AQA GCSE Biology | 8461

SPECIFICATION POINT 4.7.3.6

Maintaining biodiversity

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**14**
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.

4.7.3.6 Maintaining biodiversity

Answer 01 · Mark scheme January 2007 | BLY1H | Original Q2 | Legacy

Question 2

	answers	extra information	mark
(a)	any **two** from: • burning • activity of microbes / microbial respiration • less photosynthesis **or** trees take in CO_2 **or** less CO_2 locked up in wood • CO_2 given off by clearing machinery	ignore CO_2 release unqualified do **not** accept CO_2 taken in for respiration	2
(b)(i)	range of different species	accept idea of variety of organisms or plants or animals	1
(ii)	any **one** from: • organisms may produce substances useful to humans • duty to preserve for future generations • effect on other organisms e.g. food chain effects • loss of environmental indicators	do **not** accept if food is only example ignore effect on human food supply	1
total			4

4.7.3.6 Maintaining biodiversity

Answer 02 · Mark scheme November 2008 | BLY1BP | Original Q5 | Legacy

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

Answer 03 · Mark scheme March 2009 | BLY1BP | Original Q7 | Legacy

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

Answer 04 · Mark scheme June 2009 | BLY1BP | Original Q9 | Legacy

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

* This question has been removed

Answer 05 · Mark scheme November 2009 | BLY1BP | Original Q7 | Legacy

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

Answer 06 · Mark scheme March 2010 | BLY1BP | Original Q8 | Legacy

Eight	**2**	**4**	**2**	**3**

Answer 07 · Mark scheme June 2010 | BLY1BP | Original Q4 | Legacy

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

Answer 08 · Mark scheme March 2011 | BLY1BP | Original Q3 | Legacy

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

4.7.3.6 Maintaining biodiversity

Answer 09 · Mark scheme

June 2011 | BLY1BP | Original Q3 | Legacy

Three	**3**	**1**	**3**	**4**

4.7.3.6 Maintaining biodiversity

Answer 10 · Mark scheme

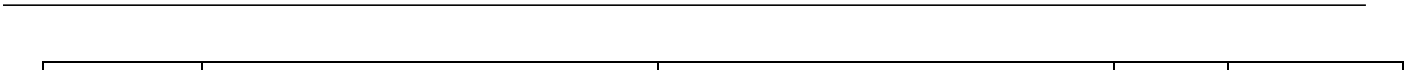
June 2016 | BL3HP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
4(a)(i)	forest at the edges (of the island) has been removed an appropriate area on the island is identified eg south east **or** bottom right	allow centrally the forest remains	1 1	AO3 3.4.2
4(a)(ii)	any **two** from: • (to provide land) for farming / agriculture • (to provide land) for quarrying • (to provide land / wood) for building • to provide fuel • to produce paper	allow to provide timber allow forest fires	2	AO2 3.4.1c 3.4.2c
4(b)	any **two** from: • decreased biodiversity • loss of habitats • increased carbon dioxide (concentration) • global warming	allow effects of global warming eg flooding / rise in sea level allow soil erosion	2	AO3 3.4.1c 3.4.2a/b/c
Total			**6**	

4.7.3.6 Maintaining biodiversity

Answer 10 · Mark scheme

June 2016 | BL3HP | Original Q4 | Legacy



4.7.3.6 Maintaining biodiversity

Answer 11 · Mark scheme

June 2019 | 8461/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	pituitary		1	AO1 4.5.3.3
06.2	ADH		1	AO1 4.5.3.3
06.3		allow ecf for name of hormone from Question **06.2** ignore name of gland		4.5.3.3
	high(er) concentration of blood **causes** (more) ADH / hormone release	allow low(er) water potential of blood causes (more) ADH / hormone release allow alternative descriptions in terms of – eg low(er) water concentration / level **or** high(er) osmotic pressure **or** high(er) solute concentration / level	1	AO2
	(and hormone / ADH causes) increased permeability of kidney tubules (to water)	allow increased permeability of collecting duct / distal convoluted tubule	1	AO1
	(so) increased water reabsorption	allow more water taken back into blood ignore reference to urine	1	AO1

