Centre Number						Candidate Number					
Surname											
Other Names											
Candidate Signature											

AQA

General Certificate of Secondary Education
Foundation Tier and Higher Tier
November 2012

Science A
Unit Biology B1b (Evolution and Environment)

Biology
Unit Biology B1b (Evolution and Environment)

BLY1BP

F&H

Tuesday 6 November 2012   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.
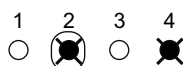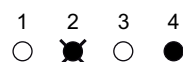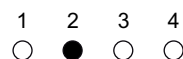
Information
● The maximum mark for this paper is 36.

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.

BLY1BP

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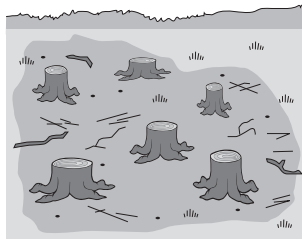
Use **each** answer only **once**.

Mark your choices on the answer sheet.

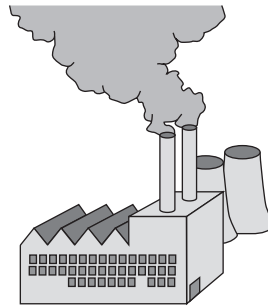**QUESTION ONE**

The drawings show four ways our activities affect the environment.
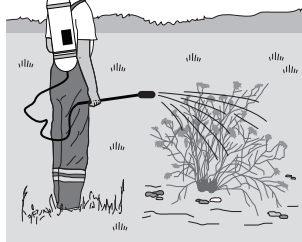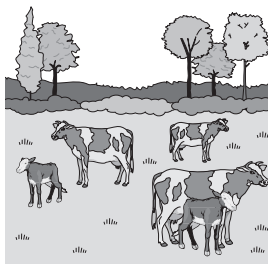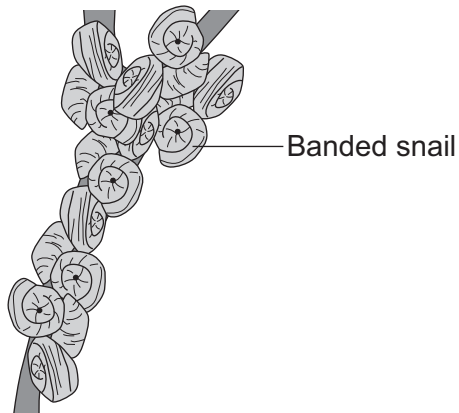
1

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

Banded snails live in woodland and grassland.

Banded snail

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 produces a different colour is caused by . . . **2** . . . .

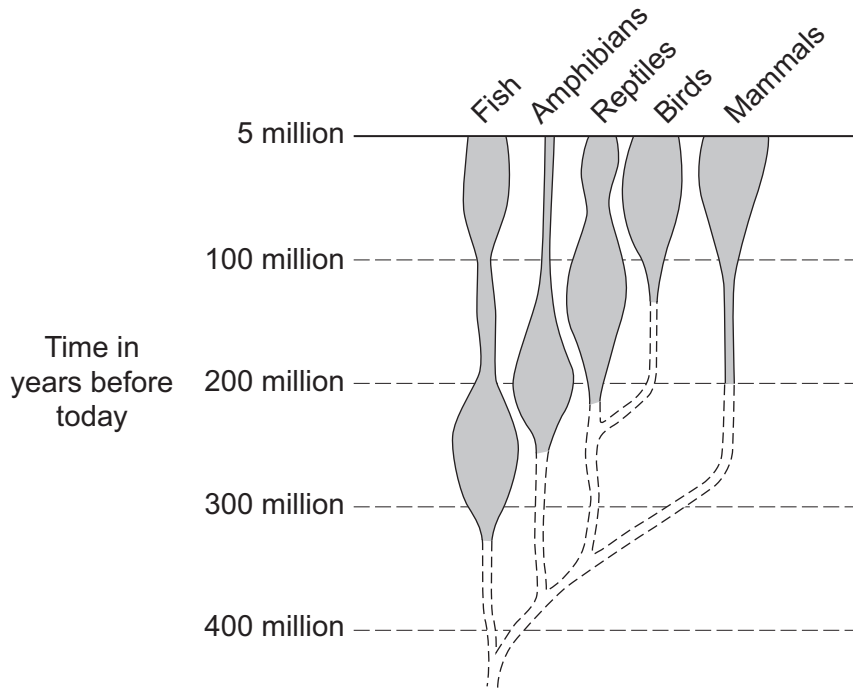Birds only eat certain coloured snails. This is an example of . . . **3** . . . .

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

Turn over ▶

QUESTION THREE

The diagram shows how the number of species in different groups of vertebrates changed between 400 million years ago and 5 million years ago.

The wider a block is, the more species there are.

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

A   fish

B   amphibians

C   reptiles

D   mammals

The group with most species 200 million years ago was . . . **1** . . . .

Birds are most closely related to . . . **2** . . . .

250 million years ago, the vertebrates on Earth were mainly . . . **3** . . . .

The group with most species 5 million years ago was . . . **4** . . . .

