AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.3.2

Fossils

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**3**
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

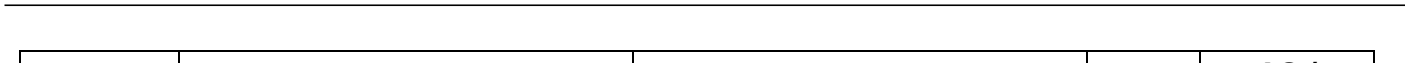
November 2020 | 8464/B/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	archaea	allow archea or archaia as phonetic spelling	1	AO1 4.6.4
06.2	horizontal line from –415 to –65 (labelled ammonites)	allow -410 to -420 for -415 (to -65) allow oblique line	1	AO2 4.6.3.3
06.3	ammonites = 350 (million years) **and** trilobites = 266 (million years) 84 million (years) or 84 000 000	allow range 345 to 355 allow correct calculation from their answer for ammonites allow answers in standard form	1 1	AO2 4.6.3.3
06.4	68 and 96 [(96-68) ÷ 68] × 100 41.17647… **or** 41.2 **or** 41	allow +/- half a small square	1 1 1	AO2 4.6.3.3
Total			**7**	

4.6.3.2 Fossils

Answer 01 · Mark scheme

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4.6.3.2 Fossils

Answer 02 · Mark scheme

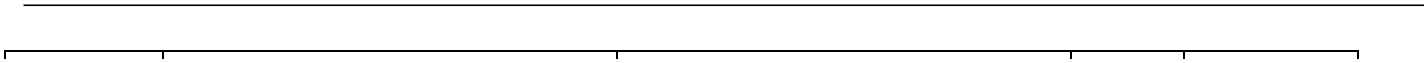
Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	*Ourasphaira*	ignore italics ignore capitalisation do **not** accept *Ourasphaira giraldae*	1	AO2 4.6.4
03.2	the mud stopped oxygen reaching the fungus		1	AO2 4.6.3.2
03.3	any **one** from: • 2.1×10^8 (years) • 210 000 000 (years)		1	AO2 4.6.3.2
03.4	any **one** from: • fossil(s) of the fungus may have been destroyed (by geological activity) • fossil(s) of the fungus may not have been found (yet) • dating methods are not precise / accurate • the time at which an organism / fungus evolves from ancestors is difficult to pinpoint	ignore some destroyed ignore some not found (yet) allow point of speciation is not known	1	AO3 4.6.3.2
03.5	eukaryota	allow eukaryote(s)	1	AO1 4.6.4

03.6	can survive in extreme environments cytoplasm contains DNA		1 1	AO1 AO2 4.6.4 4.1.1.1 4.1.1.2 4.6.2.4
03.7	any **three** from: • studies of internal / cell structures with light microscopes • studies of internal / cell structures with electron microscopes • chemical analysis • comparison of biochemical processes • DNA / genetic analysis • studies of evolution(ary relationships)	allow organelles for internal / cell structures if neither mark awarded allow studies of internal / cell structures (with microscopes) for **1** mark	3	AO1 4.6.4
Total			**10**	

4.6.3.2 Fossils

Answer 02 · Mark scheme

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



4.6.3.2 Fossils

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	behaviour(al)	allow functional	1	AO2 4.7.1.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	any **two** from: • (new) predators • (new) disease / pathogen • competition for food • lack of mates	ignore habitat ignore competition unqualified allow hunters / poachers allow named example allow lack of food allow competition for mates	2	AO1 4.6.3.3 4.7.1.3

4.6.3.2 Fossils

Answer 03 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3		allow skeleton **or** hard parts for bones throughout ignore compression ignore reference to oxygen		
	(plesiosaur) died and sank (to bottom of ocean / sea)		1	AO2
	any **two** from: • (plesiosaur died and) is buried in sediment / sand / mud / silt • (only) soft parts decayed / eaten **or** bones were not decayed / eaten • bone(s) / remains replaced by minerals	do **not** accept plesiosaur (died and) is buried in rock(s) allow mineralisation of bones allow bone(s) left imprint in mud / sand / sediment (that then hardened to rock) ignore bones turned to stone / rock	2	AO1 4.6.3.2

