTION TWO

The drawing shows a cow and her calf.



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

- A** genes
- B** gametes
- C** embryos
- D** characteristics

The colour and the pattern of the skin of the calf are known as ... **1**

The information for coat colour is stored in parts of chromosomes called ... **2**

This information is passed from the cow to the calf in cells called ... **3**

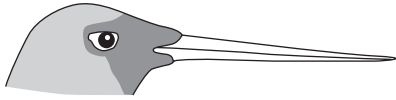
Calves can be cloned by splitting apart cells from ... **4**

Turn over for the next question

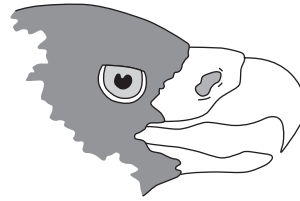
Turn over ►

QUESTION THREE

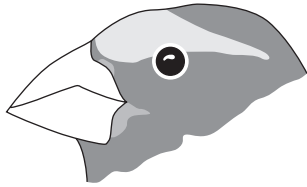
The birds in the diagrams have beaks which are well-suited to the food they eat and the ways in which they obtain it.



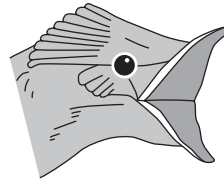
A



B



C



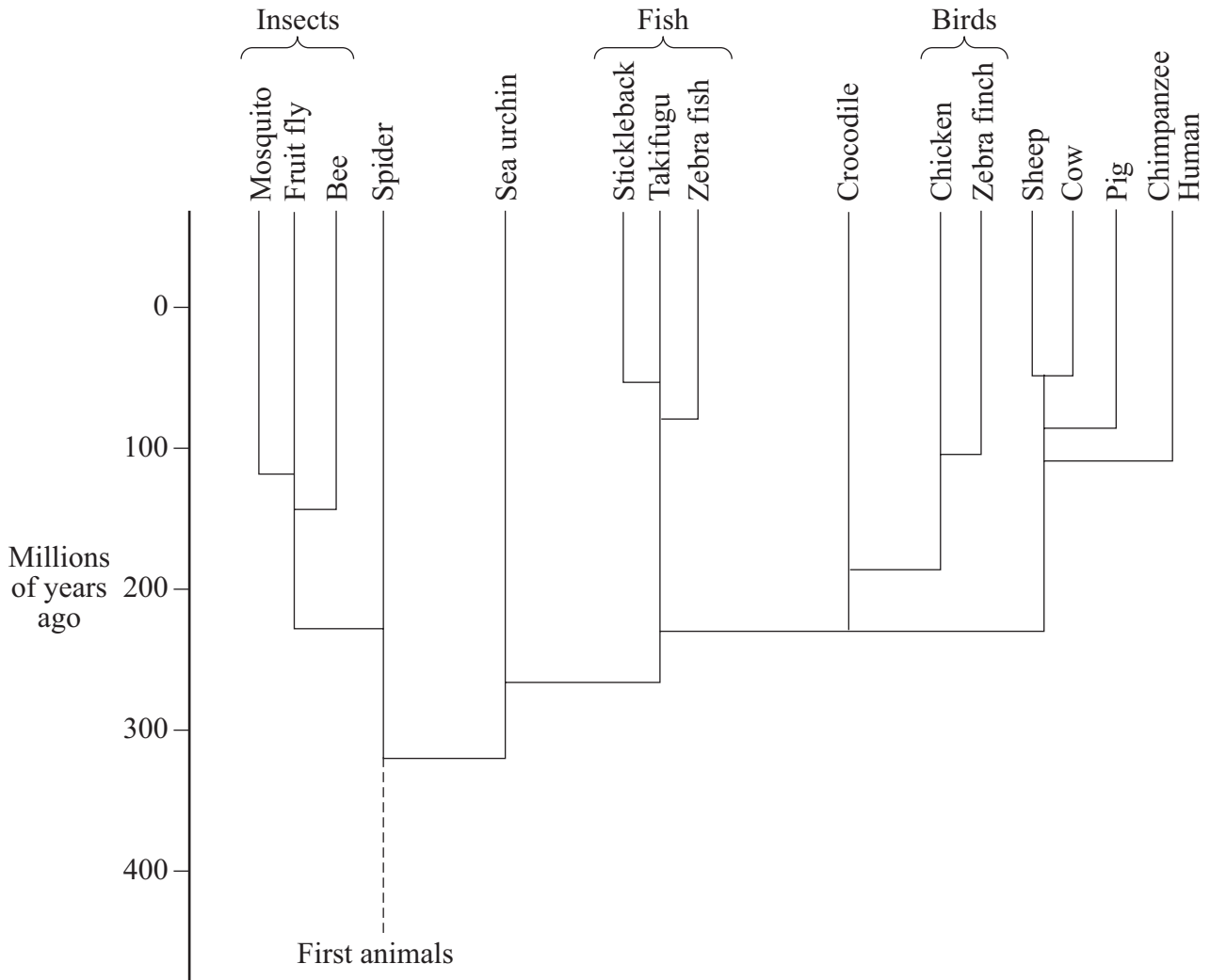
D

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

	Feeding habits
1	catches small insects as it flies
2	kills small animals with its hooked beak
3	feeds on nectar from deep inside flowers
4	eats seeds which it cracks open

QUESTION FOUR

The diagram shows how and when some different types of animal are thought to have evolved.



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

- A** sheep
- B** insects
- C** sea urchins
- D** crocodiles

Cows and . . . **1** . . . are more closely related than cows and pigs.

Around 230 million years ago, the first . . . **2** . . . began to evolve.

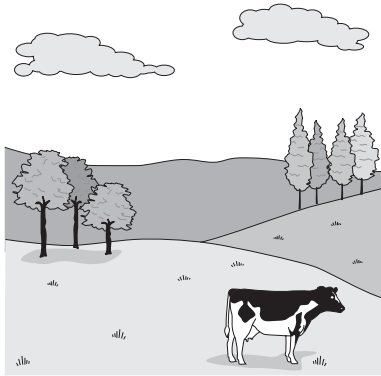
The first fish, such as Takifugu, may have evolved from the ancestors of . . . **3**

Birds could have evolved from the ancestors of . . . **4**

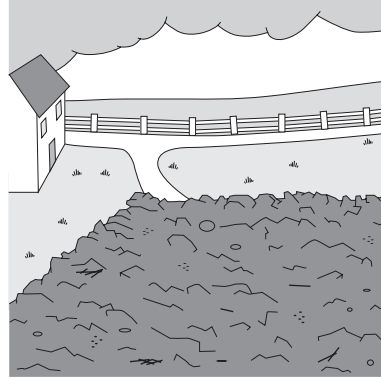
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QUESTION FIVE

