AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

GCSE
BIOLOGY

H

Higher Tier Paper 2H

Monday 1 June 2020 Afternoon Time allowed: 1 hour 45 minutes

Materials

For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	

Information
- The maximum mark for this paper is 100.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Answer **all** questions in the spaces provided.

Do not write outside the box

0 1 This question is about the decay of milk.

0 1 . 1 Name **two** types of microorganism that cause decay.

[2 marks]

1 _____

2 _____

0 1 . 2 Cows' milk is pH 6.6.

As milk decays, lipids in the milk are broken down.

One of the products of the breakdown of lipids causes the pH of milk to decrease.

Name the product that causes the pH to decrease.

[1 mark]

_____

Do not write outside the box

A student investigated the effect of temperature on the time taken for different types of milk to decay.

This is the method used.

1. Put cows' milk in six test tubes.

2. Keep each test tube at a different temperature.

3. Measure the pH of the milk in each tube every day for 12 days.

4. Record the number of days taken to reach pH 5.

5. Repeat steps 1 to 4 with goats' milk and with almond milk.

0 1 . 3 Give **one** way the pH can be measured.

[1 mark]

_____

0 1 . 4 Give **two** control variables the student should have used in this investigation.

[2 marks]

1 _____

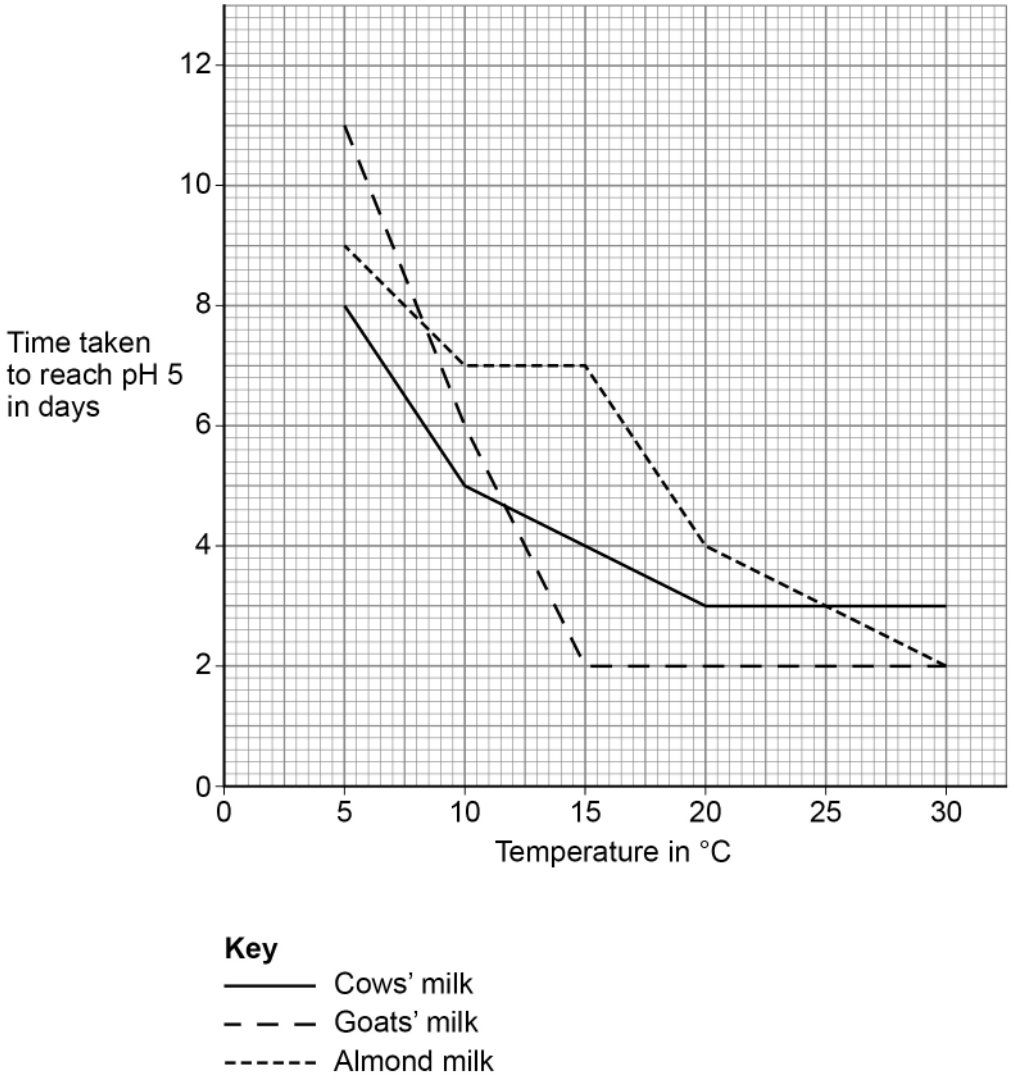
2 _____

Question 1 continues on the next page

The student improved the investigation to produce valid results.