4.6.3.2 Fossils

Answer 03 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	any **two** from: • fossil record may be incomplete • DNA will be destroyed by fossil formation • no evidence of soft tissues which are decomposed (before fossilisation) • only able to study phenotype (from fossils)	allow not all fossils have been found allow (some) fossils may have been destroyed allow there are not enough fossils (to study) allow chromosomes / genes / alleles will be destroyed by fossil formation allow fossils do not contain DNA / chromosomes / genes / alleles allow only able to study observable characteristics (of bones / skeleton)	2	AO2 4.6.2.1 4.6.3.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.5	<table><tr><th>Classification group</th><th>Name</th></tr><tr><td></td><td>eukaryota / eukaryote(s)</td></tr><tr><td></td><td></td></tr><tr><td>phylum / phyla</td><td></td></tr><tr><td></td><td></td></tr><tr><td>order</td><td></td></tr><tr><td>family</td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table>	**2** marks for 4 correct **1** mark for 2 or 3 correct **No** marks for 1 correct ignore italics and upper / lower case letters	2	AO1 AO2 4.6.4

4.6.3.2 Fossils

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.6	Cryptoclidus eurymerus	ignore italics and upper / lower case letters do **not** accept Cryptoclididae eurymerus	1	AO2 4.6.4

Total Question 5	**11**

4.6.3.2 Fossils

Answer 02 · Examiner comments

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

Question 3 (standard and standard/high demand)

Overall, there was a poor understanding of classification. Many students could not give the genus name when provided with the binomial. The calculation of the range required manipulation of figures in standard form, and was generally answered clearly. The most common incorrect answer was 2.1×10^7. Students gained credit whether or not their correct answer was given in standard form.

In **03.4**, many students did not move beyond the idea that had been given in the question, that humans were not alive when the fungus was alive and therefore there are no records of the fungus; this was insufficient. Some students could give the domain eukaryota, and phonetic spelling was allowed, as explained at the beginning of the mark scheme. **03.5** asked for recall of three types of evidence that are used now to classify living things. Despite being prompted not to refer to appearance, many responses did this, such as referring to size or external features.

Answer 03 · Examiner comments

June 2025 | 8464/B/2H | Original Q5

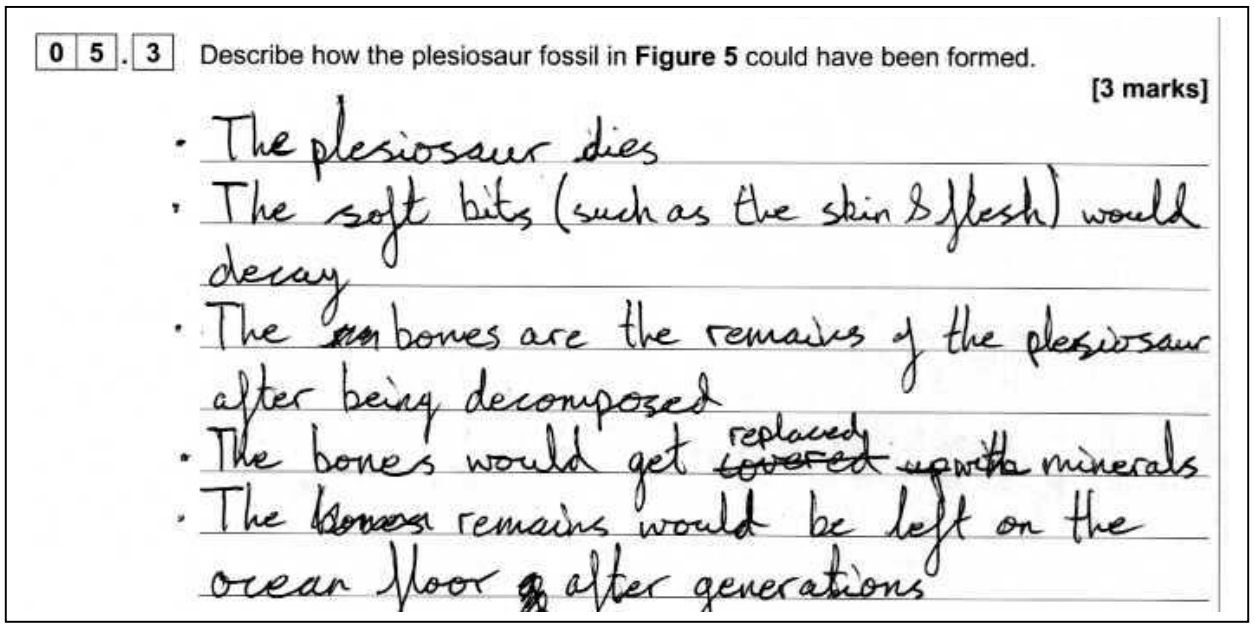
Question 5 (Standard and Standard/High demand)

