AQA GCSE BIOLOGY (HIGHER) · 8461

BIOLOGY



EXAM QUESTION PACK

4.6.2 VARIATION AND EVOLUTION (PACK 2)

SCORE	PERCENTAGE
/210	%

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Q1.

The photographs show the flowers of two closely-related species of plant.

Species A



Species B



Images: © iStock/Thinkstock

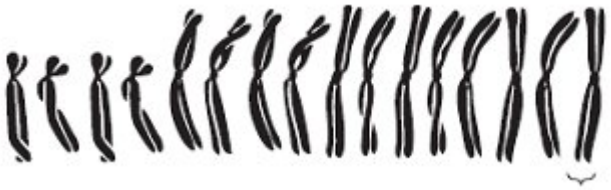
The drawings show chromosomes from one cell in the root of each plant during cell division.

Species A



One chromosome

Species B



One chromosome

(a) The drawings show that each chromosome has two strands of genetic material.

(i) How does a chromosome become two strands?

_____

_____

(1)

(ii) Explain why each chromosome must become two strands before the cell divides.

_____

_____

_____

_____

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(2)

(b) For sexual reproduction, the plants produce gametes.

(i) Name the type of cell division that produces gametes. _____

(1)

(ii) How many chromosomes would there be in a gamete from each of these two plant species?

Species A ☐ **Species B** ☐

(1)

(iii) It is possible for gametes from **Species A** to combine with gametes from **Species B** to produce healthy offspring plants.

How many chromosomes would there be in each cell of one of the offspring plants?

☐

(1)

(c) (i) Look back at the information at the start of the question and the information from part (b).

What evidence from these two pieces of information supports the belief that **Species A** and **Species B** evolved from a common ancestor?

_____

_____

_____

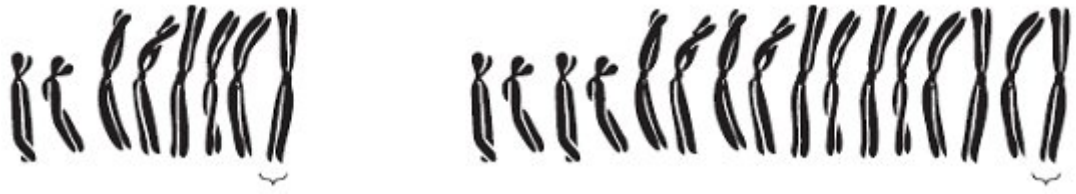
_____

(2)

(ii) For successful gamete production to take place, chromosomes that contain the same genes must pair up.

The drawings showing the chromosomes of **Species A** and of **Species B** are repeated below.

Species A **Species B**



The offspring plants cannot reproduce sexually.

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Suggest an explanation for this.

_____

_____

_____

_____

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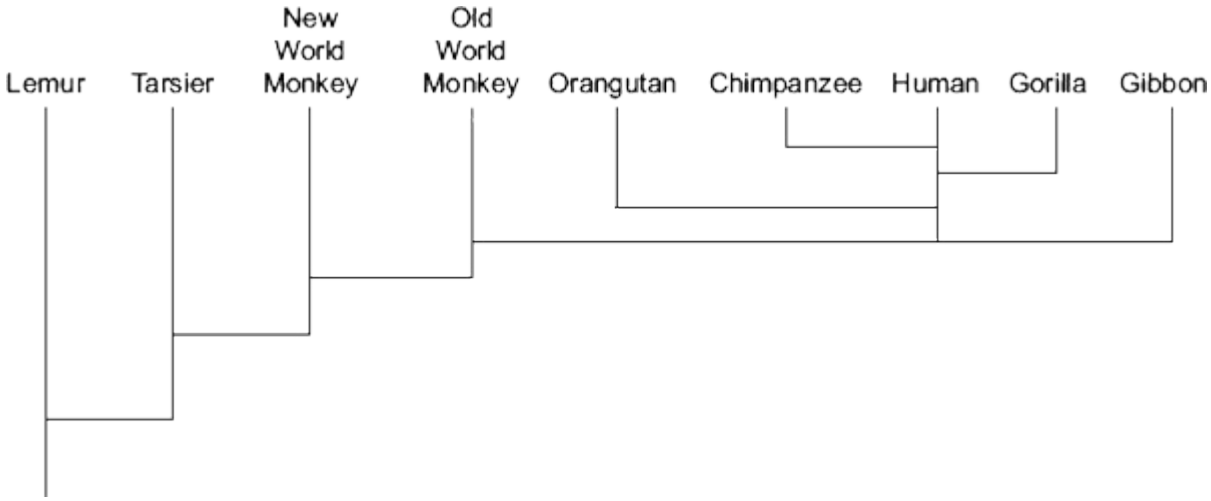
_____

(2)

(Total 10 marks)

Q2.

The diagram shows the evolution of a group called the primates.



(a) Which primate evolved first?

_____

(1)

(b) Name **two** primates that developed most recently from the same common ancestor as humans.

1. _____

2. _____

(2)

(c) (i) The theory of evolution by natural selection was suggested in the 1800s.

Which scientist suggested this theory?

_____

(1)

(ii) Use words from the box to complete the passage about natural selection.

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evolution	**environment**	**generation**
mutate	**survive**	**variation**

Individual organisms of a species may show a wide range of _____ because of differences in their genes.

Individuals with characteristics most suited to the _____ are more likely to _____ and breed successfully.

The genes that have helped these individuals to survive are then passed on to the next _____

(4)

(Total 8 marks)

Q3.

The photograph shows a zorse.



By Kumana @ Wild Equines [CC-BY-2.0], via Wikimedia Commons

A zorse is a cross between a male zebra and a female horse.
The zorse has characteristics of both parents.

(a) The zorse was produced by *sexual reproduction.*

(i) What is *sexual reproduction?*

_____

_____

(1)

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(ii) The zorse has characteristics of a zebra and a horse.
Why?

_____

_____

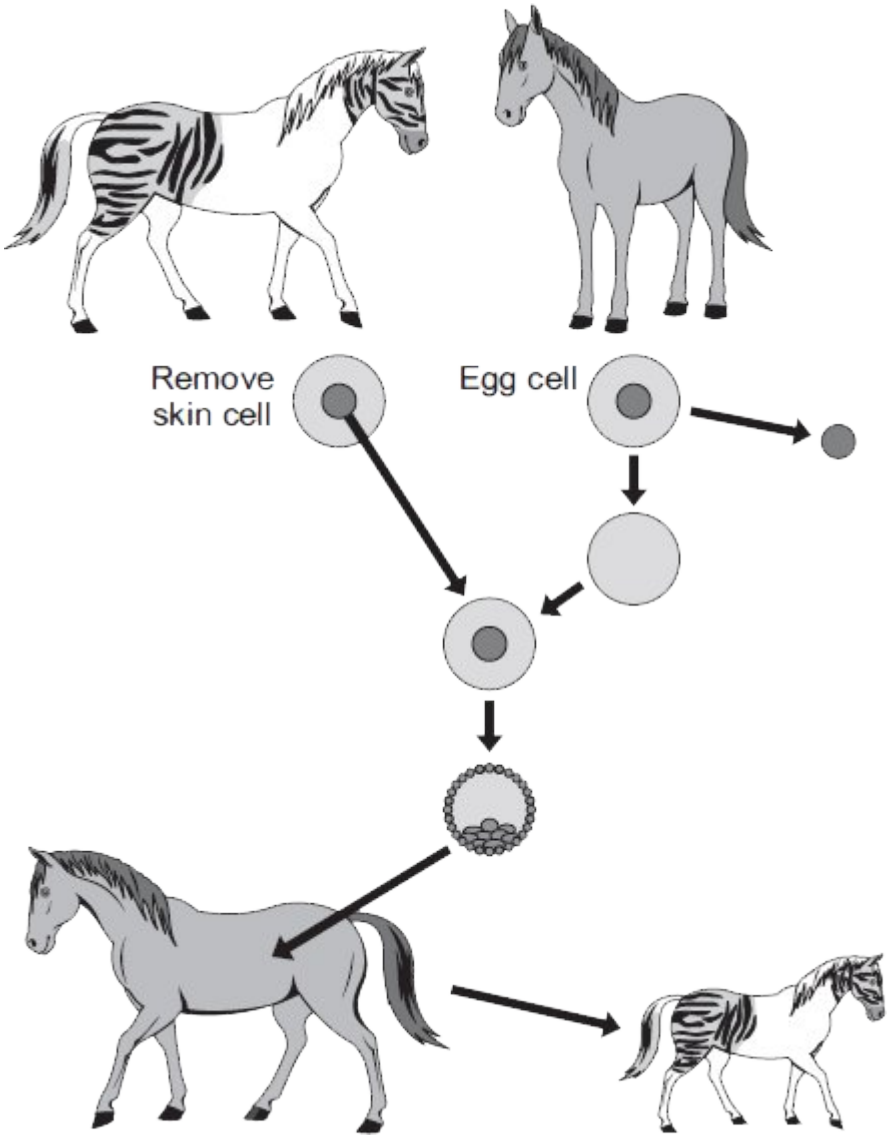
_____

_____

(2)

(b) Zorses are **not** able to breed.
Scientists could produce more zorses from this zorse by adult cell cloning.

