AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.3.4

Evidence for evolution

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**35**
Available paper years	**2007–2025**

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.

4.6.3.4 Evidence for evolution

Answer 01 · Mark scheme March 2007 | BLY1B | Original Q7 | Legacy

Seven	**3**	**1**	**4**	**2**

Answer 02 · Mark scheme March 2007 | BLY1B | Original Q8 | Legacy

Eight	**4**	**4**	**2**	**1**

Answer 03 · Mark scheme June 2007 | BLY1B | Original Q3 | Legacy

Three	**2**	**2**	**4**	**4**

Answer 04 · Mark scheme November 2007 | BLY1B | Original Q3 | Legacy

Three	**4**	**2**	**3**	**2**

4.6.3.4 Evidence for evolution

Answer 05 · Mark scheme January 2008 | BLY1H | Original Q6 | Legacy

Question 6

	answers	extra information	mark
(a)	3.2	award **both** marks for correct answer irrespective of working if answer incorrect (55 + 55 + 1.2 +5) – (110 + 3) **or** 116.2 –113 **or** (55 + 55 + 1.2 +5 + 90) – (110 + 93) gains **1** mark	2
(b)	any **one** from: • less carbon dioxide taken in by trees • less photosynthesis • burning trees releases carbon dioxide • decay releases carbon dioxide	ignore carbon dioxide released by trees **or** trees store carbon dioxide	1
(c)	heat / infra red / radiation / energy radiated by Earth carbon dioxide absorbs / traps / radiates	must be in correct context ignore light do **not** accept reflection allow reflects ignore absorbs radiation / heat / light from Sun ignore ozone	1 1 1
total			6

4.6.3.4 Evidence for evolution

Answer 05 · Mark scheme January 2008 | BLY1H | Original Q6 | Legacy

BLY1H

Answer 06 · Mark scheme March 2008 | BLY1BP | Original Q3 | Legacy

Three	**3**	**2**	**3**	**2**

Answer 07 · Mark scheme June 2008 | BLY1BP | Original Q5 | Legacy

Five	**1**	**3**	**2**	**1**

Answer 08 · Mark scheme November 2008 | BLY1BP | Original Q1 | Legacy

One	A	observed that all species change over time	**3**
	B	had sufficient evidence to prove evolution	**4**
	C	thought that evolution was by natural selection	**1**
	D	changes that happen during an organism's lifetime are inherited by offspring	**2**

Answer 09 · Mark scheme November 2008 | BLY1BP | Original Q3 | Legacy

Three	**1**	**2**	**1**	**2**

Answer 10 · Mark scheme March 2009 | BLY1BP | Original Q9 | Legacy

Nine	**1**	**3**	**2**	**3**

4.6.3.4 Evidence for evolution

Answer 11 · Mark scheme June 2009 | BLY1BP | Original Q2 | Legacy

Two	**A** Creationism **4** **B** Intelligent Design **3** **C** Lamarckism **1** **D** Darwinism **2**			
	A	**B**	**C**	**D**

Answer 12 · Mark scheme June 2009 | BLY1BP | Original Q6 | Legacy

Six	**2**	**2**	**3**	**4**

Answer 13 · Mark scheme November 2009 | BLY1BP | Original Q3 | Legacy

Three	**4**	**4**	**2**	**3**

Answer 14 · Mark scheme November 2009 | BLY1BP | Original Q9 | Legacy

Nine	**2**	**1**	**2**	**2**

Answer 15 · Mark scheme March 2010 | BLY1BP | Original Q5 | Legacy

Five	**4**	**3**	**3**	**3**

4.6.3.4 Evidence for evolution

Answer 16 · Mark scheme

June 2010 | BLY1BP | Original Q6 | Legacy

No matching mark scheme was available in the supplied archive for this question.

Answer 17 · Mark scheme

June 2010 | BLY1BP | Original Q7 | Legacy

No matching mark scheme was available in the supplied archive for this question.

Answer 18 · Mark scheme

June 2010 | BLY1BP | Original Q8 | Legacy

No matching mark scheme was available in the supplied archive for this question.

