AQA GCSE Biology | 8461

SPECIFICATION POINT 4.6.2.2

Evolution

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**48**
Available paper years	**2007–2024**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.6.2.2 Evolution

Answer 01 · Mark scheme January 2007 | BLY1H | Original Q6 | Legacy

Question 6

	answers	extra information	mark
(a)	wing pattern similar to *Amauris*		1
	birds assume it will have foul taste		1
(b)	mutation / variation produced wing pattern similar to *Amauris*	do **not** accept breeds with *Amauris* do **not** accept idea of intentional adaptation	1
	these butterflies survived		1
	breed / genes passed to next generation		1
total			5

Answer 02 · Mark scheme March 2007 | BLY1A | Original Q1 | Legacy

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

Answer 03 · Mark scheme March 2007 | BLY1B | Original Q8 | Legacy

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

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

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

Answer 05 · Mark scheme June 2007 | BLY1B | Original Q8 | Legacy

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

Answer 06 · Mark scheme June 2007 | BLY1H | Original Q8 | Legacy

The full source mark scheme begins on page 51. Follow original question 8 in that document.

4.6.2.2 Evolution

Answer 07 · Mark scheme

November 2007 | BLY1B | Original Q3 | Legacy

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

Answer 08 · Mark scheme

November 2007 | BLY1B | Original Q8 | Legacy

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

4.6.2.2 Evolution

Answer 09 · 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

4.6.2.2 Evolution

Answer 09 · Mark scheme January 2008 | BLY1H | Original Q7 | Legacy

BLY1H

Answer 10 · Mark scheme June 2008 | BLY1BP | Original Q2 | Legacy

Two	**A**	mutation	**3**		
	B	natural selection	**1**		
	C	extinction	**4**		
	D	variation	**2**		
	A		**B**	**C**	**D**

Answer 11 · Mark scheme June 2008 | BLY1BP | Original Q5 | Legacy

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

Answer 12 · Mark scheme June 2008 | BLY1BP | Original Q9 | Legacy

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

4.6.2.2 Evolution

Answer 13 · 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**

4.6.2.2 Evolution

Answer 13 · Mark scheme June 2008 | BLY1H | Original Q5 | Legacy

COMPONENT NUMBER: BLY1H

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

Answer 14 · 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 15 · Mark scheme November 2008 | BLY1BP | Original Q3 | Legacy

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

Answer 16 · Mark scheme March 2009 | BLY1BP | Original Q9 | Legacy

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

Answer 17 · Mark scheme June 2009 | BLY1AP | Original Q6 | Legacy

Six	**1**	**4**	**1**	**4**

4.6.2.2 Evolution

Answer 18 · 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 19 · Mark scheme

November 2009 | BLY1BP | Original Q9 | Legacy

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

4.6.2.2 Evolution

Answer 20 · Mark scheme

Question 2

question	answers	extra information	mark
2(a)	any **two** from • survival of fittest • amplification of fittest ie has adaptations to survive • go on to breed **or** genes / characteristics passed on to next generation	 allow examples allow examples NB best adapted organisms survive gains **2** marks	2
2(b)	any **two** from eg: • increased height • increased erectness / backbone or spine straighter • shorter arms • legs straighter • larger skull • larger pelvis **or** changing shape described • humans walk on two legs / feet	ignore unqualified change eg 'the skull changes shape' allow description of modern human characteristic eg 'modern humans stand up straight' allow description of ape-like characteristics eg ape-like ancestor walked on four legs	2
2(c)	any **two** from: • religious objections • insufficient evidence • mechanism of heredity not known did not know about genes / chromosomes / DNA / mutations • did not like the thought of being descended from apes	 ignore **no** evidence accept could not prove	2

4.6.2.2 Evolution

BLY1H

Question 2 continued

question	answers	extra information	mark
2(d)	Darwin's theory depends on differences in genes at birth / inborn variation / mutation	allow Darwin's theory depends on genetics ignore references to time	1
Total			**7**

