AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.3.1

Evidence for evolution

Past-paper questions

Tier	**Foundation**
Question groups	**7**
Available paper years	**2020–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.6.3.1 Evidence for evolution

Question 01

November 2020 | 8464/B/2F | Original Q2

0 2 Ammonites became extinct millions of years ago.

Figure 2 is a photograph of a fossil ammonite.

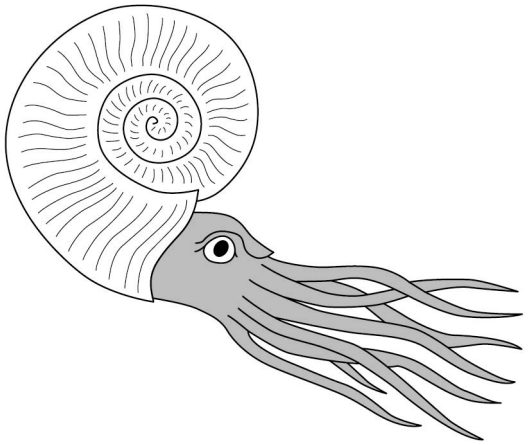
.

Figure 3 is a drawing of what scientists think a living ammonite looked like.

Figure 2



Figure 3



0 2 . 1 How was the fossil in **Figure 2** formed?

[1 mark]

Tick (✓) **one** box.

- The ammonite left traces where it moved. ☐
- The ammonite shell was replaced by minerals. ☐
- The ammonite was frozen in ice. ☐

0 2 . 2 Suggest why scientists are **not** certain what living ammonites looked like.

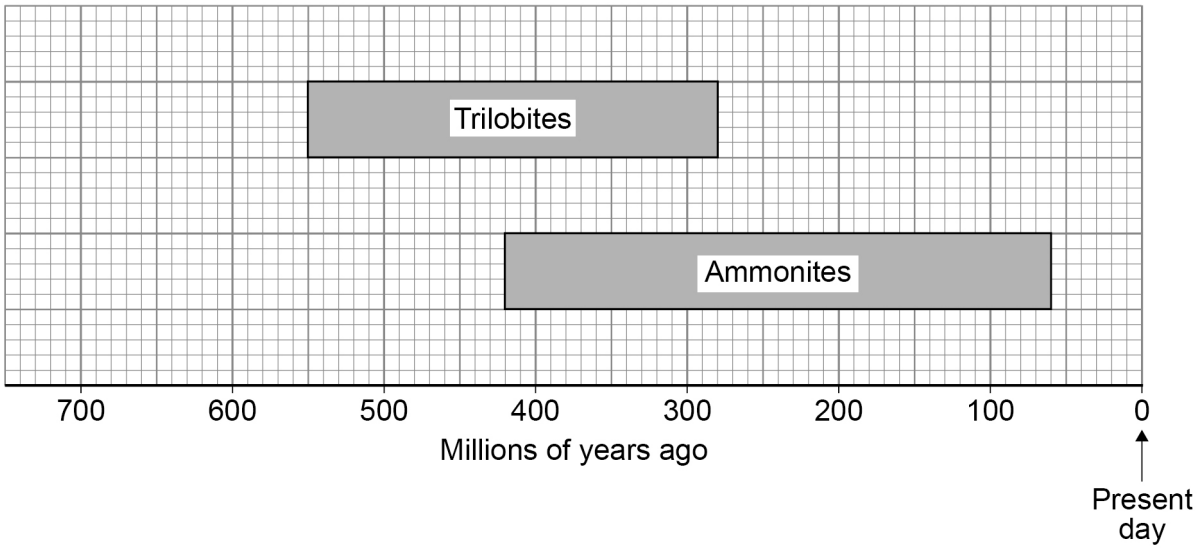
[1 mark]

4.6.3.1 Evidence for evolution

Question 01 · continued

Figure 4 shows when two different types of organism were alive on Earth.

Figure 4



0 2 . 3 How many millions of years ago did ammonites become extinct?

Use **Figure 4**.

[1 mark]

_____ million years

0 2 . 4 Trilobites lived on Earth for 270 million years.