Answer 19 · Mark scheme

November 2010 | BLY1BP | Original Q9 | Legacy

Nine	**3**	**4**	**2**	**3**

4.6.3.4 Evidence for evolution

Answer 20 · Mark scheme March 2011 | BLY1AP | Original Q7 | Legacy

Seven	**4**	**4**	**4**	**2**

Answer 21 · Mark scheme March 2011 | BLY1BP | Original Q6 | Legacy

Six	**3**	**1**	**3**	**2**

Answer 22 · Mark scheme March 2011 | BLY1BP | Original Q7 | Legacy

Seven	**3**	**4**	**2**	**2**

Answer 23 · Mark scheme November 2011 | BLY1BP | Original Q3 | Legacy

Three	**4**	**1**	**2**	**2**

Answer 24 · Mark scheme November 2011 | BLY1BP | Original Q9 | Legacy

Nine	**3**	**4**	**3**	**3**

The AQA UMS Conversion Calculator can be found at the following web address:

http://www.aqa.org.uk/umsconversion

4.6.3.4 Evidence for evolution

Answer 25 · Mark scheme

June 2012 | BL1HP | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2 (a)	**X** respiration	correct order only allow decay / decomposition / rotting ignore breakdown / disintegrate	1
	Y combustion / burning		1
2 (b)	any **three** from: • photosynthesise / absorb carbon dioxide	accept are producers **or** produce / make biomass / glucose / other named do **not** accept photosynthesis releases CO_2	3
	• release carbon dioxide / respire		
	• eaten by animals		
	• fed on / decayed by microorganisms	ignore eaten by microorganisms	
2 (c)	any **two** from: (in tropical rainforest conditions are) • warm(er) / hot		2
	• damp / moist / wet / humid	ignore rain	
	• a lot of microorganisms		
	• a lot of material to decay	allow warm(er) so enzymes work faster for **2** marks	
Total			**7**

4.6.3.4 Evidence for evolution

Answer 25 · Mark scheme June 2012 | BL1HP | Original Q2 | Legacy

BL1HP

4.6.3.4 Evidence for evolution

Answer 26 · Mark scheme

June 2012 | BL2HP | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)	fossil is (remains / impression of) organism that lived a long time ago	if numbers, ≥ 1000s years	1
	fossils show changes over time **or** older fossils simpler **or** fossils simpler than present-day species		1
	fossils have similar features to present-day species	allow fossils allow us to compare old species with present-day species	1
6(b)	isolation / separation / splitting		1
	by geographical barrier / sea	ignore other examples	1
	there was variation (in these isolated populations) / different alleles	accept mutation	1
	different environmental conditions **or** example eg climate / predators / food		1
	natural selection acted on the isolated populations	accept became adapted in each area	1
	OR		
	only certain allele(s) passed on to offspring / different alleles passed on in different environments	allow genes	
	so differences lead to inability to interbreed	allow differences described – eg mismatch of genitalia / different courtship displays / different breeding seasons	1
Total			**9**

4.6.3.4 Evidence for evolution

Answer 26 · Mark scheme

June 2012 | BL2HP | Original Q6 | Legacy

BL2HP

4.6.3.4 Evidence for evolution

Answer 27 · Mark scheme

June 2013 | BL1HP | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)	Lamarck	ignore any first name(s)	1
8(b)(i)	variation / range of sword lengths (in ancestors)	accept mutation produced longer sword	1
	those with long swords get more food	accept those with short swords get less food	1
	swordfish (with long swords) survive **and** breed	allow have offspring for breed	1
	(survivors) pass on gene(s) / allele(s) (for long sword)	allow mutation for gene(s) / allele(s)	1
8(b)(ii)	any **one** from: • more evidence (now) • DNA / genes / mechanism of inheritance discovered	accept examples of evidence, e.g. more fossils allow Lamarck's theory has been disproved ignore religious arguments ignore proof	1
Total			**6**

