AQA GCSE Biology | 8461

SPECIFICATION POINT 4.7.1.3

Biotic factors

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**29**
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.

4.7.1.3 Biotic factors

Answer 01 · Mark scheme

March 2007 | BLY1A | Original Q1 | Legacy

One	**A**	ear	**4**
	B	eye	**2**
	C	nose	**3**
	D	skin	**1**

Answer 02 · Mark scheme

March 2007 | BLY1B | Original Q5 | Legacy

Five	**A**	cell	**1**
	B	chromosome	**4**
	C	enzymes	**2**
	D	gene	**3**

Answer 03 · Mark scheme

June 2007 | BLY1B | Original Q9 | Legacy

Nine	**3**	**1**	**4**	**1**

* This question is removed

Answer 04 · Mark scheme

June 2007 | BLY1H | Original Q4 | Legacy

The full source mark scheme begins on page 35. Follow original question 4 in that document.

4.7.1.3 Biotic factors

Answer 05 · Mark scheme

Question 7

	answers	extra information	mark
(a)	any **four** from: • mutation / variation • produces smaller wings / fatter body • wings no longer an advantage since no predators • wings no longer an advantage since food on ground • fatter body can store more energy when fruit scarce • successful birds breed / pass on genes	must be linked to mutation / variation allow wings / flight not needed as no predators allow wings / flight not needed as food on ground	4
(b)	any **one** from: • evidence has all gone • no scientists on island at time to record evidence • no records (from sailors)		1
total			5

4.7.1.3 Biotic factors

Answer 05 · Mark scheme January 2008 | BLY1H | Original Q7 | Legacy

BLY1H

Answer 06 · Mark scheme March 2008 | BLY1BP | Original Q2 | Legacy

Two	**A**	competition	**3**
	B	environmental change	**1**
	C	survival	**4**
	D	extinction	**2**

	A	B	C	D

Answer 07 · Mark scheme June 2008 | BLY1AP | Original Q1 | Legacy

Question		Key	
One	**A**	antibiotics	**2**
	B	painkillers	**4**
	C	antibodies	**3**
	D	vaccines	**1**

Answer 08 · Mark scheme June 2008 | BLY1BP | Original Q9 | Legacy

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

4.7.1.3 Biotic factors

Answer 09 · Mark scheme June 2008 | BLY1H | Original Q1 | Legacy

question	answers	extra information	mark
1(a)	**1** mark for each adaptation and **1** mark for its correct linked advantage • long / thick hair / fur (1) for insulation (1) • small ears (1) for reduced heat loss (1) • small feet (1) for reduced heat loss (1) • white fur / coat (1) for camouflage / poor emitter (1) • small SA/V ratio (1) reduces heat loss (1) • thick layer of fat (1) insulates / keeps warm (1)	allow keeps warm ignore wide feet ignore prevent sinking	max 4
1(b)	**1** mark for each adaptation and **1** mark for its correct linked advantage • horns (1) for defence (1) • long legs (1) for speed / escape / vision (1) • light colour (1) for camouflage (1) • eyes on side of head (1) for wider field of vision (1) • hooves (1) for speed / escape (1) • large ears (1) to hear predators better (1)	allow pattern	max 4
Total			**8**

4.7.1.3 Biotic factors

Answer 09 · Mark scheme

June 2008 | BLY1H | Original Q1 | Legacy

COMPONENT NUMBER: BLY1H

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

4.7.1.3 Biotic factors

Answer 10 · Mark scheme

June 2008 | BLY1H | Original Q5 | Legacy

question	answers	extra information	mark
5	any **four** from: • mutation produced a bird whose bill was crossed • birds compete for <u>food</u> / <u>seeds</u> • mutant crossbill able to obtain food faster / easier / more successfully • selected for **or** more likely to survive • reproduce / mate / breed / produce offspring	max **two** marks for a Lamarck explanation do **not** allow birds decide to mutate	4
Total			**4**

4.7.1.3 Biotic factors

Answer 10 · Mark scheme June 2008 | BLY1H | Original Q5 | Legacy

COMPONENT NUMBER: BLY1H

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

Answer 11 · Mark scheme November 2008 | BLY1AP | Original Q5 | Legacy

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

Answer 12 · Mark scheme November 2008 | BLY1BP | Original Q2 | Legacy

Two	**A** for floating **3** **B** to deter predators **1** **C** for climbing **2** **D** for reducing water loss **4**			
	A	**B**	**C**	**D**

