Version 1.0

Surname		Other Names	
Centre Number						Candidate Number				
Candidate signature										

General Certificate of Secondary Education
Specimen Paper

SCIENCE A **BLY1B**
Unit 1b Biology (Evolution and Environment)

BIOLOGY
Unit 1b Biology (Evolution and Environment)

Date and Time

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 'Evolution and Environment' 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: 1 2 3 4
- Do **not** extend beyond the circles.
- If you want to change your answer, **you must** cross out your original answer, as shown: 1 2 3 4
- 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: 1 2 3 4

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**.

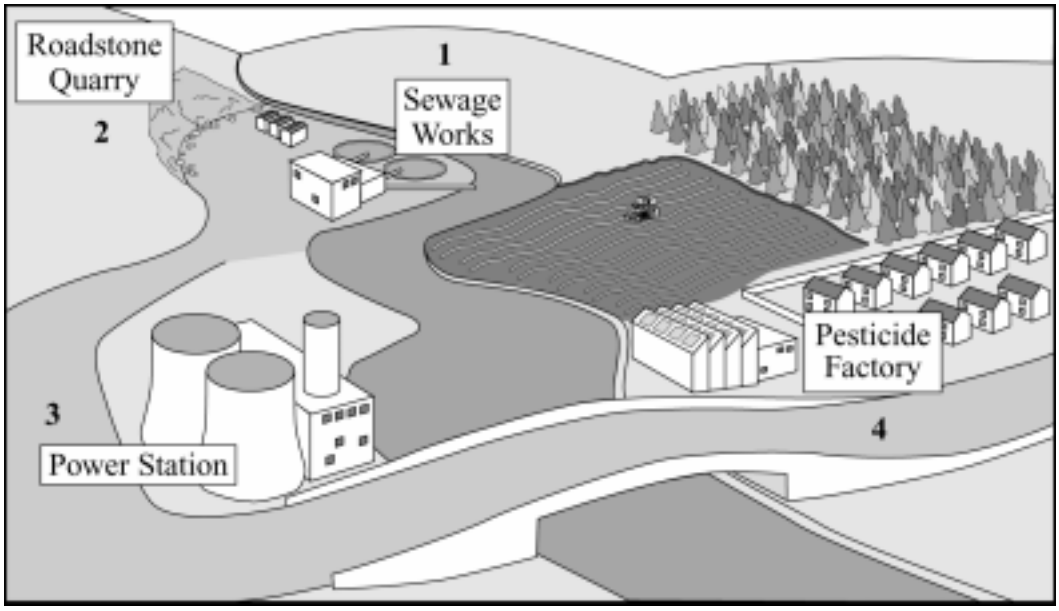
In these questions, match the letters, **A**, **B**, **C** and **D**, with the numbers **1 – 4**.

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

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows some of the ways in which humans affect the environment.



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

A Every year, this place destroys more homes of animals and plants.

B This place causes most water pollution.

C This place produces chemicals that pollute soil.

D This place produces most carbon dioxide.

QUESTION TWO

These young rabbits look like their parents.

This is because information about characteristics such as fur colour is passed from parent to their young.

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

A chromosomes

B genes

C nucleus

D sex

Information is passed from parents to their young in . . . **1** . . . cells.

Each characteristic, eg fur colour, is controlled by . . . **2** . . . .

The structures which carry information for a large number of characteristics are called . . . **3** . . . .

The part of the cell which contains these structures is called the . . . **4** . . . .

QUESTION THREE

Some substances affect the environment.

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

A carbon dioxide

B fertiliser

C methane

D sulfur dioxide

The main substance that produces acid rain is . . . **1** . . . .

The main substance given off by cars is . . . **2** . . . .

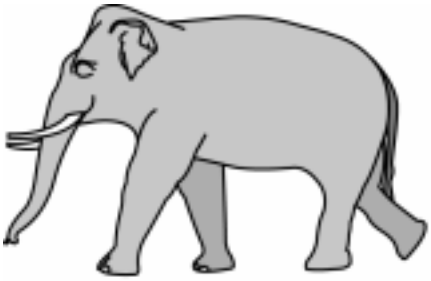
The substance produced mainly by cattle and rice fields is . . . **3** . . . .

The substance that may pollute both land and water is . . . **4** . . . .

QUESTION FOUR

Animals are adapted to survive in their environments.

The drawings show four animals.