The diagram shows how the scientists might clone a zorse.



In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Use information from the diagram and your own knowledge to describe how adult cell cloning could be used to clone a zorse.

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_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 9 marks)

Q4.

The Blue-moon butterfly lives on a small island called Samoa, in the Pacific Ocean.



By Emoke Dénes [CC-BY-SA-2.5], via Wikimedia Commons

In 2006 Blue-moon butterflies almost became extinct.

Wolbachia bacteria killed males before they could hatch from eggs. Only females were resistant to the bacteria.

In 2006 the number of male Blue-moon butterflies had decreased to only 1 per cent of the population. Two years later, the number of males was equal to the number of females.

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(a) Scientists believe that a change in a gene suddenly occurred to make some males resistant to the bacteria.

What scientific term describes a change in a gene?

_____

(1)

(b) The numbers of male Blue-moon butterflies in the population increased quickly after the new form of the gene had appeared.

Suggest why.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 5 marks)

Q5.

Kangaroos have brown coats. The two parent kangaroos in the photograph produced a baby kangaroo with a white coat.



Photographs supplied by iStockphoto/Thinktsock

(a) Use words from the box to complete the sentences.

asexual	**characteristic**	**chromosome**
mutation	**nucleus**	**sexual**

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The baby kangaroo was produced by _____ reproduction.

The coat colour of the adult kangaroo is a _____

The different coat colour of the baby kangaroo is the result of a

_____ of a gene.

The gene is found on a thread-like structure called a _____

(4)

(b) Some animals similar to kangaroos are endangered species.

Cloning is one way of making sure that endangered species do not die out.
The flowchart below shows one way of cloning an animal.

The four statements needed to complete the flowchart are numbered **1**, **2**, **3** and **4**.

Complete the flow chart by writing the **number** of the correct statement in the empty box.

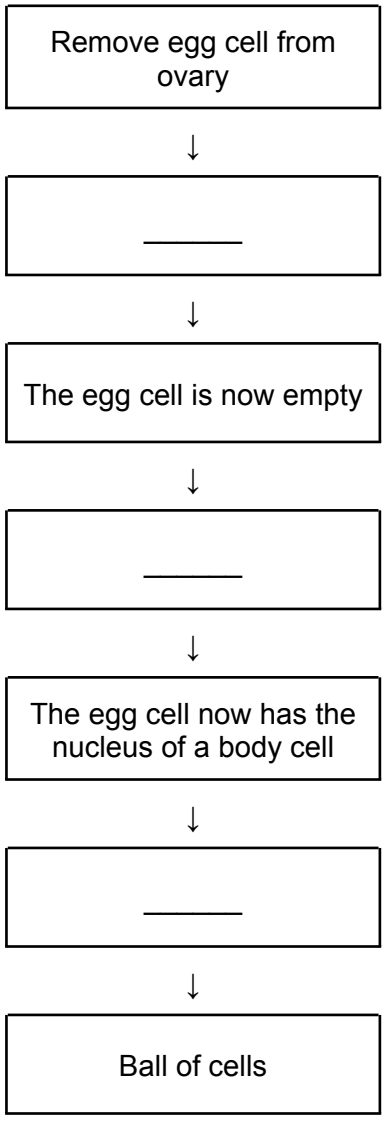
Each number should be used **once** only.

1 Give a small electric shock

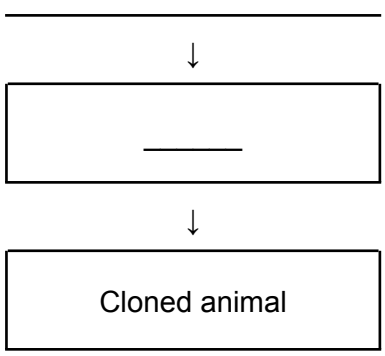
2 Transfer nucleus from body cell

3 Remove nucleus from egg cell

4 Insert embryo into womb of female



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(3)
(Total 7 marks)

Q6.

(a) Animal breeders use sexual reproduction to produce new strains of animals.

How does sexual reproduction produce variation?

_____

_____

_____

_____

(2)

(b) A salmon is a type of fish.

Scientists have created a GM (genetically modified) 'super' salmon.

The scientists transferred a gene from a fish called a pout into a salmon. The gene increases the secretion of growth hormone in the salmon. The GM salmon grows much faster than an ordinary salmon, reaching market size up to one year earlier. Many more GM salmon will be grown in fish farms.

(i) Describe how a gene can be transferred from a pout into a salmon.

_____

_____

_____

_____

_____

_____

(3)

(ii) The government might not allow the production of GM salmon.

Suggest **one** reason why.

_____

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_____

(1)

(Total 6 marks)

Q7.

When animals die, they usually fall to the ground and decay.
In 1977 the body of a baby mammoth was discovered.
The baby mammoth died 40 000 years ago and its body froze in ice.

The picture shows the mammoth.



By Thomas Quine [CC BY-SA 2.0], via Wikimedia Commons

(a) Explain why the body of the baby mammoth did **not** decay.

_____

_____

_____

_____

(2)

(b) Mammoths are closely related to modern elephants.
The pictures show these two animals.

What scientists think a mammoth looked like

Modern elephant

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By WolfmanSF (Own work) [CC-BY-SA-3.0], via Wikimedia Commons



By Caitlin from Hertfordshire, UK [CC-BY-2.0], via Wikimedia Commons

Mammoths are *extinct*. What does *extinct* mean?

_____

_____

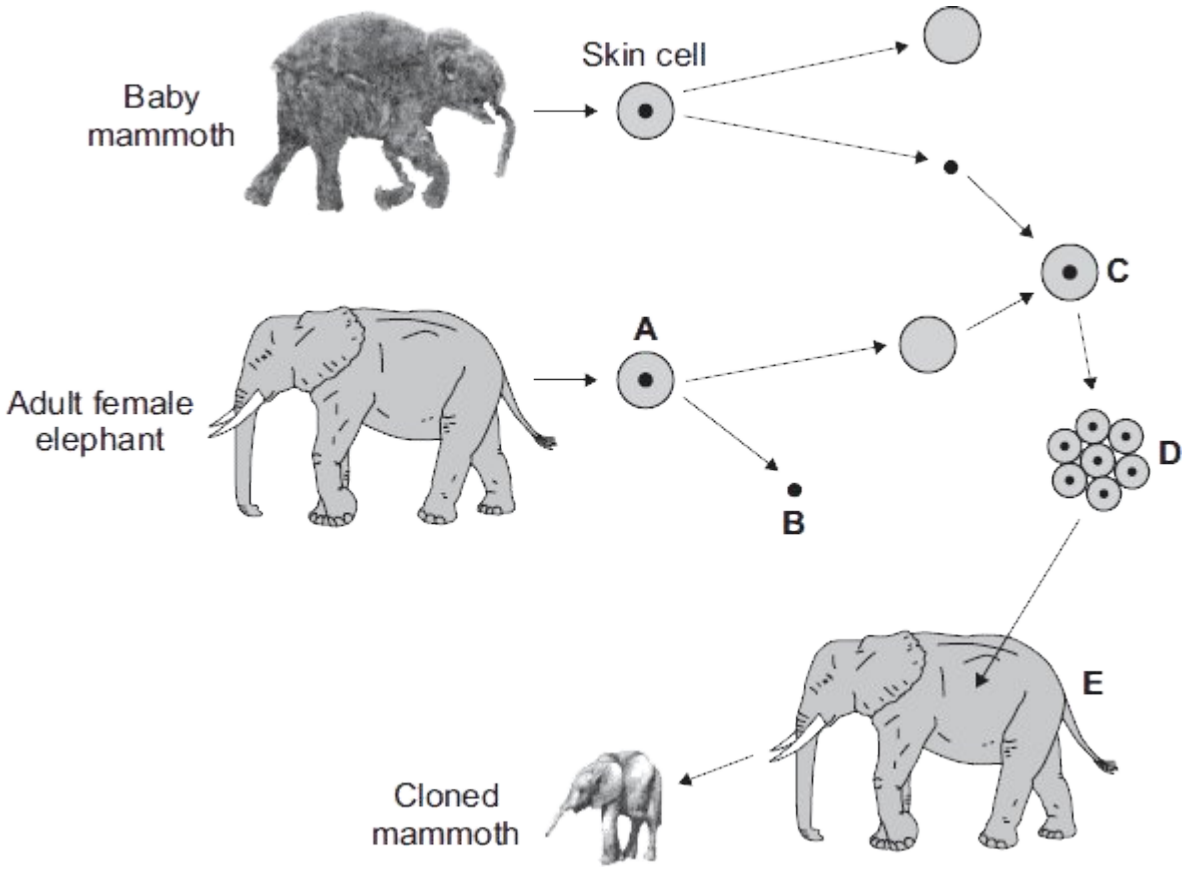
(1)

(c) Scientists believe they may be able to use adult cell cloning to recreate a living mammoth.