QUESTION FOUR

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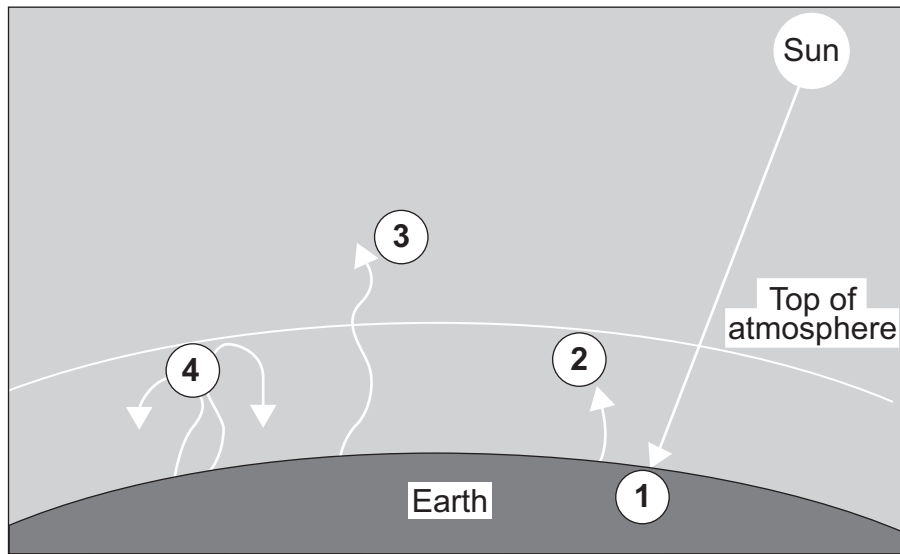
Match statements, **A**, **B**, **C** and **D**, with the labels **1**–**4** on the diagram.

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

Turn over ▶

QUESTION FIVE

The drawing shows a cow and her calf.
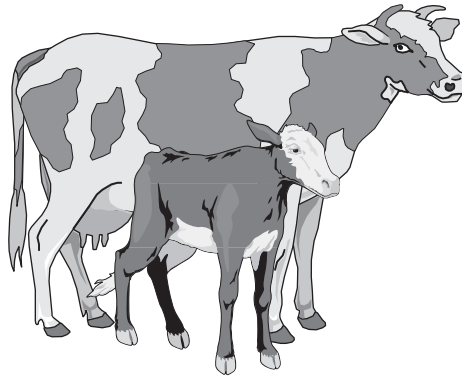
Match words, **A**, **B**, **C** and **D**, with the numbers **1**–**4** in the sentences.

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

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

Fennec fox
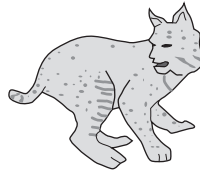
Bobcat
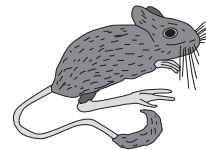
Jerboa

Antelope squirrel
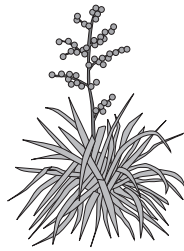
Yucca

Prickly pear cactus

6A 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

6B All the animals above probably compete for . . .

1 light.

2 oxygen.

3 carbon dioxide.

4 territory.

6C   When the plants grow near to each other, the plants do **not** compete for . . .

    1   prey.

    2   water.

    3   light.

    4   space.

6D   To help the fennec fox to lose heat, it has . . .

    1   forward facing eyes.

    2   camouflaged fur.

    3   sharp claws.

    4   large ears.

Turn over for the next question

QUESTION SEVEN

The picture shows a crocodile.

7A The crocodile can keep most of its body underwater for a long time.

Which row in the table has ticks for all the features of the crocodile that help it to stay underwater for a long time?

	Nostrils at the tip of the nose	Sharp teeth	Transparent eyelids	Eyes at top of the head	Scaly skin
1	✓	✓	✓		
2				✓	✓
3		✓	✓		
4	✓		✓	✓	

Female crocodiles lay up to 80 eggs in a large nest on land and then cover the nest with vegetation. The vegetation rots and produces heat. The heat incubates the eggs.

Scientists investigated how the temperature at which the eggs are kept affects the sex of the young crocodile. The table below shows their results.

Temperature at which eggs are kept in °C	30.8	31.2	31.6	32.0	32.4
Percentage of eggs that hatch as males	14	48	88	42	16

7B   What pattern does the data show?

   1   There is an ideal temperature for the eggs to hatch as males.

   2   The lower the temperature of the eggs, the more eggs hatch as males.

   3   The higher the temperature of the eggs, the more eggs hatch as males.

   4   There is no relationship between temperature and the number of eggs that hatch
            as males.

7C   Which is the best estimate of the percentage of eggs that would hatch as males if the eggs
         were kept at 31.0 °C?

   1   30%

   2   58%

   3   70%

   4   84%

7D   Scientists predict that the temperature of the atmosphere will increase by up to 1 °C in the next
         50 years.

         What effect will a 1 °C increase have on the population of crocodiles?