A farmer is thinking about where to build a new house on his land. He has two possibilities in mind. One is to use a field (site **X**) where nothing has been built before. The other is to use a site (site **Y**) that used to have a building on it which was destroyed by fire and has now been levelled.



Site **X**: not built on before



Site **Y**: built on before

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

- A** an advantage of site **X**
- B** a disadvantage of site **X**
- C** an advantage of site **Y**
- D** a disadvantage of site **Y**

	Feature
1	Farmland will be lost.
2	Electricity and water supplies are already in place.
3	The site may be expensive to clear up.
4	There is more choice where to build the house.

QUESTION SIX

Farms may pollute the environment in several ways.

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

A carbon dioxide

B pesticide

C fertiliser

D sewage

	Feature
1	chemical spread on land to help crop growth
2	solid and liquid waste produced by cows
3	produced by tractors
4	chemical sprayed on crops to kill insects

Turn over for the next question

Turn over ►

SECTION TWOQuestions **SEVEN** to **NINE**.

Each of these questions has four parts.

In each part choose only **one** answer.Mark your choices on the answer sheet.

QUESTION SEVEN

Deforestation is a major concern for all of us.

The forests of Brazil are now much smaller than they used to be.

The graph shows the loss of trees from the Amazon rain forest from 1980 to 2004.



7A In which year were most trees lost?

- 1 1982
- 2 1988
- 3 1996
- 4 2000

7B What was the loss of trees in 1988?

- 1 12 km² per year
- 2 120 km² per year
- 3 1 200 km² per year
- 4 12 000 km² per year

7C Most of the loss of trees from tropical forests has been due to . . .

