AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.4

Classification of living organisms

Past-paper questions

Tier	**Higher**
Question groups	**7**
Available paper years	**2018–2025**

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.

4.6.4 Classification of living organisms

Question 01

June 2018 | 8464/B/2H | Original Q3

0 3 Scientists have removed microorganisms from inside rocks in caves in Mexico.

The microorganisms have been trapped there for between 10 000 and 50 000 years.

The caves are dark, very hot, humid and acidic.

0 3 . 1 Why are these microorganisms called extremophiles?

[2 marks]

Tick **two** boxes.

- They are thousands of years old ☐
- They survive in high humidity ☐
- They survive in high temperatures ☐
- They survive in the dark ☐
- They survive inside rocks ☐
- They survive where it is acidic ☐

Question 3 continues on the next page

Question 01 · continued

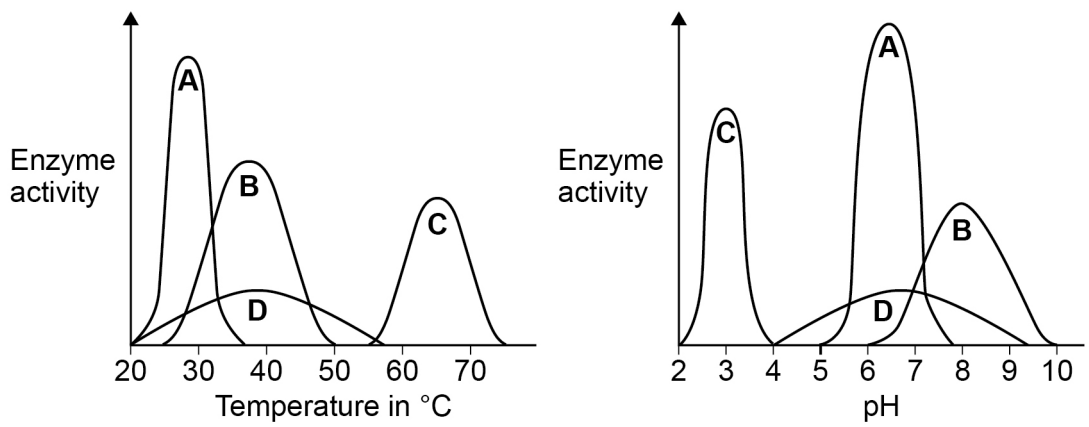
The microorganisms have been inactive for thousands of years but the scientists have reactivated them.

Figure 2 shows the results of enzyme analysis on four enzymes, **A**, **B**, **C** and **D**.

Three of the enzymes were from microorganisms found in the soil near the caves.

One of the enzymes was from a reactivated microorganism from the caves.

Figure 2



0 3 . 2 Which enzyme comes from the microorganism from the caves?

[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 3 . 3 Give the reasons for your answer to question **03.2**

[1 mark]

4.6.4 Classification of living organisms

Question 01 · continued

0 3 . 4 Carl Woese developed the 'three-domain system' of classification.

Describe the 'three-domain system' of classification.

[3 marks]

0 3 . 5 Most of the microorganisms from the caves were classified as belonging to the Archaea domain of the 'three-domain system'.

Suggest why.

[1 mark]

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4.6.4 Classification of living organisms

Question 02

0 6 Scientists believe that the first life on Earth was primitive anaerobic bacteria which first appeared billions of years ago.