Figure 1 shows the results.

Figure 1



0 1 . 5 Which type of milk stays fresh the longest at 10 °C?

[1 mark]

Do not write outside the box

0 1 . 6 Describe the effect of temperature on the time taken for **goats'** milk to reach pH 5.

Use data from **Figure 1** in your answer.

[2 marks]

0 1 . 7 The time taken for cows' milk to reach pH 5 at 10 °C is less than the time taken for cows' milk to reach pH 5 at 5 °C.

Suggest **one** reason why.

[1 mark]

0 1 . 8 Suggest **two** reasons why the different types of milk took different lengths of time to reach pH 5.

[2 marks]

1

2

Question 1 continues on the next page

Do not write outside the box

0 1 . 9 The student said:

‘The temperature milk is stored at affects how likely the milk is to cause food poisoning.’

How can the investigation be developed to find out if the student is correct?

[1 mark]

Tick (✓) **one** box.

Determine the types of bacteria present in the milk ☐

Record the pH every 12 hours ☐

Use more than three different types of milk ☐

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ANSWER IN THE SPACES PROVIDED

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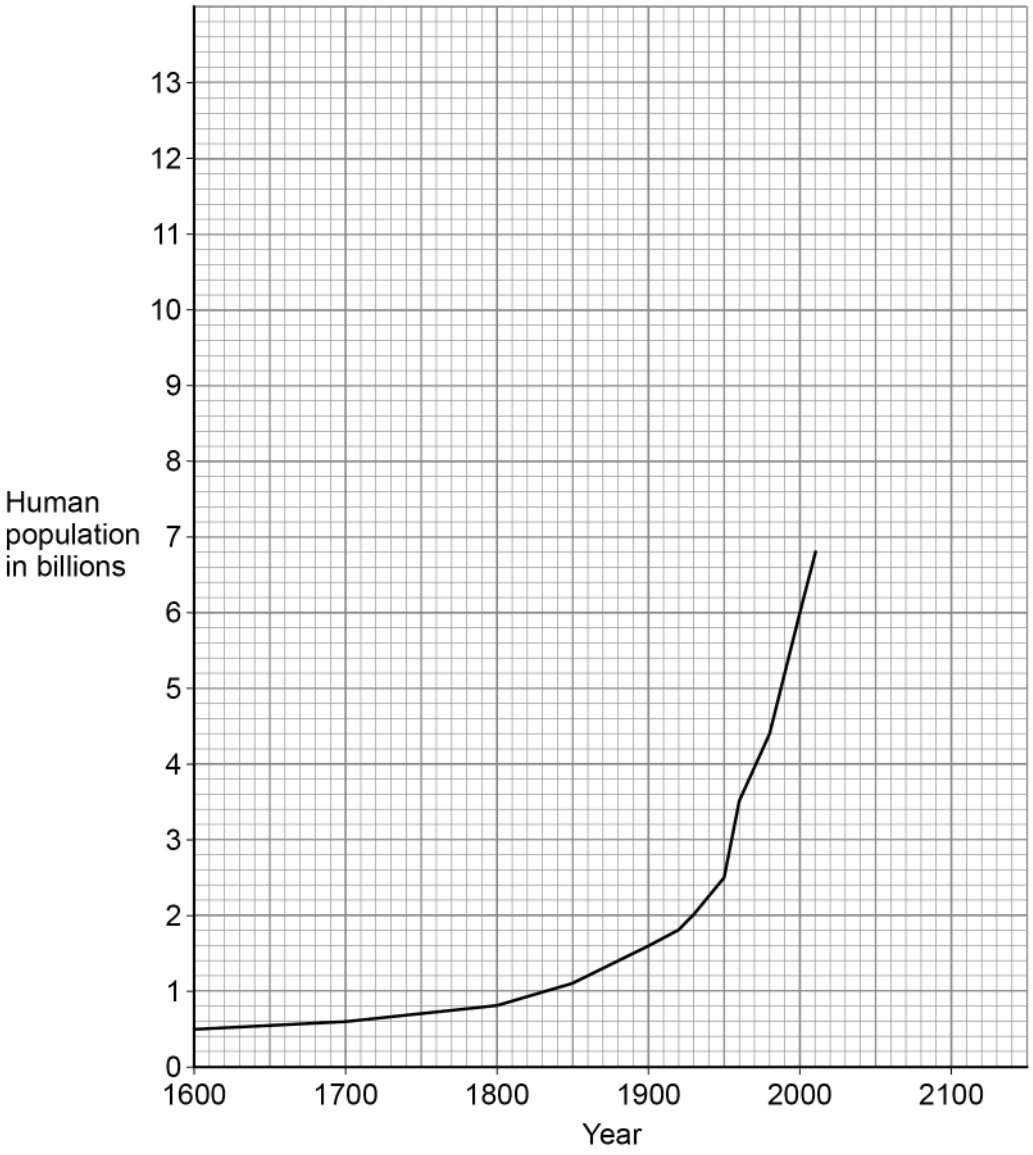
0 2 **Figure 2** shows the human population from 1600 to 2010.