   1   no effect

   2   decrease the percentage of eggs hatching as females

   3   increase the total number of eggs hatching

   4   we cannot tell from the data provided
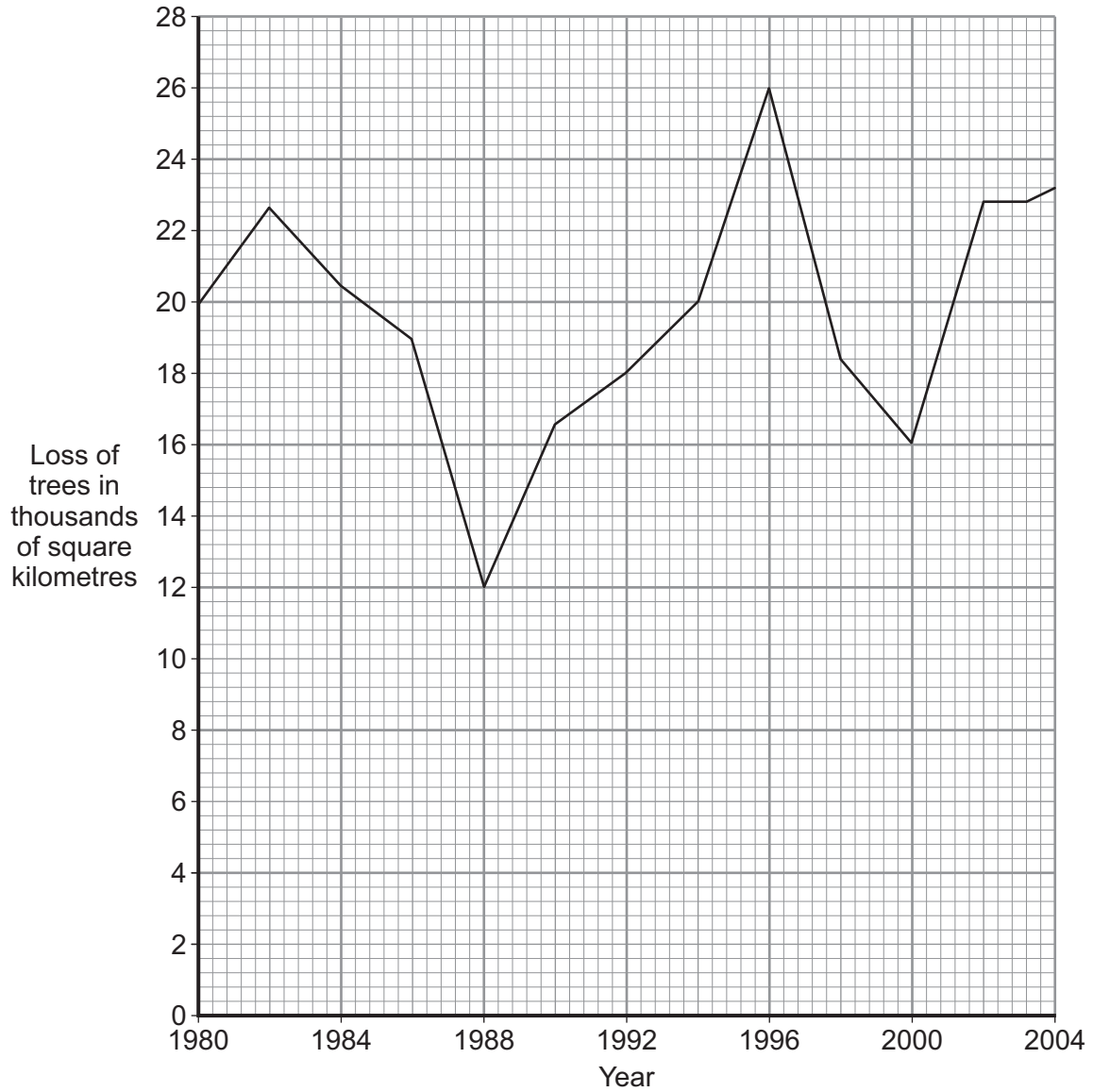
Turn over for the next question

Turn over ▶

QUESTION EIGHT

Deforestation is a 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.

8A In which year were most trees lost?

   1   1982

   2   1988

   3   1996

   4   2000

8B What was the loss of trees in 1988?

   1 $12\,km^2$

   2 $120\,km^2$

   3 $1\,200\,km^2$

   4 $12\,000\,km^2$

8C Most of the loss of trees from tropical rain 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.

8D 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 NINE

A group of students did 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 cover of each seaweed.
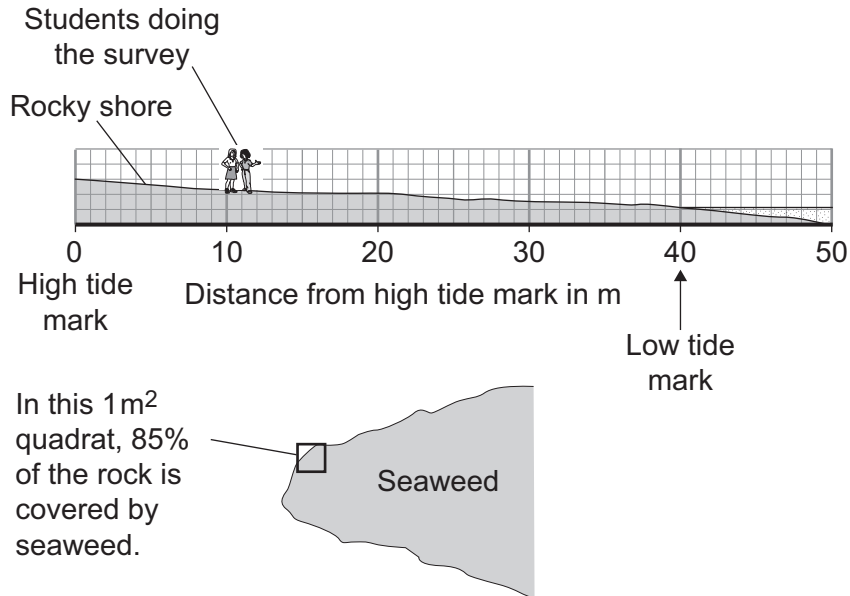
9A Which of the following sampling methods would provide the most reliable results?