African elephant

Arctic hare

Musk ox

Walrus

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

A a large amount of body fat

B camouflage

C increased surface area

D thick fur

A white coat in the Arctic hare acts as . . . **1** . . . .

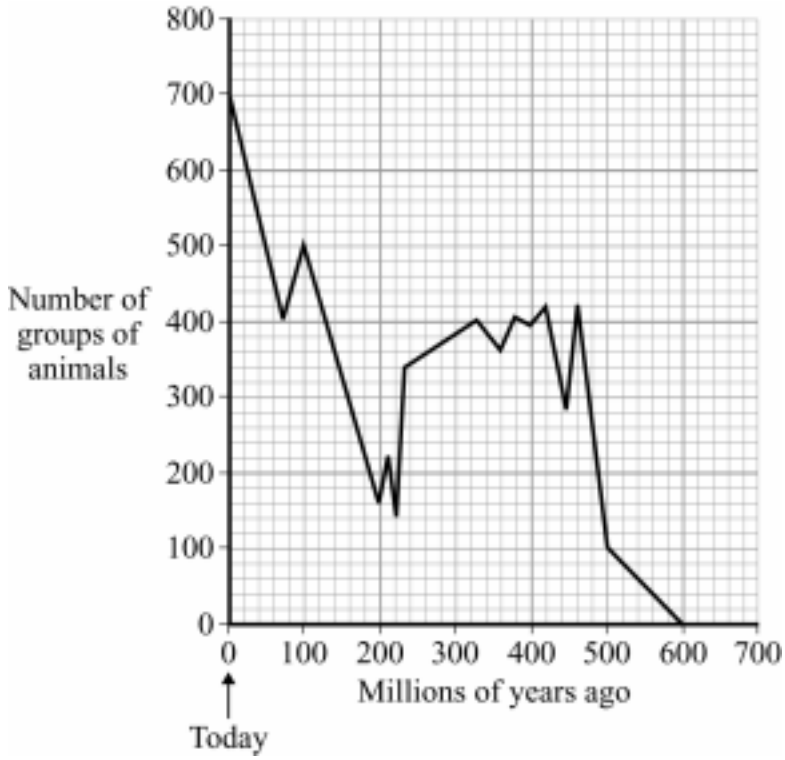
The large ears of an African elephant give it an . . . **2** . . . .

The musk ox is insulated by . . . **3** . . . .

The walrus is insulated by . . . **4**. . . .

QUESTION FIVE

The diagram shows how the number of groups of animals has changed during the history of life on Earth.



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

A 20

B 400

C 500

D 600

Animals first appeared on Earth . . . **1** . . . million years ago.

400 million years ago there were . . . **2** . . . groups of animals.

It took . . . **3** . . . million years for the number of animals to rise to 500.

The proportion of animals that became extinct between 100 and 80 million years ago was . . . **4** . . . .

QUESTION SIX

We can now produce animals and plants with characteristics that we prefer.

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

A splitting apart cells

B taking cuttings

C transferring genes

D using small groups of cells

Plants can be produced cheaply by . . . **1** . . . from an older plant.

Tissues culture involves . . . **2** . . . from part of an organism.

Genetic engineering involves . . . **3** . . . from one organism to another.

Embryo transplantation involves . . . **4** . . . from an organism before they specialise.

Turn over for the next question

SECTION TWO

Questions **SEVEN** to **NINE**.

Each of these questions has four parts.