Figure 2



In 1900 the human population was 1.6 billion.

0 2 . 1 Calculate how many times greater the human population was in the year 2000 compared with the year 1900.

[2 marks]

Number of times greater = _____

Do not write outside the box

0 2 . 2 In 1950 the human population was 2.5 billion.

Calculate the mean annual increase in the human population between 1900 and 1950.

[2 marks]

Mean annual increase = _____ billion per year

0 2 . 3 Predict the human population in 2050 if the current rate of population increase continues.

You should draw an extrapolation line on **Figure 2**.

[2 marks]

Predicted human population = _____

0 2 . 4 The increasing human population has caused a decline in fish stocks.

Describe how fishing quotas can help to return fish stocks to a sustainable level.

[2 marks]

Question 2 continues on the next page

Do not write outside the box

0 2 . 5 Farming techniques have changed in recent years.

Describe:

- why more land is being used for farming
- how increased farming has decreased biodiversity.

[6 marks]

Do not write outside the box

0 2 . 6 Genetic modification of crop plants can help meet the demands of the increasing human population.

Golden rice is a genetically modified (GM) crop.

What is the advantage of golden rice compared with non-GM rice?

[1 mark]

Tick (✓) **one** box.

Golden rice contains protein-rich mycoprotein ☐

Golden rice has improved nutritional value ☐

Golden rice produces human insulin ☐

0 2 . 7 Suggest **one** reason why some people are concerned about the use of golden rice.

[1 mark]

_____

_____

16

Turn over for the next question

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0 3 This question is about plant hormones.

0 3 . 1 Farmers can spray seeds with gibberellins to start germination.

What are **two** other uses of gibberellins?

[2 marks]

Tick (✓) **two** boxes.

To help in tissue culture ☐

To help roots form ☐

To increase fruit size ☐

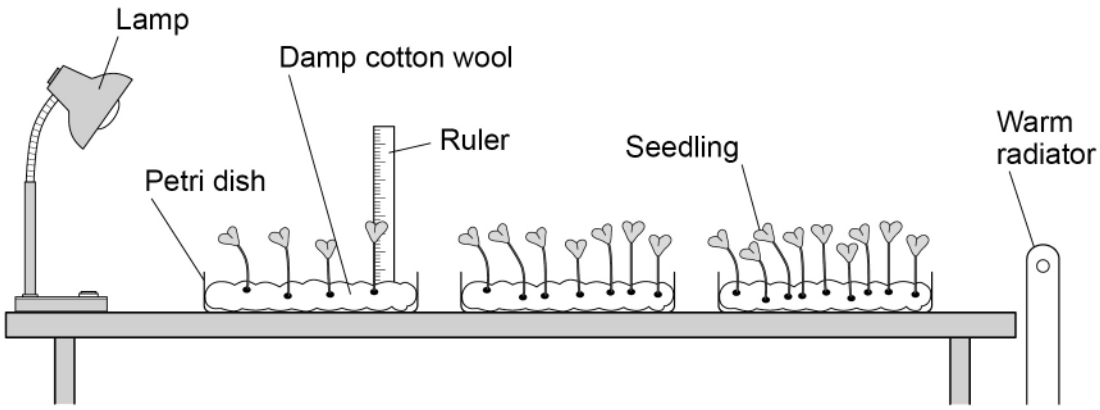
To kill weeds ☐

To promote flower production ☐

Students investigated the effect of light intensity on the height of seedlings.