4.6.2.2 Evolution

Answer 20 · Mark scheme

January 2010 | BLY1H | Original Q2 | Legacy

BLY1H

Answer 21 · Mark scheme

March 2010 | BLY1BP | Original Q5 | Legacy

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

Answer 22 · Mark scheme

June 2010 | BLY1BP | Original Q6 | Legacy

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

Answer 23 · Mark scheme

June 2010 | BLY1BP | Original Q7 | Legacy

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

4.6.2.2 Evolution

Answer 24 · Mark scheme

June 2010 | BLY1H | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	variation / range of leg sizes / mutation	do **not** allow intention to mutate	1
	ones with longer legs could feed in deeper water / get more food **or** long legged ones less likely to get feathers wet **or** long-legged ones could escape from leopards	allow reverse argument	1
	survive / breed / pass on genes	allow characteristics passed onto next generation	1
7(b)	flamingos stretched their legs (to be able to feed in deeper water/ keep feathers dry / escape from leopards)	It must be clear that the characteristic develops during the organisms lifetime ie it is not inherited from parents accept long legs are an acquired characteristic	1
	longer legs / acquired characteristic inherited by offspring	accept (acquired) genes for long legs passed on	1
Total			**5**

4.6.2.2 Evolution

Answer 24 · Mark scheme

June 2010 | BLY1H | Original Q7 | Legacy

BLY1H

Answer 25 · Mark scheme

November 2010 | BLY1BP | Original Q9 | Legacy

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

4.6.2.2 Evolution

Answer 26 · Mark scheme

January 2011 | BLY1H | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7	a mutation occurs **or** variation in size / shape of pelvis	allow idea that walking upright needs larger pelvis to bear weight	1
	large / wide birth canal / pelvis allowed passage of wide skull / brain	do **not** allow pelvis became larger to enable birth of larger-skulled babies	1
	link between brain size and intelligence		1
	those with larger pelvis / brain more likely to survive / reproduce		1
Total			**4**

4.6.2.2 Evolution

Answer 26 · Mark scheme January 2011 | BLY1H | Original Q7 | Legacy

BLY1H

Answer 27 · Mark scheme June 2011 | BLY1BP | Original Q1 | Legacy

Question	Key		
One	**A**	extinction	4
	B	mutation	2
	C	reproduction	3
	D	variation	1

Answer 28 · Mark scheme June 2011 | BLY1BP | Original Q2 | Legacy

Two	**A**	each of the four species changes slowly over time	1
	B	none of the four species changes over time and some species die out	4
	C	none of the four species changes over time	3
	D	new species evolve over time	2

	A	**B**	**C**	**D**

4.6.2.2 Evolution

Answer 29 · Mark scheme

June 2011 | BLY1H | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6	mutation **or** <u>variation</u> **or** <u>range</u> of sizes	do **not** accept deliberate mutation **or** factor caused mutation	1
	warm(er) / dry(er) now	allow global warming	1
	if warmer more smaller lambs / sheep survive winter **or** if warmer sheep do not need fat / wool / fur to keep warm **or** if warmer smaller sheep can lose heat more readily / do not overheat / keep cool (so survive) **or** if warmer smaller sheep have larger SA / V ratio (so survive) **or** if dryer smaller lambs / sheep need less grass (to survive)	award 'survival' point only if linked to warmer / dryer conditions do **not** accept smaller sheep retain more heat do **not** accept smaller sheep have smaller SA / V ratio ignore small sheep feed easier on grass	1
	small sheep breed / pass genes / mutations / characteristics to next generation	do **not** accept if Lamarckian ignore competition / predation / human influence	1
Total			**4**

4.6.2.2 Evolution

Answer 29 · Mark scheme June 2011 | BLY1H | Original Q6 | Legacy

BLY1H

Answer 30 · Mark scheme November 2011 | BLY1BP | Original Q3 | Legacy

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

Answer 31 · Mark scheme November 2011 | BLY1BP | Original Q7 | Legacy

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

Answer 32 · 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

4.6.2.2 Evolution

Answer 33 · 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**

4.6.2.2 Evolution

Answer 33 · Mark scheme

June 2012 | BL2HP | Original Q6 | Legacy

BL2HP

4.6.2.2 Evolution

Answer 34 · Mark scheme

January 2013 | BL1HP | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	variation (between organisms within species)	allow described example allow mutation – but **not** if caused by change in conditions	1
	those most suited / fittest survive		1
	genes / alleles passed on (to offspring / next generation)	allow mutation passed on	1
7(b)(i)	any **two** from: • increase in latitude reduces number of (living) species • increase in latitude reduces time for evolution (of new species) • the less the time to evolve the fewer the number of (living) species	allow converse ignore references to severity of conditions	2
7(b)(ii)	any **two** from: • (increase in latitude reduces number of (living) species because) less food / habitats / more competition at high latitude • increase in latitude reduces time for evolution (of new species) because) severe conditions act more quickly / to a greater extent on the weakest • (the less the time to evolve the fewer the number of (living) species because) species that evolve slowly don't survive	do **not** accept intention or need to evolve allow only extremophiles / well-adapted species can survive	2
Total			**7**

