AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.6.4

Classification of living organisms

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**5**
Available paper years	**2021–2024**

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.

4.6.4 Classification of living organisms

Answer 01 · 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

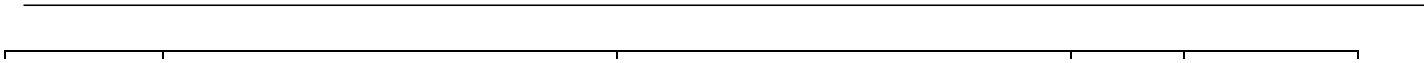
4.6.4 Classification of living organisms

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**	

4.6.4 Classification of living organisms

Answer 01 · Mark scheme

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



Answer 02 · 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

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

Answer 03 · Mark scheme

June 2023 | 8464/B/2F | Original Q4

Question 4

Question	Answers	Mark	AO / Spec. Ref.
04.1	<table><tr><th>Group</th><th>Classification for salmon</th></tr><tr><td>Kingdom</td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>Genus</td><td></td></tr><tr><td>Species</td><td></td></tr></table> ignore upper case and italics	1 1 1	AO2 4.6.4

Question	Answers	Mark	AO / Spec. Ref.
04.2	soya plants ⟶ salmon ⟶ sea lice	1	AO2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.3	the transfer of energy in the food chain		1	AO1 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.4	breed together the offspring that are most resistant to sea lice		1	AO2 4.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.5	when all offspring are resistant to sea lice		1	AO2 4.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.6	any **one** from: • salmon grow larger • salmon grow faster • salmon need less food • salmon lose less energy • do not have to remove sea lice • no / less need for pesticides • not off-putting (to consumers / buyers) • (salmon) more likely to be sold / bought • salmon less likely to be damaged / infected • no / less need for antibiotics / medication	allow converse for salmon that have sea lice if clearly stated allow no / less need for insecticides do **not** accept the idea of antibiotics / medication killing sea lice ignore sea lice are not feeding on salmon unqualified	1	AO3 4.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	all the salmon may suffer from the same diseases		1	AO3 4.6.2.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	any **two** from: (GM salmon) • more profit(able) / cost-effective • cost less to feed • grow faster • do not need to be farmed / kept as long • feeds more people	answers must be comparative allow converse for non-GM salmon if clearly stated allow sell for more money / revenue ignore less food unqualified allow can be sold sooner allow sell twice as many (in 3 years) allow grow bigger (in 3 years) allow cheaper to buy salmon ignore reference to sea lice	2	AO3 4.6.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.9	to reduce the risk of GM salmon breeding with wild salmon		1	AO3 4.6.2.4

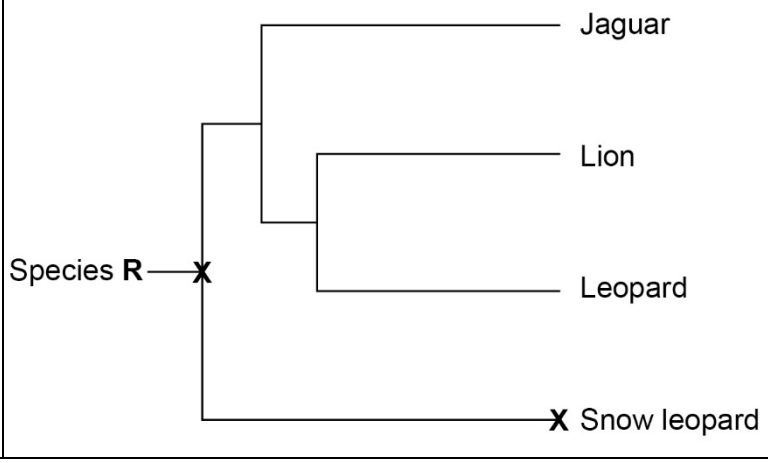
Total Question 4	**12**

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

4.6.4 Classification of living organisms

Answer 04 · Mark scheme

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		

Answer 04 · Mark scheme

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

Answer 05 · Mark scheme

June 2024 | 8464/B/2F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	domain		1	AO1 4.6.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	offspring are genetically identical		1	AO1 4.6.1.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	a gamete contains half of the number of chromosomes		1	AO1 4.6.1.1 4.6.1.2

4.6.4 Classification of living organisms

Answer 05 · Mark scheme

June 2024 | 8464/B/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	any **one** from: • similar / same structure / characteristics / phenotype (as potatoes)	allow named similar structure / characteristics such as same shape / leaves / flowers / taste allow studied with microscopes ignore 'look the same / similar' unqualified	1	AO1 4.6.4
	• similar DNA / genes	allow DNA analysis allow analysis of genetic material allow similar genetic material ignore genetic information do **not** accept same DNA / genes		
	• similar / same biochemistry			
	• same first part of binomial (name)	allow same first part of Latin / scientific name		

