AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.3.2

Fossils

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**5**
Available paper years	**2020–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.6.3.2 Fossils

Answer 01 · Mark scheme

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	the ammonite shell was replaced by minerals		1	AO2 4.6.3.2
02.2	any **one** from: • no living ones around now or during human times • all the soft parts have decayed • the soft parts did not mineralise / fossilise.	allow there were no humans living then	1	AO3 4.6.3.2
02.3	60 (million years)		1	AO2 4.6.3.3
02.4	(ammonites) 420 - 60 = 360 360 - 270 = 90 (million years)	 allow ecf from question **02.3**	1 1	AO2 4.6.3.3
02.5	any **two** from: • drought • ice age / global warming • volcanic activity • asteroid / meteor collision • (new) predators • (new) diseases / pathogens • competition for food • competition for mates • lack of habitat **or** habitat change	ignore pollution ignore temperature change unqualified allow earthquake / tsunami allow hunted / eaten by other animals allow lack of food allow isolation **or** lack of mates if no other mark awarded allow natural disaster **or** climate change **or** catastrophic event for **1** mark	2	AO1 4.6.3.3
02.6	Charles Darwin		1 (1-3)	AO1 4.6.3.1

4.6.3.2 Fossils

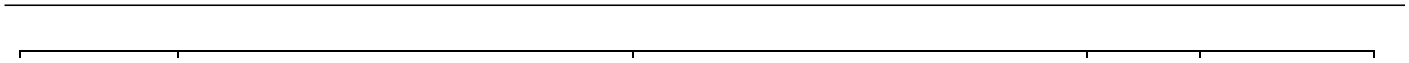
Answer 01 · Mark scheme

02.7	older fossils are more simple		1	AO3 4.6.3.2
Total			**9**	

4.6.3.2 Fossils

Answer 01 · Mark scheme

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



4.6.3.2 Fossils

Answer 02 · Mark scheme

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	Ourasphaira		1	AO2 4.6.4
04.2	decay		1	AO2 4.6.3.2
04.3	8.9×10^8 years old		1	AO2 4.6.3.2
04.4	Carl Linnaeus		1	AO1 4.6.4
04.5	eukaryota		1	AO1 4.6.4
04.6	electron microscopes allow more detail to be seen inside cells		1	AO1 4.6.4

4.6.3.2 Fossils

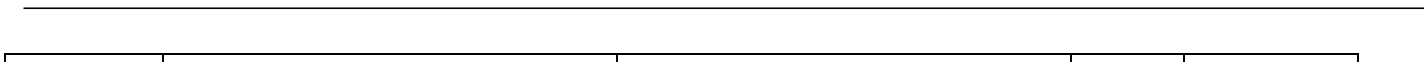
Answer 02 · Mark scheme

04.7	any **two** from: • drought • ice age • global warming • volcanic activity • asteroid collision • (new) predators • (new) disease / pathogen • competition for food • competition for mates • lack of habitat **or** habitat change	if none of these, allow climate change for 1 mark ignore weather if neither of these, allow catastrophic event **or** natural disaster for **1** mark allow named example allow hunters allow named example allow lack of food allow lack of mates ignore competition unqualified ignore environment change ignore isolation ignore pollution	2	AO1 4.6.3.3
Total			**8**	

4.6.3.2 Fossils

Answer 02 · Mark scheme

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



4.6.3.2 Fossils

Answer 03 · Mark scheme

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

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	knowledge of how DNA controls inheritance		1	AO1 4.6.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.2	there was no oxygen in the amber		1	AO2 4.6.3.1 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.3	silverfish	ignore A	1	AO3 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.4	C		1	AO2 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.5	dragonflies	ignore A / B	1	AO3 4.6.3.2

4.6.3.2 Fossils

Answer 03 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.6	<table><tr><td></td><td>animalia</td></tr><tr><td></td><td></td></tr><tr><td></td><td>insecta</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td>Musca</td></tr><tr><td></td><td>domestica</td></tr></table>	all correct for **3** marks allow **2** marks for 2 or 3 correct allow **1** mark for 1 correct allow animals allow insects ignore italics and upper / lower case letters	3	AO2 4.6.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.7	eukaryota		1	AO2 4.6.4