- 1 using the land for agriculture.
- 2 removing the threat from wild animals.
- 3 opening up the area for tourism.
- 4 housing the population.

7D Forests are important for our planet because . . .

- 1 they remove acid rain from the atmosphere.
- 2 they release carbon dioxide to the atmosphere.
- 3 they radiate energy back into space.
- 4 large amounts of carbon are 'locked-up' in the trees.

Turn over ►

QUESTION EIGHT

Darwin and Lamarck were two scientists who had different ideas about how animals and plants have changed over time.

8A The idea that animals and plants have changed over millions of years is called . . .

- 1 adaptation.
- 2 mutation.
- 3 evolution.
- 4 extinction.

8B New explanations about changes in animals and plants are called . . .

- 1 observations.
- 2 hypotheses.
- 3 evidence.
- 4 issues.

8C In Darwin's and Lamarck's lifetimes, many other scientists did not believe their explanations because of lack of . . .

- 1 bias.
- 2 hypotheses.
- 3 evidence.
- 4 issues.

8D Most scientists now accept Darwin's explanation because of the discovery of fossils.

This makes his explanation more . . .

- 1 accurate.
- 2 valid.
- 3 theoretical.
- 4 biased.

Turn over for the next question

Turn over ►

QUESTION NINE

Read the passage:

The *Agrobacterium tumefaciens* bacterium will accept genes from another organism. The bacterium can then transfer those genes from itself into plants. The plant then grows a lump of cells (a gall) that contain the genes from the bacterium. New plants, containing the genes, can be grown from galls. This technique has been used to transfer genes from a firefly into a tobacco plant, which then glows in the dark.

- 9A** The transfer of genes from the firefly into the bacterium is an example of . . .
- 1 asexual reproduction.
 - 2 cloning.
 - 3 genetic engineering.
 - 4 transplantation.
- 9B** From which structure in the firefly would scientists cut out the gene that causes glowing?
- 1 gamete
 - 2 chromosome
 - 3 enzyme
 - 4 cell
- 9C** Cells from the tobacco plants containing the new genes would have to be cloned. This cloning would be carried out using . . .
- 1 embryo transplantation.
 - 2 adult cell cloning.
 - 3 genetic engineering.
 - 4 tissue culture.

9D What was the most likely reason for carrying out this experiment?

- 1** to make tobacco plants grow taller
- 2** to remove genes from fireflies
- 3** to see whether genes could be transferred from animals to plants
- 4** to grow plants from galls

END OF TEST

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

HIGHER TIER

SECTION ONE

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

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

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

Mark your choices on the answer sheet.

QUESTION ONE

Farms may pollute the environment in several ways.

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

A carbon dioxide

B pesticide

C fertiliser

D sewage

	Feature
1	chemical spread on land to help crop growth
2	solid and liquid waste produced by cows
3	produced by tractors
4	chemical sprayed on crops to kill insects

QUESTION TWO

Read the passage:

Mount Rainier in America is home to some very rare plants. Many of them grow there even though the weather is so cold that trees cannot grow. As global warming continues, the mountain will become warmer. For every one degree Celsius rise in temperature, the trees can grow 75 metres higher up the mountain.

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

- A** competition
- B** environmental change
- C** survival
- D** extinction

1	allows trees to grow higher up the mountain
2	a possible consequence of global warming for the rare plants
3	a possible consequence of global warming for both the trees and the rare plants
4	a possible consequence of protecting the rare plants

Turn over for the next question

Turn over ►

SECTION TWOQuestions **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

Darwin and Lamarck were two scientists who had different ideas about how animals and plants have changed over time.

3A The idea that animals and plants have changed over millions of years is called . . .

- 1 adaptation.
- 2 mutation.
- 3 evolution.
- 4 extinction.

3B New explanations about changes in animals and plants are called . . .

- 1 observations.
- 2 hypotheses.
- 3 evidence.
- 4 issues.

3C In Darwin's and Lamarck's lifetimes, many other scientists did not believe their explanations because of lack of . . .

- 1 bias.
- 2 hypotheses.
- 3 evidence.
- 4 issues.

3D Most scientists now accept Darwin's explanation because of the discovery of fossils.