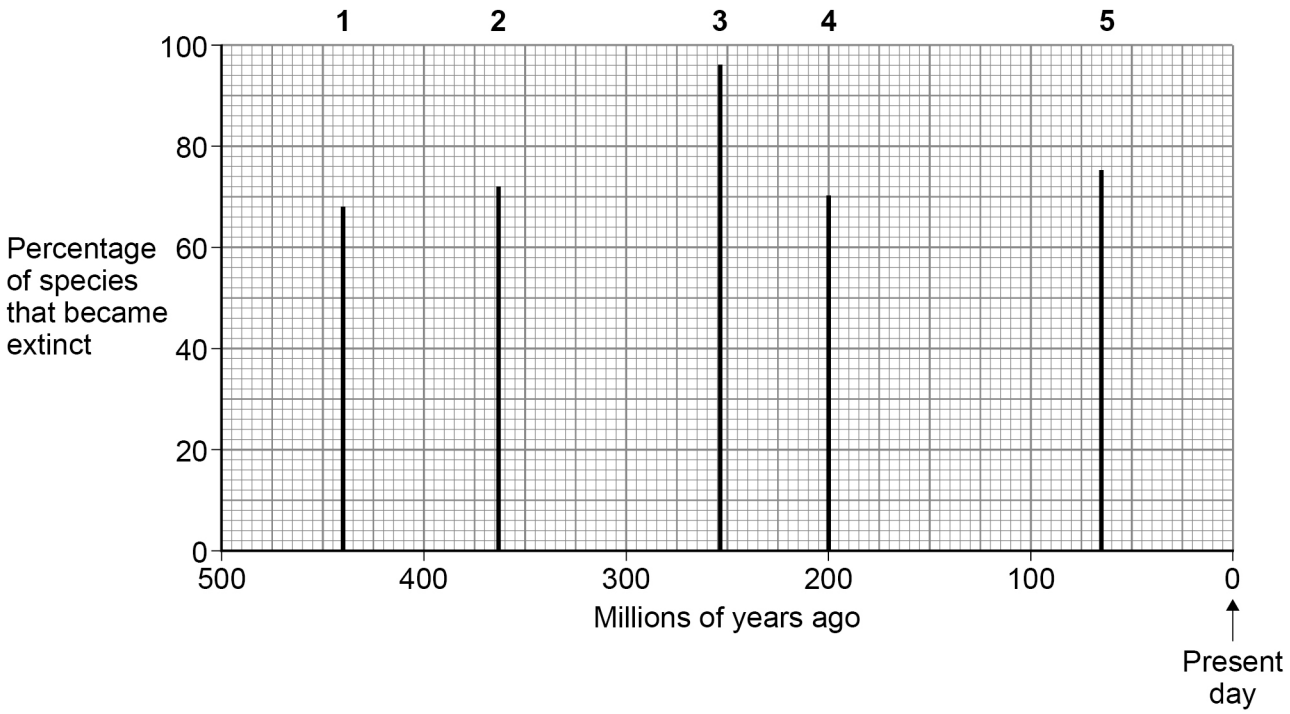
0 6 . 1 Which domain of the three-domain classification system do these primitive anaerobic bacteria belong to?

[1 mark]

Scientists have identified five periods of mass extinction since the fossil record began.

Figure 6 shows the timeline of the five mass extinction events.

Figure 6



0 6 . 2 Ammonites were organisms that first appeared in the oceans 415 million years ago.

Ammonites disappeared in the 5th mass extinction.

Draw a horizontal line on **Figure 6** to show the time period that ammonites existed on Earth.

Label the line 'ammonites'.

[1 mark]

4.6.4 Classification of living organisms

Question 02 · continued

0 6 . 3 Another type of organism that existed in the oceans was called trilobites.

Trilobites existed from 544 million years ago until 278 million years ago.

How many more years did ammonites exist than trilobites?

[2 marks]

_____ years

0 6 . 4 There was an increase in the percentage of species which became extinct in the third mass extinction compared to the first mass extinction.

Calculate the percentage increase.

[3 marks]

Percentage increase = _____ %

7

4.6.4 Classification of living organisms

Question 03

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

0 3 A fossil was found in rocks. The rocks were formed from mud.

The fossil is of the fungus *Ourasphaira giraldae.*

0 3 . 1 What is the genus of the fungus?

[1 mark]

0 3 . 2 Why was the mud important during the formation of the fossil?

[1 mark]

Tick (✓) **one** box.

The fungus completely decayed in the mud. ☐

The mud stopped oxygen reaching the fungus. ☐

There was water in the mud around the fungus. ☐

Question 3 continues on the next page

Question 03 · continued

The estimated age of the fossil is in the range from 8.9×10^8 years old to 1.1×10^9 years old.

0 3 . 3 Calculate the size of the range of the estimated age of the fossil.

[1 mark]

Size of range = _____ years

0 3 . 4 Humans did **not** exist when the fungus was alive.

Suggest **one** other reason why an accurate estimation of when this species of fungus existed is not known.

[1 mark]

Carl Woese developed the three-domain system of classification.

0 3 . 5 Fungi are **not** in the domain Archaea.

Which domain are fungi classified in?

[1 mark]

Question 03 · continued

0 3 . 6 Which **two** characteristics are features of organisms in the domain Archaea?

[2 marks]

Tick (✓) **two** boxes.