The scientists will use a skin cell from the baby mammoth.

The diagrams show how the skin cell will be used.

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In each question, draw a ring around the correct answer.

(i) What type of cell is cell **A**?

skin cell **egg cell** **sperm cell**

(1)

(ii) Part **B** is removed from cell **A**.

What part of the cell is part **B**?

nucleus **cytoplasm** **cell membrane**

(1)

(iii) After cell **C** is formed, it divides into embryo cells.

What is done to cell **C** to make it divide?

Cell **C** is

treated with enzymes.
mixed with sperm cells.
given an electric shock.

(1)

(iv) The embryo cells form a ball of cells. The ball of cells will be put into female elephant, **E**.

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Which part of elephant **E** is the ball of cells put into?

womb **stomach** **ovary**

(1)

(d) The scientists expect any offspring of the adult cell cloning to look like a mammoth and **not** like an elephant.

Why?

_____

_____

(1)

(Total 8 marks)

Q8.

Insecticides are chemicals which kill insects.
Insecticides may be sprayed onto crops to increase crop yield.

(a) Killing insects on crops increases crop yield.

Suggest why.

_____

_____

(1)

(b) A microorganism contains a gene which causes the production of an insect poison.

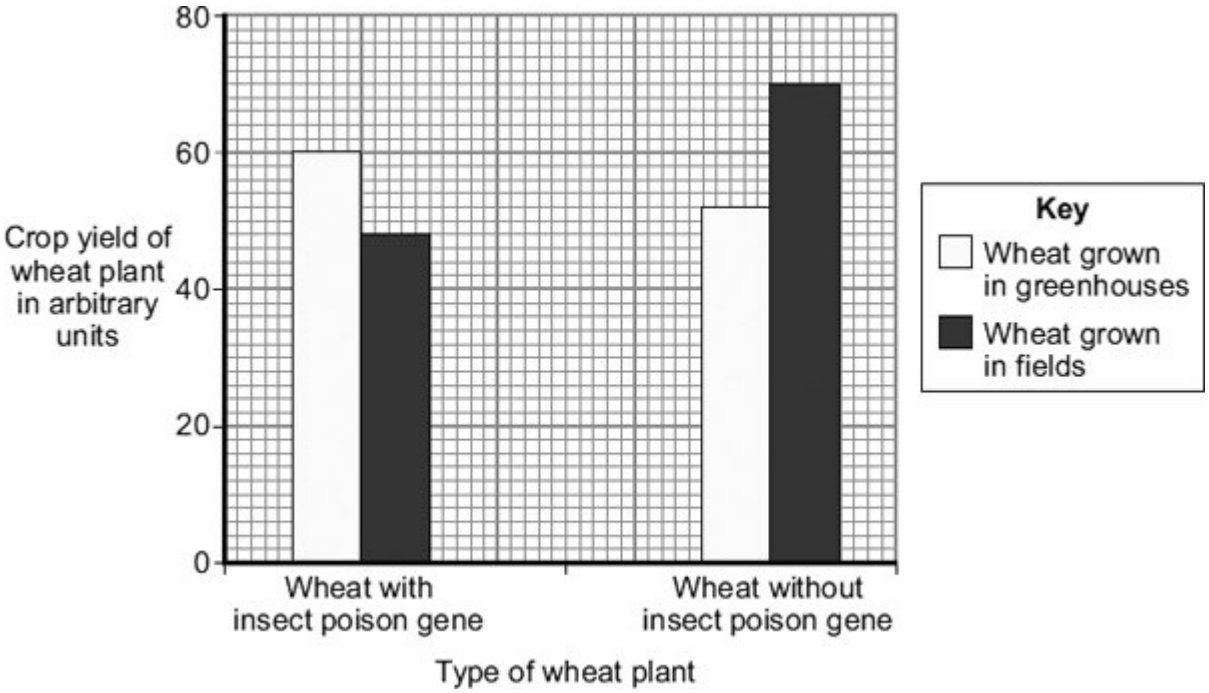
Scientists transferred the gene for production of the insect poison into wheat plants. This makes genetically modified (GM) wheat.

The scientists:

- grew wheat plants with the insect poison gene in fields and in greenhouses
- grew wheat plants without the insect poison gene in fields and in greenhouses
- measured the crop yield of the wheat plants.

The bar chart shows the results.

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(i) What was the yield of the wheat with the insect poison gene grown in greenhouses?

_____ arbitrary units

(1)

(ii) The yield from wheat without the insect poison gene grown in greenhouses was different from the yield you gave in (b)(i).

Describe this difference in yield.

_____

_____

_____

_____

(2)

(iii) Look again at the bar chart.

What advice would you give to a farmer about the type of wheat to grow in fields?

Give a reason for your answer.

_____

_____

_____

_____

(2)

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(c) Some people are concerned about the use of GM crops.

Why?

_____

_____

_____

_____

_____

(2)

(Total 8 marks)

Q9.

The picture shows a zebra fish.



Illustration © Emily S. Damstra

Zebra fish are small freshwater fish that usually have black and silver stripes.
Zebra fish can tolerate a wide range of environmental conditions.

(a) Scientists have genetically modified zebra fish to act as pollution indicators.
The genetically modified zebra fish have a gene transferred from a jellyfish.
The gene allows the stripes of the zebra fish to change colour.

Describe how the scientists produced the genetically modified zebra fish.

_____

_____

_____

_____

_____

_____

_____

(3)

(b) Some scientists are worried about the production of genetically modified zebra fish.

Suggest reasons why.

_____

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_____

_____

_____

(2)

(Total 5 marks)

Q10.

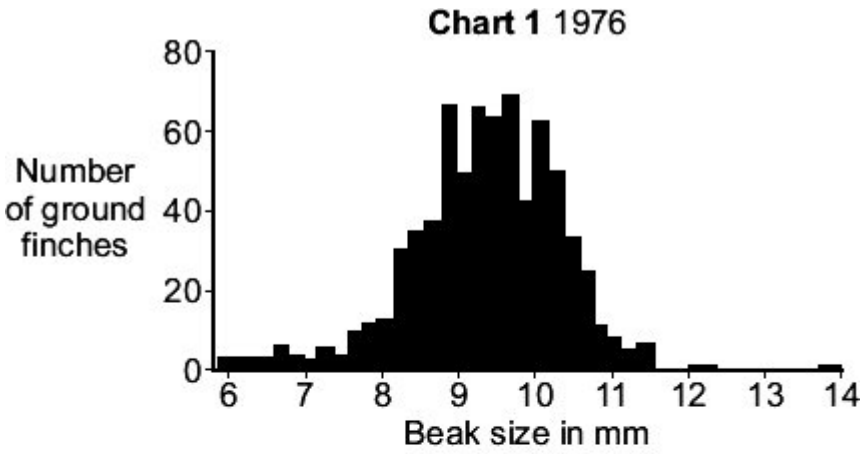
The Galapagos Islands are in the Pacific Ocean, 1400 km from South America.
A type of bird called a ground finch lives on the islands.
The picture shows a ground finch.

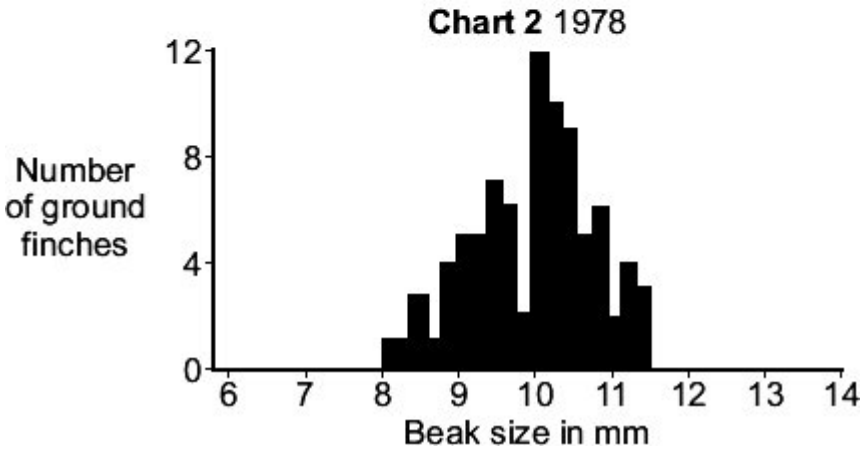


By Charlesjsharp (Own work) [CC-BY-SA-3.0], via Wikimedia Commons

The size of the seeds the ground finch can eat depends upon the size of the beak.
To eat large seeds, a large beak is needed.
The bar charts show the sizes of the beaks of ground finches on **one** island, in 1976 and in 1978.

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(a) The population of the ground finches and their beak sizes changed between 1976 and 1978.

Describe these changes.