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

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

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

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

The diagram shows the students' results.
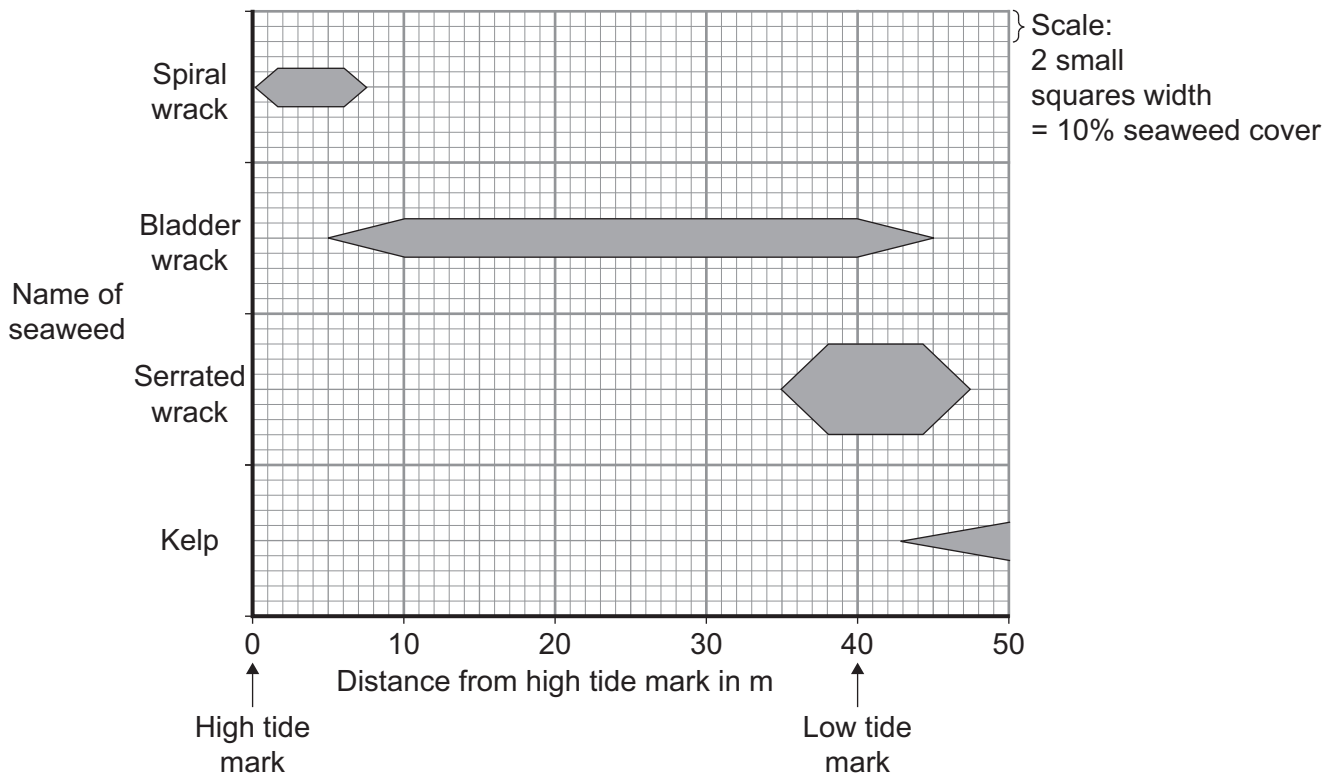
9B What is the distribution range of bladder wrack on the rocky shore?

1 0 to 8 metres

2 5 to 45 metres

3 35 to 48 metres

4 43 to 50 metres

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

1 20

2 30

3 50

4 60

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

1 Spiral wrack

2 Bladder wrack

3 Serrated wrack

4 Kelp

END OF TEST

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

HIGHER TIER

Section One

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

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

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

Mark your choices on the answer sheet.

QUESTION ONE

The drawing shows a cow and her calf.
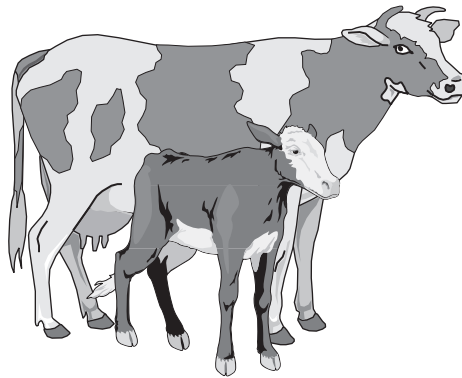
Match words, **A**, **B**, **C** and **D**, with the numbers **1–4** in the sentences.

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** . . . .

QUESTION TWO

This question is about evolution.

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

A   mutation

B   natural selection

C   extinction

D   variation

Evolution happens because of . . . **1** . . . .

Evolution is a very slow process.

Individual organisms of a particular species have differences in their genes, so may show a wide . . . **2** . . . .

These organisms breed and pass on their genes to the next generation, and this passes on their useful characteristics.

More rapid change in a species may be because of . . . **3** . . . .

A new disease might cause . . . **4** . . . of the species.

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.