4.6.3.4 Evidence for evolution

Answer 28 · Mark scheme June 2014 | BL2HP | Original Q7 | Legacy

7(a)	lack of fossils / fossils destroyed (due to soft parts) decaying / geological activity	allow lack of evidence allow an example – eg vulcanism or earth movements or erosion allow converse points re skeletons, shells, hard parts	1 1	AO1 2.8, 2.8.1 a,b,c
7(b)(i)	**A** and **B** did not mate successfully	'**A** and **B** did not mate' insufficient allow did not produce fertile offspring	1	AO2 2.8.1f
7(b)(ii)	any **two** from: • may not be mating season • **A** and **B** may not find each other attractive • this is just a one-off attempt / an anomaly / need repeats • may be juvenile / immature • may be the same sex	allow other sensible suggestion eg were put in unfavourable environment or one / both could be infertile	2	AO3 2.8.1f
7(c)	1. (two ancestral populations) separated (by geographical barrier / by land) / were isolated 2. genetic variation (in each population) **or** different / new alleles **or** mutations occur 3. different environment / conditions 4. natural selection occurs **or** some phenotypes survived **or** some genotypes survived 5. (favourable) alleles / genes / mutations passed on (in each population) 6. eventually two types cannot interbreed successfully	 allow abiotic or biotic example allow eventually cannot produce fertile offspring	1 1 1 1 1 1	AO1 / AO2 2.8.1f
Total			**11**	

4.6.3.4 Evidence for evolution

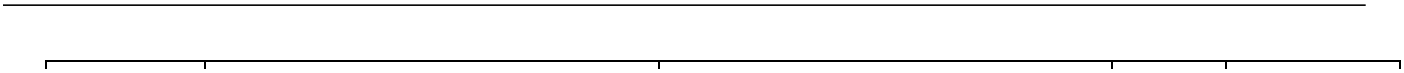
Answer 29 · Mark scheme June 2015 | BL2HP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	any **two** from: • (dead) animal buried in sediment • hard parts / bones do not decay **or** soft parts do decay • mineralisation (of hard parts / bones)	 allow imprint in mud allow (one of) the conditions for decay is missing – accept example, eg oxygen / water / correct temperature / bacteria allow replacement by other materials	2	AO1 / AO2 2.8.1a,b
6(a)(ii)	any **two** from: • conditions not right for fossilisation • geological activity has destroyed fossils / has destroyed evidence • fossils not yet found	 ignore references to soft-bodied allow a named / described example – eg vulcanism / earth movements / erosion allow description of why not yet found	2	AO3 2.8, 2.8.1a,c,d
6(b)	any **four** from: • separation / isolation (of different populations) • different environmental conditions (between locations) • mutation(s) occur **or** genetic variation (within each population) • better adapted survive **or** natural selection occurs • favourable alleles passed on (in each population) • eventually different populations unable to breed successfully with each other	 allow ‘survival of the fittest’ ignore animals adapt to their environment ignore reference to stronger survive allow genes for alleles allow unable to produce fertile offspring	4	AO1 2.8.1e,f
Total			**8**	

4.6.3.4 Evidence for evolution

Answer 29 · Mark scheme

June 2015 | BL2HP | Original Q6 | Legacy



4.6.3.4 Evidence for evolution

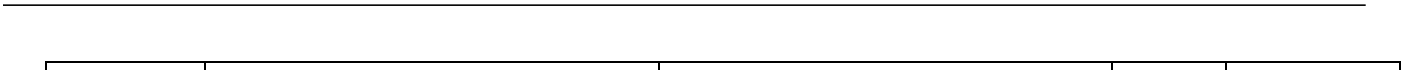
Answer 30 · Mark scheme June 2017 | BL1HP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)	any three from: • mutation **or** variation • better adapted survive **or** survival of the fittest • (survivors / better adapted) reproduce • genes passed on	allow points if given in example allow genetic changes allow differences in appearance allow ref to offspring	3	AO1 1.8.1e/f
2(b)(i)	wanted to discredit theory / Darwin	allow wanted to make Darwin / theory look stupid allow idea that (cartoon shows) humans evolved from monkeys	1	AO3 1.8.1b/c
2(b)(ii)	any **two** from: • Darwin's theory challenged idea that God created life • little / insufficient evidence • there were other (scientific) theories (at the time) • mechanism of inheritance not known	allow Darwin's theory challenged / against religious ideas/teaching. ignore against religion ignore no evidence allow examples, eg Lamarckism, allow genes / DNA not discovered ignore did not know about inheritance	2	AO1 1.8.1b/c
Total			**6**	