_____

_____

_____

_____

_____

_____

(3)

(b) In 1977 there was very little rain on the island. The lack of rain affected the seeds that the finches ate.
The table shows how the seeds were affected.

Year	Mean number of seeds per m^2	Mean mass of each seed in mg
1976	8.5	3.5

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1978	2.8	4.2

Suggest an explanation for the changes in beak sizes between 1976 and 1978.

_____

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 7 marks)

Q11.

(a) How do fossils provide evidence that species alive today have evolved from simpler organisms?

_____

_____

_____

_____

_____

_____

(3)

(b) The photographs show two species of gull.

Herring gull (*Larus argentatus*) **Lesser black-backed gull (*Larus fuscus*)**

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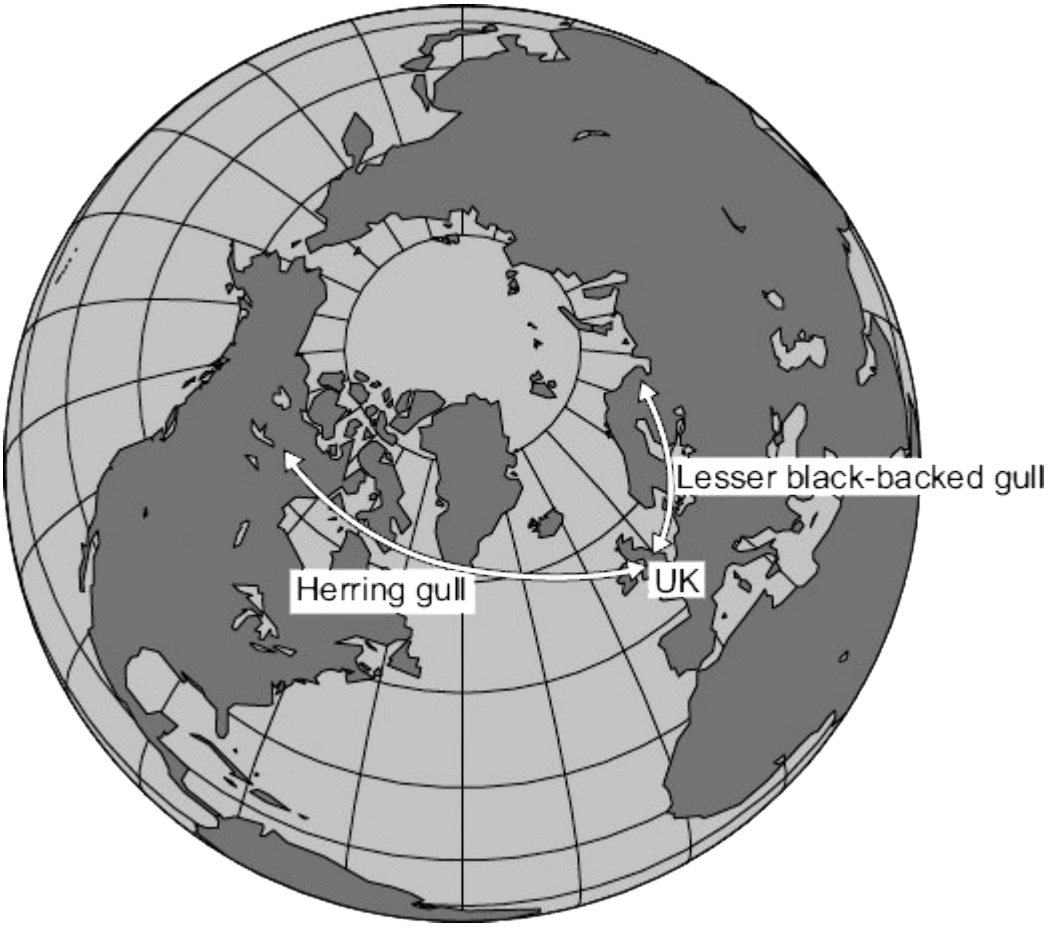
By Ken Billington (Own work) [CC-BY-SA-3.0], via Wikimedia Commons



By Andreas Trepte (Own work) [CC-BY-SA-2.5], via Wikimedia Commons

Both species are now found in the UK but the two species cannot interbreed with each other. Scientists believe that these two species have evolved from a common ancestor.

The map below shows a view of the Earth from above the North Pole.
The map also shows where these two species are found.



Suggest an explanation for the development of these different species.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 9 marks)

Q12.

(a) The drawings show one way of producing new plants. The new plants are identical to the parent plant.



Use words from the box to complete the sentences.

asexual	**characteristics**	**clones**	**engineering**	**genes**	**sexual**

The colour and shape of the leaves are known as _____

The information for leaf colour is stored in parts of chromosomes

called _____

The new plants are known as _____

The new plants have been produced by _____ reproduction.

(4)

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(b) (i) Name **one** other way of producing plants that are identical to their parents.

_____

(1)

(ii) Name **one** way of producing animals that are identical to each other.

_____

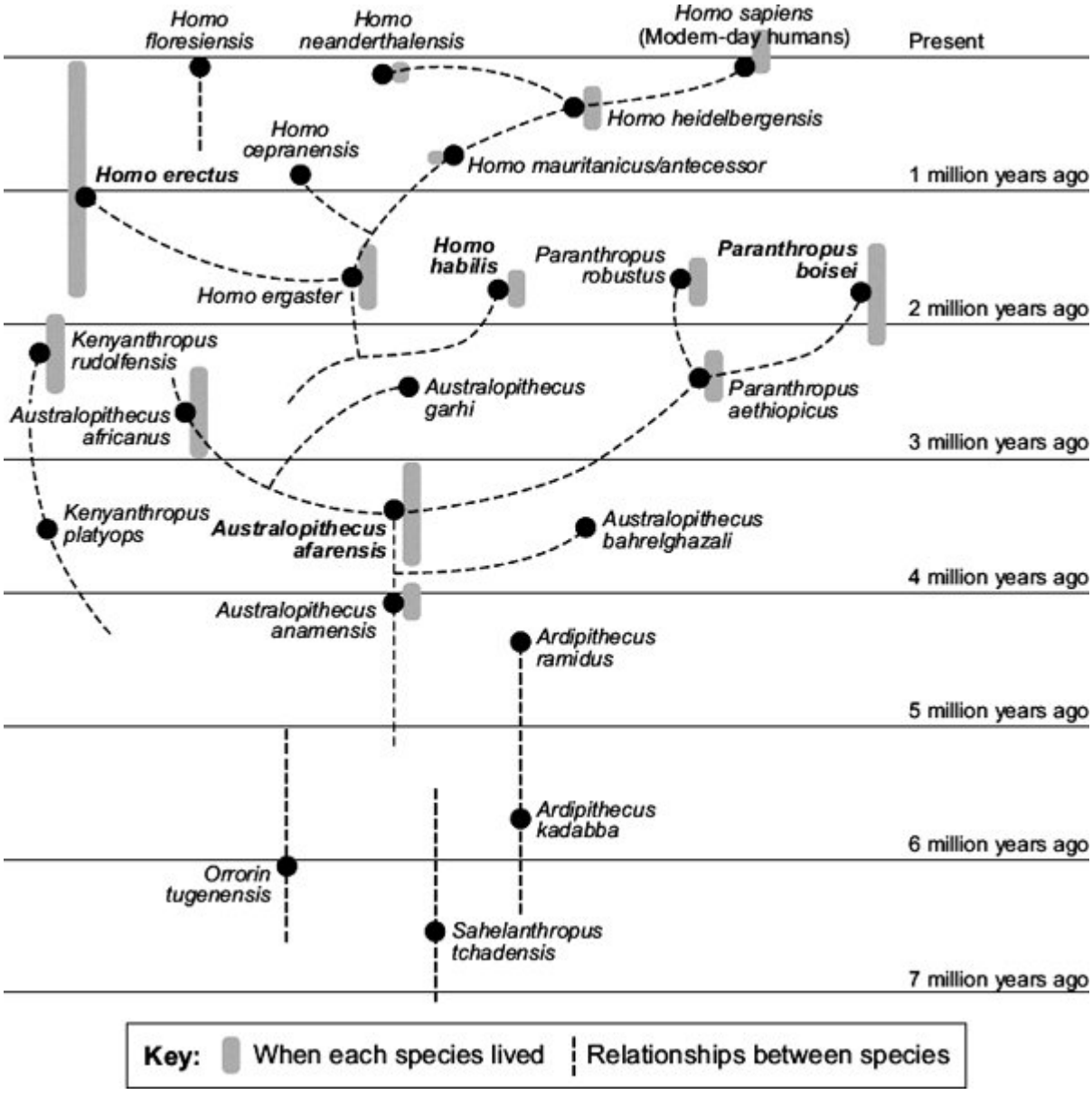
(1)

(Total 6 marks)

Q13.

The diagram shows an evolutionary tree for humans.

The diagram is based on a study of fossils.



(a) When did *Australopithecus afarensis* first appear?