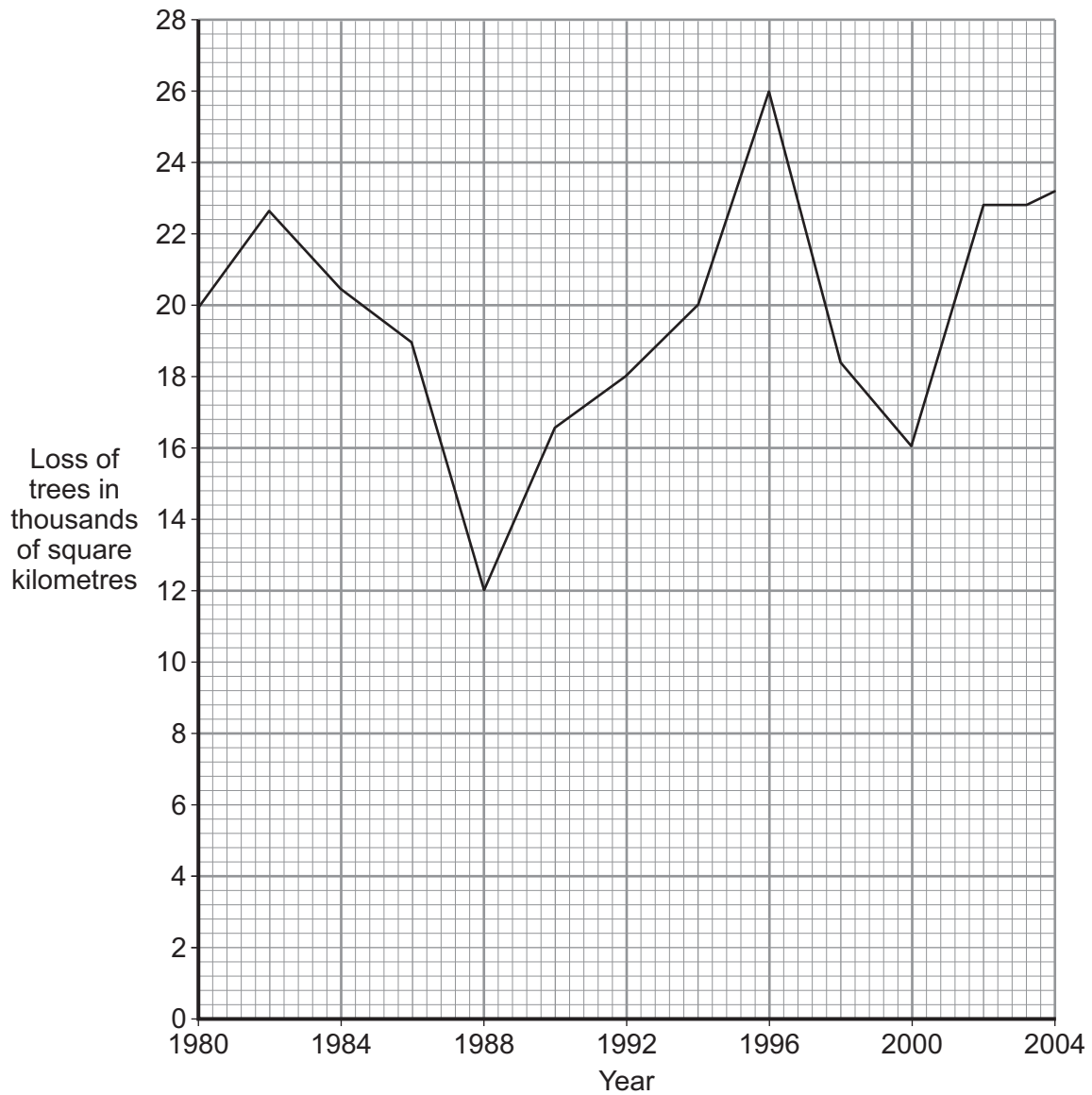Mark your choices on the answer sheet.

QUESTION THREE

Deforestation is a 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.

3A   In which year were most trees lost?

    1   1982

    2   1988

    3   1996

    4   2000

3B   What was the loss of trees in 1988?

    1 $12\,km^2$

    2 $120\,km^2$

    3 $1\,200\,km^2$

    4 $12\,000\,km^2$

3C   Most of the loss of trees from tropical rain 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.
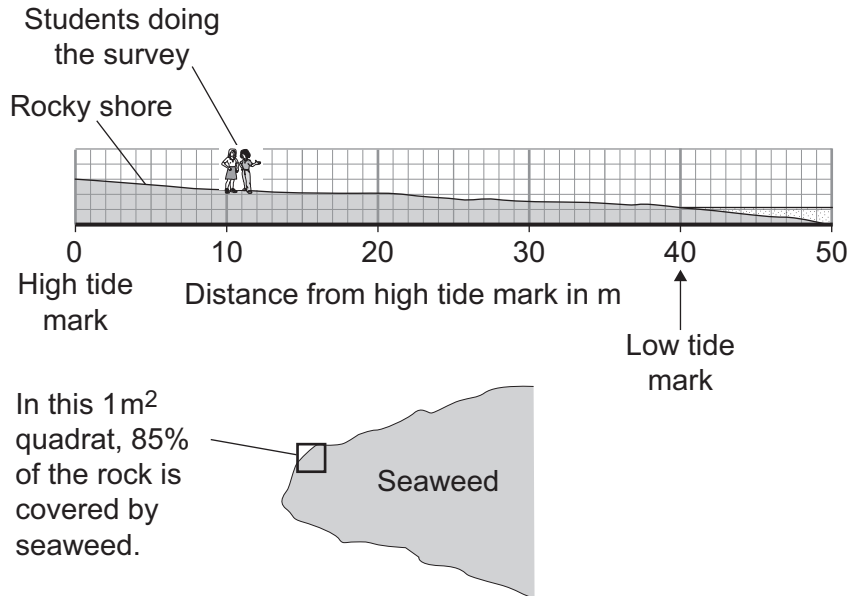
    4   housing the population.

3D   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.

QUESTION FOUR

A group of students did 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 cover of each seaweed.

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

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

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

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

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

The diagram shows the students' results.