- Can only survive in light ☐
- Can survive in extreme environments ☐
- Cells contain chloroplasts ☐
- Cells do not have a cell wall ☐
- Cytoplasm contains DNA ☐

0 3 . 7 Carl Linnaeus lived in the 1700s.

Carl Linnaeus classified living things into groups depending on their appearance.

Give **three** types of evidence that are used **now** to classify living things.

Do **not** refer to appearance in your answer.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

10

4.6.4 Classification of living organisms

Question 04

0 6 The polar bear is a mammal that lives in arctic habitats.

0 6 . 1 Complete **Table 2** for the classification of the polar bear, *Ursus maritimus*.

[2 marks]

Table 2

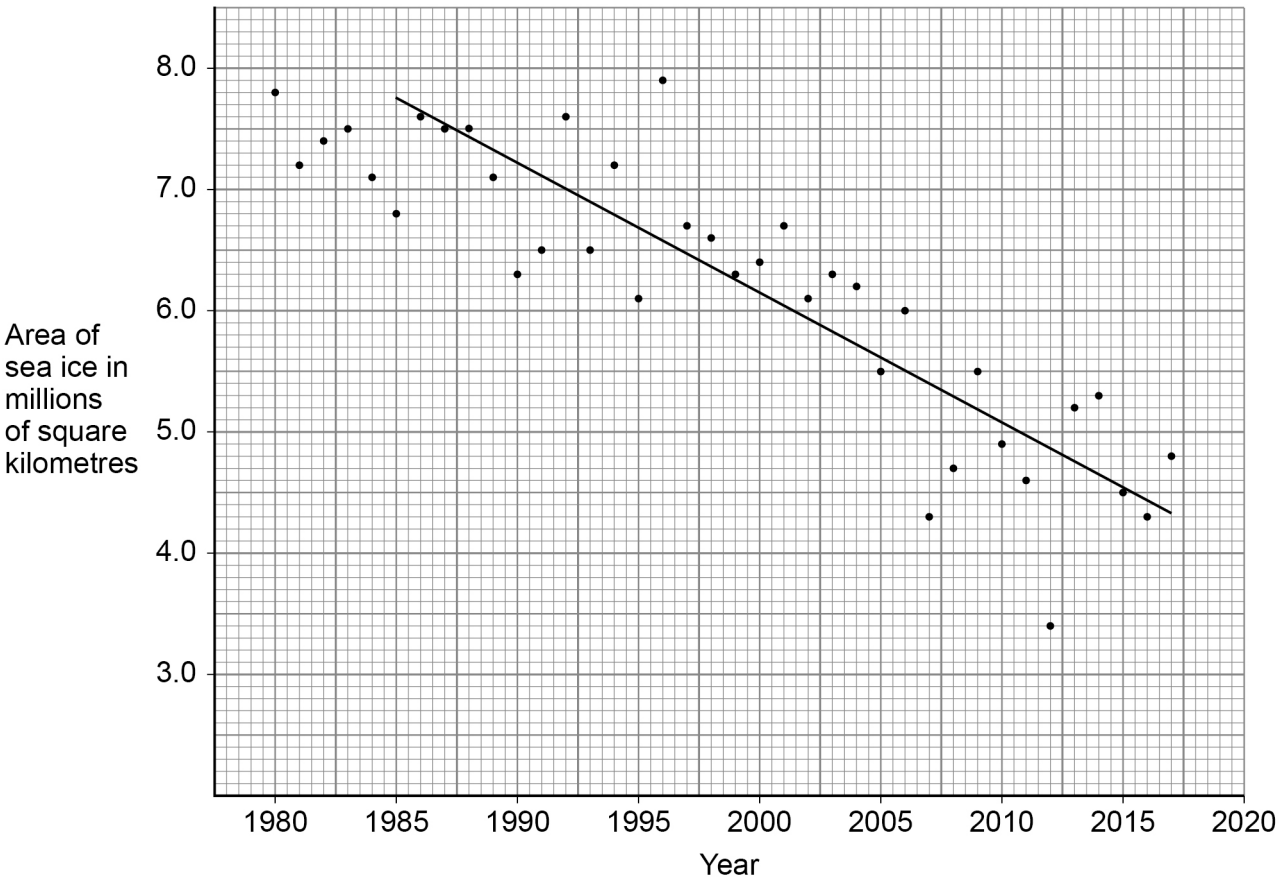
Classification group	Name
Domain	
Kingdom	
	chordata
Class	mammalia
Order	carnivora
	ursidae
Genus	Ursus
Species	maritimus

Question 04 · continued

Scientists have been measuring the area of sea ice in the Arctic since 1980.