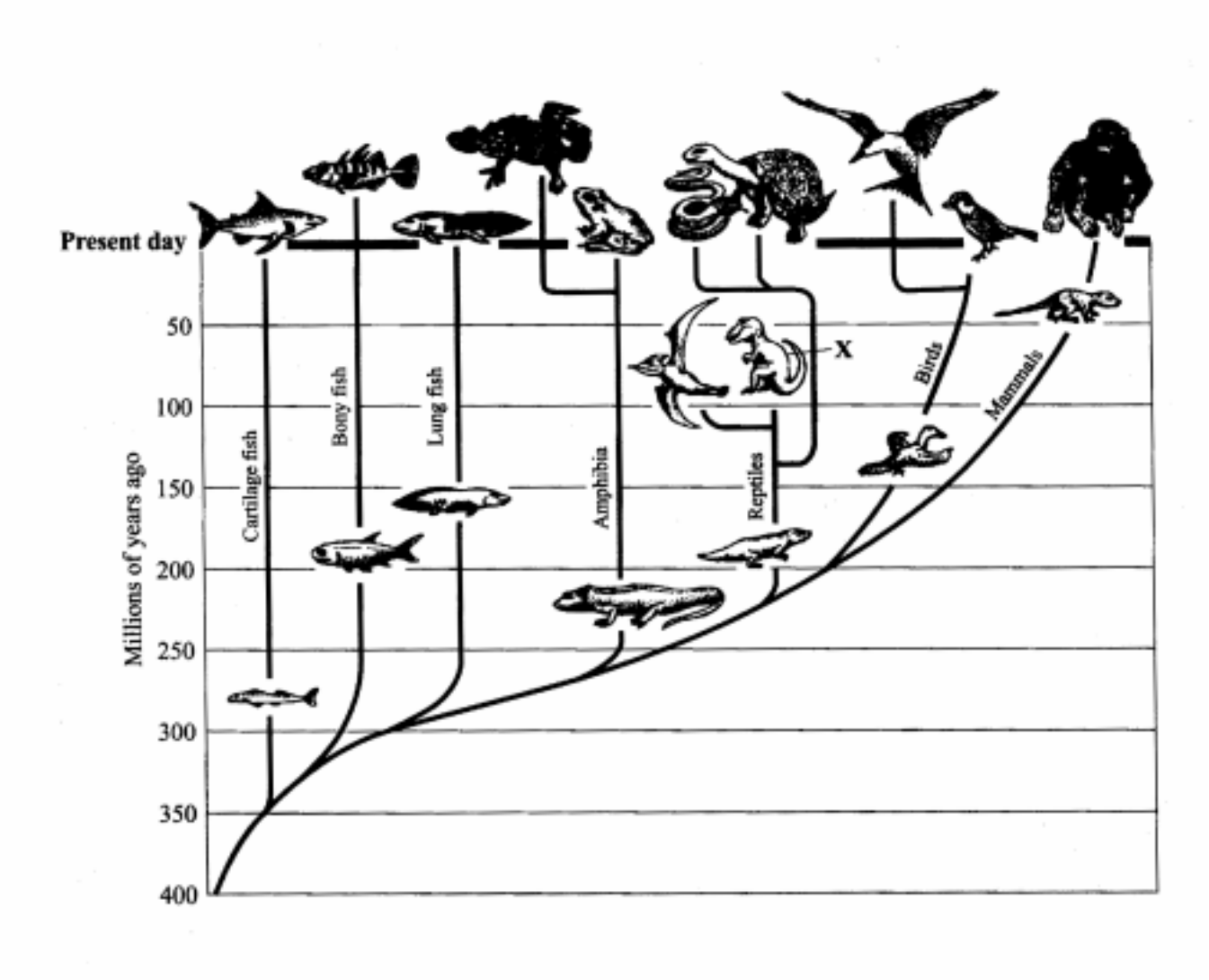
In each part choose only **one** answer.

Mark your choices on the answer sheet.

QUESTION SEVEN

The diagram shows a timeline for the evolution of some groups of animals.

All the groups shown below the line for **Present Day** are extinct.



7A Which four groups of animals developed legs?

1 amphibians, reptiles, birds and mammals

2 bony fish, lung fish, amphibians and reptiles

3 cartilaginous fish, bony fish, lung fish and amphibians

4 lung fish, amphibians, reptiles and birds

7B Which group of animals, shown in the diagram, evolved first?

1 amphibians

2 bony fish

3 cartilaginous fish

4 lung fish

7C The animal, labelled **X**, has been extinct for over 50 million years.

How do scientists know that it once lived?

1 from blood samples

2 from DNA samples

3 from fossils

4 from stories passed down through generations

7D Animals may become extinct because of new . . .

1 diseases.

2 enzymes.

3 hormones.

4 rocks.

QUESTION EIGHT

Lichens are simple plants that are easily damaged by air pollution.

The table show how many different species of lichen were recorded at set distances from a city centre.

Distance from city centre in km	Number of species of lichen found in a given area
0	4
2	7
3	10
5	20
6	25
7	40

8A The least polluted air is found . . .

1 in the city centre.

2 2 km from the city centre.

3 5 km from the city centre.

4 7 km from the city centre.

8B What is the relationship, if any, between the number of lichen species and distance from the city centre?