4.6.3.4 Evidence for evolution

Answer 30 · Mark scheme

June 2017 | BL1HP | Original Q2 | Legacy



4.6.3.4 Evidence for evolution

Answer 31 · Mark scheme

June 2017 | BL2HP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	organisms that can breed / mate **or** organisms that can reproduce together	allow converse points re. 2 different species	1	AO1 2.8.1f
	successfully	allow produces fertile offspring for 2 marks allow can reproduce to form fertile offspring for 2 marks	1	
7(a)(ii)	any **two** from: • fossils show how species have changed **or** show changes over time • older fossils are simpler (than later ones or present day species) • fossils have features similar to present-day species	allow fossils enable us to compare old species with present-day species	2	AO1 2.8, 2.8.1a/d

4.6.3.4 Evidence for evolution

Answer 31 · Mark scheme

7(b)	any **six** from: • (geographical) isolation (prevents interbreeding) • similar environmental conditions required similar adaptations / favoured similar mutations • an example of a suitable similar adaptation is explained • lack of predators / dinosaurs allowed survival without flight **or** plentiful food near ground allowed survival without flight • genetic variation / mutation (in each population) • natural selection / better adapted survive • favourable alleles passed on	allow ref. to continental drift allow description via example allow survival of the fittest allow genes / mutations	6	AO1/2 2.8.1f

Total		**10**

4.6.3.4 Evidence for evolution

Answer 32 · Mark scheme

November 2020 | 8461/2H | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	38 500 000 – 36 000 000	allow 500 000 × 5	1	AO2 4.6.3.6
	2 500 000 (years) **or** 2.5 million (years)	if no other mark awarded, allow 38.5 – 36 = 2.5 **or** 0.5 × 5 = 2.5 for **1** mark	1	

4.6.3.4 Evidence for evolution

Answer 32 · Mark scheme

November 2020 | 8461/2H | Original Q8

08.2	(extinction of Andrewsarchus) led to population increase / evolution of another predator because Andrewsarchus no longer competing for food / resources other predator (population) hunted more Brontotherium **or** (extinction of Andrewsarchus) led to population increase / evolution of another herbivore (previously eaten by Andrewsarchus) (1) because Andrewsarchus no longer predating (other) herbivore (1) more competition with other herbivores (1) **or** (extinction of Andrewsarchus so) Brontotherium are not eaten so therefore the population increases (1) so much that the food source decreases (1) Brontotherium compete with each other so much that they all die (1)	allow idea of a new predator allow because Andrewsarchus no longer eating another predator max **2** marks if reference to hunted by humans **or** still killed by Andrewsarchus **or** reference to climate change or factors relating to climate change	1 1 1	AO2 4.6.3.6 4.7.1.1 4.7.1.3 4.7.4.1

4.6.3.4 Evidence for evolution

Answer 32 · Mark scheme

November 2020 | 8461/2H | Original Q8

08.3	any **three** from: • fossils buried deep(er) so hard(er) to find • fossils smaller so harder to find • more likely to be destroyed by geological activity / earthquakes / erosion • oldest organisms were soft-bodied so most of the tissue decayed • dating older fossils is hard • older eras less researched by scientists because less to find • (usually) unclear when one species evolves into another species (because not enough fossils found)	allow oldest organisms were soft-bodied so there were very few fossils	3	AO2 4.6.3.5

4.6.3.4 Evidence for evolution

Answer 32 · Mark scheme

November 2020 | 8461/2H | Original Q8

Question	Answers	Mark	AO / Spec. Ref.
08.4	**Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3 4.6.3.6 4.7.1.2 4.7.1.3
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.	3–4	
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content **Supporting the statement** • decrease (in large mammals) is large(r) in some areas • decrease (in large mammals) occurs when humans enter areas • decrease occurs at different times in the areas, so not suggestive of worldwide climate change or meteor impact or volcanic activity • decrease is not (always) immediate, suggesting human population grew, then had impact **or** decrease accelerates as human population grows **Not supporting the statement** • only shows large mammals **or** does not show other species • correlation does not mean causation • there were always some left so it wasn't a 'mass extinction' • decrease could have been due to other factors / named • no information about climate change / abiotic factors • no information about predators / pathogens / food sources / other biotic factors • decrease (in mammal population) in Africa (after humans present) is small • decrease (in mammal population) in Madagascar (after humans present) was gradual / slow • only shows data for four areas of the world **or** no data shown for other areas of the world Answers in level **3** must refer to evidence supporting **and** not supporting the statement		