Answer 05 · Mark scheme

Question	Answers	Mark	AO / Spec. Ref.
06.5	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO3
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	
	Indicative content allow reference to named crop throughout **effects of climate change** • climate change will change weather patterns / trends • climate change causes flooding **or** drought **or** temperature change • farming land decreased by sea level rise / flooding / desertification • current crops cannot grow / survive (in changing conditions) **benefits of GM** ○ GM may allow crops to grow in wider range of conditions ○ GM may allow crops to be resistant to wider range of pests / diseases ○ GM may allow crops to be stored for longer ○ GM may increase crop yield **or** increase growth rate ○ to feed the increasing human population ○ useful if less area available for farming ○ larger human population needs more land for housing **other relevant content** ▪ variation amongst current crops reduced by asexual reproduction **or** selective breeding ▪ rate of evolution (by natural selection) may be slower than rate of climate change For **Level 3**, answers must explain effect(s) of climate change **and** benefit(s) of GM with logical link.		4.6.2.4 4.7.3.2 4.7.3.5 4.7.3.6

Total Question 6	10

4.6.4 Classification of living organisms

Answer 01 · 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 02 · 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 03 · Examiner comments

June 2023 | 8464/B/2F | Original Q4

Question 4 (Low and Standard demand)

04.1 The most common correct answer was ‘kingdom’. Many students had a lack of knowledge of the difference between genus and species and hence frequently had these placed incorrectly in reverse position.

04.2 The majority of students could identify the correct food chain.

04.3 Few students knew what the arrows in a food chain represent, with many ticking ‘the predators in the food chain’.

04.4 Most students could identify the next stage in the process of selective breeding.

04.5 70% of students could identify when the process of selective breeding is finished, but a significant number thought it was finished after one generation have produced offspring.

04.6 The most common correct statements were:

- do not have to remove lice
- more likely to be bought
- not off-putting to customers.

Very few students referenced that antibiotics would not be required or that pesticides were not required.

The health or safety of the consumer being compromised was a common theme of many student responses that did not gain credit. Likewise, salmon are 'healthier' was a common statement that was too vague.

04.7 70% of students could identify a disadvantage of selective breeding.

04.8 Answers needed to be comparative to give an advantage of farming GM salmon instead of non-GM salmon. Many students simply copied the information provided, which is never given credit. For example, ‘The GM salmon **cost less to feed**’ was creditworthy, but an answer stating ‘The GM salmon need 25% less food to get to the same size’ would not be creditworthy since that information was given in the question.

4.6.4 Classification of living organisms

Answer 03 · Examiner comments June 2023 | 8464/B/2F | Original Q4

Other fish farmers have produced genetically modified (GM) salmon.

GM salmon grow large enough to sell in 18 months.

Non-GM salmon grow large enough to sell in 3 years.

GM salmon need 25% less food than non-GM salmon to get to the same size.

0 4 . 8 Suggest **two** advantages of farming GM salmon instead of farming non-GM salmon.
[2 marks]

1 grow large enough to sell in 18 months

2 25% less food than non-GM salmon to get to same size

0 4 . 8 Suggest **two** advantages of farming GM salmon instead of farming non-GM salmon.
[2 marks]

1 Spending less money on food

2 grow quicker so you can sell them quicker

The first response only repeats the information given in the question, therefore no mark was awarded. The second response gained 2 marks for bullet point 2 and bullet point 3.

04.9 70% of students could identify the risk of GM salmon breeding with wild salmon.