1 The number of lichen species is directly proportional to the distance from the city centre.

2 The number of lichen species is inversely proportional to the distance from the city centre.

3 The number of lichen species is **not** related to the distance from the city centre.

4 The number of lichen species is related to the distance from the city centre.

Lichens are also indicators of the age of a forest. The more species of lichen present, the older the forest.

8C What would be the best way of collecting data on lichens to compare the ages of two very large forests?

1 Examine every tree in the two forests.

2 Examine 10 trees from each forest.

3 Examine the oldest trees in each forest.

4 Examine the trees in one square kilometre of each forest.

8D Which computer application would be best for storing results from a survey of lichen in a large number of different forests?

1 communications package

2 database

3 graphics package

4 word processor

Turn over for the next question

QUESTION NINE

Professor John Lawton researches into the problem of controlling the spread of bracken. He is waiting for government permission to release the *Conservular* caterpillar which feeds on the bracken. The Secretary of State has to decide whether the *Conservular* caterpillar can be released.

The article printed below describes some of the problems faced by the Secretary of State.

David the caterpillar to bracken's Goliath

Bracken is one of the most widespread and dangerous weeds known to man. Professor Lawton is researching a new method of controlling bracken with *Conservular* caterpillars which could have done the job for nothing.

His research has shown that bracken is the caterpillar's only food. However, can scientists predict what will happen when insects are released into the wild?

Bracken is poisonous – more than 20 000 sheep and 1000 cattle are poisoned by it each year. Its spores can cause hill walkers to develop cancer. Bracken cost £4 m a year to control. It destroys grazing land worth £5 m each year.

The National Farmers Union is concerned about the caterpillar getting out of control. What if it started eating potatoes? However, the caterpillar might help to preserve important habitats for rare animals and plants.

World-wide, scientists are trying to control 94 species of weeds by using insects. Professor Lawson says that there is good control in approximately one-third of these cases.

9A A student performs an experiment to find whether caterpillars prefer eating garden ferns to bracken.

What would be the independent variable in this experiment?

1 the amount of plant eaten

2 the number of caterpillars

3 the number of plants

4 the types of plant

9B How could the validity of the experiment be improved?

1 by increasing the number of caterpillars and the number of plants

2 by increasing the number of plants of each type

3 by increasing the number of types of caterpillar

4 by increasing the number of types of plant

9C The Secretary of State might decide **not** to allow the caterpillar to be released.

One reason for this could be that . . .

1 it would cost too much money.

2 it would upset the National Farmers Union.

3 it would upset the Ramblers Association.

4 there is insufficient scientific evidence about the effects of releasing the caterpillar.

9D What will be the effect on hill farms if the Secretary of State decides that the caterpillar should **not** be released?

1 Hill farms will become less profitable.

2 More ramblers will use the countryside.

3 Some hill farms will be turned into forests.

4 There will be more grazing land for sheep on hill farms.

END OF TEST

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

HIGHER TIER

SECTION ONE

Questions **ONE** to **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

We can now produce animals and plants with characteristics that we prefer.

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Genetic engineering involves . . . **3** . . . from one organism to another.

Embryo transplantation involves . . . **4** . . . from an organism before they specialise.

QUESTION TWO

The Earth's climate is affected by several factors.

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

A carbon dioxide

B energy

C methane

D temperature

Deforestation increases the amount of . . . **1** . . . in the air.

Growing rice crops increases the amount of . . . **2** . . . in the air.

Some gases absorb . . . **3** . . . radiated by the Earth.

This causes the Earth's . . . **4** . . . to increase.

Turn over for the next question

SECTION TWO

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

Each of these questions has four parts.

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

Mark your choices on the answer sheet.

QUESTION THREE

Lichens are simple plants that are easily damaged by air pollution.

The table shows how many different species of lichen were recorded at set distances from a city centre.

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3A The least polluted air is found . . .

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3 Graphics package

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QUESTION FOUR

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4D What will be the effect on hill farms if the Secretary of State decides that the caterpillar should **not** be released?