Calculate how much longer ammonites lived on Earth than trilobites.

Use **Figure 4**.

[2 marks]

_____

_____

_____ million years

4.6.3.1 Evidence for evolution

Question 01 · continued

0 2 . 5 Suggest **two** factors which may have caused ammonites to become extinct.

[2 marks]

1 _____

_____

2 _____

_____

The fossil record provides evidence for the theory of evolution by natural selection.

0 2 . 6 Which scientist proposed the theory of evolution by natural selection?

[1 mark]

Tick (✓) **one** box.

Carl Linnaeus ☐

Carl Woese ☐

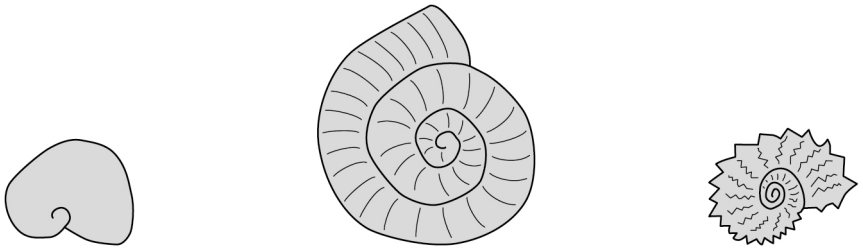
Charles Darwin ☐

4.6.3.1 Evidence for evolution

Question 01 · continued

0 2 . 7 **Figure 5** shows ammonite fossils from three different time periods.

Figure 5



400 million years ago | 300 million years ago | 200 million years ago

How do the fossils in **Figure 5** give evidence for the theory of evolution by natural selection?

[1 mark]

Tick (✓) **one** box.

All fossils have coiled shells. ☐

More recent fossils are bigger. ☐

Older fossils are more simple. ☐

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4.6.3.1 Evidence for evolution

Question 02

November 2021 | 8464/B/2F | Original Q3

0 3 **Figure 2** shows one species of bird on a bird feeder.

Figure 2



The birds use their beaks to reach nuts inside the bird feeder.

Cats sometimes eat the birds.

0 3 . 1 Give the food chain for the birds, cats and nuts.

[2 marks]

0 3 . 2 Which organism in the food chain you gave in Question **03.1** is the primary consumer?

[1 mark]

4.6.3.1 Evidence for evolution

Question 02 · continued

0 3 . 3 Cats are one biotic factor that affects the size of the bird population.

Which **two** of the following are **biotic** factors?

[2 marks]

Tick (✓) **two** boxes.