Figure 5 shows the area covered by sea ice every September.

Figure 5



0 6 . 2 Determine the annual rate of loss of sea ice between 1985 and 2017.

A trend line has been drawn on **Figure 5** to help you.

[3 marks]

Rate of loss = _____ million square kilometres per year

Question 6 continues on the next page

4.6.4 Classification of living organisms

Question 04 · continued

The total number of polar bears living on the arctic ice is not known.

The hunting of polar bears has been banned or reduced in some areas.

In some populations the average mass and height of polar bears has decreased.

Polar bears eat seals. Seals live on the sea ice in winter and raise their pups there in early spring. In the summer seals live mainly in the sea catching fish to eat.

Polar bears spend much of the year hunting seals on the sea ice and in the sea nearby. The sea ice area is at its lowest each year in September at the end of summer. The polar bears feed mainly in early spring, and again in autumn to build fat stores to survive the next winter.

During the winter of 2017 scientists measured the metabolic rates of nine female polar bears and found them to be much higher than expected. Cameras attached to the female polar bears showed they had to swim long distances to find seals to eat.

0 6 . 3 Suggest why polar bears find it harder to catch seals in autumn than in spring.

[2 marks]

0 6 . 4 Evaluate what might happen to the population of polar bears in the Arctic in the future.

[4 marks]

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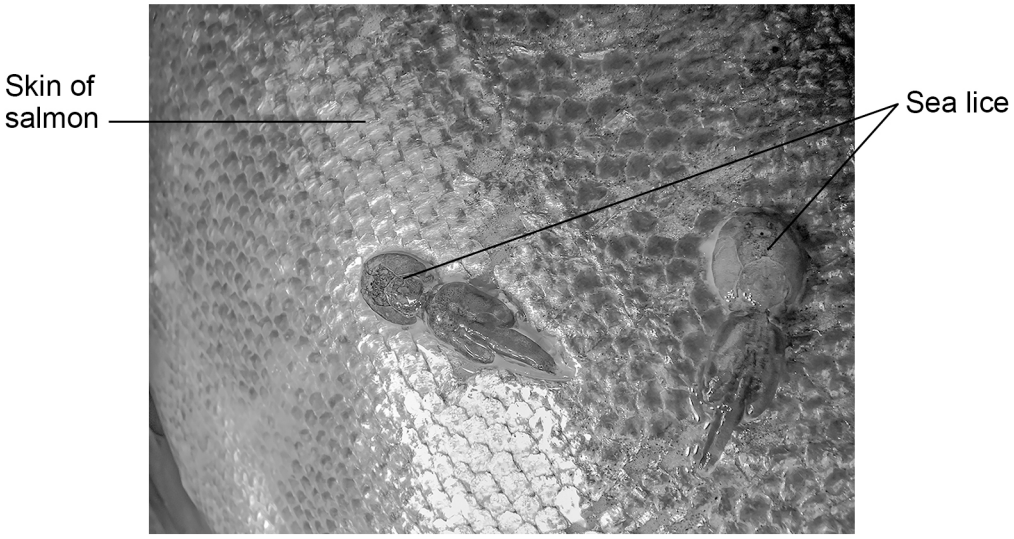
4.6.4 Classification of living organisms

Question 05

0 4 Sea lice are small animals that feed on the skin and blood of salmon fish.

Figure 3 shows sea lice attached to the skin of a salmon, *Oncorhynchus keta*.

Figure 3



0 4 . 1 What is the genus name of salmon?

[1 mark]

0 4 . 2 Which domain are sea lice classified in?

[1 mark]

4.6.4 Classification of living organisms

Question 05 · continued

0 4 . 3 Some salmon have genes that result in fewer sea lice attaching to the skin.

Describe how fish farmers can selectively breed salmon that sea lice **cannot** attach to.

[3 marks]

0 4 . 4 Explain the advantages to salmon farmers of producing salmon that do **not** have sea lice attached to their skin.

[3 marks]

Question 4 continues on the next page

4.6.4 Classification of living organisms

Question 05 · continued

0 4 . 5 Explain the **disadvantage** of selectively breeding salmon.

Do **not** refer to cost or to time in your answer.

[2 marks]

10

4.6.4 Classification of living organisms

Question 06

0 2 Potatoes are a food crop.