} Scale:
2 small
squares width
= 10% seaweed cover
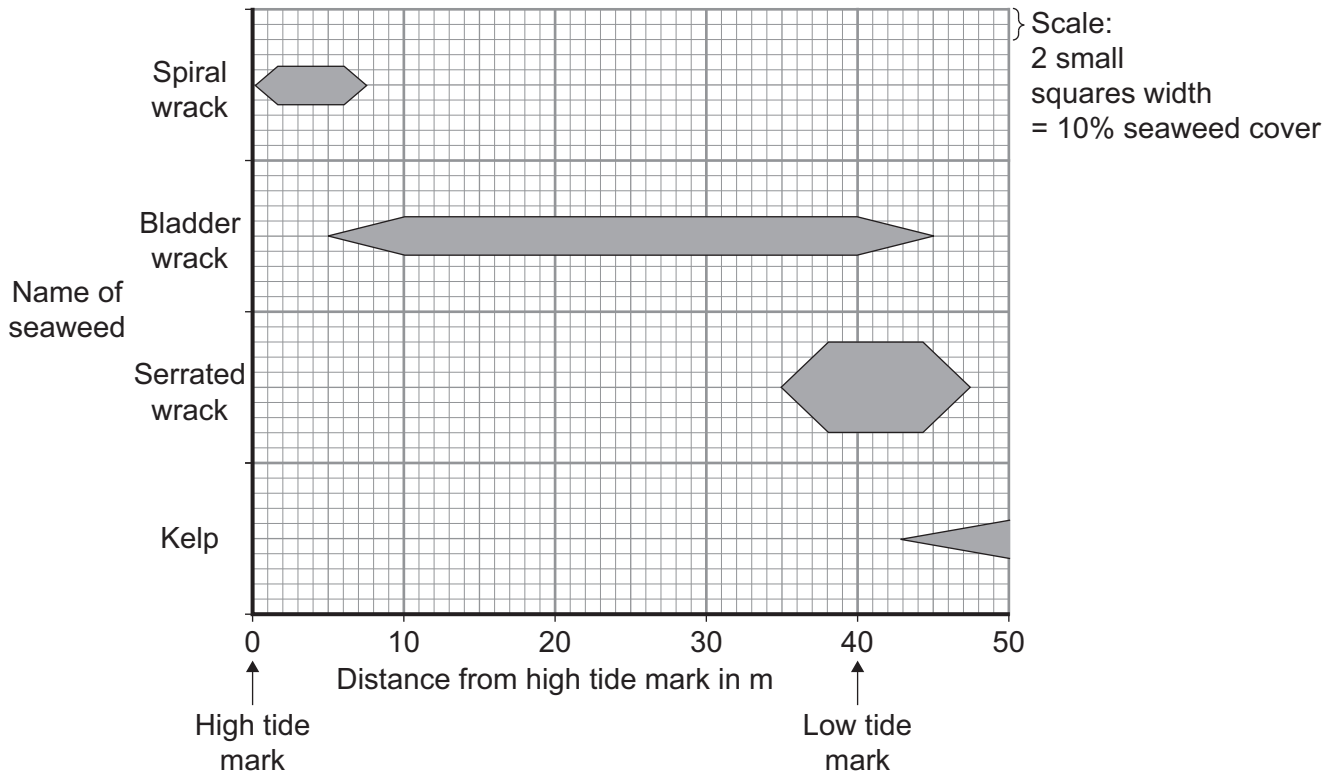
4B What is the distribution range of bladder wrack on the rocky shore?

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

3   50

4   60

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

1   Spiral wrack

2   Bladder wrack

3   Serrated wrack

4   Kelp

Turn over ▶

QUESTION FIVE

Corn borer insects damage corn crops. Genetically modified (GM) corn plants produce a poison. The poison kills the corn borer insects. Scientists say that corn borer insects will develop resistance to the poison in about 3 to 4 years.

5A   The first GM corn plant was produced when genes from bacteria were inserted into the cells of an embryo corn plant.

These genes were 'cut out' from the bacteria using . . .

1   enzymes.

2   gametes.

3   hormones.

4   chromosomes.

5B   One advantage of using GM corn plants rather than normal corn plants is that . . .

1   insects will become resistant.

2   biodiversity is reduced.

3   less money is spent on pesticides.

4   all the offspring will be identical.

5C   One disadvantage of using GM corn plants is that . . .

1   the corn borer will pass the gene on to other insects.

2   all insects that feed on the corn will become resistant.

3   corn borer predators might become extinct.

4   the corn plants cannot be eaten.

5D Which of the following best describes how the corn borer insects might become resistant to the poison?

1 A mutation in the corn plant allows the corn borer insects to eat the corn and survive to reproduce.

2 An enzyme is produced that breaks down the poison.

3 Resistant corn borer insects only mate with other resistant corn borer insects.

4 Some corn plants become resistant to the predators of the corn borer insect.

Turn over for the next question

Turn over ▶

QUESTION SIX

A scientist studied a population of snails living in grassland. Some of the snails had striped shells, the other snails had unstriped shells. Birds eat both types of snail.

The scientist counted the number of snails in the population in September each year for seven years. At the same time each year, she also estimated the area of ground covered with grass.

Her results are shown in the graph.