This makes his explanation more . . .

- 1 accurate.
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Turn over for the next question

Turn over ►

QUESTION FOUR

Read the passage:

The *Agrobacterium tumefaciens* bacterium will accept genes from another organism. The bacterium can then transfer those genes from itself into plants. The plant then grows a lump of cells (a gall) that contain the genes from the bacterium. New plants, containing the genes, can be grown from galls. This technique has been used to transfer genes from a firefly into a tobacco plant, which then glows in the dark.

- 4A** The transfer of genes from the firefly into the bacterium is an example of . . .
- 1 asexual reproduction.
 - 2 cloning.
 - 3 genetic engineering.
 - 4 transplantation.
- 4B** From which structure in the firefly would scientists cut out the gene that causes glowing?
- 1 gamete
 - 2 chromosome
 - 3 enzyme
 - 4 cell
- 4C** Cells from the tobacco plants containing the new genes would have to be cloned. This cloning would be carried out using . . .
- 1 embryo transplantation.
 - 2 adult cell cloning.
 - 3 genetic engineering.
 - 4 tissue culture.

4D What was the most likely reason for carrying out this experiment?

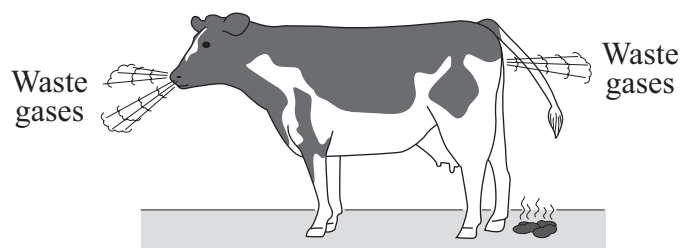
- 1 to make tobacco plants grow taller
- 2 to remove genes from fireflies
- 3 to see whether genes could be transferred from animals to plants
- 4 to grow plants from galls

Turn over for the next question

Turn over ►

QUESTION FIVE

Rearing cattle affects the environment.



5A In addition to methane, which other greenhouse gas do cattle release into the atmosphere?

- 1 carbon dioxide
- 2 carbon monoxide
- 3 nitrogen dioxide
- 4 sulfur dioxide

5B Cattle rearing can lead to sewage and farm chemicals entering streams and lakes.

The level of pollution of these water systems can be estimated most reliably by examining the . . .

- 1 colour of the water.
- 2 range of lichens living near the water.
- 3 range of invertebrates living in the water.
- 4 temperature of the water at regular intervals.

5C Greenhouse gases keep the Earth warm because . . .

- 1 they are good insulators.
- 2 they trap energy as it enters the Earth's atmosphere from the Sun.
- 3 they allow more radiation to pass through.
- 4 they re-radiate energy back to the Earth.

5D Forests help to reduce the greenhouse effect mainly by . . .

- 1 'locking-up' carbon dioxide as wood.
- 2 giving out oxygen.
- 3 taking in methane.
- 4 absorbing radiation from the Sun.

Turn over for the next question

Turn over ►

QUESTION SIX

Puffins are birds which live along coastal regions from southern Spain to Iceland. Scientists investigated whether wing length is related to temperature by collecting data on five adult puffins from each of Spain, France, the British Isles and Iceland.

The results are shown in the table.

Country	Latitude in ° North	Mean daily temperature range in °C	Range of wing length in cm
Spain	36 to 43	10 to 28	13.3 to 14.8
France	42 to 50	3 to 25	14.1 to 15.8
the British Isles	50 to 58	2 to 18	15.2 to 16.8
Iceland	63 to 66	-10 to 10	15.9 to 17.5

6A In which country was the greatest range of wing length observed?

- 1 Spain
- 2 France
- 3 the British Isles
- 4 Iceland

6B What relationship does the data show?

- 1 Puffins from more northerly countries have larger bodies.
- 2 Puffins which live in colder countries have smaller wings.
- 3 There is no relationship between wing length and latitude.
- 4 Puffins from more northerly countries have longer wings.

6C The wing length of a dead adult puffin washed up on the shore was 15.7 cm.

From which countries could the puffin have come?