_____ million years ago.

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(1)

(b) Which species was the direct ancestor of *Paranthropus boisei*?

_____

(1)

(c) Which species is most closely related to *Homo habilis?*

_____

(1)

(d) About 250 fossils of *Homo erectus* have been found. About 50 of these fossils have been found in China.

A Chinese scientist has suggested the hypothesis that Chinese people evolved from *Homo erectus*.

Most scientists do **not** agree with this hypothesis.

Use the information above and information from the diagram to suggest **two** reasons why.

1. _____

_____

2. _____

_____

(2)

(e) Darwin suggested the theory of natural selection. It was a long time before this theory was accepted by most scientists.

Give **two** reasons why it took a long time.

1. _____

_____

2. _____

_____

(2)

(Total 7 marks)

Q14.

A child saved apple seeds from an apple she ate. She planted the seeds in the garden. A few years later the apple trees she had grown produced apples.

(a) The apples from the new trees did **not** taste like the original apple.

Explain why.

_____

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_____

_____

_____

_____

(2)

(b) (i) Apple trees can be reproduced so that the apples from the new trees will taste the same as the apples from the parent trees.

Give **one** method used to reproduce apple trees in this way.

_____

_____

(1)

(ii) Explain why the method you have suggested in part **(b)(i)** will produce apples that taste the same as the apples from the parent trees.

_____

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_____

_____

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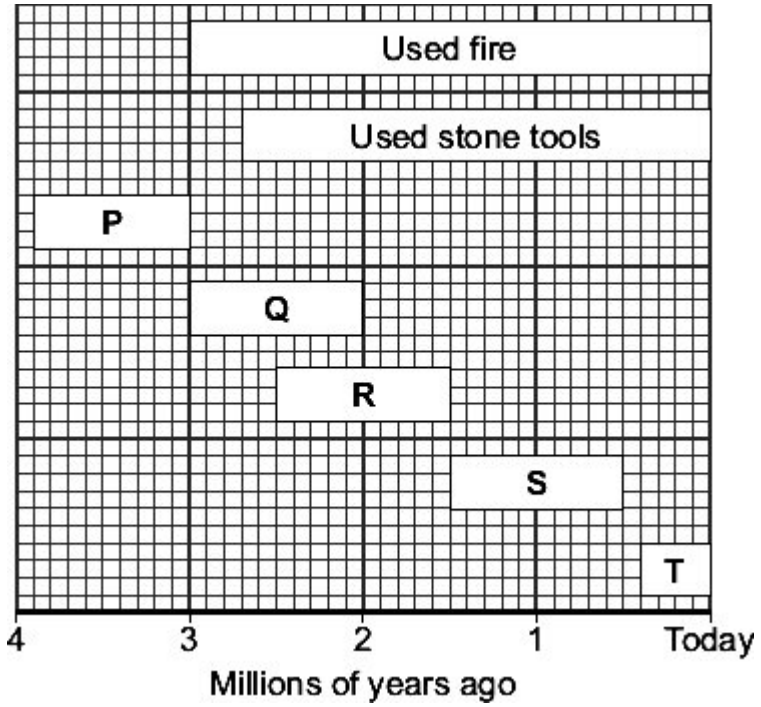
(2)

(Total 5 marks)

Q15.

The diagram shows a time line for the evolution of humans.

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The letters **P**, **Q**, **R** and **S** show human ancestors.
The letter **T** shows modern humans.

(a) (i) How many millions of years ago did humans first use fire?

millions of years ago

(1)

(ii) Which human ancestor, **P**, **Q**, **R** or **S**, was the first ancestor to use tools?

(1)

(iii) For how many millions of years did human ancestor **R** live on Earth?

(1)

(b) How do we know that human ancestors **P**, **Q**, **R** and **S** lived on Earth?

_____

_____

(1)

(c) Which scientist suggested that humans have evolved from ape-like ancestors?

Draw a ring around **one** answer.

Darwin **Mendel** **Semmelweiss**

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(1)

(Total 5 marks)

Q16.

We can now produce organisms with the characteristics we want the organisms to have.

List A gives the names of four ways of producing organisms.

List B gives information about the ways of producing organisms.

Draw **one** line from each way of producing organisms in **List A** to the correct information in **List B**.

List A **Ways of producing organisms**	**List B** **Information**
	Taking part of the stem from a plant, then putting this part of the stem in wet soil in a plant pot.
Embryo transplantation	
	Growing groups of cells from a plant on special jelly.
Genetic engineering	
	Transferring genes from one organism to a different organism.
Taking cuttings	
	Growing plants from seeds in a garden.
Tissue culture	
	Separating groups of cells from a very young developing animal then putting the groups of cells into host mothers.

(Total 4 marks)

Q17.

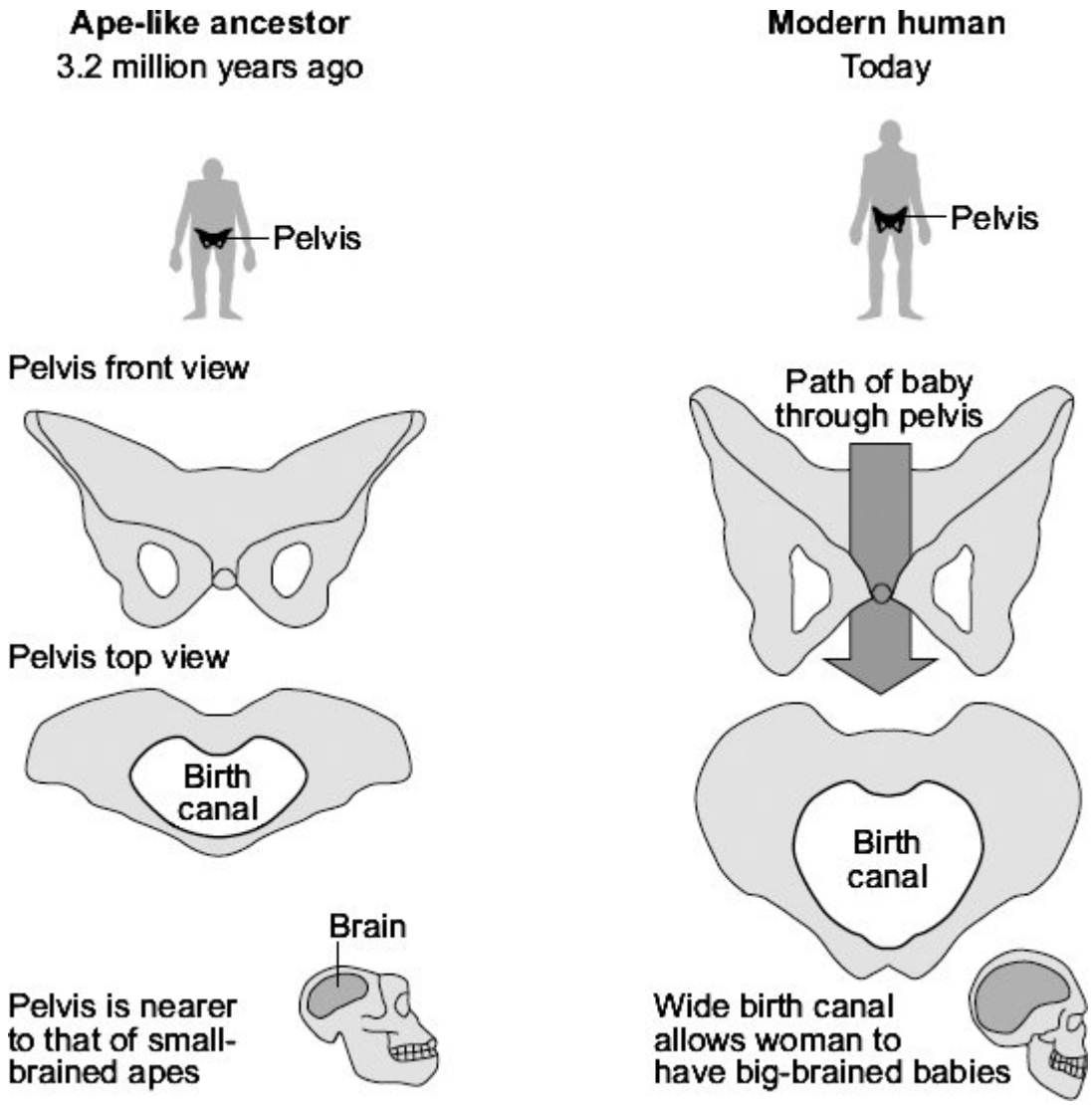
Humans have evolved from ape-like ancestors by natural selection.

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The drawing shows the pelvis of an ape-like ancestor and a modern human.

The skull and brain of the new born baby are also shown to the same scale.

Modern humans are much more intelligent than their ape-like ancestors.



Suggest an explanation for the evolution of the size and shape of the pelvis of modern humans.

Use information from the drawing to help you.

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_____

_____

_____

(Total 4 marks)

Q18.