4.6.2.2 Evolution

Answer 34 · Mark scheme

January 2013 | BL1HP | Original Q7 | Legacy

BL1HP

4.6.2.2 Evolution

Answer 35 · Mark scheme

January 2013 | BL2HP | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)	organisms that can breed together successfully	accept converse points re. 2 different species accept produces fertile offspring	1 1
7(b)	any **two** from: (live at) • different pH of soil • different height above sea level • different flowering times **AND** genetic variation / mutation / different alleles (produced in isolated populations) natural selection acts differently on the two populations **or** different characteristics in the two populations survive **or** different alleles passed on in the two groups eventually resulting in interbreeding no longer possible		2 1 1 1
Total			**7**

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

4.6.2.2 Evolution

Answer 36 · 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**

4.6.2.2 Evolution

Answer 37 · Mark scheme

June 2013 | BL2HP | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)(i)	DNA replication / copies of genetic material were made	'it' = a chromosome allow chromosomes replicate / duplicate / are copied ignore chromosomes divide / split / double	1
8(a)(ii)	one copy of each (chromosome / chromatid / strand) to each offspring cell	ignore ref. to gametes and fertilisation	1
	each offspring cell receives a complete set of / the same genetic material	allow 'so offspring (cells) are identical'	1
8(b)(i)	meiosis	allow mieosis as the only alternative spelling	1
8(b)(ii)	Species A = 4 **and** Species B = 8		1
8(b)(iii)	sum of A + B from (b)(ii) e.g. 12		1

Question 8 continues on the next page...

Question 8 continued...

question	answers	extra information	mark
8(c)(i)	similarities between chromosomes **or** similarities between flowers described	 e.g. shape of petals / pattern on petals / colour / stamens	1
	can breed / can sexually reproduce	allow can reproduce with each other / they can produce offspring	1
8(c)(ii)	any **two** from: • offspring contain 3 copies of each gene / of each chromosome / odd number of each of the chromosomes • some chromosomes unable to pair (in meiosis) • (viable) gametes not formed / some gametes with extra / too many genes / chromosomes **or** some gametes with missing genes / chromosomes		2
Total			**10**

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

4.6.2.2 Evolution

Answer 38 · Mark scheme

June 2014 | BL1HP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.
7(a)(i)	variation (in population) / mutation		1	AO1 / AO2
	longer nosed individuals get more food / leaves	allow longer nosed individuals more likely to survive	1	1.8.1a,d, e,f
	(these) survivors breed (more)		1	
	pass on genes / alleles / DNA (for long nose)	allow pass on mutation	1	
7(a)(ii)	Phiomia / ancestor stretched its nose (during its lifetime) to reach food / leaves		1	AO1 / AO2
	passed on (stretched nose) to offspring	allow offspring inherit (stretched nose) do **not** allow ref to genes	1	1.8.1c
7(b)(i)		ignore other theories, eg religion		AO1
	insufficient evidence / no proof	do **not** allow no evidence	1	1.8.1b
	mechanism of inheritance not known	allow genes / DNA not discovered	1	
7(b)(ii)	God made all living things / them	allow creationism ignore religion	1	AO1 1.8.1b
Total			**9**	

4.6.2.2 Evolution

Answer 38 · Mark scheme

June 2014 | BL1HP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.

4.6.2.2 Evolution

Answer 39 · Mark scheme

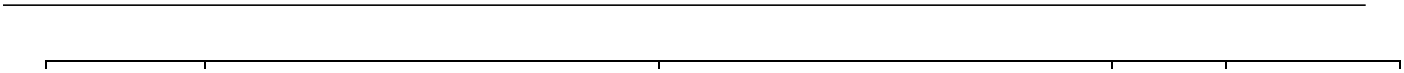
June 2015 | BL2HP | Original Q6 | Legacy