4.6.3.4 Evidence for evolution

Answer 32 · Mark scheme

November 2020 | 8461/2H | Original Q8

08.5	(disadvantage) any **one** from: • loss of potential, future biodiversity • reduction in range of alleles (advantage) allows evolution of new species / varieties	 allow loss of biodiversity allow reduction in gene pool allow opportunity for speciation	 1 1	AO3 4.6.3.6
Total			**16**	

4.6.3.4 Evidence for evolution

Answer 33 · Mark scheme

June 2023 | 8461/2H | Original Q9

Question 9

Question	Answers	Mark	AO / Spec Ref.
09	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.6.3.1 4.6.3.2 4.6.3.3 4.6.3.4 4.6.3.5 4.6.3.6 4.6.3.7 4.6.4
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	
	No relevant content	0	

4.6.3.4 Evidence for evolution

Answer 33 · Mark scheme

June 2023 | 8461/2H | Original Q9

	Indicative content **Fossil evidence:** • fossils show evidence of life in the past • fossils show change over time • fossil record shows development of species over time • fossils show evidence of extinction • fossil record shows how organisms from the past are related to species alive today • gaps in fossil record • gaps in fossil record are being filled in with new evidence • ref to evolutionary trees • description of how fossils are formed **Genetics:** • ref to Mendel's breeding experiments with plants • Mendel's description / idea of units / factors of inheritance • dominant and recessive units / alleles / genes • observation of chromosome behaviour during cell division • chromosome behaviour and Mendel's units work in similar ways • structure of DNA worked out • gene mechanism in determining protein synthesis worked out • (genetic) variation in a species • (variation) due to mutation or change in gene (structure) • individuals with advantageous characteristics more likely to survive • individuals with advantageous characteristics more likely to reproduce • (survivors) pass on (advantageous) alleles / genes • eg of evolution (such as antibiotic resistance in bacteria) • new species arise when sufficient changes occur to prevent (successful) reproduction For **Level 3**, the response must include details about fossils and about the mechanisms of genetics For **Level 2**, the response should include descriptions about fossils and / or genetics		

Total Question 9	**6**

4.6.3.4 Evidence for evolution

Answer 34 · Mark scheme

June 2024 | 8461/1H | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.1	penicillin	allow other named antibiotics ignore penicillium	1	AO1 4.3.1.3 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.2	the bacterium is killed (by antibiotic **C**)	allow there is a zone of inhibition (around antibiotic **C**)	1	AO2 4.3.1.8 4.1.1.6 RPA2
	if the bacterium was resistant, bacteria would be right up to the (edge of the) antibiotic disc	allow resistance means that the bacterium is not killed (by antibiotic(s)) allow if the bacterium was resistant there would be no zone of inhibition ignore no white area	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.3	any **two** from: • current / available antibiotics do not kill (certain) bacteria • diseases become more common **or** there will be some diseases that cannot be cured / treated • new antibiotics need to be developed which takes time / money	allow current / available antibiotics have no effect on (certain) bacteria ignore more people become ill allow some diseases become more difficult to treat	2	AO2 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.4	viruses **only** exist / reproduce inside (living) cells	allow viruses **need** (living) cells to exist / reproduce allow viruses exist / reproduce inside (living) cells **and** agar is not made of cells ignore names of cell types	1	AO2 4.3.1.8 4.3.1.1

4.6.3.4 Evidence for evolution

Answer 34 · Mark scheme

June 2024 | 8461/1H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.5	(these) drugs (can) damage (body) cells / tissues **or** it is hard to get (these) drugs into (living) cells	allow viruses often / frequently mutate (giving resistance to these drugs)	1	AO1 4.3.1.8