Answer 13 · Mark scheme March 2009 | BLY1BP | Original Q8 | Legacy

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

Answer 14 · 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**

4.7.1.3 Biotic factors

Answer 15 · Mark scheme

June 2009 | BLY1H | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)	streamlined / aerodynamic / swept-back / arrow-shaped / dart-shaped wings / tail **or** large / long wings	allow pointed / curved wings ignore pointed tail / beak ignore large tail	1
1(b)	no / fewer insects / food (in winter)	allow **too** cold ignore not adapted to cold ignore day length	1
1(c)(i)	any **two** from • feed / hunt at different heights **or** swifts feed higher up • feed / hunt at different times **or** swifts feed at night • arrive / depart at different times		2
1(c)(ii)	nesting sites / territory / habitat	allow homes / space ignore food unqualified allow well qualified food answers eg insects / food near the ground **or** insects / food when it's light **or** insects / food between early May and early August	1
Total			**5**

4.7.1.3 Biotic factors

Answer 15 · Mark scheme June 2009 | BLY1H | Original Q1 | Legacy

BLY1H

Answer 16 · Mark scheme March 2010 | BLY1BP | Original Q2 | Legacy

Two	**A**	The trees' leaves live for about 30 years.	**4**		
	B	The trees can grow new bark.	**1**		
	C	The trees have needle-shaped leaves.	**3**		
	D	The trees grow far apart.	**2**		
	A		**B**	**C**	**D**

Answer 17 · Mark scheme March 2010 | BLY1BP | Original Q9 | Legacy

Nine	**4**	**2**	**1**	**3**

Answer 18 · Mark scheme March 2011 | BLY1BP | Original Q8 | Legacy

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

4.7.1.3 Biotic factors

Answer 19 · Mark scheme

June 2012 | BL1HP | Original Q3 | Legacy

Question 3

question	information		mark
3	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 2, and apply a 'best-fit' approach to the marking.		6
0 marks	**Level 1 (1-2 marks)**	**Level 2 (3-4 marks)**	**Level 3 (5-6 marks)**
No relevant content.	There is at least one example of an adaptation of either an animal **or** a plant. However it may not be clear how the adaptation helps the organism to avoid being eaten.	There is a description of an adaptation of at least one animal **and** at least one plant. It is clear how at least one of these adaptations helps the organism to avoid being eaten.	There are clear and detailed descriptions of a range of adaptations of named animals **and** named plants. It is clear how most of these adaptations help the organisms to avoid being eaten.

examples of clear and detailed biology points made in response:

- **camouflage** – the method of camouflage should be described plus a statement that the predator is less likely to see the prey
- **mimicry / warning colouration** – the method should be described plus a statement that the predator is likely to confuse the prey with e.g. a poisonous organism
- **thorns / prickles / spines / horns** – a statement that these are sharp and are likely to hurt a predator
- **long limbs / streamlining** – a statement that these increase speed and make it more likely that prey will outrun predator
- **bad taste** / **poison** – a statement that predator will find this unpleasant and 'spit out' prey / not attack same prey again
- **large ears / position of eyes** – a statement that predators will be detected earlier so the prey can escape sooner

Total		6

4.7.1.3 Biotic factors

Answer 19 · Mark scheme

June 2012 | BL1HP | Original Q3 | Legacy

BL1HP

4.7.1.3 Biotic factors

Answer 20 · Mark scheme

June 2012 | BL1HP | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5 (a)(i)	dead / inactive / weakened	allow antigen / protein ignore ref to other components ignore small amount	1
	pathogen / bacterium / virus / microorganism	ignore germs / disease	1
5 (a)(ii)		antigen / antibiotic instead of antibody = max 2	
	white blood cells produce / release antibodies	accept lymphocytes / leucocytes / memory cells produce antibodies do **not** accept phagocytes	1
	antibodies produced quickly		1
	(these) antibodies destroy the pathogen	allow kill do **not** accept antibodies engulf pathogens	1
5 (b)(i)	(live) bacteria still in body	ignore numbers	1
	would reproduce	ignore mutation / growth	1
5 (b)(ii)	antibiotics / treatment ineffective **or** resistant pathogens survive	accept resistant out compete non-resistant	1
	these reproduce		1
	population of resistant pathogens increases	allow (resistant pathogens reproduce) rapidly	1
Total			**10**