Figure 3 shows the equipment.

Figure 3



0 3 . 2 Describe **two** improvements the students should make to their investigation.

[2 marks]

1 _____

_____

2 _____

_____

Question 3 continues on the next page

Do not write outside the box

Figure 4 shows a seedling growing towards a lamp.

Figure 4

0 3 . 3 Suggest how the students measured the length of the curved seedling in **Figure 4**.

[1 mark]

Do not write outside the box

0 3 . 4 Explain what happened to the growth of the seedling on side **Q** compared with the growth on side **P**.

[3 marks]

0 3 . 5 Bananas are often stored separately from other fruits because bananas release a plant hormone.

Why does storing bananas with other fruits cause the other fruits to ripen faster?

[1 mark]

9

Turn over for the next question

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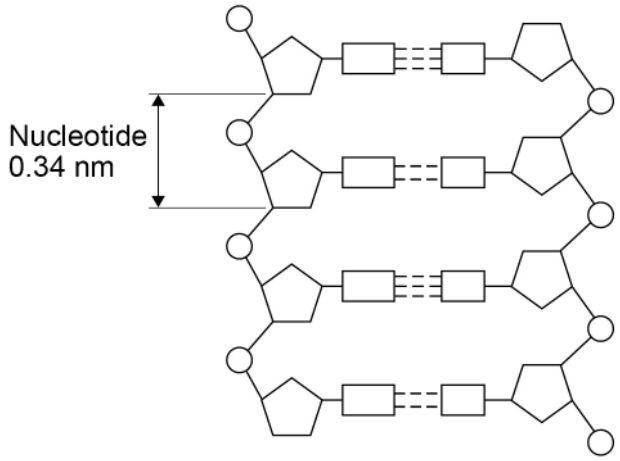
0 4 DNA is a polymer of nucleotides.

0 4 . 1 Why is DNA described as a polymer?

[1 mark]

Figure 5 shows part of a DNA molecule.

Figure 5



0 4 . 2 Describe the structure of a nucleotide.

[4 marks]

Do not write outside the box

0 4 . 3 The length of a DNA double helix increases by 0.34 nm for every pair of nucleotides.

The total number of nucleotides in a human body cell is 1.2×10^{10}.

Calculate the total length of double helix in a human body cell.

Give your answer in metres. Use information from **Figure 5**.

[5 marks]

Total length = _____ m

0 4 . 4 Some parts of DNA do **not** code for proteins.

Describe how non-coding parts of DNA can affect the expression of genes.

[1 mark]

11

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0 5 There are two types of cell division: mitosis and meiosis.

0 5 . 1 Describe **three** differences between the processes of mitosis and meiosis.

[3 marks]

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

0 5 . 2 Describe **one** similarity between the processes of mitosis and meiosis.

[1 mark]

_____

_____

Question 5 continues on the next page

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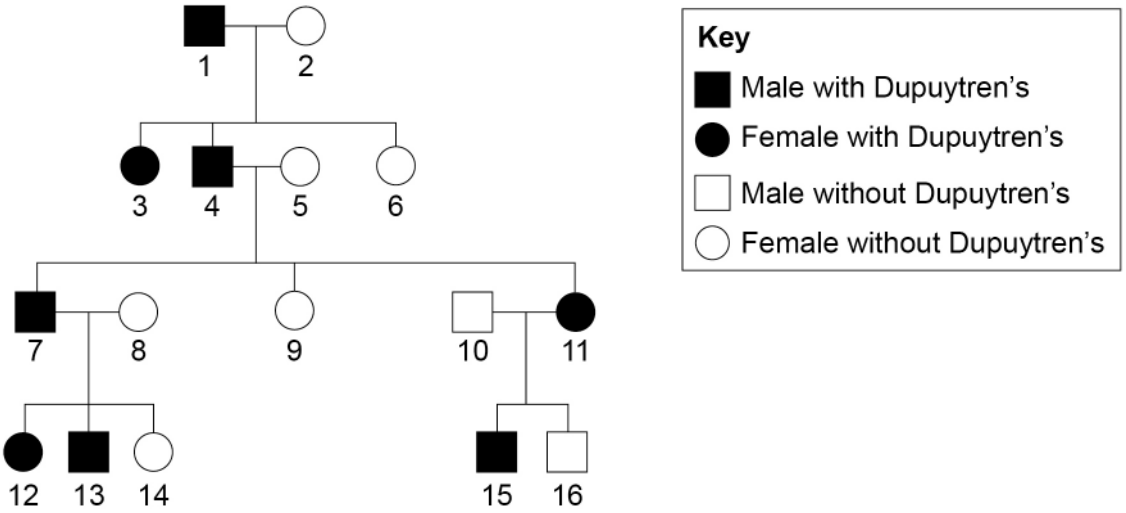
Dupuytren's is a disorder that affects the hands.