Question	Answers	Extra information	Mark	AO / Spec Ref.
06.6	AIDS		1	AO1 4.3.1.2

Total Question 6	8

4.6.3.4 Evidence for evolution

Answer 35 · Mark scheme

June 2025 | 8461/2H | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	any **two** from: • (ichthyosaur 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	allow skeleton **or** hard parts for bones throughout ignore compression ignore reference to oxygen do **not** accept (icthyosaur 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	AO2 4.6.3.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.2	120 × 17 2040 (mm) 2.04 (metres)	allow conversion to metres at any stage allow correct conversion of incorrectly calculated length	1 1 1	AO2 4.6.3.5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.3	phylum family	in this order only	1 1	AO1 4.6.3.5 4.6.4

4.6.3.4 Evidence for evolution

Answer 35 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.4	any **two** from: • ice age • global warming • volcanic activity • asteroid collision • new predators • (new) disease / pathogen • competition for mates • lack of habitat **or** habitat change	if neither 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 mates ignore competition unqualified ignore environment change allow competition between **ichthyosaurs** for food ignore isolation ignore pollution ignore lack of food	2	AO1 4.6.3.6

Total Question 1	9

4.6.3.4 Evidence for evolution

Answer 32 · Examiner comments

November 2020 | 8461/2H | Original Q8

Question 8 (standard, standard/high & high demand)

This question was about extinct mammals and the causes of their extinction. In **08.1** many students had difficulty reading the scale on the graph as the numbers increased from right to left on a time scale showing millions of years ago. The overlap in existence between the two species could be determined either by subtracting the end of the overlap from its beginning (38.5 - 36 million years = 2.5 million years) or by ascertaining that each small square represented 0.5 million years, hence 5 small squares represented 2.5 million years. Many did not gain a mark due to omitting the word 'million' in front of years on the answer line.

In **08.2** students found it conceptually difficult that the extinction of a carnivore should lead to the subsequent extinction of a herbivore, so much so that many of them imagined that the carnivore had been eaten by the herbivore, the latter thus running out of food. Higher-attaining students followed one of three possible routes to develop a hypothesis to explain the situation:

1. The extinction of the carnivore led to an increase in numbers of another carnivore which ate the herbivore.
2. The extinction of the carnivore led to an increase in numbers of a different herbivore which outcompeted (for food) the herbivore given in the question.
3. The extinction of the carnivore led to an increase in numbers of the herbivore which competed with other members of its own species so that their food ran out.

The concept of the fossil record being unclear for older species was difficult for the majority of students in **08.3**: 40% scored any marks in this question with a minority achieving the full 3 marks. Higher-attaining students stated that older fossils were more likely to have been destroyed by geological events such as earthquakes. Some alluded to the fact that older fossils were more likely to be buried deeper underground or were in inaccessible places such as the ocean bed, or that they were smaller, and so were more difficult to find.

4.6.3.4 Evidence for evolution

Answer 32 · Examiner comments

November 2020 | 8461/2H | Original Q8

In **08.4** students had to evaluate data in the form of four simple graphs showing the percentage survival of large mammal species in four different areas of the world over millions of years in relation to the time when humans first appeared in each area in order to decide whether the hypothesis that humans caused mass extinctions was correct or not. Most students noticed that large decreases in the percentage survival of the large mammals occurred when humans entered three of the areas, which supported the hypothesis. Many pointed out that, to the contrary, the decrease in survival was much less in one of the areas (Africa) and that it might have been due to some other factor, that only large mammals were considered rather than all animal species, that there was no information given about, for example, predators, pathogens, food sources, any abiotic factors, and that these four areas of the world were not necessarily representative of the effects of humans elsewhere. To obtain the highest marks, students had to have considered both sides of the argument and made a judgement based upon the evidence (or lack of it) which they had cited. 4% of students attained the highest level in their answers in order to be awarded 5 or 6 marks, the majority of the rest scoring either 2 or 3 marks.