4.7.1.3 Biotic factors

Answer 20 · Mark scheme

June 2012 | BL1HP | Original Q5 | Legacy

BL1HP

4.7.1.3 Biotic factors

Answer 21 · Mark scheme

June 2012 | BL1HP | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8 (a)(i)	0.6 **or** 6 x 10^{-1}	for correct answer if no / incorrect answer $\frac{2.4 \times 10^{4}}{4 \times 10^{6}} \times 100$ **or** 0.006 **or** 6 x 10^{-3} gains **1** mark	2
8 (a)(ii)	any **two** from: • reflected • not absorbed **or** misses chloroplasts / chlorophyll • wrong wavelength • photosynthesis inefficient • allow some lost through respiration / as heat (from respiration)	 ignore some of light is green allow transmitted **or** passes through leaves allow hits other plant parts accept other limiting factors / named	2
8 (b)	energy lost via faeces / not digested / waste / excreted (of insect-eating birds) energy loss via respiration / movement / muscle contraction / heat (by insect-eating bird) some of (insect eating) bird not eaten but all / most / more of insect is eaten	 accept examples of muscle contraction do **not** accept energy used for respiration 	1 1 1
Total			**7**

UMS Conversion Calculator www.aqa.org.uk/umsconversion

4.7.1.3 Biotic factors

Answer 22 · Mark scheme

Question	Answers	Extra information	Mark	AO / spec ref.
4(a)	mumps rubella / German measles	in either order both needed for the mark ignore measles unqualified	1	AO1 1.1.2l
4(b)(i)	80(.0)	allow **1** mark for $\frac{504}{630}$ **or** 0.8	2	AO2 1.1.2
4(b)(ii)	less chance of epidemic / pandemic **or** less chance of spread of disease / measles / mumps / rubella	allow idea of herd immunity (increased protection for those who are not vaccinated) ignore less chance of getting the disease **or** to eradicate the disease	1	AO2 1.1.2e,l
4(c)(i)	dead / inactive pathogens / viruses / bacteria	allow antigens / proteins from pathogens / viruses / bacteria ignore microorganisms	1	AO1 1.1.2l
4(c)(ii)	white blood cells produce antibodies antibodies produced rapidly (on re-infection) **or** response rapid (on re-infection) these antibodies kill pathogens / viruses / bacteria	 allow ecf if antibodies incorrectly identified in first marking point do **not** accept idea that original antibodies remain in blood and kill pathogens	1 1 1	AO1 1.1.2c, d,e,l
4(d)(i)	antibiotics don't kill viruses (because measles) virus / pathogen lives inside cells	allow antibiotics only kill bacteria allow antibiotics do not work inside cells **or** killing virus / pathogen would kill / damage cell	1 1	AO1 / AO2 1.1.2h
4(d)(ii)	(bacteria / pathogens) develop resistance (to antibiotic)	ignore reference to immunity ignore viruses develop resistance	1	AO1 1.1.2i,j
Total			**11**	

4.7.1.3 Biotic factors

Answer 22 · Mark scheme

June 2014 | BL1HP | Original Q4 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.7.1.3 Biotic factors

Answer 23 · Mark scheme

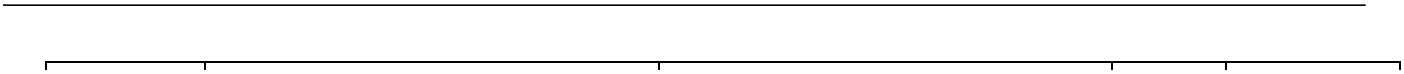
June 2017 | BL1HP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	bacteria (in vaccine) are dead / inactive / weakened	allow converse for bacteria that cause the disease, if clear allow bacteria in vaccine are attenuated allow idea that only antigen from bacteria is in vaccine	1	AO1 1.1.2l
6(a)(ii)	for vaccinated person: idea that white blood cells have previously encountered (TB) bacteria so are ready to produce antibodies rapidly / immediately	allow converse for non-vaccinated person allow ref to memory cells allow idea of specificity of antibodies / white blood cells	1 1	AO2/3 1.1.2l
6(b)(i)	(most / all) non-resistant bacteria killed (by antibiotic) resistant bacteria reproduce so offspring are resistant	allow converse allow resistance allele passed on	1 1 1	AO1/2 1.1.2j
6(b)(ii)	infection is mild / non-serious (not using antibiotic) reduces (rate of) development of resistant strains	allow not life-threatening allow might be viral (1) and antibiotics do not kill viruses (1)	1 1	AO1/2 1.1.2i
Total			8	