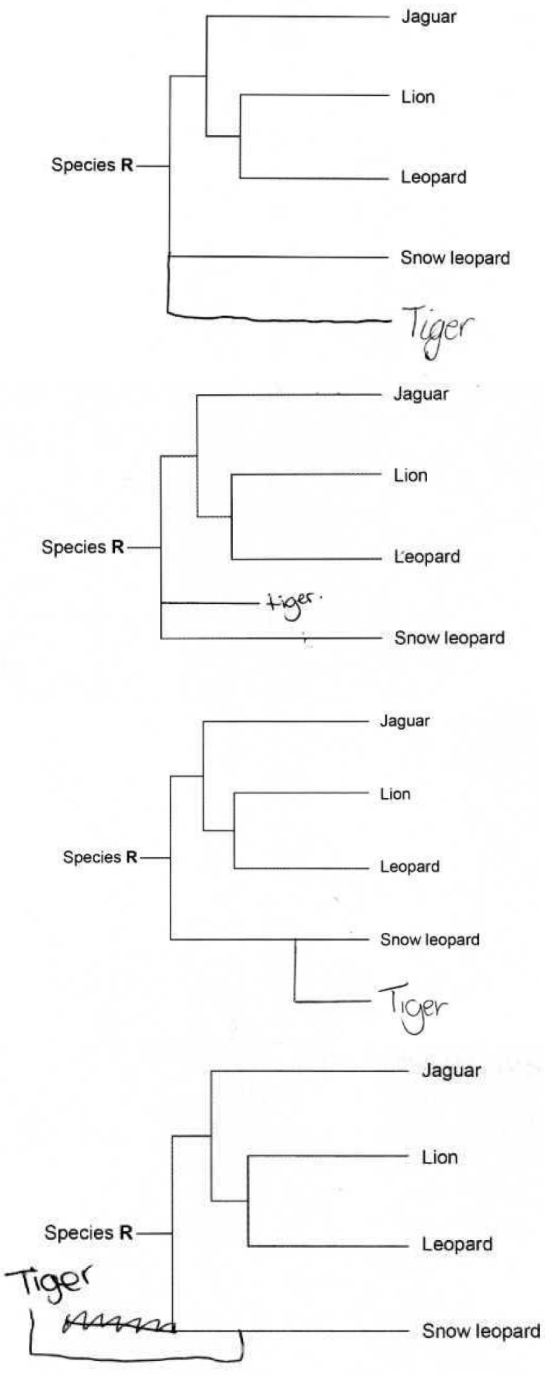
Answer 04 · Examiner comments

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

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.

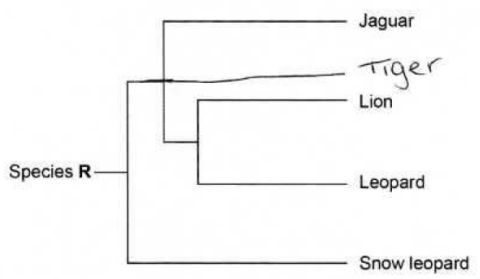


The above examples were correct, even the fourth example despite reading right to left.

© 2024 AQA and its licensors. All rights reserved.

4.6.4 Classification of living organisms

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.

© 2024 AQA and its licensors. All rights reserved.

Answer 05 · Examiner comments

June 2024 | 8464/B/2F | Original Q6

Question 6 (standard demand)

06.1 30% of students could select that the classification group 'Eukaryota' is a domain.

06.2 50% of students knew that asexual reproduction produces genetically identical offspring.

06.3 Just over 50% of students knew that a gamete contains half the number of chromosomes compared to the other cells in a potato plant.

06.4 Most students could describe how a new plant species could be identified as being in the same genus as potatoes. DNA analysis or similar characteristics were the most common correct answers.

Misconceptions were seen, such as the idea that the species would have identical DNA. On the Foundation tier, some answers were much too vague, such as 'by testing'.

© 2024 AQA and its licensors. All rights reserved.

4.6.4 Classification of living organisms

Answer 05 · Examiner comments June 2024 | 8464/B/2F | Original Q6

06.5 Few students appeared to follow the direction of the question, beyond stating that GM crops can be made to grow even if the climate changes. Some students were aware of food insecurity as a result of climate change, and this could be given credit for the idea that current crops will not be able to grow/survive.

Few students made links between climate change and the possible benefits of GM crops. Lists of possible benefits of GM with no link to climate were limited to Level 1. Some students made very good attempts at this question and a few recognised some of the effects of climate change and were able to link these to the idea that current crops would struggle to grow in these conditions. This was an attempt at a logical link and achieved a Level 2 mark.

Some students further developed this idea, and clearly had a grasp of the question being asked, as they then went on to describe how GM would enable crops (or potatoes) to survive the conditions that climate change brings. They could further strengthen their account with suggestions that more crops could be grown or crops could be grown faster. These responses were detailed and logically linked accounts and were therefore Level 3 responses.

Some students wrongly gave explanations of causes of climate change.

0 6 . 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]

the genetically modified plants can photosynthesise ~~more~~ better leading to more Oxygen in the ~~plant~~ planet as the plants are reducing the carbon dioxide amount

Genetically Modified plants can grow faster, so providing more food to the population

Genetically Modified plants can thrive better without the needs that any other plant need.

In the second paragraph, this student has given the idea that GM crops may grow faster and therefore provide more yield. This is indicated on the mark scheme as one idea for a benefit of GM crops in this context. There is no attempt to link this idea with effects of climate change, therefore the response is within Level 1 and 1 mark was awarded.

© 2024 AQA and its licensors. All rights reserved.

Contact us

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

Tel: 01483 477756
Email: gcsescience@aqa.org.uk

aqa.org.uk

© 2024 AQA and its licensors. All rights reserved.