Total Question 3		9

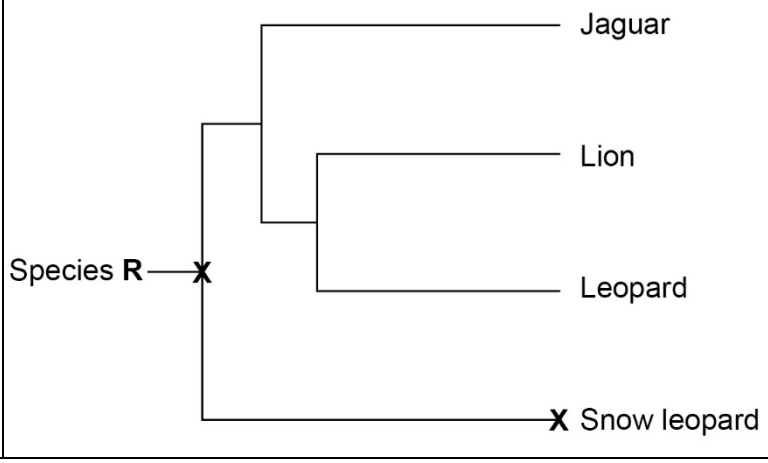
4.6.3.2 Fossils

Answer 04 · Mark scheme

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

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	leopard		1	AO2 4.6.4

Question	Answers	Mark	AO / Spec. Ref.
04.2	a branch / line drawn at any point between 'X' marks, labelled 'tiger(s)'  	1	AO3 4.6.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	a species that the other species evolved from		1	AO3 4.6.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	natural selection		1	AO1 4.6.2.2 4.6.3.1

4.6.3.2 Fossils

Answer 04 · Mark scheme

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	any **two** from: • drought • ice age • global warming	if none of these awarded allow **1** mark for climate change ignore weather	2	AO1 4.6.3.3
	• volcanic activity • asteroid collision	if neither of these awarded allow **1** mark for catastrophic event **or** natural disaster		
	• (new) predators	allow named example allow hunters		
	• (new) disease / pathogen	allow named example		
	• competition for food	allow lack of food		
	• competition for mates	allow lack of mates ignore competition unqualified		
	• lack of habitat **or** habitat change	ignore environment change ignore isolation ignore pollution		

4.6.3.2 Fossils

Answer 04 · Mark scheme

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	any **one** from: • if species is extinct • if (fossil) species is unknown • evolution is (usually) slow • (fossils) show (evolutionary) change	ignore fossils are (usually) very old	1	AO1 4.6.4 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	**(D) → B → A → E → C**	allow **1** mark for link **B → A** allow **1** mark for link **A → E** allow **1** mark for link **E → C**	3	AO2 4.6.3.1 4.6.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	antibiotic resistant bacteria will continue to evolve bacteria reproduce very rapidly		1 1	AO3 4.6.3.1 4.6.3.4

Total Question 4	12

4.6.3.2 Fossils

Answer 05 · Mark scheme

June 2025 | 8464/B/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **one** from: • (skin / body / plesiosaur) decays • skin was not fossilised • not enough evidence • no-one has seen one • fossils are (usually) from bones	 allow (skin / body / plesiosaur) not preserved allow no evidence allow description such as no DNA or no photographs allow no-one was there (at the time)	1	AO2 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	(limbs / feet / legs / arms / hands are) flat(tened) / streamlined / paddle-like / wide	allow flippers / fins	1	AO2
	for swimming	allow for movement / propulsion / pushing (through water or out of water onto land) allow to hold on to mate allow to kill prey allow to fight / protect / defend	1	AO3 4.7.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	behavioural		1	AO2 4.7.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	200 (million years ago)	allow two hundred ignore addition of 'million years ago'	1	AO2 4.6.3.2

4.6.3.2 Fossils

Answer 05 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	130 **and** 180 50 (million years)	allow (one small square is 5 million years, so) 10 × 5 ignore addition of 'million years'	1 1	AO2 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	not all plesiosaur fossils have been discovered some plesiosaur fossils will have been destroyed		1 1	AO2 4.6.3.2 4.6.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	plesiosaur **B** existed before plesiosaur **C**		1	AO3 4.6.3.1 4.6.3.2

4.6.3.2 Fossils

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	any **two** from: • bacteria have a short life-cycle (so rapid evolution) • bacteria are continuing to evolve • can study the DNA of bacteria • bacteria are more easily available	allow converse if clearly referring to fossils allow evolution in bacteria is fast(er) allow (many) fossilised species are extinct allow not able to study DNA from fossils allow fossils do not contain DNA / chromosomes / genes / alleles allow many / some fossils have been destroyed allow there are gaps in the fossil record	2	AO3 4.6.3.1 4.6.3.2 4.6.3.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.9	(people with infections of antibiotic-resistant bacteria) cannot be treated (with those antibiotics)	allow (antibiotic-resistant) bacteria cannot be killed allow antibiotics will not work allow the infection may kill people allow development of new antibiotic(s) is costly / slow	1	AO3 4.6.3.4

Total Question 4	13

4.6.3.2 Fossils

Answer 02 · Examiner comments November 2021 | 8464/B/2F | Original Q4

Question 4 (low & standard demand)

Students found this question challenging. The maths skill of using standard form was usually correct, however, parts requiring recall and application of knowledge relating to classification, decay and causes of extinction were not as well answered.