1 Hill farms will become less profitable.

2 More ramblers will use the countryside.

3 Some hill farms will be turned into forests.

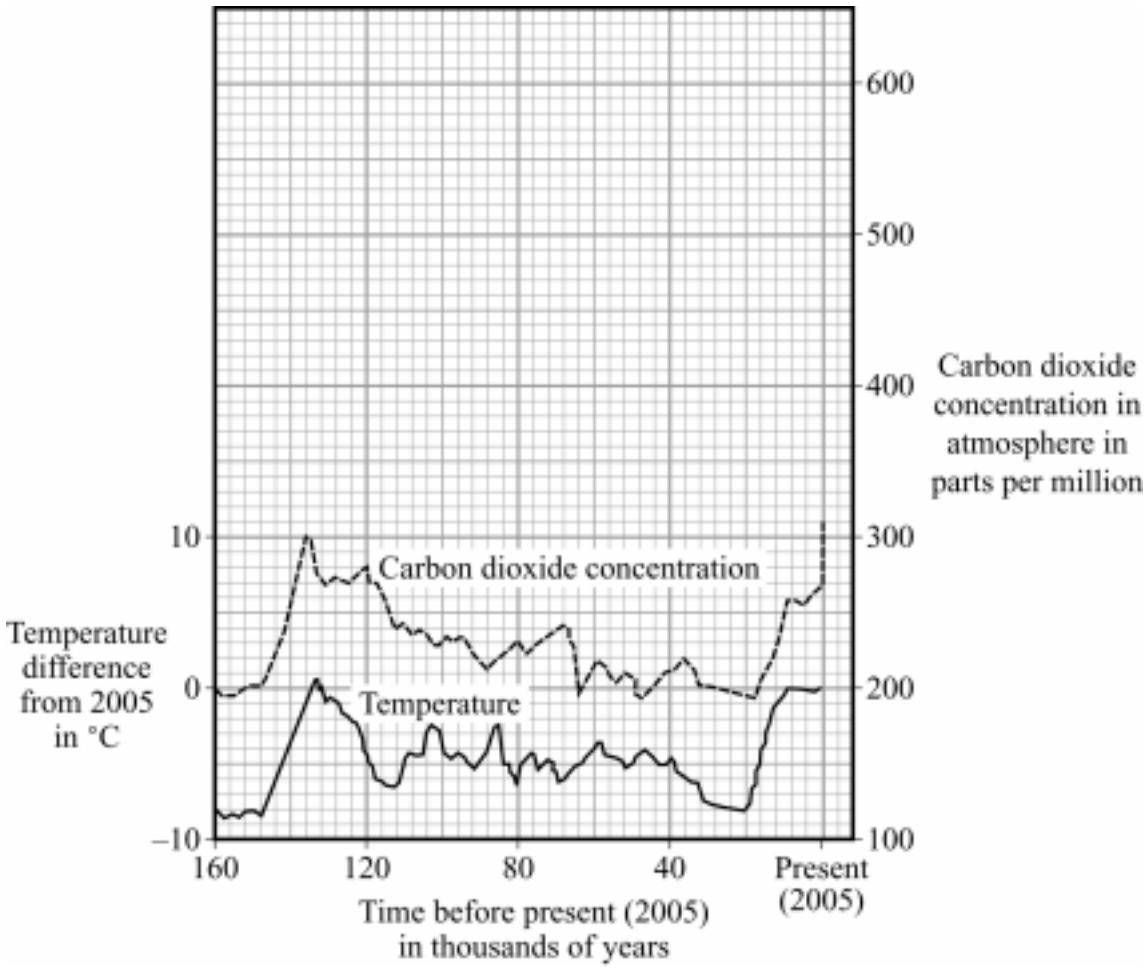
4 There will be more grazing land for sheep on hill farms.

Turn over for the next question

QUESTION FIVE

Scientists have analysed air bubbles trapped in ice in Antarctica.

The graph shows some of the data they have collected.



5A What was the carbon dioxide concentration 120 thousand years ago?

1 200 parts per million

2 220 parts per million

3 280 parts per million

4 300 parts per million

5B The mean temperature in Antarctica today is – 2 °C.

What was the mean temperature in Antarctica 160 thousand years ago?

1 0 °C

2 – 1 °C

3 – 8 °C

4 – 10 °C

5C Over the last 160 thousand years, the concentration of carbon dioxide in the atmosphere has . . .

1 fallen steadily.

2 fluctuated, but shown an overall decrease.

3 fluctuated, but shown an overall increase.

4 risen steadily.

5D The data . . .

1 proves that carbon dioxide causes the greenhouse effect.

. **2** shows an exact correlation between carbon dioxide concentration and the air temperature.

3 shows partial correlation between carbon dioxide concentration and the air temperature.