Key

- - - - Snails with striped shells

———— Snails with unstriped shells

·············· Percentage of ground covered with grass
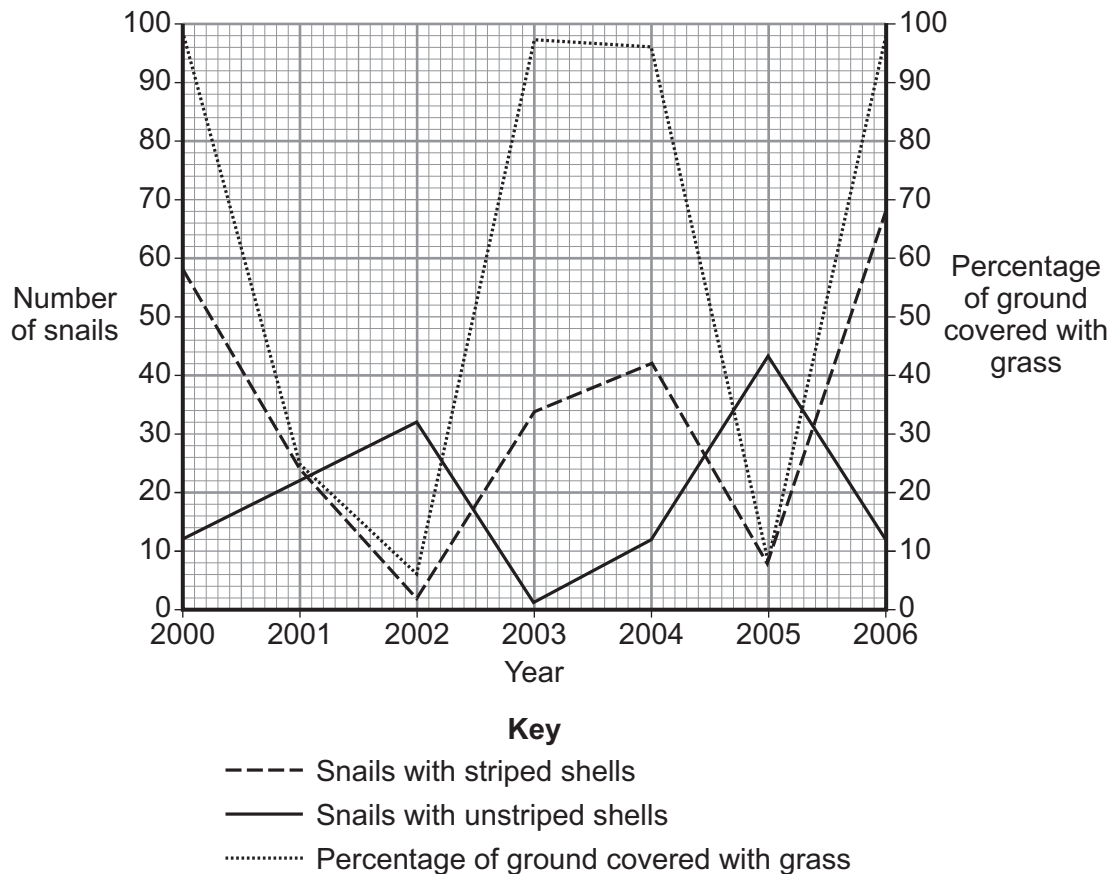
6A What was the difference between the numbers of snails with striped shells between 2002 and 2006?

1 20

2 35

3 56

4 66

6B   What percentage of all the snails counted in 2000 had unstriped shells?

    1   12.0

    2   17.1

    3   20.6

    4   48.3

6C   Which is the best conclusion that can be made from the data?

    1   Snails with striped shells are always more common than snails with unstriped shells.

    2   When there is plenty of grass there are more snails with unstriped shells.

    3   The total number of snails is directly proportional to the percentage of ground covered in grass.

    4   There is a higher proportion of snails with striped shells when there is plenty of grass cover.

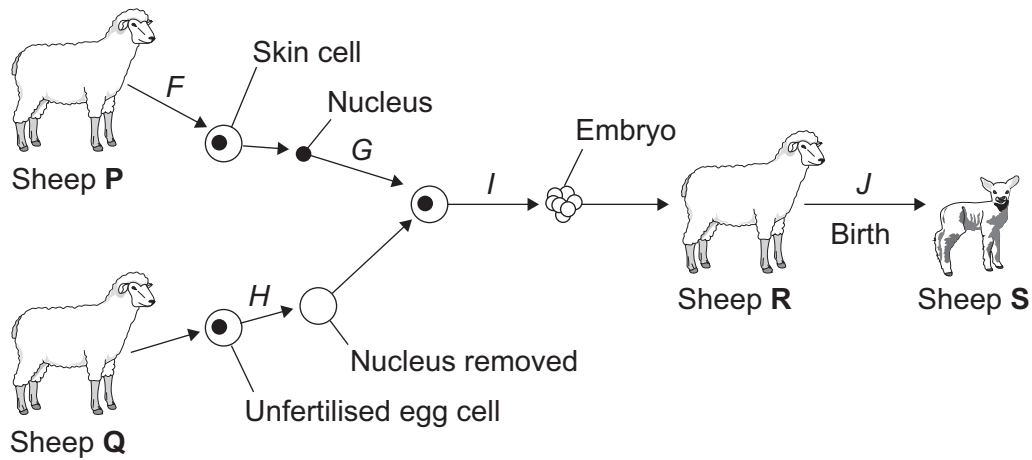**6D**   The results for the striped snails most probably depend on . . .

    1   camouflage.

    2   disease.

    3   humidity.

    4   temperature.

Turn over for the next question

QUESTION SEVEN

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

7A   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.

7B   This method of producing sheep involves . . .

    1   asexual reproduction.

    2   sexual reproduction.

    3   genes from two parents.

    4   tissue culture.

7C   Which sheep are genetically identical?