05.1 This was a poorly answered question with only one third of students giving the correct answer. Environmental, structural and physical were commonly seen wrong answers. Many students didn't give a type of adaptation as the question had asked but instead described the adaptations of the Plesiosaur.

05.2 The majority of students scored 2 marks with marking points 1 and 3 most commonly seen. Many students referred to lack of food or lack of prey as alternatives to competition for food.

A commonly seen error was just stating 'food availability' without linking it to a shortage. Competition unqualified was also another regularly seen answer but did not receive credit as students needed to describe what the competition was for. There was some confusion with abiotic factors such as temperature, oxygen, climate change or space being given by some students.

05.3 Two thirds of students gained one or more mark. Only 8% of students gained three marks. The marking point that the plesiosaur 'died and sank' was rarely seen and this was usually the reason 2-mark answers didn't pick up the 3rd mark as in the example below which scored 2 marks as there was no reference to sinking after dying.



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

[3 marks]

- The plesiosaur dies
- The soft bits (such as the skin & flesh) would decay
- The bones are the remains of the plesiosaur after being decomposed
- The bones would get ~~covered~~ replaced with minerals
- The bones remains would be left on the ocean floor after generations

Many students were awarded bullet point 1, for the idea of being buried / covered in sediment (or similar) but some responses incorrectly referred to being buried in rocks which did not allow the mark to be awarded.

Bullet point 2 was often misunderstood as there were lots of references to the body or plesiosaur or bones decaying as students failed to appreciate that only the soft parts decay when fossils form, despite the photograph.

Bullet point 3 was awarded infrequently. Sometimes students had the idea of imprints forming in the 'rock' rather than in mud / sand / sediment. The most commonly seen approach which scored the mark was the idea that minerals replace the bones.

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4.6.3.2 Fossils

Answer 03 · Examiner comments June 2025 | 8464/B/2H | Original Q5

References to compression or pressure, a lack of decay due to a lack of oxygen and references to other factors needed for decay (such as microbes or higher temperature) were often seen but these were insufficient in the context of this question.

Some students referred to how the fossil could be found and assembled by scientists rather than how the fossil formed, indicating that some students misunderstood the question. Incorrect references to natural selection and evolution were also seen.

05.4 Students found this question challenging. Insufficient responses included 'there not being any plesiosaurs alive' or 'none still living to study', that 'no-one saw them' or 'you couldn't tell how old the fossils were'. There were some vague statements given such as 'lack of evidence'.

Many students referred to DNA not being present but failed to link this idea to DNA being destroyed during the formation of fossils.

05.5 Fewer than 25% of students could complete all four spaces in the classification of the plesiosaur, but a further 30% gained one mark for two or three correct words in the correct spaces. There was frequent evidence of students knowing the first letter of the group, but they got no further, or created words based on this known first letter. Mnemonics were regularly seen, but often without fully correct corresponding responses.

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

Complete **Table 1**.

[2 marks]

Table 1

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

King Phillip Came over for Good Soup

The student has learnt a mnemonic, but cannot put this to good use. A response of one word correct out of four did not gain a mark due to the level of demand of this question.

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