Figure 6 shows the inheritance of Dupuytren's in one family.

Figure 6



Dupuytren's is caused by a dominant allele in this family.

D = dominant allele

d = recessive allele

0 5 . 3 Give the genotype of person **1**.

Explain your answer.

[2 marks]

Genotype _____

Do not write outside the box

0 5 . 4 Person **7** and person **8** in **Figure 6** are expecting a fourth child.

What is the probability of the child having Dupuytren's?

You should:

- draw a Punnett square diagram
- identify which offspring have Dupuytren's

[5 marks]

Probability = _____

0 5 . 5 Explain how **Figure 6** shows the allele for Dupuytren's is **not** on the Y chromosome.

[2 marks]

_____

_____

_____

_____

13

Turn over for the next question

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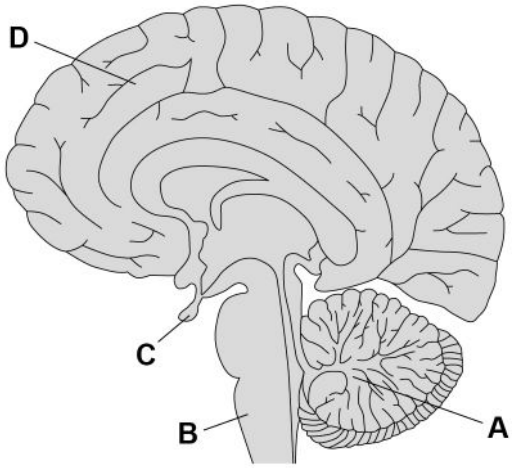
0 6 **Figure 7** shows the brain.

Figure 7



0 6 . 1 Which part of the brain becomes more active if a person balances on one leg instead of standing on two legs?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 6 . 2 Name the part of the brain that is responsible for making a decision.

[1 mark]

_____

Do not write outside the box

0 6 . 3 In most MRI scanners the person being scanned needs to stay completely still.

A functional MRI (fMRI) scanner allows a person to move while the scanner makes images of the person's brain activity.

Suggest how the fMRI scanner could help to find out more about the brain damage a person has.

[3 marks]

0 6 . 4 Describe how the brain receives information about light entering the eye.

You should include the names of structures in your answer.

[3 marks]

Question 6 continues on the next page

Do not write outside the box

0 6 . 5 The eyes of some birds contain cells that detect ultraviolet (UV) light.

UV light is reflected by some fruits and the urine of small mammals.

Explain how birds that detect UV light have evolved from birds that could not detect UV light.

[6 marks]

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0 7 A new dog food has been developed that does **not** contain meat from cows, sheep or chickens.

The new dog food contains insects.

The insects in the dog food factory are fed on waste vegetables.

0 7 . 1 Sketch the pyramid of biomass for the food chain that produces food for dogs from insects.

Label the pyramid.

[2 marks]

0 7 . 2 Describe **two** reasons why the biomass of the insects eaten by dogs does **not** all become biomass of the dogs.

[2 marks]

1 _____

_____

2 _____

_____

Do not write outside the box

0 7 . 3 Explain how making dog food from insects could improve **human** food security in the future.

[4 marks]

8

Turn over for the next question

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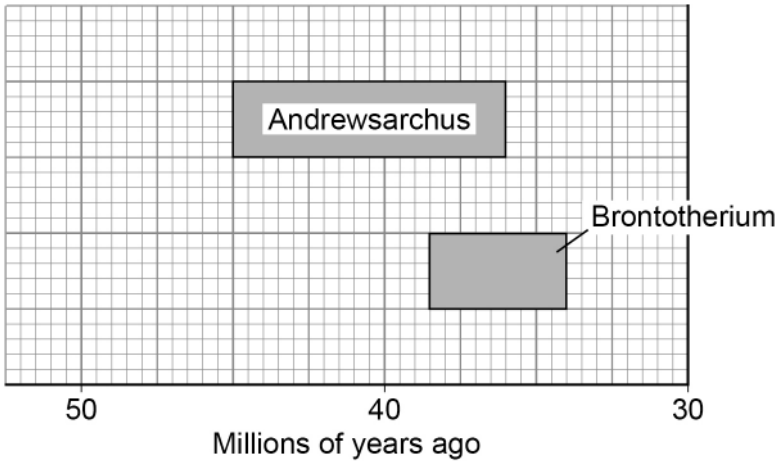
0 8 **Figure 8** shows when two mammals existed in Asia.