- 1 Spain and the British Isles
- 2 the British Isles and Iceland
- 3 France and the British Isles
- 4 Spain and France

6D Which of the following describes a weakness in the design of this investigation?

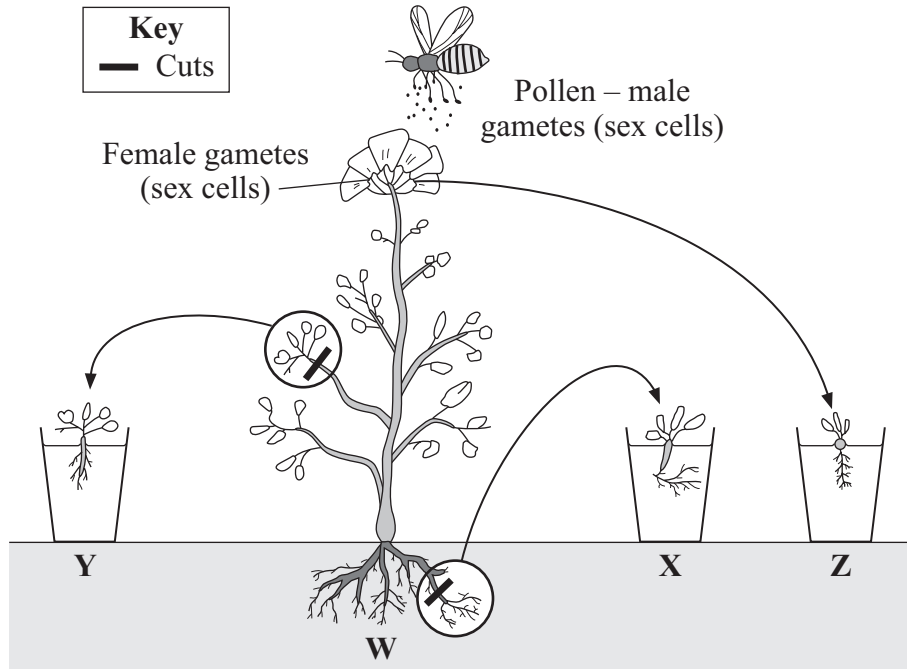
- 1 The wing lengths of puffins from other parts of the world were not measured.
- 2 No wing lengths were measured in puffins from latitudes 59° to 62° North.
- 3 Only five puffins were measured from each country.
- 4 The ranges of wing lengths overlap.

Turn over for the next question

Turn over ►

QUESTION SEVEN

New plants may be produced from older adult plants in a variety of ways. Three of these are shown in the diagram.



7A Which process has been used to produce plant **X**?

- 1 taking cuttings
- 2 sexual reproduction
- 3 adult cell cloning
- 4 embryo transfer

7B Which process has been used to produce plant **Z**?

- 1 taking cuttings
- 2 sexual reproduction
- 3 adult cell cloning
- 4 embryo transfer

7C Which of these plants will have genes which are all identical to the adult plant (**W**)?

- 1 X and Y
- 2 X, Y and Z
- 3 Y and Z
- 4 X and Z

7D Producing new plants by the method used to produce plant **Y** is . . .

- 1 quick and cheap.
- 2 quick and expensive.
- 3 slow and expensive.
- 4 slow and cheap.