- Food ☐
- Pathogens ☐
- Sunlight ☐
- Temperature ☐
- Water ☐

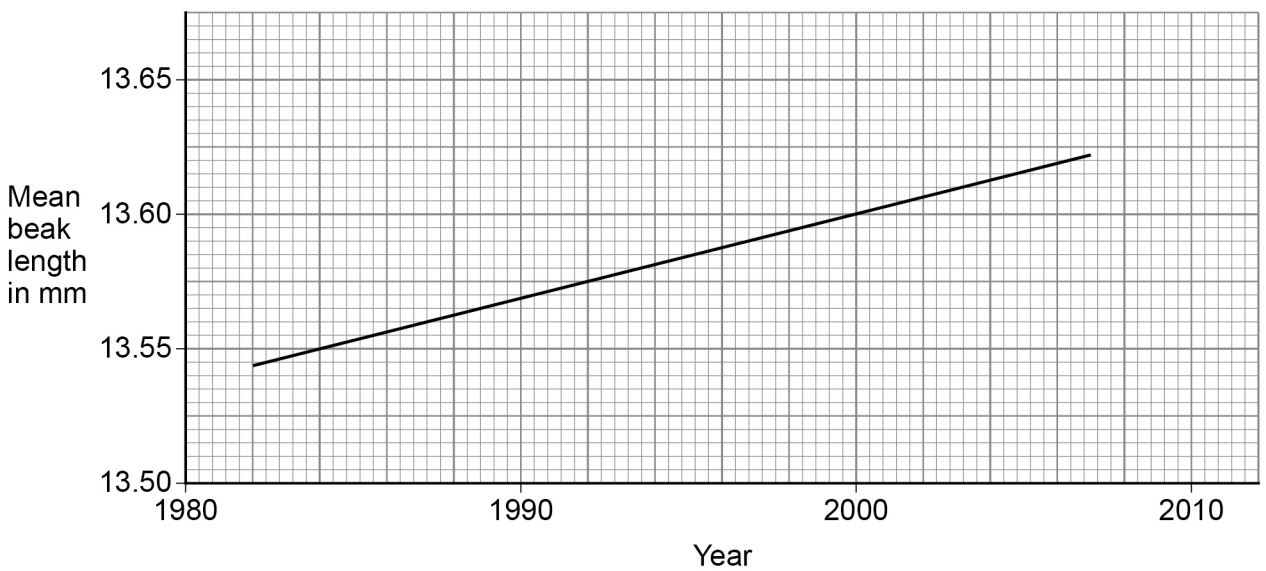
Question 3 continues on the next page

4.6.3.1 Evidence for evolution

Question 02 · continued

Figure 3 shows the mean beak length of this species of bird from 1982 to 2007.

Figure 3



0 3 . 4 What was the mean beak length in 2000?

[1 mark]

Mean beak length = _____ mm

0 3 . 5 What type of adaptation is beak length?

[1 mark]

Tick (✓) **one** box.

Behavioural ☐

Chemical ☐

Structural ☐

4.6.3.1 Evidence for evolution

Question 02 · continued

Figure 3 shows evidence of evolution in this species of bird.

0 3 . 6 Scientists have concluded that beak length in this species of bird is increasing.

Complete the sentences about the evolution of this species of bird.

Choose answers from the box.

[4 marks]

excretion	**generation**	**mutation**
reproduction	**respiration**	**variation**

The difference in beak length in the bird population

is called _____ .

A change in a gene affects the beak length.

Change in a gene is called _____ .

The birds with the longest beaks get more food.

Getting more food improves a bird's chances of

survival and _____ .

This process of evolution takes place over more

than one _____ .

Question 3 continues on the next page

4.6.3.1 Evidence for evolution

Question 02 · continued

0 3 . 7 Birds of this species:

- live for about 3 years
- produce up to 24 eggs every year.

Why is evolution easier to study in birds than in humans?

[1 mark]

Tick (✓) **one** box.

Birds breed less frequently than humans. ☐

Birds have a shorter life cycle than humans. ☐

Birds have fewer offspring than humans. ☐

0 3 . 8 Bacteria also provide evidence for evolution.

Which statement describes evidence for evolution?

[1 mark]

Tick (✓) **one** box.

Bacteria can become resistant to antibiotics. ☐

Decomposition can be caused by bacteria. ☐

Some bacteria are pathogens. ☐

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4.6.3.1 Evidence for evolution

Question 03

November 2021 | 8464/B/2F | Original Q4

0 4 A fossil was found in rocks. The rocks were formed from mud.

The fossil is of the fungus *Ourasphaira giraldae*.

0 4 . 1 What is the genus of the fungus?

[1 mark]

Tick (✓) **one** box.

- Giraldae ☐
- Ourasphaira ☐
- Ourasphaira giraldae ☐

0 4 . 2 The mud around the fungus did **not** contain oxygen.

Which process did the mud around the fungus prevent?

[1 mark]

Tick (✓) **one** box.

- Decay ☐
- Geological activity ☐
- Photosynthesis ☐

Question 4 continues on the next page

4.6.3.1 Evidence for evolution

Question 03 · continued

0 4 . 3 The fossilised fungus is estimated to be 890 000 000 years old.

What is 890 000 000 in standard form?

[1 mark]

Tick (✓) **one** box.

8.9×10^6 ☐

8.9×10^7 ☐

8.9×10^8 ☐

8.9×10^9 ☐

0 4 . 4 Traditional classification divided organisms into kingdoms.

Who developed the traditional system of classification?

[1 mark]

Tick (✓) **one** box.

Carl Linnaeus ☐

Carl Woese ☐

Charles Darwin ☐

4.6.3.1 Evidence for evolution

Question 03 · continued

0 4 . 5 More recent classification methods use a three-domain system.