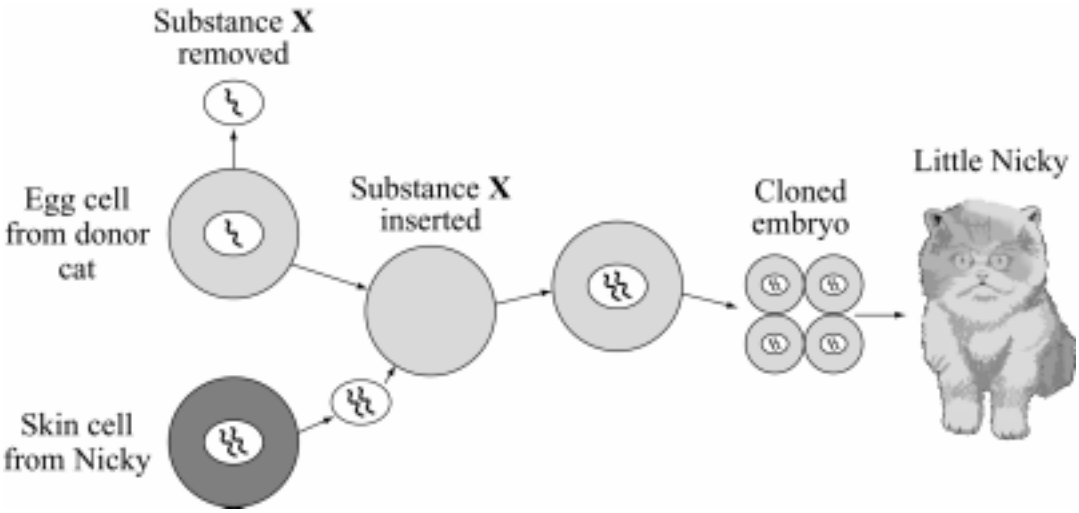
4 shows that air temperature depends on carbon dioxide concentration.

QUESTION SIX

Read the passage below about cloning.

> The first cloned-to-order pet sold in the United States is named Little Nicky, a 9-week-old kitten delivered to a Texas woman saddened by the loss of a cat she had owned for 17 years. The kitten cost its owner $50 000 and was created from substance **X** from her beloved cat, named Nicky, who died last year.
>
> "He is identical. His personality is the same," the owner, Julie, told The Associated Press in a telephone interview. She asked that her last name and home town not be disclosed because she said she fears being targeted by groups opposed to cloning.

The diagram shows how Nicky was cloned.



6A Substance **X** is . . .

1 carbohydrate.

2 DNA.

3 fat.

4 protein.

6B This technique involves . . .

1 asexual reproduction.

2 fertilisation.

3 mutations.

4 sexual reproduction.

6C Nicky and little Nicky are identical because they have the same . . .

1 cells.

2 enzymes.

3 genes.

4 personality.

6D On which grounds are people most likely to object to this technique?

1 economic

2 ethical

3 scientific

4 social

Turn over for the next question

QUESTION SEVEN

Most scientists accept the theory of evolution.

7A The theory of evolution states that all living things alive today have evolved from . . .

1 chemicals.

2 dead organisms.

3 meteorites.

4 simple life forms.

7B Scientists are uncertain about how life began on Earth because . . .

1 humans were one of the most recent species to evolve.

2 living things first appeared a long time ago.

3 the evidence has been destroyed.

4 there are religious arguments about it.

7C The most likely reason for the extinction of all the dinosaurs is that . . .

1 conditions on Earth changed.

2 there were too many of them.

3 they caught a disease.

4 they had too many predators.

7D New forms of genes arise by . . .

1 asexual reproduction.

2 changes to cells.

3 mutation.

4 sexual reproduction.

There are no questions printed on this page

QUESTION EIGHT

Coastal marshes can provide grazing for cattle and sheep. They also support huge numbers of birds and a wide range of water, plant and animal communities. Some of these communities include nationally rare species.

There has been a dramatic reduction in the extent of the grazing marshes in the estuary of the River Thames in recent years. These grazing marshes are downstream from the capital city, London. The table shows what some of the grazing marshes have been converted into.