4.7.3.6 Maintaining biodiversity

Answer 11 · Mark scheme

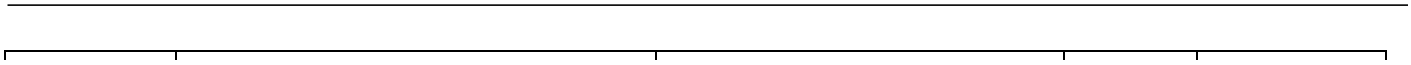
June 2019 | 8461/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4		allow converse if clearly describing dialysis explanation must match reason		AO3 4.5.3.3
	changes in concentrations / levels of substances / urea are minimised	allow no change in concentration / level of substances / urea allow correctly named substances	1	
	(so) less / no chance of causing damage to body cells / tissues	allow eg less / no osmotic stress **or** not poisoned by urea	1	
	not repeatedly puncturing skin **or** blood not in contact with machine	allow blood does not leave the body	1	
	(so) less / no chance of infection **or** less / no chance of blood clots **or** no need to take anti-clotting drugs	allow less / no chance of microorganisms entering body allow only one operation so less chance of infection for **2** marks allow dialysis requires anti-clotting drugs and so may lose more blood if cut for **2** marks	1	
Total			**9**	

4.7.3.6 Maintaining biodiversity

Answer 11 · Mark scheme

June 2019 | 8461/2H | Original Q6



4.7.3.6 Maintaining biodiversity

Answer 12 · 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	

4.7.3.6 Maintaining biodiversity

Answer 12 · 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

4.7.3.6 Maintaining biodiversity

Answer 12 · 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

4.7.3.6 Maintaining biodiversity

Answer 12 · 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		

4.7.3.6 Maintaining biodiversity

Answer 12 · 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**	

4.7.3.6 Maintaining biodiversity

Answer 13 · Mark scheme

November 2021 | 8461/2H | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	from light / sunlight absorbed by chlorophyll / chloroplasts	ignore sun unqualified if no other mark awarded allow by photosynthesis for **1** mark	1 1	AO1 4.7.2.1 4.7.4.3 4.4.1.1
07.2	krill / herring / copepod		1	AO2 4.7.2.1 4.7.4.1
07.3	algae		1	AO2 4.7.2.1 4.7.4.1
07.4	1 algae 2 krill **or** copepod 3 squid 4 mackerel (5 Human)	all correct for **1** mark	1	AO2 4.7.2.1
07.5	any **two** from: (losses due to) • non-eaten parts (of squid / krill) • <u>respiration</u> **or** <u>respiring</u> (in mackerel) • excretion (by mackerel)	 allow bones / shells allow eaten by other animals do **not** accept respiration produces / makes / creates energy allow loss of a named waste product such as CO_2 / urea ignore loss of waste unqualified ignore faeces	2	AO1 4.7.4.3

4.7.3.6 Maintaining biodiversity

Answer 13 · Mark scheme

November 2021 | 8461/2H | Original Q7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.6	2.3 **and** 0.1 (million)	allow in the range 2.25 to 2.3 for 2.3 (million)	1	AO2 4.7.5.3
	$\frac{2.3 - 0.1}{2.3} \times 100$ **or** $\frac{220}{2.3}$		1	
	95.65217.....	allow answer from correct substitution of incorrect values from **Figure 11**	1	
	96	allow student's calculated answer correctly rounded to the nearest whole number	1	