What is the name of the domain the fungus *Ourasphaira giraldae* is classified in?

[1 mark]

Tick (✓) **one** box.

Bacteria ☐

Eukaryota ☐

Plants ☐

0 4 . 6 Why has classification changed over time?

[1 mark]

Tick (✓) **one** box.

Electron microscopes allow more detail to be seen inside cells. ☐

Many more types of organisms have become extinct. ☐

Some fossils are buried so deep that they may never be discovered. ☐

0 4 . 7 The fungus *Ourasphaira giraldae* is now extinct.

Give **two** possible causes of extinction.

[2 marks]

1 _____

_____

2 _____

_____

8

4.6.3.1 Evidence for evolution

Question 04

June 2022 | 8464/B/2F | Original Q3

0 3 The theory of evolution by natural selection was suggested by Charles Darwin in 1859.

Evidence from fossils supports Darwin's theory.

0 3 . 1 What evidence supports the theory of evolution by natural selection?

[1 mark]

Tick (✓) **one** box.

- Knowledge of how DNA controls inheritance ☐
- Knowledge of how the dinosaurs became extinct ☐
- Knowledge of how the Earth was formed ☐
- Knowledge of what causes global warming ☐

4.6.3.1 Evidence for evolution

Question 04 · continued

0 3 . 2 **Figure 3** shows a fossil fly preserved in amber.

The fossil formed when the amber solidified with the fly trapped inside.

Figure 3



Why has the fly been preserved?

[1 mark]

Tick (✓) **one** box.

The amber has been kept at a constant temperature. ☐

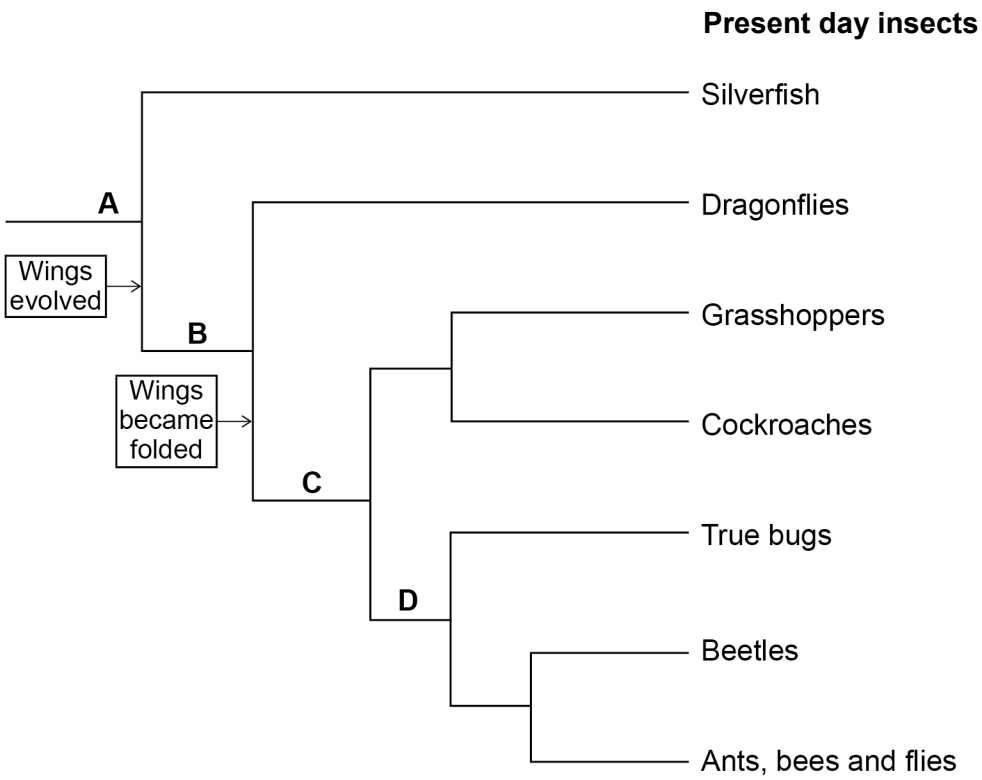
The fly was soft-bodied. ☐

There was no oxygen in the amber. ☐

Question 04 · continued

Figure 4 shows a simplified evolutionary tree for the insect group of animals.