4.7.1.3 Biotic factors

Answer 23 · Mark scheme

June 2017 | BL1HP | Original Q6 | Legacy



4.7.1.3 Biotic factors

Answer 24 · Mark scheme

November 2021 | 8461/2H | Original Q5

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>05.1</td><td>
<table>
<tr><th>Factor</th><th>Biotic</th><th>Abiotic</th></tr>
<tr><td>Nitrates in the soil</td><td></td><td>✓</td></tr>
<tr><td>Rabbits eating the plants</td><td>✓</td><td></td></tr>
<tr><td>Shading by a building</td><td></td><td>✓</td></tr>
<tr><td>Soil pH</td><td></td><td>✓</td></tr>
<tr><td>Temperature</td><td></td><td>✓</td></tr>
<tr><td>Trampling by people</td><td>✓</td><td></td></tr>
</table>
all 6 correct = 3 marks
4 or 5 correct = 2 marks
2 or 3 correct = 1 mark
0 or 1 correct = 0 marks
</td><td></td><td>3</td><td>AO1
4.7.1.2
4.7.1.3
4.4.1.2</td></tr>
<tr><td>05.2</td><td>(grid and) coordinates

to achieve randomness</td><td>

ignore throwing quadrat

allow random coordinates for 2 marks

if no other mark awarded allow random walk or description of random walk for 1 mark</td><td>1

1</td><td>AO1
4.7.2.1
RPA9</td></tr>
</table>

4.7.1.3 Biotic factors

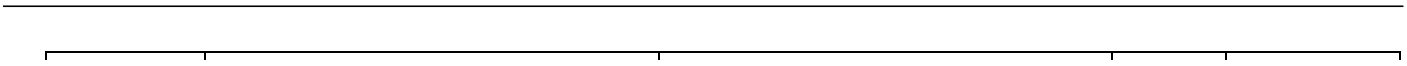
Answer 24 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.3	*(mean per m^2 =)* 24 **or** 6 × 4		1	AO2 4.7.2.1 RPA9
	(calculation of area of lawn =) (½ × 16 × 10) – (6 × 3) **or** 80 – 18		1	
	(area of lawn =) 62 m^2	allow correct calculation using total area (of triangle) – area of rectangle	1	
	(total number of daisies =) 24 × 62	allow correct calculation using an incorrectly calculated area of the lawn and / or mean	1	
	1488	allow answer based on incorrect area	1	
	(answer to 3 sig figs =) 1490	allow student's calculated answer rounded to 3 sig figs	1	
05.4	too few quadrats **or** quadrat too small	allow sample size too small	1	AO3 4.7.2.1 RPA9
	sample may not be representative of the lawn	allow quadrats may not have been placed randomly	1	
Total			13	

4.7.1.3 Biotic factors

Answer 24 · Mark scheme

November 2021 | 8461/2H | Original Q5



4.7.1.3 Biotic factors

Answer 25 · Mark scheme

June 2022 | 8461/2H | Original Q2

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	**abiotic** any **two** from: • water • oxygen / air (in soil) • pH (of soil) • minerals / ions • temperature • size of soil particles **or** texture / type of soil **biotic** any **two** from: • food • predators / consumers / carnivores • disease / pathogens / bacteria / fungi	 allow moisture / humidity / rain(fall) allow dryness ignore carbon dioxide allow acidity / alkalinity (of soil) allow salts allow named example of an ion ignore nutrients allow named example of soil type ignore space / toxins / weather allow amount of dead / decaying matter (in soil) ignore nutrients allow example – such as birds allow microorganisms / microbes / parasites if **no** other marks awarded allow **2** marks for **four** factors in reverse categories	2 2	AO1 4.7.1.1 4.7.1.2 4.7.1.3

4.7.1.3 Biotic factors

Answer 25 · Mark scheme

Question	Answers	Mark	AO / Spec. Ref.
02.2	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5–6	AO2
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	AO2
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	AO1
	No relevant content	0	
	Indicative content • same concentration of chemical / **X** applied to the soil • same volume / amount of chemical / **X** applied to the soil • same size of area sampled – eg 1 m^2 or 0.25 m^2 • use of a quadrat • same time between application and collecting worms • same time allowed for collecting worms after application • each sample area selected randomly • method of achieving randomness – eg random coordinates • (collect and) count worms in each of areas **A** and **B** • at least 5 repeats in each of areas **A** and **B** • calculate mean (per unit area) **or** total for each of areas **A** and **B** • compare means / totals for areas **A** and **B**		4.7.2.1 RPA9

Total Question 2		**10**

4.7.1.3 Biotic factors

Answer 26 · Mark scheme

June 2023 | 8461/1H | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.1	any **two** from: • *(effect)* muscle fatigue **or** oxygen debt occurs (1) *(reason)* caused by (build-up of) lactic acid (1) • *(effect)* (continued) heavy / deep / fast breathing (1) *(reason)* to provide the oxygen needed to break down (built-up) lactic acid (1) • *(effect)* (continued) increased heart rate (1) (*reason)* to provide the oxygen needed to break down (built-up) lactic acid (1) • *(effect)* fewer / weaker muscle contractions (1) *(reason)* (because) less energy is released / available (1)	mark as pairs allow muscle cramp ignore fatigue / cramp unqualified allow to repay the oxygen debt allow to repay the oxygen debt do **not** accept energy being produced / made / created	4	AO1 4.4.2.1 4.4.2.2