4.7.3.6 Maintaining biodiversity

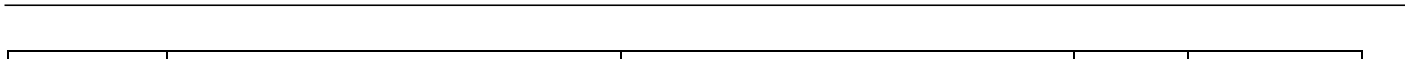
Answer 13 · Mark scheme

Question	Answers	Mark	AO / Spec Ref.
07.7	**Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	5–6	AO3 4.7.5.3
	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 figures may be given without units (million tonnes) throughout **points for:** • small fish are not caught so can live long enough to reproduce • biomass / stocks have generally increased after these laws introduced • '77-'81 law (total ban) resulted in increase in biomass, eg 0.1 to 0.48 **or** to 0.9 by '84 • '84 law (mesh size) resulted in increase in biomass, eg 0.9 to 1.8 (by '90) • '97 law (quotas) resulted in increase, eg 1.15 to 1.25 • '98 law (ban in breeding season) resulted in increase, eg 1.25 to 2.5 **points against:** • could be a cause other than the law **or** correlation does not necessarily indicate causal relationship **or** other factors • laws superimposed so can't necessarily tell the effect of each • each law results in an increase followed by a decrease • quotas lead to dead fish being thrown back into sea For **Level 3** points both for and against must be considered together with appropriate use of data		
Total		**17**	

4.7.3.6 Maintaining biodiversity

Answer 13 · Mark scheme

November 2021 | 8461/2H | Original Q7



4.7.3.6 Maintaining biodiversity

Answer 14 · Mark scheme

June 2025 | 8461/2H | Original Q5

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	for burning / combustion as compost	allow as a fuel allow for growing plants ignore as fertiliser allow to improve soil drainage / texture / quality allow as a building material allow as animal feed / supplement	1 1	AO1 4.7.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.2	the variety of (all) <u>species</u> on Earth **or** the variety of (all) <u>species</u> in a habitat / area / ecosystem / community	allow the number of (all) <u>species</u> on Earth allow the number of (all) <u>species</u> in a habitat / area / ecosystem / community	1	AO1 4.7.3.1

Answer 14 · Mark scheme

Question	Answers	Mark	AO / Spec. Ref.
05.3	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.7.2.4 4.7.3.1 4.7.3.3 4.7.3.5
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical thinking. 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 thinking.	1–2	
	No relevant content	0	
	Indicative content • (destruction of peat) causes decrease in biodiversity locally / globally ***Local effects*** • causes death / extinction of (local) populations / species o (due to) loss of (specialised) habitat o (so) lack of food o (so) lack of shelter • causes migration of (local) populations / species o (due to) loss of (specialised) habitat o (so) need to find food o (so) need to find shelter ***Global effects*** • (removal of peat) releases (trapped) carbon dioxide • (removal of peat) releases (trapped) methane • burning peat releases carbon dioxide • decay of peat releases carbon dioxide (from respiration of microorganisms) • decay of peat releases methane (from anaerobic respiration of microorganisms) o (causes) global warming **or** greenhouse effect o (causes) climate change **or** extreme weather o (causes) melting ice caps **or** rising sea levels **or** flooding o (causes) drought / desertification **or** changing rainfall patterns o (causes) loss of food / habitats o (so) migration patterns change o (so) some species / organisms become extinct For **Level 2**, must refer to local and global effects with an explanation. For **Level 3**, must give an explanation for local and for global effects supported by other details for local and / or global effects.		

Total Question 5	**9**

4.7.3.6 Maintaining biodiversity

Answer 12 · 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.

Answer 12 · Examiner comments

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.

4.7.3.6 Maintaining biodiversity

Answer 12 · Examiner comments

November 2020 | 8461/2H | Original Q8

Mark Ranges and Award of Grades

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

Answer 13 · Examiner comments

November 2021 | 8461/2H | Original Q7

Question 7 (standard, standard/high & high demand)

This question was about a marine food web and legislation to ensure sustainable fishing of herring in the North Sea. In **07.1**, almost two-thirds of students scored 1 mark for stating either that light was the source of energy for the algae or that the algae used photosynthesis. Many stated that the energy came 'from the Sun' which did not distinguish between light and other forms of solar energy. Incorrect answers included carbon dioxide, water, mineral ions and even from eating other organisms. 1% of answers mentioned that chlorophyll or chloroplasts absorbed the light energy.