Figure 4



0 3 . 3 Which present day insect evolved first?

[1 mark]

0 3 . 4 Animals **A**, **B**, **C** and **D** were ancestors of present day insects.

Which animal is the most recent ancestor of both grasshoppers and beetles?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 3 . 5 Name the group of present day insects which have wings which do **not** fold.

[1 mark]

4.6.3.1 Evidence for evolution

Question 04 · continued

0 3 . 6 The house fly has the binomial name *Musca domestica*.

Table 2 shows part of the classification for the house fly.

Table 2

Classification group	Name
Kingdom	
Phylum	arthropoda
Class	
Order	diptera
Family	muscidae
Genus	
Species	

Complete **Table 2**.

Choose answers from the box.

[3 marks]

animalia	**domestica**	**Musca**	**insecta**

Question 3 continues on the next page

4.6.3.1 Evidence for evolution

Question 04 · continued

0 3 . 7 Carl Woese proposed the 'three-domain system' of classification.

Which domain are insects in?

[1 mark]

Tick (✓) **one** box.

Archaea ☐

Eukaryota ☐

Prokaryota ☐

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4.6.3.1 Evidence for evolution

Question 05

June 2023 | 8464/B/2F | Original Q7

0 7 It is estimated that 99.9% of all species that have ever existed are now extinct.

0 7 . 1 Why is the percentage of species that are extinct only an estimate?

[1 mark]

Tick (✓) **one** box.

All individuals of one species have the same genes. ☐

Extinction is always caused by humans. ☐

Humans have not found evidence of every species. ☐

0 7 . 2 What evidence is used to study species that have become extinct?

[1 mark]

4.6.3.1 Evidence for evolution

Question 05 · continued

0 7 . 3 A bacterium called *Clostridioides difficile* (*C. difficile*) can infect the human digestive system.

C. difficile can multiply and produce toxins. The toxins cause diarrhoea.

Doctors are concerned that new strains of *C. difficile* may evolve. Antibiotics may **not** be able to kill these new strains.

Explain how the evolution of antibiotic resistant *C. difficile* can be slowed down.

[6 marks]

8

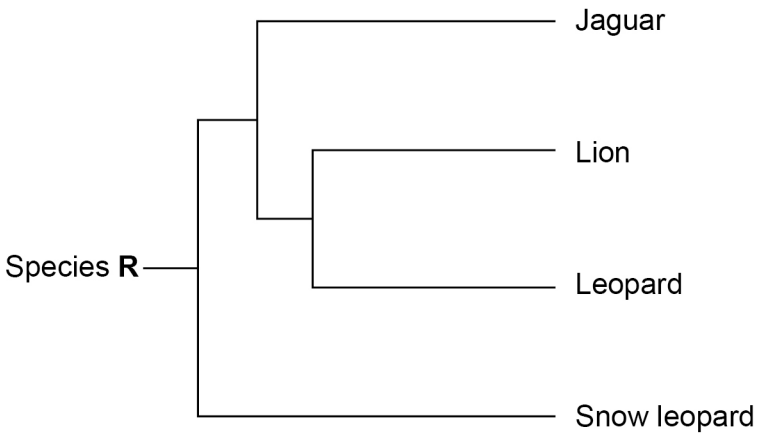
4.6.3.1 Evidence for evolution

Question 06

June 2024 | 8464/B/2F | Original Q4

0 4 **Figure 8** shows an evolutionary tree.

Figure 8



0 4 . 1 Which species in **Figure 8** is most closely related to lions?

[1 mark]

Tick (✓) **one** box.

Jaguar ☐

Leopard ☐

Snow leopard ☐

0 4 . 2 Tigers are more closely related to snow leopards than to jaguars.

Draw a line on **Figure 8** to show the evolution of tigers.

Label the line 'Tiger'.

[1 mark]

4.6.3.1 Evidence for evolution

Question 06 · continued

0 4 . 3 What is represented by species **R** on **Figure 8**?