Answer 26 · Mark scheme

Question	Answers	Mark	AO / Spec Ref.
04.2	**Level 3:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	5-6	AO3 4.4.2.2
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3-4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1-2	
	No relevant content.	0	
	Indicative content • test a group of athletes • use at least two different types / intensities of exercise • get each athlete to do all exercises **or** have a large (≥30) group doing each exercise • record heart rate for each athlete before and after exercise **or** calculate increase in heart rate for each athlete after exercise • calculate the mean increase in heart rates for each type / intensity of exercise • compare mean increase in heart rates for each type / intensity of exercise • control variables: o same (biological) sex **or** mix of sexes o same level of activity / exercise o same age o same caffeine / drug / medicine intake o same length of time for exercise o no health issues / illnesses o return to resting heart rate before each exercise		

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.3	(athlete is) faster / stronger	allow description of improved performance allow reference to increased stamina / endurance	1	AO2 4.4.2.1 4.4.2.2
	(because more muscle mass so) more / stronger muscle contractions		1	

4.7.1.3 Biotic factors

Answer 26 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.4	hybridoma		1	AO1 4.3.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.5	any **three** from: • (cell) is cloned • many (identical) cells are produced • all the cells make the same antibody • the antibody is (collected and) purified	 ignore name of cell allow many clones are produced	3	AO1 4.3.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.6	a monoclonal antibody only binds to the anabolic steroid		1	AO2 4.3.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.7	to show that the test is working	allow to prevent a false negative (result) ignore to show there are free / remaining monoclonal antibodies	1	AO3 4.3.2.1 4.3.2.2

4.7.1.3 Biotic factors

Answer 26 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.8	*evidence* no blue / visible dye (in control area) *reason* (because) no (free) monoclonal antibodies bound to control area **or** (because) there were no (free) monoclonal antibodies on the end of the (test) strip	allow no line(s) (in control area) allow no colour change (in control area) allow the (free) monoclonal antibodies did not move up the test strip allow urine did not move up the test strip	1 1	AO3 4.3.2.1 4.3.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.9	D		1	AO3 4.3.2.1 4.3.2.2

Total Question 4	21

Answer 27 · 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

4.7.1.3 Biotic factors

Answer 27 · Mark scheme

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

4.7.1.3 Biotic factors

Answer 28 · Mark scheme

June 2024 | 8461/2H | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.1	a change in: • DNA • base code **or** nucleotide sequence • base (in DNA) • gene / allele • part of a chromosome • number of chromosomes • genetic code / material	ignore genetic information / variation ignore reference to amino acids or proteins	1	AO1 4.6.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.2	any **three** from: • variation (between members of a species) • better adapted survive • (better adapted or survivors) reproduce • pass on (favourable) allele(s) / gene(s) / mutation(s)	allow in terms of an example ignore mutation allow survival of the fittest allow converse ignore passing on genetic material **or** chromosomes **or** characteristic	3	AO1 4.6.2.1 4.6.2.2 4.6.3.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.3	Alfred Wallace and Charles Darwin		1	AO1 4.6.2.2 4.6.3.1 4.6.3.2

4.7.1.3 Biotic factors

Answer 28 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.4	hoverfly looks like a wasp	allow pattern of the markings is similar (on the hoverfly and wasp) ignore predator / animal thinks the hoverfly is a wasp	1	AO3 4.6.3.2 4.7.1.1 4.7.1.4
	predator / animal avoids **wasps** so it does not get stung		1	
	(so) predator / animal does not attack / eat hoverfly	allow correctly named predator ignore bite / harm	1	

Total Question 1	8

Answer 29 · 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

4.7.1.3 Biotic factors

Answer 29 · 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

Version 1.0: 0707

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Biology 4411

BLY1H Unit Biology 1

Mark Scheme

2007 examination - June series

4.7.1.3 Biotic factors

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2007 AQA and its licensors. All rights reserved.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334). Registered address: AQA, Devas Street, Manchester M15 6EX.
Dr Michael Cresswell, Director General.

4.7.1.3 Biotic factors

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.)

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

4.7.1.3 Biotic factors

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a candidate writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.

However if the answer is incorrect, mark(s) can be gained by correct substitution / working and this is shown in the 'extra information' column;

3.4 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.6 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.7 Brackets

(…..) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.8 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.