Converted to	**Mean Annual Rate of Conversion to Other Land Uses (Hectares/Year)**			
	1935–68	**1968–72**	**1972–81**	**1981–89**
Arable (crop-growing)	49	188	90	102
Formal open spaces (parks)	11	30	12	27
Open water	9	9	7	4
Roads and buildings	83	186	142	45
Woodland	3	1	3	2

8A How many hectares of marshes were converted into roads and buildings between the years 1968 and 1972?

1 142

2 186

3 744

4 930

8B What was the percentage change in the mean annual rate of conversion of marshes to formal open spaces (parks), from the period 1972–81 to the period 1981–89?

1 15.0

2 44.4

3 55.5

4 125.0

8C What is the most likely effect on the environment of converting marshes to crop growing?

1 more air pollution

2 more land pollution

3 more water pollution

4 more land and water pollution

8D What is the most likely effect on plant life of converting marshes to crop growing?

1 There are likely to be more plants.

2 There are likely to be fewer plants.

3 There are likely to be more plant species.

4 There are likely to be fewer plant species.

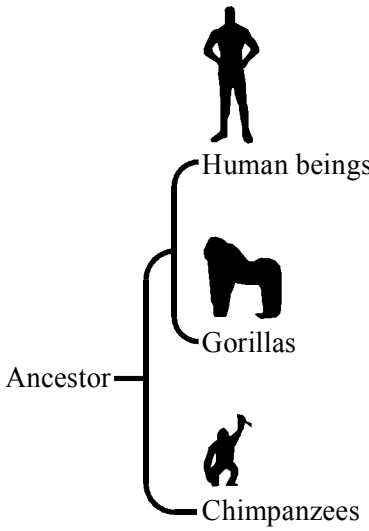
Turn over for the next question

QUESTION NINE

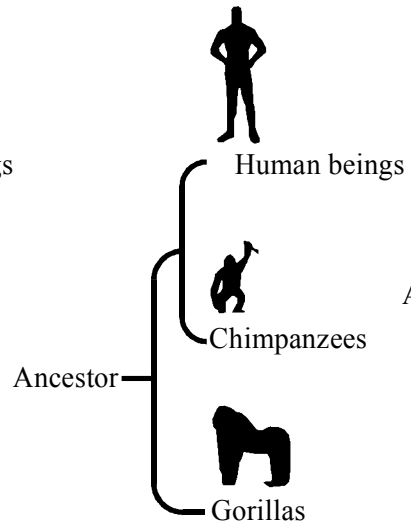
Biologists believe that human beings, gorillas and chimpanzees share a common ancestor. They do not agree as to how this common ancestor evolved into these three species.

The diagram shows three models representing the evolutionary relationship between the three species and the ancestor.

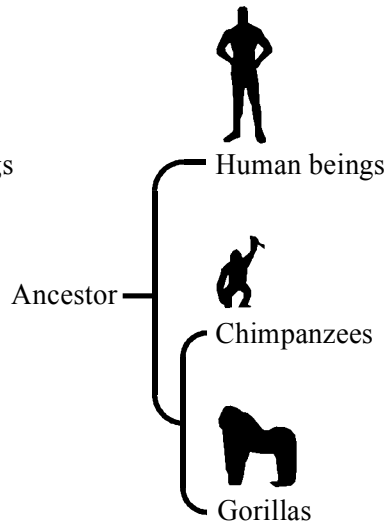
Relationship 1
Human beings and gorillas closely related



Relationship 2
Human beings and chimpanzees closely related



Relationship 3
Chimpanzees and gorillas closely related



The table summarises some of the available evidence concerning the relationship between the three species.

Characteristic	Gorillas	Humans	Chimpanzees	Relationship indicated (if any)
Bones/teeth	Legs shorter than arms	Arms shorter than legs	Legs shorter than arms	**3**
	Large canine teeth	Small canine teeth	Large canine teeth	**2**
	Short thumbs	Long thumbs	Short thumbs	**W**
Soft parts of body	Short head hair	Long head hair	Short head hair	**3**
	Thin buttocks	Fat buttocks	Thin buttocks	**3**
Chromosomes	Total number = **X**	Total number = 46	Total number = 48	**3**
	Structure of chromosomes 5 and 12 differs from other primates	Structure of chromosomes 5 and 12 like other primates	Structure of chromosomes 5 and 12 = **Y**	**3**
	Fluorescence of chromosome Y same as humans	Fluorescence of chromosome Y same as gorilla	Fluorescence of chromosome Y same as other primates	**1**
Molecules	Slight difference from human haemoglobin		Identical to human haemoglobin	**Z**

9A What relationship, (**W**), if any, is indicated by thumb length?