0 2 . 1 Potato plants are classified as eukaryota.

What type of classification group is eukaryota?

[1 mark]

Tick (✓) **one** box.

- Class ☐
- Domain ☐
- Kingdom ☐
- Phylum ☐

0 2 . 2 Potato plants can reproduce by asexual reproduction.

Which statement is true for asexual reproduction?

[1 mark]

Tick (✓) **one** box.

- Meiosis occurs. ☐
- Offspring are genetically identical. ☐
- Pollen and egg cells are produced. ☐

Question 2 continues on the next page

Question 06 · continued

0 2 . 3 Flowers of potato plants contain gametes for sexual reproduction.

How is a gamete different from other cells in a potato plant?

[1 mark]

Tick (✓) **one** box.

A gamete contains one-quarter of the number of chromosomes. ☐

A gamete contains half of the number of chromosomes. ☐

A gamete contains double the number of chromosomes. ☐

0 2 . 4 Plants in the same genus as potatoes have been studied by scientists.

Describe **one** way a new plant species could be identified as being in the same genus as potatoes.

[1 mark]

4.6.4 Classification of living organisms

Question 06 · continued

0 2 . 5 Scientists have collected and stored seeds from species in the same genus as potatoes.

In the future, these seeds may be used for genetic modification of potato plants.

Genetically modified potato plants could help supply food to the human population as the climate changes.

Explain why genetic modification of crop plants may be important for the human population to survive climate change.

[6 marks]

10

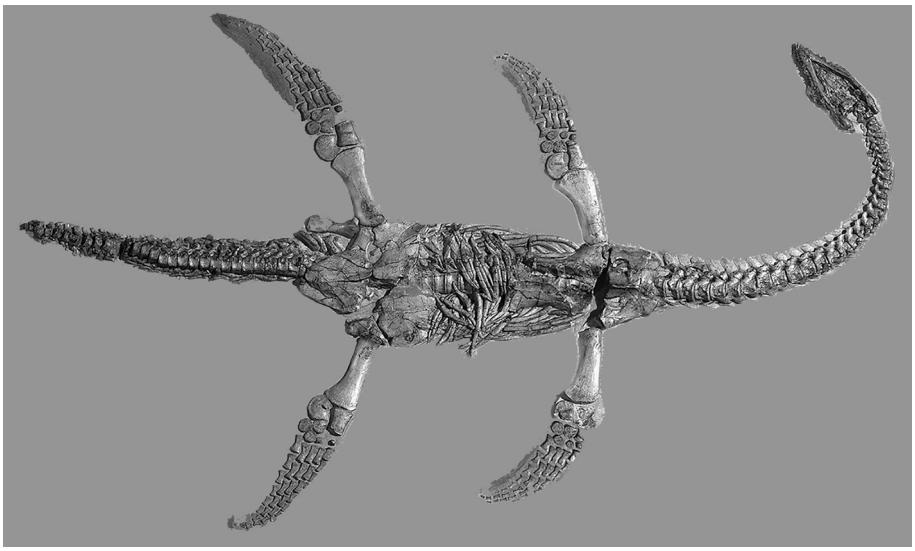
4.6.4 Classification of living organisms

Question 07

0 5 Plesiosaurs are extinct reptiles that lived in the ocean.

Figure 5 shows a fossil of a plesiosaur.

Figure 5



0 5 . 1 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]

_____

0 5 . 2 Give **two biotic** factors that may have caused the extinction of plesiosaurs.

[2 marks]

1 _____

_____

2 _____

_____

4.6.4 Classification of living organisms

Question 07 · continued

0 5 . 3 Describe how the plesiosaur fossil in **Figure 5** could have been formed.

[3 marks]

0 5 . 4 Scientists use fossils to study evolution.

Suggest **two** reasons why scientists **cannot** study the mutations involved in the evolution of plesiosaurs.

Do **not** refer to extinction in your answer.

[2 marks]

1

2

0 5 . 5 **Table 1** shows part of the classification of a plesiosaur.

Complete **Table 1**.

[2 marks]

Table 1

Classification group	Name
Domain	
Kingdom	Animalia
	Chordata
Class	Reptilia
	Plesiosaur
	Cryptoclididae
Genus	Cryptoclidus
Species	eurymerus

0 5 . 6 Give the binomial name of the plesiosaur in **Table 1**.

[1 mark]

_____

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