Most students were able to identify a primary consumer and the producer in the food web in **07.2** and **07.3**, respectively. A common incorrect answer for the primary consumer was the 'human', presumably confusing primary with top. Similarly, around three-quarters of students were able to assign 5 organisms from the food web to a food chain ending in the human.

In **07.5**, although one reason for the lower biomass of the mackerel than that of the combined biomass of the krill and squid was given as non-digestibility of parts of these animals, many students suggested 'lost in faeces' as an additional reason. Around one-third of students gained some credit for their answers by suggesting losses due to respiration or excretion or, alternatively, that some parts of the krill and squid were not even eaten or they were eaten by other animals.

Answer 13 · Examiner comments

November 2021 | 8461/2H | Original Q7

07.6 was a 4-mark calculation of percentage decrease using figures read from a graph. Fewer than half of students were completely successful. Errors included the use of an incorrect starting point – the first and highest value on the graph for the year 1950 was quite a common error, or reading the value for 1977 as '0.2' or '0.05' instead of 0.1. Many students did not get credit for not rounding their answer to the nearest whole number as instructed in the question. Some calculated a percentage reduction in excess of 100%, the highest such value being '2300%'. Around one-sixth of students scored no marks.

07.7 was a 6-mark extended response question requiring the evaluation of the data from the graph in relation to various acts of legislation introduced at different times. Many students found this very difficult with more than two-thirds attaining no higher than Level 1. The question instructed students to use data from the graph and information from the diagram showing the relationship between mesh size of fishing nets and the sizes of herring of different ages. Many students did not cite any data, or did not consider all four pieces of legislation and their subsequent effects on herring biomass. It was rare to read any negative points – the most common being the decrease in biomass at certain times despite the legislation that had been introduced – and hardly any students thinking that causes in addition to the given legislation might have been responsible for the changes in biomass or that, since the acts of legislation overlapped in their application, it was hard to ascertain the effect of each. Very few students attempted to make a judgement on the basis of the points they had made and no-one scored all 6 marks.

Answer 14 · Examiner comments

June 2025 | 8461/2H | Original Q5

Question 5 (Standard, Standard/high and High demand)

05.1

This question required students to give two uses of the peat removed from peat bogs. Over 50% of students gained one mark, with a pleasing 25% gaining both marks available. 'Combustion' and 'fuel' were the most common answers seen, with only 1% of students not attempting the question. The most common incorrect answer given was 'fertiliser', or a description of the role of fertiliser.

05.2

Only 40% of student gained the mark for correctly defining biodiversity. Those that fell short of the mark generally did so for not using the term 'species' in their answer. Some students referred to 'the species of plants and animals' which did not include all other species such as prokaryotes and so could not gain credit.

05.3

This was a levelled response question which was marked holistically.

Students were required to give a detailed explanation of how the destruction of peat bogs could affect biodiversity both in the local area **and** globally. Just over a third of students only gave a one-sided explanation of either the global or the local effects and consequently were restricted to Level 1.

Just over 10% of students gained credit in Level 3. Such answers included details of global and local effects of peat bog destruction, alongside clear explanations of the impact on biodiversity.

Around 40% of students gained credit in Level 2, falling short of Level 3 often due to having less effective explanations for local effects, while still giving clear explanations of the impact of global effects. While many students mentioned local habitat destruction, or lack of food – this was rarely linked with death/extinction of *species* – but instead referred to death/extinction of animals/plants/wildlife which was not sufficient for credit. Most answers, however, gave detailed descriptions of carbon dioxide release either directly, or by combustion and/or decay of peat – linked with the consequences of this on global warming, climate change and habitat destruction.

Answer 14 · Examiner comments

June 2025 | 8461/2H | Original Q5

Students are strongly encouraged to engage in regular practice with this question type during their studies and revision, paying particular attention to formulating a balanced response that addresses the entirety of the question's scope.