[1 mark]

Tick (✓) **one** box.

A species recently evolved from jaguars. ☐

A species that may evolve in the future. ☐

A species that the other species evolved from. ☐

0 4 . 4 Complete the sentence.

Choose the answer from the box.

[1 mark]

classification	**homeostasis**	**natural selection**

Evolution occurs by the process of _____.

0 4 . 5 Species can become extinct.

Give **two** possible causes of extinction.

[2 marks]

1 _____

_____

2 _____

_____

Question 4 continues on the next page

4.6.3.1 Evidence for evolution

Question 06 · continued

0 4 . 6 Fossils are used to study the evolution of some species.

Suggest **one** reason why fossils are used to study evolution.

[1 mark]

Some bacteria have evolved to be resistant to penicillin.

Penicillin is an antibiotic.

0 4 . 7 How has the process of evolution produced bacteria that are resistant to penicillin?

Write the stages, **A**, **B**, **C**, **D** and **E** in the correct order.

The first stage has been completed for you.

[3 marks]

A The bacteria with mutations are more likely to survive.

B The population of bacteria is exposed to penicillin.

C The mutation for resistance to penicillin is passed on to offspring.

D Variation in the population of bacteria is caused by mutation.

E The surviving bacteria reproduce.

D → _____ → _____ → _____ → _____

4.6.3.1 Evidence for evolution

Question 06 · continued

0 4 . 8 New antibiotics are **not** likely to control the spread of bacteria that are resistant to antibiotics.

What are **two** reasons why?

[2 marks]

Tick (✓) **two** boxes.

- Antibiotics kill all types of bacteria. ☐
- Antibiotic resistant bacteria will continue to evolve. ☐
- Bacteria reproduce very rapidly. ☐
- New antibiotics are cheap to produce. ☐
- Testing new antibiotics is quick. ☐

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Turn over for the next question

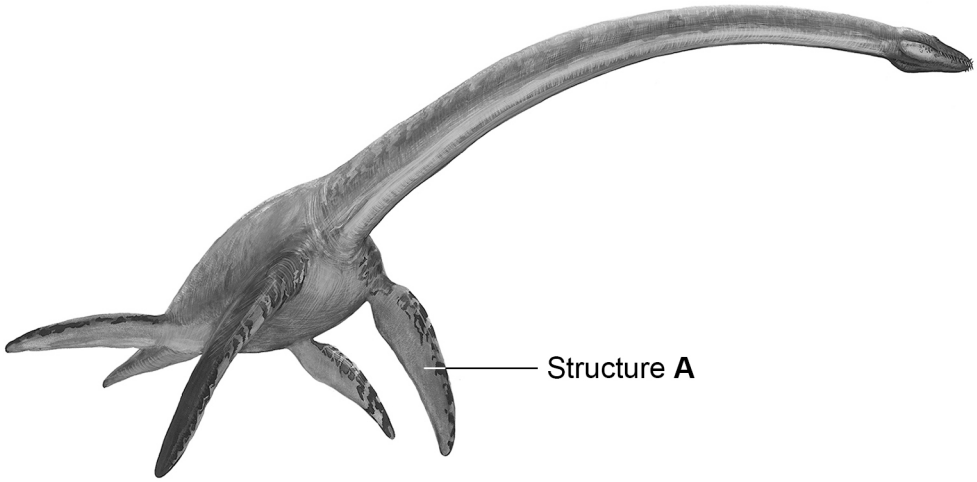
4.6.3.1 Evidence for evolution

Question 07

0 4 Plesiosaurs are extinct animals that lived in the ocean.

Figure 5 shows what scientists think a living plesiosaur may have looked like.

Figure 5



0 4 . 1 Scientists think that the plesiosaur had smooth skin.

Suggest why the scientists **cannot** be certain what the skin of the plesiosaur was like.

[1 mark]

0 4 . 2 Explain how structure **A** in **Figure 5** helped the plesiosaur survive in the ocean.

[2 marks]

4.6.3.1 Evidence for evolution

Question 07 · continued

0 4 . 3 Plesiosaurs may have moved rapidly upwards to hold their heads above the water surface to search for prey.