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

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

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

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

**7D** This process is not carried out on humans because . . .

    1   it is unethical to choose the characteristics for a human.

    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

Turn over ▶

QUESTION EIGHT

The graph shows the results of a survey into the effect of tree felling on the population density of two different species of bird, **X** and **Y**.
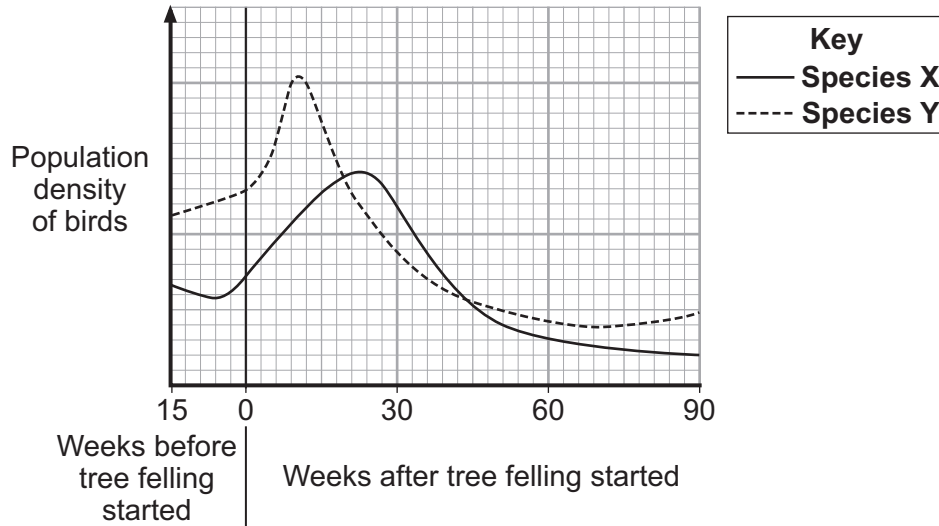
8A Which one of the following statements suggests that species **X** might be a predator of species **Y**?

1 The population density of species **X** is always lower than that of species **Y**.

2 The maximum population density of species **Y** reaches a peak 20 weeks before the population density of species **X** begins to decrease.

3 The maximum population density of species **X** occurs as the population density of species **Y** is decreasing.

4 A decrease in the population density of species **X** causes an increase in the population density of species **Y**.

8B The survey team concluded that tree felling caused a reduction in the population density of the birds.

What evidence in the graph supports this conclusion?

1 48 weeks after the start of tree felling, the population density of both species of bird was less than before the tree felling started.

2 72 weeks after the start of tree felling, the population density of species **Y** was less than half of its lowest population density before tree felling started.

3 The decrease in the population density of species **Y** occurs before that of species **X**.

4 The decrease in the population density of species **Y** was faster than that of species **X**.

8C How might the data about the population density of the two species of bird have been collected in the area where the trees were being felled?

1 Every six weeks, count all the birds of both species for 24 hours over all the area where the trees are being felled.

2 Every six weeks, count all the nests of the birds of both species over all the area where the trees are being felled.

3 Put a numbered ring on all the birds of both species and record how many of these birds are caught and released every six weeks.

4 Mark out several smaller areas and count the number of birds of both species that are seen during a 24-hour period every six weeks.

8D What other evidence might be used to confirm the conclusions of the survey?

1 data from other surveys on the effects of tree felling on bird population densities

2 data from other surveys on the effects of tree felling on the plant population where the birds live

3 data from other surveys on the availability of the birds' food resources

4 data from other surveys on the breeding habits of birds

Turn over for the next question

Turn over ▶

QUESTION NINE

The use of pesticides by farmers affects the environment.

The table gives the characteristics of some pesticides.

Pesticide	Relative leaching potential	Half-life in days	Relative toxicity to fish (LC_{50})	Toxicity to rats (LD_{50}) in mg per litre
Amdro	high	10	high	128
Cygon	medium	7	medium	6000
Dioxin	low	5	very high	0.0002
Diazinon	high	30	high	1202
Dursban	low	30	very high	230
Malathion	low	1	very high	5500
Orthene	low	3	very low	833
Sevin	low	10	medium	250
Storm	high	6	very high	0.25
Temik	high	12	very high	0.9

- Relative leaching potential is a measure of how quickly the pesticide passes through the soil into rivers.

- Half-life is the time taken for half of the pesticide to be broken down in the soil.

- Relative toxicity to fish (LC_{50}) is the concentration of the pesticide that will kill 50% of the fish tested.

  'Very high' means less than 0.1 mg pesticide per litre of solution.

- Toxicity to rats (LD_{50}) is the dose in mg that will kill 50% of the rats tested.

9A Many small mammals, such as mice, feed on crops grown in the fields.

Which one of the following pesticides, applied in the same concentration, is likely to have the greatest effect on the populations of these small mammals?

1 Cygon

2 Dioxin

3 Sevin

4 Storm

9B   The LD_{50} for Temik is 75 times greater for humans than for rats.

What is the LD_{50} of Temik for humans?

1   67.5

2   150

3   675

4   18750

9C   A farmer grows crops close to a river that is popular with fishermen.

Which pesticide should he use on his crops in order to minimise the concentration of pesticides in the river water?

You should assume that all the pesticides are applied in the same concentration.

1   Amdro

2   Cygon

3   Malathion

4   Orthene

9D   When using a pesticide, the majority of farmers are **least** likely to consider . . .

1   the cost of the pesticide.

2   the ease of application of the pesticide.

3   how the pesticide kills the pests.

4   the types of pests killed by the pesticide.

END OF TEST

There are no questions printed on this page