Scientists have brought an extinct species of mountain goat, the Pyrenean ibex, 'back to life'. These scientists used skin cells from preserved Pyrenean ibex in cloning experiments.

The Scientists:

- removed the nuclei from domestic goat egg cells
- transferred cell nuclei from the skin cells of the Pyrenean ibex into domestic goat egg cells
- used the domestic goats as surrogate mothers for the embryos that developed.

The scientists made 439 cloned embryos, but only 57 were suitable for transfer into the surrogate goat mothers. Only seven of the goats got pregnant and only one live offspring was born.

Some biologists are very worried about using cloning to preserve endangered animals, because cloned animals often have developmental problems. Some endangered animals are difficult to breed in captivity. For these animals cloning is another way to continue the genetic line.

The biggest threats to endangered animals today are habitat loss, illegal hunting, pollution and climate change. Many scientists say that cloning is not as important as trying to preserve the wild places on Earth. The wild places are being lost very quickly and the animals and plants living in the wild places are dying out.

(a) The Pyrenean ibex was 'brought back to life'.

How is this process different from using adult cell cloning to clone a pet animal?

_____

_____

(1)

(b) Evaluate the use of adult cell cloning to conserve endangered species.

Use the information given and your own knowledge and understanding.

Remember to give a conclusion to your evaluation.

_____

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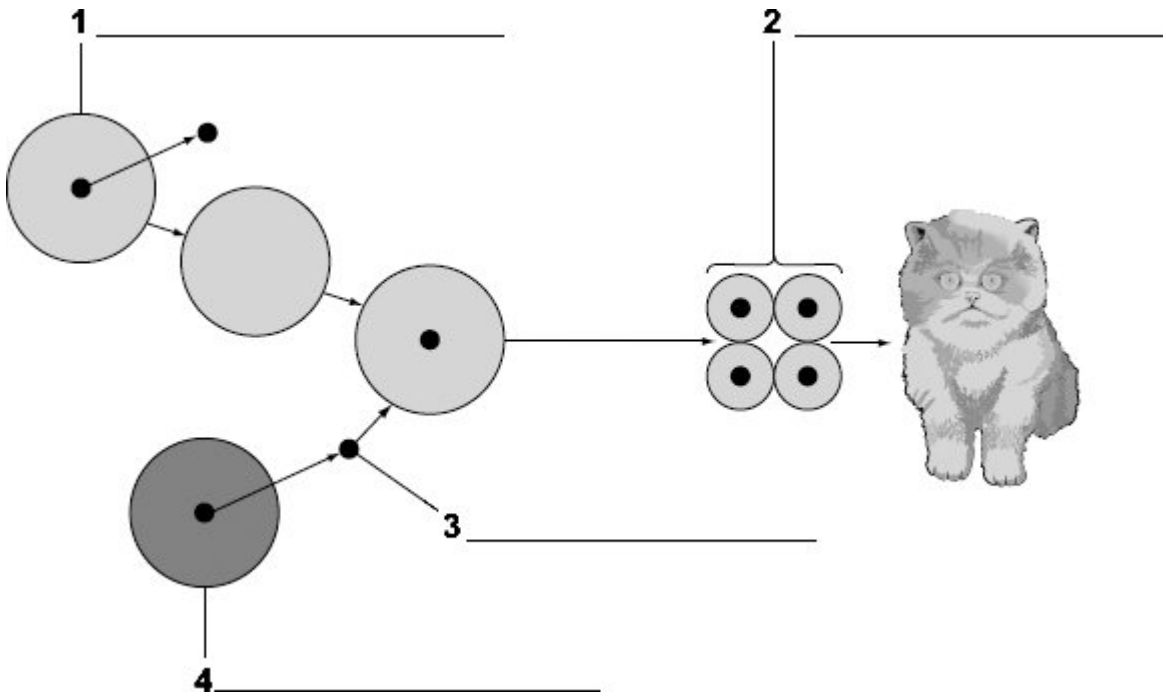
(4)

(Total 5 marks)

Q19.

It is possible to clone pets.

The diagram shows one way of cloning a pet cat, using the nucleus from a cat skin cell.



embryo	**egg**	**nucleus**	**skin cell**	**sperm**

(a) Use words from the box to label structures **1**, **2**, **3** and **4** on the diagram.

(4)

(b) The cloning of humans is not allowed.

Tick (✓) **one** box to complete the sentence.

One **ethical** reason for banning the cloning of humans is that . . .

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the method used in animal cloning has not been evaluated. ☐

the method is very expensive. ☐

the child created by cloning would not have been able to give permission. ☐

(1)

(Total 5 marks)

Q20.

Soay sheep live wild on an island off the north coast of Scotland. No people live on the island.



By Owen Jones = Jonesor [CC-BY-SA-2.5], via Wikimedia Commons

Over the last 25 years, the average height and mass of the wild Soay sheep have decreased.

The scientists think that climate change might have affected the size of the sheep.

(a) More Soay sheep are now able to survive winter than 25 years ago.

What change in the climate may have helped more Soay sheep to survive winters?

_____

_____

(1)

(b) Complete the sentences.

(i) Soay sheep show variation in size because of differences in their

_____

(1)

(ii) The change in the size of the Soay sheep over 25 years can be explained by Darwin's

theory of _____

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(1)

(Total 3 marks)

Q21.

Soay sheep live wild on an island off the north coast of Scotland. No people live on the island.



By Owen Jones = Jonesor [CC-BY-SA-2.5], via Wikimedia Commons

Over the last 25 years, the average height and mass of the wild Soay sheep have decreased.

The scientists think that climate change might have affected the size of the sheep.

Suggest an explanation for the evolution of the wild Soay sheep over the last 25 years.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(Total 4 marks)

Q22.

Organisms can be produced by asexual reproduction and by sexual reproduction.

(a) Give **two** differences between asexual reproduction and sexual reproduction.

1. _____

_____

2. _____

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_____

(2)

(b) Adult cell cloning is a type of asexual reproduction.

Explain why.

_____

_____

_____

_____

(2)

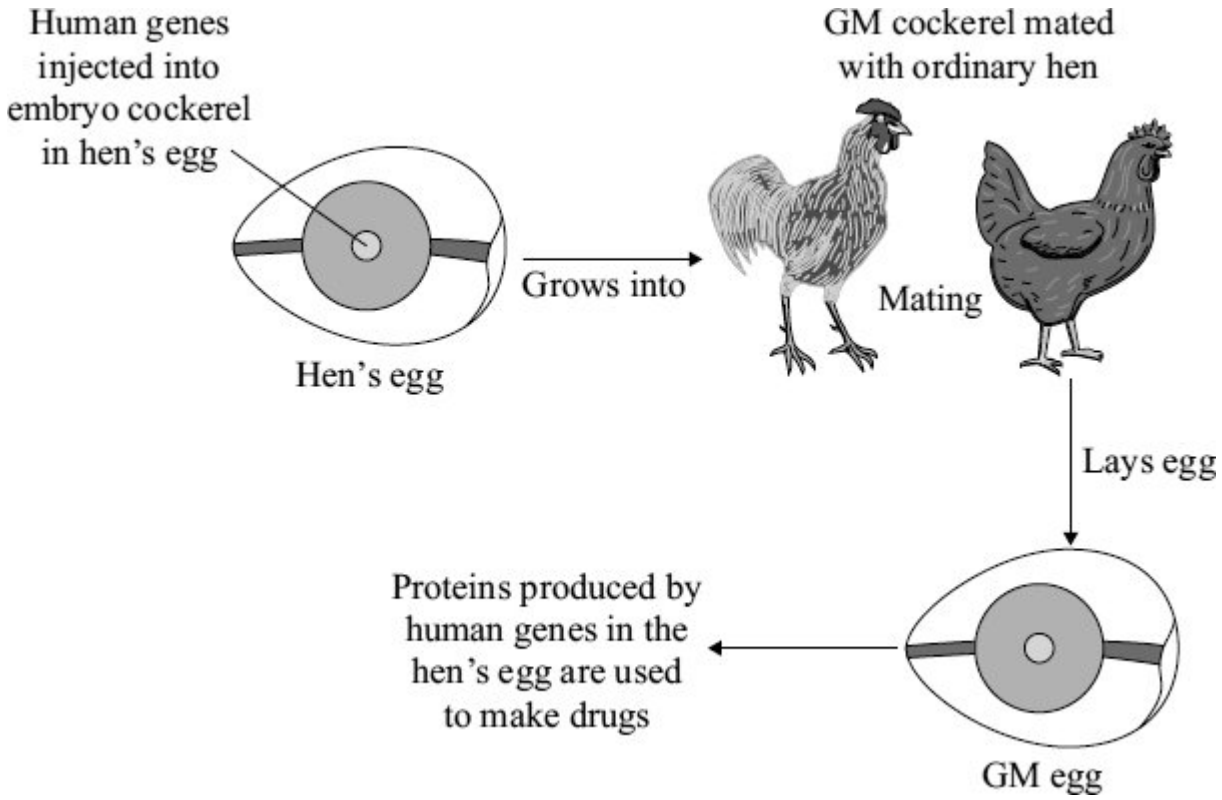
(Total 4 marks)

Q23.