Figure 8



0 8 . 1 Determine the number of years both Andrewsarchus and Brontotherium existed together.

[2 marks]

Time = _____ years

Do not write outside the box

0 8 . 2 The oldest fossils of human ancestors found in this area are 700 000 years old.

Andrewsarchus was a carnivore and Brontotherium was a herbivore.

Suggest how the extinction of Andrewsarchus could have resulted in the extinction of Brontotherium.

[3 marks]

0 8 . 3 Information about extinct animals is often **not** clear because the fossil record is incomplete.

Give **three** reasons why the fossil record is **not** clear for older species.

[3 marks]

1

2

3

Question 8 continues on the next page

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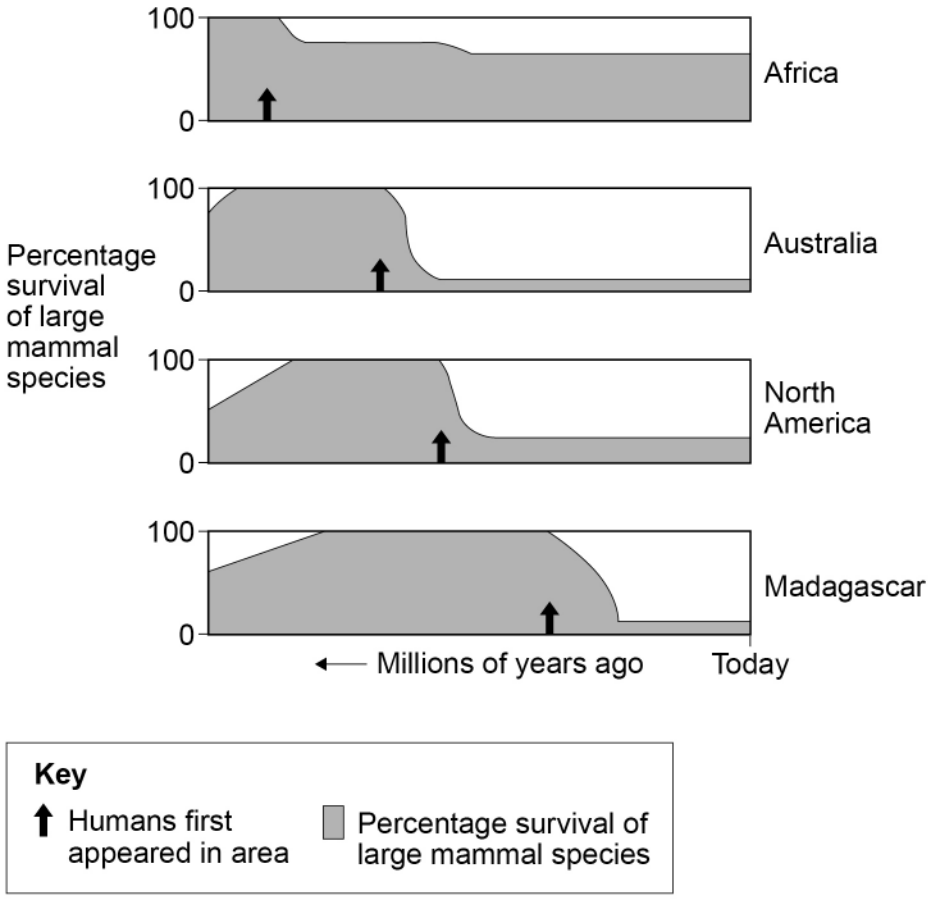
Figure 9 shows the percentage (%) survival of large mammal species in four areas of the world.

The time at which humans first appeared in each of the four areas is also shown.

Figure 9



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A mass extinction is a rapid decrease in biodiversity on Earth.

0 8 . 4 A student stated:

'The data in **Figure 9** shows that humans caused mass extinctions.'

Evaluate the student's statement.

[6 marks]

Question 8 continues on the next page

Do not write outside the box

0 8 . 5 Give **one** disadvantage and **one** advantage of mass extinction events.

Answer in terms of evolution.

[2 marks]

Disadvantage _____

_____

Advantage _____

_____

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END OF QUESTIONS

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Question number	**Additional page, if required.** **Write the question numbers in the left-hand margin.**

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