What type of adaptation was the rapid upwards movement?

[1 mark]

Tick (✓) **one** box.

Behavioural ☐

Chemical ☐

Structural ☐

Question 4 continues on the next page

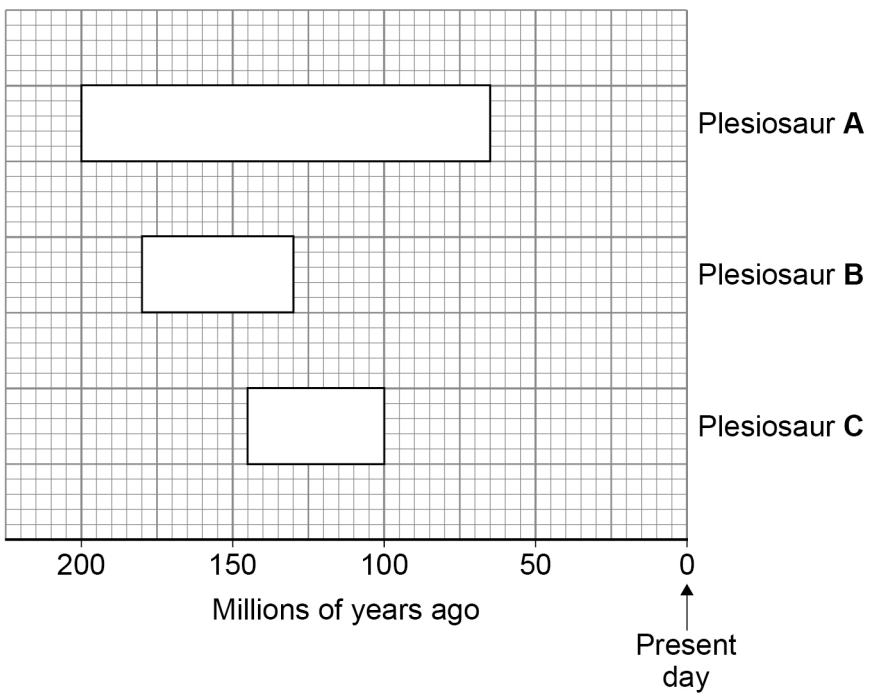
4.6.3.1 Evidence for evolution

Question 07 · continued

Scientists use fossils to estimate when different types of plesiosaur existed.

Figure 6 shows when three types of plesiosaur existed.

Figure 6



0 4 . 4 When did plesiosaur **A** first evolve?

Use **Figure 6**.

[1 mark]

_____ million years ago

0 4 . 5 Determine how many million years plesiosaur **B** existed for.

Use **Figure 6**.

[2 marks]

_____

_____

_____

Time = _____ million years

4.6.3.1 Evidence for evolution

Question 07 · continued

0 4 . 6 The exact year of extinction of all plesiosaur species can only be estimated.

Which are **two** reasons why?

[2 marks]

Tick (✓) **two** boxes.

- All plesiosaurs will have formed fossils. ☐
- Not all plesiosaur fossils have been discovered. ☐
- Plesiosaur bones do not decay. ☐
- Plesiosaurs had many predators. ☐
- Some plesiosaur fossils will have been destroyed. ☐

0 4 . 7 What evidence from **Figure 6** shows that plesiosaur **C** might have evolved from plesiosaur **B**?

[1 mark]

Tick (✓) **one** box.

- Plesiosaur **B** and plesiosaur **C** did not exist at the same time. ☐
- Plesiosaur **B** existed before plesiosaur **C**. ☐
- Plesiosaur **B** became extinct more recently than plesiosaur **C**. ☐

Question 4 continues on the next page

4.6.3.1 Evidence for evolution

Question 07 · continued

0 4 . 8 Evolution can be studied using evidence from:

- fossils
- antibiotic-resistant bacteria.

Suggest **two** reasons why it is easier to study evolution in bacteria than to study evolution using fossils.

[2 marks]

1 _____

_____

2 _____

_____

0 4 . 9 Give **one** reason why doctors are concerned about antibiotic-resistant bacteria.

[1 mark]

_____

_____

13