Answer 03 · Examiner comments June 2022 | 8464/B/2F | Original Q3

Question 3 (low & standard demand)

03.1 Two-thirds of students knew that knowledge of how DNA controls inheritance supports the theory of evolution by natural selection.

03.2 62% of students knew the fly had been preserved in amber because there was no oxygen in the amber.

03.3 55% of students could correctly interpret the evolutionary tree.

03.4 43% of students could identify the most recent ancestor of both grasshoppers and beetles using Figure 4.

03.5 28% of students could work out the group of present-day insects which have wings which do not fold.

03.6 Generally, students could not correctly place the four words to demonstrate understanding of classification by Carl Linnaeus or the binomial system. 6% of students achieved all three marks. Animalia was the most common correct answer.

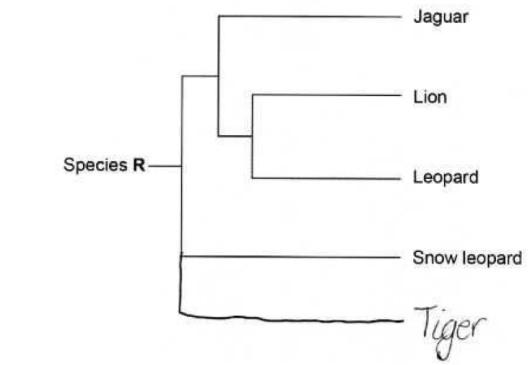
03.7 43% of students could identify the domain insects are in.

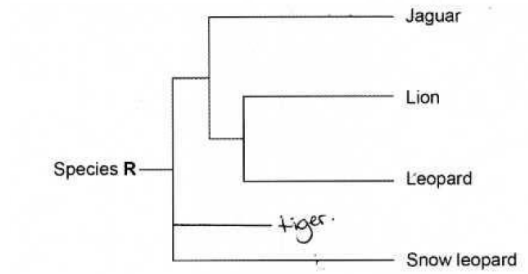
Answer 04 · Examiner comments

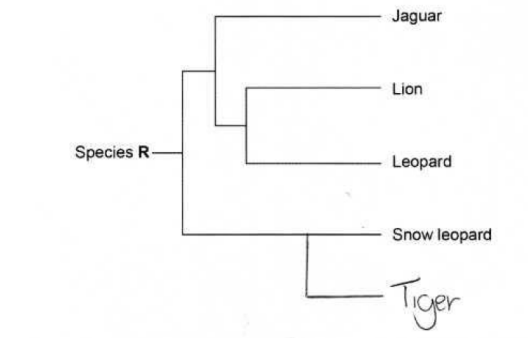
Question 4 (low & standard demand)

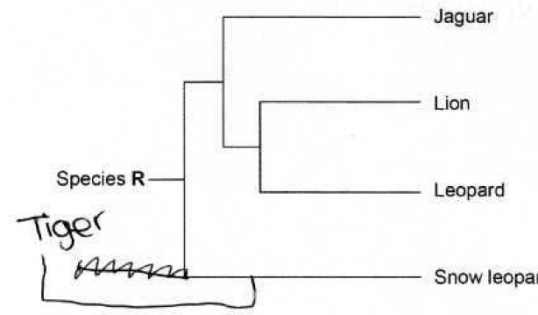
04.1 Most students could interpret the evolutionary tree correctly.

04.2 Most students could add the line and label to the Figure. Students who did not score the mark did not label their line or labelled it incorrectly, 'lion' being frequently used. Other incorrect responses linked their line with other lines on the diagram.







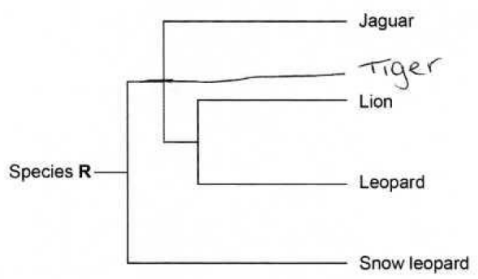


The above examples were correct, even the fourth example despite reading right to left.