Scientists have discovered how to produce genetically modified (GM) hens' eggs.

Some proteins produced in GM eggs can be used as drugs to treat humans.

The diagram shows how this is done.



(a) Which type of reproduction is involved when the cockerel mates with the hen?

Tick (✓) **one** box.

Asexual ☐

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Cloning ☐

Sexual ☐

(1)

(b) From which part of a human are the genes cut?

Tick (✓) **one** box.

Chromosome ☐

Embryo ☐

Glands ☐

(1)

(c) Read the information about genetically modified animals.

- GM animals might escape and breed with wild animals.
- Genetic modification can produce fast-growing animals for food.
- Genetic modification can be used to clone animals in danger of extinction.
- Using GM animals can reduce the number of animals used in medical research.
- Animals have the right to be free from genetic modification.

Use **only** this information to answer these questions.

(i) Give **two** reasons why many people are in favour of genetically modified animals.

1. _____

2. _____

(2)

(ii) Give **two** reasons why many people are against genetically modified animals.

1. _____

2. _____

(2)

(Total 6 marks)

Q24.

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Charles Darwin proposed the theory of natural selection.

(a) What is meant by natural selection?

_____

_____

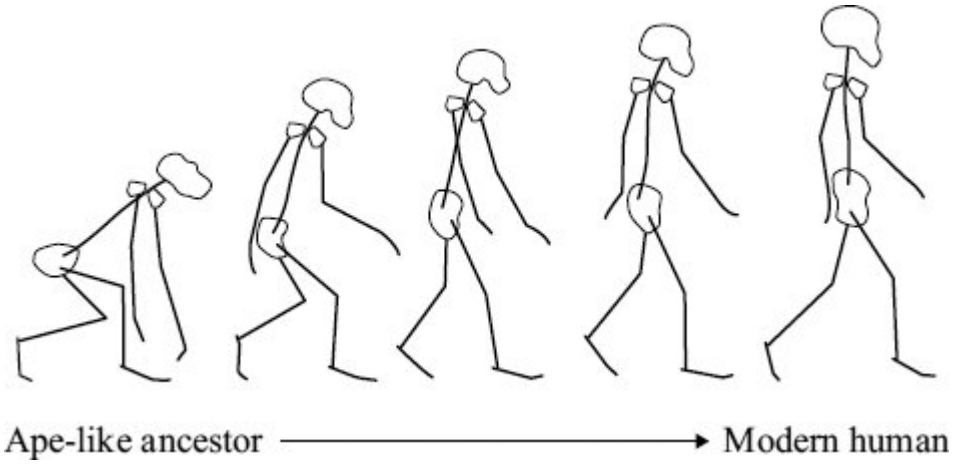
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(2)

(b) The drawings show stages in the evolution of the human skeleton.

All the drawings are to the same scale.



Use information from the drawings to describe **two** trends in the evolution of the human skeleton.

1. _____

_____

2. _____

_____

(2)

(c) Darwin said that humans had evolved from ape-like ancestors.

Many people disagreed with him at the time.

Give **two** reasons why.

1. _____

_____

2. _____

_____

(2)

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(d) Lamarck's theory of evolution stated that useful changes which occur in an organism during its lifetime will be inherited by its offspring.

Give **one** way in which Darwin's theory differs from Lamarck's.

_____

_____

(1)

(Total 7 marks)

Q25.

We breed animals with the characteristics that we prefer.

(a) The photograph shows a rabbit with some of its babies.



Photograph supplied by iStockphoto/Thinkstock

Use words from the box to complete the sentences about inheritance in rabbits.

characteristic	**chromosome**	**gene**	**gamete**

(i) The colour of a rabbit's fur is known as a _____

(1)

(ii) This colour is controlled by a _____

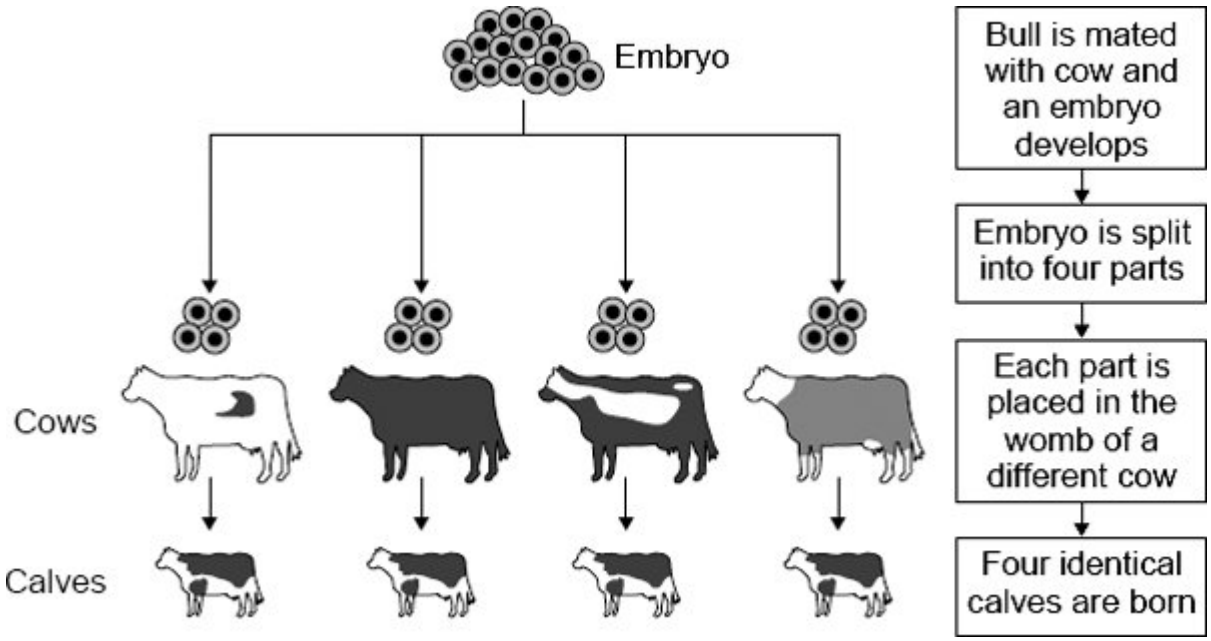
(1)

(iii) Each sex cell of a rabbit is known as a _____

(1)

(b) The diagram shows one way of producing calves.

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Use words from the box to complete the sentences.

asexual	**clones**	**cuttings**	**gametes**	**genetic**	**sexual**

A bull was mated with a cow.

This is _____ reproduction.

The embryo produced was split into four parts.

The calves in the diagram have identical genetic information.

This is because the calves were produced by _____ reproduction.

The identical calves are known as _____

(3)

(Total 6 marks)

Q26.

The photograph shows an *Anolis* lizard. This lizard lives on a tiny island.



By Paul Hirst (Phirst) (Own work) [CC-BY-SA-2.5], via Wikimedia Commons

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Scientists investigated how the leg length of the *Anolis* lizards affected their survival. At the start of the investigation the *Anolis* lizards had a large range of leg lengths.

- The scientists placed six *Curly-tailed* lizards onto the island.
- The *Curly-tail* lizard is a predator of the *Anolis* lizard.
- After one year the population of *Anolis* lizards had halved.
- Nearly all the remaining *Anolis* lizards had long legs.

(a) Why did the population of *Anolis* lizards halve?

_____

_____

(1)

(b) The remaining *Anolis* lizards had long legs.

Suggest an explanation for this.

_____

_____

_____

_____

_____

(2)

(c) Answer each of these questions by placing a tick (✓) in the correct box.

(i) Which theory is supported by evidence from this investigation?

Global warming ☐

Natural selection ☐

Sustainability ☐

(1)

(ii) Which scientist proposed this theory?

Darwin ☐

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Lamarck ☐

Semmelweiss ☐

(1)

(Total 5 marks)

Q27.

Scientists have recently cloned a mouse that had died and been frozen for 16 years.

(a) Explain what is meant by a clone.

_____

_____

_____

_____

(2)

(b) The scientists used an egg cell from a living mouse and the genetic material from a brain cell of the frozen mouse.

Describe how the process of adult cell cloning could be used to clone the frozen mouse.

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(c) People could ask scientists to use this technique to clone long-dead relatives, whose bodies have been deep-frozen.

Most people would be opposed to cloning a human from a deep-frozen, long-dead relative.

Give **one** reason why.

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_____

_____

(1)

(Total 6 marks)

Q28.

The photograph shows some flamingos.



By Charles J Sharp (Own work) [GFDL, CC-BY-SA-3.0 or CC-BY-2.5], via Wikimedia Commons

- Flamingos feed on organisms that live in mud at the bottom of lakes.
- Leopards prey on flamingos.
- Flamingos find it difficult to fly if their feathers get wet.