1 Relationship **1**

2 Relationship **2**

3 Relationship **3**

4 No relationship

Question 9 continues on the next page

9B What relationship, (**Z**), if any, is indicated by haemoglobin?

1 relationship **1**

2 relationship **2**

3 relationship **3**

4 no relationship

9C How many chromosomes, (**X**), does a gorilla have?

1 23

2 46

3 48

4 50

9D What is the most likely appearance of chromosomes 5 and 12 in the chimpanzee (**Y**)?

1 identical with human

2 identical with gorilla

3 different from human

4 different from gorilla

END OF TEST

FOUNDATION TIER

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

QUESTION ONE		1	2	3	4
A	Every year, this place destroys more homes of animals and plants.	○	○	○	○
B	This place causes most water pollution.	○	○	○	○
C	This place produces chemicals that pollute soil.	○	○	○	○
D	This place produces most carbon dioxide.	○	○	○	○

QUESTION TWO		1	2	3	4
A	chromosomes	○	○	○	○
B	genes	○	○	○	○
C	nucleus	○	○	○	○
D	sex	○	○	○	○

QUESTION THREE		1	2	3	4
A	carbon dioxide	○	○	○	○
B	fertiliser	○	○	○	○
C	methane	○	○	○	○
D	sulfur dioxide	○	○	○	○

QUESTION FOUR		1	2	3	4
A	a large amount of body fat	○	○	○	○
B	camouflage	○	○	○	○
C	increased surface area	○	○	○	○
D	thick fur	○	○	○	○

QUESTION FIVE		1	2	3	4
A	20	○	○	○	○
B	400	○	○	○	○
C	500	○	○	○	○
D	600	○	○	○	○

QUESTION SIX		1	2	3	4
A	splitting apart cells	○	○	○	○
B	taking cuttings	○	○	○	○
C	transferring genes	○	○	○	○
D	using small groups of cells	○	○	○	○

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

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

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

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OTQ03

GCSE SCIENCE

AQA ASSESSMENT and QUALIFICATIONS ALLIANCE

Unit : BLY1B – Biology 1b

Date/Series :

Centre :

Candidate Number : **UCI :**

Candidate Name :

For completion by the Examination Invigilator. **Please fill this oval 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.

QUESTION ONE	1	2	3	4
A splitting apart cells	○	○	○	○
B taking cuttings	○	○	○	○
C transferring genes	○	○	○	○
D using small groups of cells	○	○	○	○

QUESTION TWO	1	2	3	4
A carbon dioxide	○	○	○	○
B energy	○	○	○	○
C methane	○	○	○	○
D temperature	○	○	○	○

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

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

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

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

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

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

QUESTION NINE
A ○
B ○
C ○
D ○

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SCIENCE A (4461)/BIOLOGY (4411)

Objective Test Answer Key

BLY1B (Evolution and Environment)

Specimen Paper

Foundation Tier

Question	Key		
One	**A**	Every year, this place destroys more homes of animals and plants.	**2**
	B	his place causes most water pollution.	**1**
	C	This place produces chemicals that pollute soil.	**4**
	D	This place produces most carbon dioxide.	**3**
Two	**A**	chromosomes	**3**
	B	genes	**2**
	C	nucleus	**4**
	D	sex	**1**
Three	**A**	carbon dioxide	**2**
	B	fertiliser	**4**
	C	methane	**3**
	D	sulfur dioxide	**1**
Four	**A**	a large amount of body fat	**4**
	B	camouflage	**1**
	C	increased surface area	**2**
	D	thick fur	**3**
Five	**A**	20	**4**
	B	400	**2**
	C	500	**3**
	D	600	**1**
Six	**A**	splitting apart cells	**4**
	B	taking cuttings	**1**
	C	transferring genes	**3**
	D	using small groups of cells	**2**

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

GCSE

SCIENCE A (4461)/BIOLOGY (4411)

Objective Test Answer Key

BLY1B (Evolution and Environment)

Specimen Paper

Higher Tier

Question	Key		
One	**A**	splitting apart cells	**4**
	B	taking cuttings	**1**
	C	transferring genes	**3**
	D	using small groups of cells	**2**
Two	**A**	carbon dioxide	**1**
	B	energy	**3**
	C	methane	**2**
	D	temperature	**4**

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