Concluding Remarks

Particular problems which occurred quite frequently included:

- confusion of certain terms, eg mitosis / meiosis, reabsorption / filtration / excretion
- paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response, avoid misconceptions and the inclusion of irrelevant information
- repeating, rather than using, information given in the question, for which no marks are available
- careless reading of the question resulting in an inappropriate answer, or not following instructions in multiple-choice items, such as to tick the correct number of boxes
- careless reading of data from a graph
- omitting numbers when a question asks for the use of data
- missing a question when no answer lines were provided and the answer needed to be in a table or a Punnett square
- poor handwriting, for example with numerals – especially the distinction between the numbers 1 and 2
- not checking whether the answer to a calculation is sensible – for example, in converting units over an appropriate order of magnitude, such as the conversion of nanometres to metres.

4.6.3.4 Evidence for evolution

Answer 32 · Examiner comments

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.6.3.4 Evidence for evolution

Answer 33 · Examiner comments

June 2023 | 8461/2H | Original Q9

Question 9

This question was about how fossil evidence and our increasing understanding of the mechanisms of genetics have contributed to our understanding of evolution.

This was a high demand and challenging extended response question. Level 3 responses were rarely seen, but such answers were clear and well-structured, addressed several of the points of indicative content in the mark scheme and told the 'story' particularly well and eloquently.
Level 2 responses were common. For the most part, students answered well when writing about fossils. They tended to do less well when writing about the genetics aspect of the question and gave some weak accounts about natural selection.

Level 1 responses were weak in general and tended to mention fossils rather than genetics. Many students produced answers that were lacking in specifics and contained little or no relevant information. The question expected students to have some knowledge of fossils and the mechanisms of genetics and how these have contributed to our knowledge of Darwinian evolution. The vast majority of students confined their answers to animals (sometimes only humans) and there was meagre reference to the evolution of plants.

In describing fossil evidence, many students gave much detail of how fossils were formed (and sometimes little else) but others were able to describe the role of fossils in enabling the understanding of how past organisms have developed through time. However, many failed to express that evolution occurred on a species-wide scale, instead referring to the change in individual organisms. Little was mentioned about extinction or how the fossil evidence is incomplete or how modern discoveries are helping to fill the gaps.

Descriptions of how the mechanisms of genetics have contributed to our knowledge of evolution were poorly expressed or not accounted for at all. Such mechanisms began with Mendel and his experiments which have led to our understanding of chromosomes, mechanisms of cell division, genes, alleles and then to the structure of DNA and its detailed function. A few students referred to Mendel's experiments with peas but considerations of genetics were limited to descriptions of speciation which did achieve some credit; however, statements were often made about advantageous characteristics or even genetics being passed on to offspring instead of alleles, or genes or mutations.

4.6.3.4 Evidence for evolution

Answer 33 · Examiner comments

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.6.3.4 Evidence for evolution

Answer 34 · Examiner comments

June 2024 | 8461/1H | Original Q6

Question 6 (standard, standard/high demand and high demand)

06.1 83% of students were able to name an appropriate antibiotic. Commonly seen incorrect answers included aspirin, ibuprofen and paracetamol.

06.2 65% of students scored one mark on this question, with the majority achieving the first marking point. 6% of students scored two marks.

The vast majority of responses referenced a zone of inhibition, rather than a description of an area where the bacteria had been killed, both of which were creditworthy. However, references to a 'clear' or 'white' area were not. A number of students missed out on the mark, however, for offering vague references to bacteria 'not growing' rather than describing the effect the antibiotic had on them. For marking point 2, the majority of students went on to simply repeat what they had said for marking point 1 in a different way; that because the bacteria were killed, or because there was a zone of inhibition, they cannot be resistant, rather than what would happen if the bacteria *were* resistant. Frequently, reference to the antibiotic being resistant was seen.

06.3 74% of students scored zero marks on this question, largely due to not accurately articulating their ideas. The most commonly seen response related to marking point 3, regarding the difficulty of developing new antibiotics in terms of cost or time, with nearly a quarter of students achieving one mark. Some students began a sentence about the difficulty of developing new antibiotics, but offered no further clarification and therefore could not be awarded a mark. For marking point 2, many students began to try to express the idea that diseases would become more common and/or diseases would be more difficult to treat. However, they struggled to articulate themselves in a way that was creditworthy, with the emphasis on (individual) illnesses or infection, rather than diseases generally.