Flamingos have evolved very long legs.

How would each of the following theories explain the evolution of these long legs?

(a) Darwin's theory

_____

_____

_____

_____

_____

_____

_____

_____

(3)

(b) Lamarck's theory.

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_____

_____

_____

_____

_____

_____

(2)

(Total 5 marks)

Q29.

Animals have adaptations that enable them to survive.

(a) The photograph shows an echidna.



The echidna has pointed spines on its back.

Explain how these spines might help the echidna to survive.

_____

_____

_____

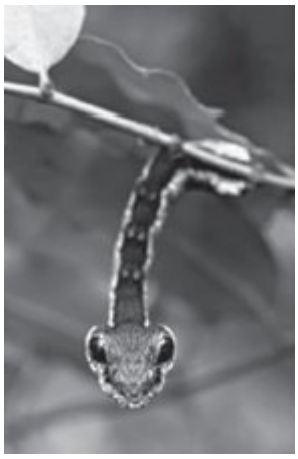
_____

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_____

(2)

(b) The photograph shows a caterpillar.



© S.J. Krasemann / Peter Arnold / Still Pictures

Explain how the caterpillar's appearance might help it to survive.

_____

_____

_____

_____

_____

(2)

(c) Draw a ring around the correct answer to complete each sentence.

(i) Evolution can be explained by a theory called

genetic engineering
mutation
natural selection

.

(1)

(ii) This theory was suggested by a scientist called Charles

Darwin
Lamarck
Semmelweiss

.

(1)

(iii) This scientist said that all living things have evolved from

monkeys
dinosaurs
simple life forms

.

(1)

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(d) Many religious people oppose the theory of evolution.

Give **one** reason why.

_____

_____

(1)

(Total 8 marks)

Q30.

The photographs show a zorse and its parents, a zebra and a horse.

Horse



Zebra



Zorse



(a) Draw a ring around the correct answer to complete the sentence.

The zorse was produced by

cloning
asexual reproduction
sexual reproduction

.

(1)

(b) Explain the appearance of the zorse.

Use **both** words from the box in your explanation.

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gametes	genes

(3)

(Total 4 marks)

Q31.

(a) Explain, as fully as you can, how natural selection leads to evolution.

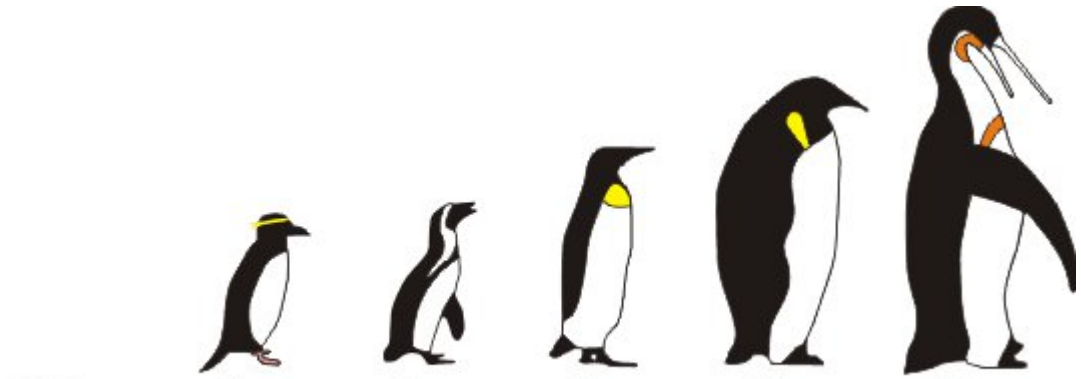
(3)

(b) Most penguins live in cold climates. The modern penguin best adapted for cold conditions is the emperor penguin.

Scientists have found fossils of a 'giant' penguin which they have called *Icadyptes*.

The diagram shows how the size of modern penguins compares with *Icadyptes*.

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Height	63 cm Rockhopper	68 cm Peruvian	90 cm King	1.2 m Emperor	1.5 m *Icadyptes*

The scientists were surprised to discover that *Icadyptes* lived in warm seas at a time when the Earth's climate was much warmer than it is now.

Explain why the scientists were surprised that *Icadyptes* lived in warm seas.

_____

_____

_____

_____

_____

_____

_____

(2)

(Total 5 marks)

Q32.

The use of cloned animals in food production is controversial.

It is now possible to clone 'champion' cows.

Champion cows produce large quantities of milk.

(a) Describe how adult cell cloning could be used to produce a clone of a 'champion' cow.

_____

_____

_____

_____

_____

_____

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_____

_____

_____

_____

(4)

(b) Read the passage about cloning cattle.

> The Government has been accused of 'inexcusable behaviour' because a calf of a cloned American 'champion' cow has been born on a British farm. Campaigners say it will undermine trust in British food because the cloned cow's milk could enter the human food chain.
>
> But supporters of cloning say that milk from clones and their offspring is as safe as the milk we drink every day.
>
> Those in favour of cloning say that an animal clone is a genetic copy. It is not the same as a genetically engineered animal. Opponents of cloning say that consumers will be uneasy about drinking milk from cloned animals.

Use the information in the passage and your own knowledge and understanding to evaluate whether the government should allow the production of milk from cloned 'champion' cows.

Remember to give a conclusion to your evaluation.

_____

_____

_____

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_____

(5)

(Total 9 marks)

Q33.

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Some organisms are in danger of extinction.
The photograph shows an African elephant feeding on tree leaves.



(a) Read the information about elephants and humans in Africa.

- The African elephant is the largest land animal.
- The African elephant feeds on lots of leaves.
- Adult African elephants have no natural predators.
- Elephants are killed by poachers for their ivory tusks.
- African elephants live for about 70 years.
- Most African elephants live in large herds.
- Land available to elephants is disappearing rapidly.

The African elephant is now extinct in many parts of Africa.

Use information from the list to give **three** reasons why.

1. _____

_____

2. _____

_____

3. _____

_____

(3)

(b) Organisms that are in danger of extinction can be cloned.

List A gives the names of three different cloning techniques.

List B gives information about these techniques.

Draw a line from each technique in **List A** to the correct information about it in **List B**.

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List A Technique	List B Information
	Small groups of cells from parts of a plant are grown on a special jelly.
Adult cell cloning	
	Cells from a developing animal are separated before they become specialised and then placed into host mothers.
Embryo transplanting	
	Genes are cut out from chromosomes and inserted into other organisms.
Tissue culture	
	A nucleus is removed from an unfertilised egg cell. The nucleus from a body cell is inserted into the egg cell. An electric shock causes the egg to start to divide.

(3)

(Total 6 marks)

Q34.

The photograph shows a snake eating a toad.



Cane toads were first introduced into Australia in 1935. The toads contain toxins and most species of Australian snake die after eating the toad.

The cane toad toxin does not affect all snakes the same way. Longer snakes are less affected by toad toxin.

Scientists investigated how red-bellied black snakes had changed in the 70 years since cane toads were introduced into their area. They found that red-bellied black snakes had become longer by around 3 – 5 %.

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Suggest an explanation for the change in the body length of the red-bellied black snakes since the introduction of the cane toads.

_____

_____

_____

_____

_____

_____

_____

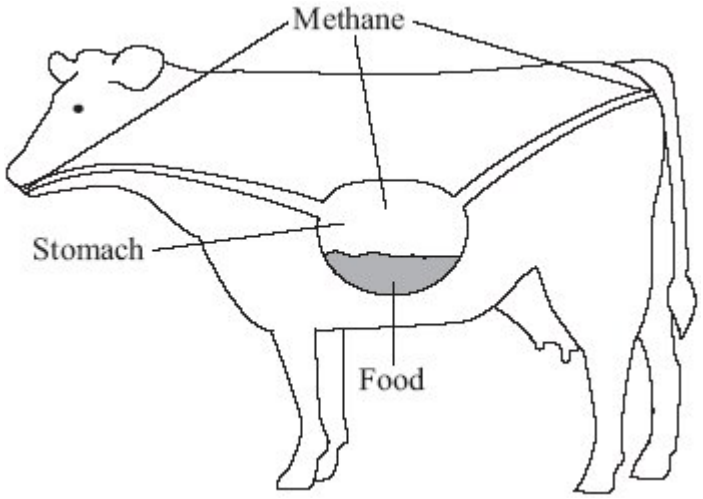
_____

(Total 4 marks)

Q35.

Scientists are investigating how to reduce methane emissions from cattle.

Most of this methane is emitted by the cows belching.



Scientists have found that less methane is belched if the cows eat high-sugar rye grass.

This rye grass has been produced by genetic engineering.

(i) Suggest how the high-sugar rye grass might have been produced by genetic engineering.

_____

_____

_____

_____

_____

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_____

(3)

(ii) Some people might object to the growing of genetically-engineered, high-sugar rye grass for feeding cattle.

Give **two** reasons why.

1. _____

_____

_____

2. _____

_____

_____

(2)

(Total 5 marks)

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