4.7.1.3 Biotic factors

BLY1H Question 1

	answers	extra information	mark
(a)	scientists figures based on research / calculations / data **or** scientists sample whole area	ignore reasons based on bias	1
	fishermen based on impression / hearsay / experience **or** fishermen fish in well-stocked / limited areas	scientists sample a wider area = **2** marks fishermen only fish in well-stocked areas = **2** marks if no marks gained fishermens' opinion **and** scientists' opinion gains **1** mark	1
(b)	any **two** from: • economic considerations • political impact • pressure groups **or** fears of extinction	 eg fear for jobs, profits, big demand for cod eg allow EU / government decide or laws will be passed	2
total			4

4.7.1.3 Biotic factors

BLY1H Question 2

	answers	extra information	mark
(a)	any **two** from: • area of bed sampled • sampling time • size of net • kicking action • net position	control variables from information given	2
(b)	any **two** from: • some animals not dislodged • some animals missed / through / escaped net • invertebrates difficult to identify • invertebrates from outside area	must be ideas related to a sample ignore reliability etc	2
(c)	10 to 99 **or** 10 – 99 **or** 99 to 10 **or** 99 – 10		1
(d)	any **two** from: • increased / goes up • 0 at sample 4 • to (more than) 100	allow increase implied from all data described	2
(e)	mayfly because not found downstream of point where sewage enters stream **or** only in the unpolluted water		1 1
total			9

4.7.1.3 Biotic factors

BLY1H Question 3

	answers	extra information	mark
	adaptation and linked advantage eg	max **2** for 3 adaptations	max 2 max 2
	• roots widespread / long (1) to collect water from large area (1)	ignore large roots accept to collect more water	
	• some roots deep / long (1) to collect water from deep down (1)	ignore large roots accept to collect more water	
	• absence of leaves (1) reduces water loss (1)		
	• swollen stem (1) to store water (1)		
	• roots near surface (1) to absorb rainwater (1)		
	• roots widespread (1) support in sandy soil (1)		
total			4

4.7.1.3 Biotic factors

BLY1H Question 4

	answers	extra information	mark
(a)(i)	viruses live inside cells		1
	viruses inaccessible to antibiotic	allow drug / antibiotic (if used) would (have to) kill cell	1
(ii)	mutation	ignore mutation caused by antibiotic	1
	natural selection **or** no longer recognised by antibiotics	accept description of natural selection	1
(b)	(stimulate) antibody production	ignore antitoxin	1
	(by) white cells		1
	<u>rapidly</u> produce antibody on re-infection	ignore antibodies remain in blood	1
total			7

4.7.1.3 Biotic factors

BLY1H Question 5

	answers	extra information	mark
(a)	ovary or ovaries		1
(b)	(hormone) implant		1
(c)	do not have to remember to take		1
(d)	does not involve hormone **or** it is a mechanical method	allow coil may be dislodged allow egg <u>is</u> fertilised / released allow not preventing egg fertilisation / release	1
(e)	involves death of fertilised egg **or** (regard) fertilised egg as human **or** stops fertilised egg developing	allow embryo / baby for fertilised egg ignore against religion only allow fertilised egg is alive ignore side effects	1
(f)(i)	inhibit FSH (production) so no eggs mature / develop / are produced	allow inhibits LH allow (LH) <u>stimulates</u> egg release ignore progesterone	1 1
(ii)	contains FSH which causes egg to mature / develop / be produced **or** in women whose FSH is low	allow contain LH allow (LH) <u>stimulates</u> egg release	1 1
total			9

4.7.1.3 Biotic factors

BLY1H Question 6

	answers	extra information	mark
(a)	asexual reproduction / mitosis **or** no fusion of gametes **or** division after fusion **or** from fertilised egg **or** from same embryo **or** from same egg **and** sperm	ignore cloning	1
	each embryo has identical genetic information / genes / DNA / chromosomes		1
(b)	any **two** from: • experimental subject and control are identical **or** fair test since monkeys identical • monkeys similar to humans, so effect of drugs likely to be similar • all identical so will have same reaction to drugs / disease • it's better than catching wild ones	allow closely related so… ignore evolved from	2
total			4

4.7.1.3 Biotic factors

BLY1H Question 7

	answers	extra information	mark
(a)	any **two** from: • balance between two important for good heart health • high LDL causes heart disease / high cholesterol • high HDL reduces heart disease / cholesterol	ignore blood pressure do **not** accept converse argument do **not** accept converse argument	2
(b)	heart attacks greater amongst patients with low HDL levels statins reduce heart attacks of patients **or** placebo is less effective	ignore statins cause heart disease ignore comparative effects of the two statins allow pravastatin is more effective supported by appropriate calculations eg pravastatin > 39 33% < 39 31.4% Average 32.4 > 39 32% < 39 28.2% Average 30.05%	1 1
total			4