Turn over for the next question

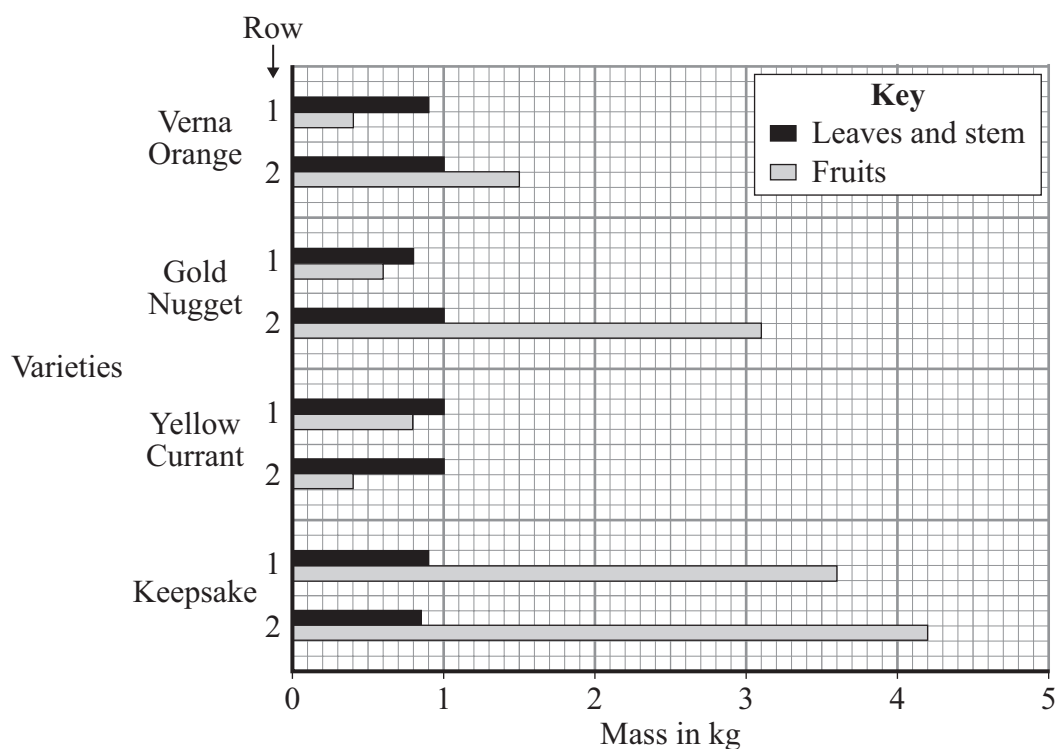
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QUESTION EIGHT

The bar chart shows the mass of tomato fruits and of leaves and stems for four varieties of tomato plant.

Five plants of each variety were taken from each of two rows growing next to each other.

All plants were provided with the same type of soil and volume of water.



8A Which one of the following is true?

- 1 In Verna Orange plants, the mass of the leaves and stems is greater than the mass of the fruits.
- 2 In Keepsake plants, the mass of the fruits is greater than the mass of the leaves and stems.
- 3 In Gold Nugget plants, the mass of the fruits is less than the mass of the leaves and stems.
- 4 In Yellow Currant plants, the mass of the leaves and stems is less than the mass of the fruits.

8B The mean mass of fruits per row from a Gold Nugget plant is . . .

- 1 0.90 kg
- 2 1.375 kg
- 3 1.85 kg
- 4 3.70 kg

8C One student suggested that, ‘tomatoes in row 2 produce more fruit than those in row 1’.

Which tomato plants do **not** support this suggestion?

- 1 Verna Orange
- 2 Gold Nugget
- 3 Yellow Currant
- 4 Keepsake

8D How could a new variety of tomato plant with a greater yield of tomato fruits be produced?

- 1 breeding together two Keepsake plants
- 2 taking cuttings from existing varieties
- 3 using tissue culture
- 4 breeding together different varieties of tomato plant

Turn over for the next question

Turn over ►

QUESTION NINE

The UK Government is committed to supporting sustainable development.

9A What is meant by *sustainable development*?

- 1 improving our quality of life without compromising future generations
- 2 ensuring that everybody has a better standard of living
- 3 keeping pollution to a minimum
- 4 reducing the greenhouse effect

9B Which of the following would promote *sustainable development*?

- 1 encouraging farmers to remove trees to grow more crops
- 2 building more houses on greenfield sites
- 3 ensuring that methane released from council waste tips is captured and used for local heating schemes
- 4 heating schools using oil rather than gas

Amongst many ideas, the Government promises that by 21 April 2009 only timber originating from sustainable sources will be used by Government departments – appropriate documentation will be required to prove it.

9C What is meant by *timber originating from sustainable sources*?

- 1 timber that has been produced in a natural forest
- 2 timber that has been replaced by growing another tree
- 3 timber that has come from vast forests in Russia
- 4 timber from only the oldest trees in forests

9D Why is it important that appropriate documentation will be required?

- 1 so that the correct taxes are paid
- 2 to keep a check on how much timber is being bought
- 3 to check on the source of timber
- 4 to check on the quality of timber

END OF TEST