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4.6.3.2 Fossils

Answer 04 · Examiner comments June 2024 | 8464/B/2F | Original Q4



This response is incorrect.

04.3 The majority of students could identify what 'species R' represented.

04.4 Most students knew that evolution occurs by the process of natural selection.

04.5 Many students could give two possible causes of extinction. The most common correct responses described predators or lack of food or loss of habitat.

04.6 Most students expressed their answers in line with marking point 1 or marking point 4, with the majority saying to compare old species with those of today or seeing what they used to look like. Alternatively, for the first marking point students responded 'to see what animals there used to be before they became extinct'.

There was confusion evident in answers, with many students referring to what fossils are or references to history, what life was like in the past or how big/old the fossils were. Some students referred to fossils showing the skeletal structure but didn't compare it to the structure of the species today or discuss any change that could be seen between different fossils.

There were also many responses that referred to fossils being hundreds or thousands of years old or giving us knowledge of species that existed thousands of years ago, which is a misconception regarding geological time.

04.7 Rarely did students score 3 marks for this question, indicating that the process of evolution was not clearly understood. Students frequently linked:

- A to E or E to C
- B to A was less frequently linked.

Some students also included D in their responses even though D had already been given as the first stage.

04.8 More than 50% of students gained both marks here. A significant number of students only ticked one box, or ticked more than two boxes.

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Answer 05 · Examiner comments

June 2025 | 8464/B/2F | Original Q4

Question 4 (Low and Standard demand)

04.1 Many students gave correct ideas about skin decaying, or a lack of evidence. Many students repeated the information provided and simply stated 'they are extinct'. Repeating information provided can never be given credit.

04.2 For marking point 1, students could either describe how structure A was adapted, such as 'wide' or 'paddle-like', or use a term such as fin or flipper.

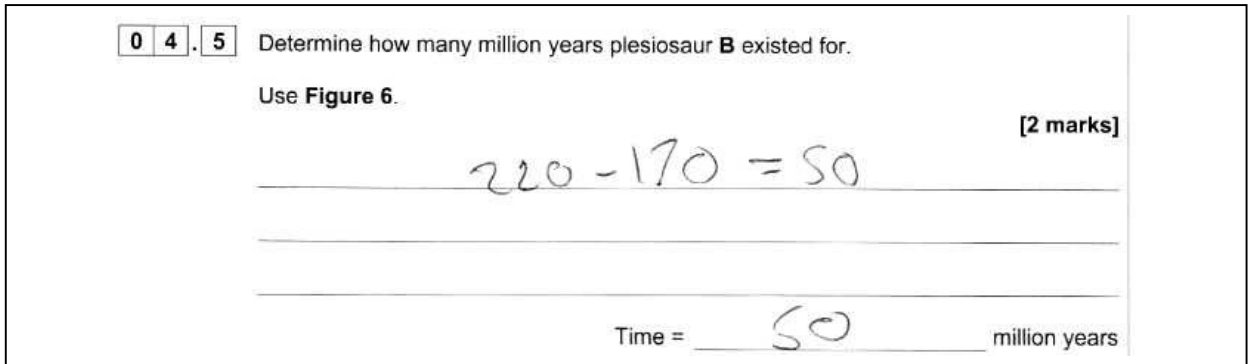
Marking point 2, for the explanation of how the structure would help the plesiosaur survive in the ocean, was more commonly seen than marking point 1.

A surprising number of students thought the label was directed at the neck. These responses could not gain credit.

04.3 Over 60% of students could identify the adaptation as behavioural.

04.4 Two thirds of student correctly interpreted the figure.

04.5 Many students made two correct readings and calculated the number of years correctly. Where errors were made, this was most often for misinterpreting the scale. 170 was frequently seen instead of 180.



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

Use **Figure 6**.

[2 marks]

220 - 170 = 50

Time = 50 million years

This student took two incorrect readings from the figure, therefore gains no marks, despite the final answer given being the same as the mark scheme. They have clearly demonstrated that they reached the answer through an incorrect method.

04.6 Two thirds of students could identify two reasons why the exact date of extinction can only be estimated.

04.7 Almost 70% of students could select the correct statement as evidence.

04.8 The most common correct answer was that (some) fossils have been destroyed. Few students gained both marks.

04.9 Students had difficulty expressing their responses, and again, repeating information from the question was insufficient. Some students were too vague to gain credit, with responses such as 'it makes you ill'. Some misconceptions between antibiotic resistance and the term 'immunity' were seen and some students showed confusion over what was resistant, such as stating that the body is resistant.

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