4.7.1.3 Biotic factors

BLY1H Question 8

	answers	extra information	mark
(a)	present day organisms have evolved from simpler organisms	ignore answers in terms of natural selection	1
	over long periods of time **or** millions / billions of years		1
(b)	(natural selection operates on successful) characteristics produced by chance / (random) mutation		1
	in this experiment caused by hormones / environment	allow this example indicates inheritance of acquired characteristics for **2** marks allow this is Lamarckism only for **1** mark	1
total			4

4.7.1.3 Biotic factors

Answer 24 · Examiner comments — November 2021 | 8461/2H | Original Q5

Question 5 (standard, standard/high & high demand)

This question related to Required Practical Activity 9 and was about determination of the size of a daisy population on a lawn. There was much confusion about biotic and abiotic factors that might affect the growth of daisy plants on the lawn and, although three-quarters assigned at least two of the given factors correctly, fewer than half got all six correct.

In **05.2**, around half the students knew that sampling of the daisies should be at random but very few were able to describe adequately how this might be achieved, ie the use of random coordinates. References to 'throwing' the quadrat were not rewarded.

05.3 was a 6-mark extended calculation of the daisy population on a triangular shaped lawn with a rectangular paved area cut into it. This examined mathematics skill 5c and students were therefore expected to know how to calculate the area of a triangle and a rectangle. However, some thought that the Pythagoras theorem was appropriate for calculating the area of a triangle. Some calculations were very difficult to follow and students should be encouraged to make their reasoning clear; others gave highly improbable answers, eg a total population on the lawn being less than the mean for one quadrat. There was the anticipated error in calculating the area of a 50 cm × 50 cm quadrat, with incorrect answers including 25 m^2. Many students attempted to convert all measurements to centimetres rather than metres and the excessive number of zeros often caused transfer errors from one line of working to the next; or they thought there were 100 cm^2 in 1 m^2 rather than 10 000. Some calculations did not include the given mean of 6 plants per quadrat. Thus, around an eighth of students were completely successful, scoring all 6 marks, and almost two-thirds scored less than half-marks.

Answer 24 · Examiner comments — November 2021 | 8461/2H | Original Q5

Most students scored one of the two marks available in **05.4**, for pointing out that the use of just 10 quadrats may not have been sufficient. Hardly any students could go on to elaborate on this to state, for example, that this may not have been a representative sample or that it would not have allowed for an uneven distribution of the daisies, or that the 10 quadrat positions may not have been sufficiently random.

4.7.1.3 Biotic factors

Answer 25 · Examiner comments June 2022 | 8461/2H | Original Q2

Question 2

This was the second of three questions common to both the Foundation and Higher Tier papers. The topic was biotic and abiotic factors that affected the populations of earthworms in two habitats.

02.1 It was evident that many students did not understand the difference between the two types of factors, with fewer than half scoring full marks for suggesting two abiotic and two biotic factors that could affect the size of an earthworm population. Appropriate answers for abiotic factors included water, oxygen, pH and temperature and, for biotic factors, food availability, predators and pathogens.

02.2 This was a 6-mark extended response question on planning an investigation to compare the number of earthworms per m^2 in two areas: a grass lawn and a farmer's field. Most students answered this very well, with almost a half scoring full marks. Answers typically included the use of the given chemical **X** to bring the worms to the surface, the use of a quadrat (sometimes of stated dimensions) placed randomly, with a suitable method for selection of random coordinates, counting the worms, repeating the procedure a large number of times, calculation of a mean and a comparison between the two areas. Points less frequently given included standardisation of the concentration and volume of the chemical, waiting a standard amount of time for the worms to come to the surface and collecting for a standard time period. Inappropriate points included the use of a transect or attempts at randomisation by throwing the quadrat.

Answer 26 · Examiner comments June 2023 | 8461/1H | Original Q4

Question 4 (Standard, standard/high and high demand)

04.1 Students were asked to explain two effects of anaerobic respiration on the body. Over 87% of students scored some marks on this question but only around 12% managed to score full marks. Many students mentioned lactic acid and were able to put this in the context of oxygen debt or muscle fatigue, though some answers were vague and referred to pain, aches or stitch which were not deemed sufficient to gain credit at this level. Lots of students gave increased breathing and heart rate as effects but less were able to relate this to the reason of needing the oxygen to break down lactic acid. Oxygen debt was frequently referred to but only gained credit as an explanation if reference was made to it being repaid in this context. While a significant number of students referred to 'less energy' being available, very few students correctly linked this idea to 'weaker muscle contractions'.