06.4 36% of students were awarded the mark in this question. The majority of students were aware that viruses only exist inside living cells although many had difficulty expressing this clearly enough to gain the mark. The most commonly seen correct response referred to viruses needing cells to reproduce, rather than viruses *only* reproducing inside cells.

06.5 43% of students achieved the mark in this question. A significant number of students understood that drugs used to destroy viruses would also damage the body cells, with vastly fewer recognising that it was hard to get these drugs into cells. Those who did not gain credit for this idea often stated that 'antibiotics only kill bacteria', 'viruses are small, so are difficult to find' or 'it is hard/expensive to research and develop new drugs'.

Those student who referenced mutation usually did not gain credit because they described viruses mutating 'more' or 'faster', rather than frequently. Often, students used the term 'they' in their answer as referring to 'the drugs', when in fact 'they', in the context of the question, refers to 'the scientists'. Students should be encouraged to look at the subject of the question before answering in terms of 'they' or 'it' for example, or better still, not use such terms in their answer.

06.6 84% of students correctly identified AIDS as a viral disease that damages white blood cells.

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4.6.3.4 Evidence for evolution

Answer 35 · Examiner comments

June 2025 | 8461/2H | Original Q1

Question 1 (Standard demand)

01.1

This question required students to apply their knowledge of fossil formation to the specific example of an ichthyosaur fossil.

4.6.3.4 Evidence for evolution

Answer 35 · Examiner comments

Only two steps in the fossilisation process were required to score full marks, so misunderstanding or omission of one step, was not critical. Almost a third of students achieved both marks.

Many students showed good knowledge of the first step in fossil formation, often referring to sediment, or an appropriate synonym; however, some also referred to the dead animal being buried in 'rock' or in 'rocks' which disqualified this idea. Whether this burying occurred before or after decay was not important in the award of the mark.

Although many students were aware that the dead ichthyosaur had decayed, they were often imprecise in terms of what had decayed. Many described the whole 'body' or the 'tissues' decaying, which implied that both soft and hard material decays. Some were able to recover this point with statements such as 'the body decays, leaving the bones behind'. Very few students referred to the soft tissues being eaten (by detritivores).
Students were commonly well versed in the idea of mineralisation of bones.
There were some excellent answers showing that students had revised this topic well, often giving all three points on the mark scheme in clear and concise detail.

01.2
Students were provided with the length of the fossil image and the relevant magnification factor and were required to calculate the real length of the fossil.
The majority of students completed this calculation well with a pleasing 80% gaining all 3 available marks. The most common error was in converting millimetres to metres, where a conversion factor of 100 was not uncommon. Some students completed the conversion in two steps, first converting to centimetres, then to millimetres, perhaps showing a lack of confidence in their maths, at the start of the paper.
A not uncommon error was for students to use the magnification equation, with the two values as numerator and denominator. It was rare then, for students to attempt to convert their answer to metres.

01.3
Students were required to recall the classification hierarchy, completing a partial classification using given terms.
This was very well attempted with nearly 90% of students gaining both marks. It was clear that many students had remembered the sequence by using a mnemonic, often written alongside the question. However, less successful students occasionally confused population for phylum, presumably due to the same initial letter.

01.4
Students were required to suggest causes for the extinction of ichthyosaurs, and over 80% of students gained at least one of the available marks.
Although this should not be an unfamiliar question to students who have practised from previous examination papers, the context of the information provided meant that some general answers were insufficient. The information in the question was that ichthyosaurs lived in the sea, consequently 'drought' was not credited. Similarly, the information provided stated that ichthyosaurs were in competition with other predators for food, thus a 'lack of food' was ignored, as was the presence of 'predators'. For this last idea, a mark could only be awarded if any predators were described as being 'new'.

4.6.3.4 Evidence for evolution

Answer 35 · Examiner comments June 2025 | 8461/2H | Original Q1

The question was well answered, common correct responses included reference to ‘disease’, ‘natural disasters’ and ‘habitat loss’, although all of the possible answers were seen frequently.