04.2 This levelled response question required students to design an investigation to show the effects of different exercise on heart rate. Most students attempted an answer, seemingly familiar with such an investigation. Over 16% of students were successful at entering level 3, with around 32% reaching level 2. The main barrier to students achieving higher marks seemed to be using just one athlete for the investigation which then limited the maximum mark achievable, as this would not lead to a valid outcome. Most understood the importance of measuring heart rate before and after exercise, although some students forgot about measuring the initial heart rate first, which again would not lead to a valid outcome. There were many references to technology such as heart rate monitors or watches to measure heart rate, which was creditworthy as long as heart rate was recorded before and after exercise. Students were generally very competent at describing control variables for their investigation.

4.7.1.3 Biotic factors

Answer 26 · Examiner comments

04.3 Nearly 58% of students managed to gain the first marking point about anabolic steroids making athletes faster or stronger, or gave specific descriptions of improved performance or enhanced stamina. Only 6% of students also gained the second marking point, and were able to develop this and explain that the increased muscle mass caused more or stronger muscle contractions. Students must take care not to repeat information in the question stem without adding value to this; thus, an answer stating that anabolic steroids improve performance was insufficient.

04.4 Over 92% of students correctly identified 'hybridoma' as the type of cell created when a mouse lymphocyte and tumour cell combine.

04.5 The process of creating monoclonal antibodies is clearly well known by some students, though others have varied misconceptions including that the lymphocyte or monoclonal antibodies are cloned, rather than the hybridoma. Just under 3% of students were able to get the full 3 marks as a result.
Many students spent a lot of their answer describing that a hybridoma is formed when a mouse lymphocyte and tumour cell combine, but this gained no credit as it had been assessed in the previous question, and so wasted time and answer space. Very few described that the hybridoma is cloned (simply dividing by mitosis was frequently stated but gained no credit). Additionally, very few were able to describe that all the cells produced made the same antibody. The most common point made that gained credit was that monoclonal antibodies need to be purified after collection. This question was set at high demand and required correct use of terminology, which very few students were able to do; consequently, almost 59% of students scored zero marks.

04.6 Almost 90% of students were able to correctly identify that a monoclonal antibody only binds to the anabolic steroid.

04.7 Around 47% of students were able to correctly suggest the purpose of the control area in a test strip, and suggested that it was to show that the test had worked. Some were distracted into giving other irrelevant details of the test process here and discussed the complementary nature of monoclonal antibodies, rather than focus on the question posed.

04.8 Many students were able to give correct evidence with 58% gaining 1 mark. Sadly, less were able to suggest a possible reason for the evidence they had selected and consequently, only around 26% of students successfully gained both available marks. Some students referred to other processes involved in the test when discussing the reason, rather than focussing on the idea of monoclonal antibodies not binding to, or reaching, the control area. Lots of students described the test not being used properly, or the urine not having any steroids in it as their reason, neither of which gained credit.

04.9 Just over 75% of students correctly identified athlete D as testing positive for anabolic steroids.

4.7.1.3 Biotic factors

Answer 27 · 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.

© 2024 AQA and its licensors. All rights reserved.

4.7.1.3 Biotic factors

Answer 28 · Examiner comments — June 2024 | 8461/2H | Original Q1

Question 1 (standard demand)

01.1 Over 70% of students were able to define a mutation correctly. Those that did not gain credit generally knew that it was something to do with 'a change', but this was anything from a cell or a particular characteristic of a phenotype to a whole species changing.

01.2 A third of students were able to give a full description of natural selection to gain full marks. 15% of students did not gain any marks at all for this question. Very few students talked about variation for the first bullet point. Bullet points 2 and 3 were the most common marks gained by students - the third bullet point often awarded for the implication that those that survived went on to breed, and often was by mentioning 'offspring' in marking point 4. Vague references to 'traits' or 'characteristics' being passed on were not creditworthy in bullet point four. Students who were able to give an example of natural selection had better structures to their answers, with giraffe necks being the most common example given.

© 2024 AQA and its licensors. All rights reserved.

Answer 28 · Examiner comments — June 2024 | 8461/2H | Original Q1

01.3 Just over 75% of students were able to identify Alfred Wallace and Alexander Fleming as the scientists that suggested the theory of evolution by natural selection.

01.4 Over 85% of students managed to gain at least one mark in this question, most commonly for stating 'the hoverfly looks like the wasp'. Marking point 2 was rarely awarded as students did not explicitly refer to the wasp. Some incorrect answers referred to the hoverfly being able to camouflage which did not gain credit. Overall, the main reason marks were not awarded was because of vagueness, or poor articulation of ideas.

Answer 29 · 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.

4.7.1.3 Biotic factors

Answer 29 · Examiner comments

June 2025 | 8461/2H | Original Q1

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'.

4.7.1.3 Biotic factors

Answer 29 · 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.