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**	

4.6.2.2 Evolution

Answer 39 · Mark scheme

June 2015 | BL2HP | Original Q6 | Legacy



4.6.2.2 Evolution

Answer 40 · Mark scheme

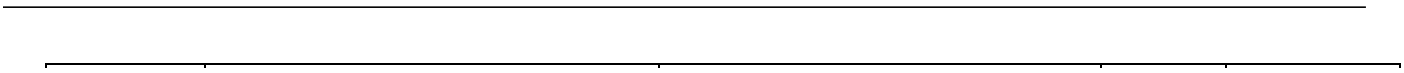
June 2016 | BL1HP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)	any **two** from: • larger / longer / thicker • fewer (bones in total) • fewer bones touching the ground	 allow examples eg fewer toes **or** bones fused allow smaller surface area touching the ground	2	AO2 1.8.1d
5(b)(i)	large(r) surface / area in contact with the ground **or** low / less pressure on ground (so) less likely to sink into mud / ground **or** (so) could run fast(er)	 allow easy / easier to escape predators	1 1	AO2 1.4.1c/d
5(b)(ii)	variation (in size / number / arrangement of bones) (and) those with large(r) / few(er) bones more suited to running **or** run faster (on harder / drier ground) these survive **and** breed (so) genes / DNA (for larger / fewer bones) passed on	allow mutation(s) (in size / number / arrangement of bones) allow ref to offspring for breed allow alleles passed on	1 1 1 1	AO1 / AO2 1.8.1e/f
Total			**8**	

4.6.2.2 Evolution

Answer 40 · Mark scheme

June 2016 | BL1HP | Original Q5 | Legacy



4.6.2.2 Evolution

Answer 41 · Mark scheme

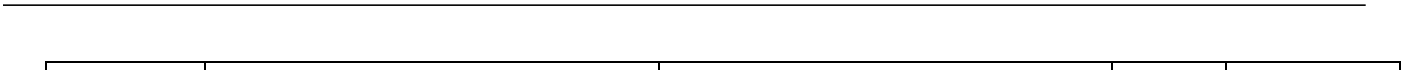
June 2017 | BL1HP | Original Q2 | Legacy

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**	

4.6.2.2 Evolution

Answer 41 · Mark scheme

June 2017 | BL1HP | Original Q2 | Legacy



4.6.2.2 Evolution

Answer 42 · 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

4.6.2.2 Evolution

Answer 42 · 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**

4.6.2.2 Evolution

Answer 43 · Mark scheme

June 2018 | 8461/2H | Original Q9

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>09.1</td><td><table><tr><th>Classification group</th><th>Name</th></tr><tr><td>Class</td><td>Mammalia</td></tr><tr><td>Order</td><td>Primates</td></tr><tr><td>Family</td><td>Lemuroidea</td></tr><tr><td>Species</td><td>catta</td></tr></table></td><td>all 4 correct = 2 marks
2 or 3 correct = 1 mark
0 or 1 correct = 0 marks</td><td>2</td><td>AO1
4.6.4</td></tr>
<tr><td>09.2</td><td>Lemur catta</td><td>ignore capitalisation / non-capitalisation of initial letters

ignore italics / non-italics
ignore underlining / non-underlining</td><td>1</td><td>AO2
4.6.4</td></tr>
<tr><td>09.3</td><td>carried by (favourable) currents on masses of vegetation</td><td>allow description of currents from Figure 13
ignore swimming</td><td>1</td><td>AO2
4.6.3.2</td></tr>
</table>

4.6.2.2 Evolution

Answer 43 · Mark scheme

June 2018 | 8461/2H | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.4	isolation of different populations		1	AO2 4.6.3.2
	habitat variation between lemur populations	allow examples – biotic (eg food / predators) or abiotic (eg temperature)	1	AO1 4.6.2.2 4.7.1.4
	genetic variation or mutation (in each population)		1	AO1 4.6.2.1 4.6.2.2 4.6.3.1 4.7.1.4
	better adapted survive (reproduce) **and** pass on (favourable) allele(s) to offspring	allow natural selection **or** survival of the fittest **and** pass on (favourable) allele(s) to offspring allow gene(s) / mutation as an alternative to allele(s)	1	AO1 4.6.2.2 4.6.3.1 4.7.1.1
	(eventually) cannot produce fertile offspring with other populations	allow cannot reproduce 'successfully' with other populations ignore cannot reproduce unqualified	1	AO1 4.6.3.1 4.6.2.2
Total			**9**	

4.6.2.2 Evolution

Answer 44 · Mark scheme

November 2020 | 8461/1H | Original Q5

The full source mark scheme begins on page 63. Follow original question 5 in that document.

4.6.2.2 Evolution

Answer 45 · Mark scheme

November 2020 | 8461/2H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	A		1	AO1 4.5.2.2
06.2	cerebral cortex	allow cerebrum allow cerebral hemisphere(s) ignore D	1	AO1 4.5.2.2
06.3	any **three** from: • can ask people to do different tasks (while taking scan) • to see which part of brain is active / inactive • to compare with a person without brain damage • to see (exactly) where the damage is • (traditional) MRI scanner cannot be used if people can't stay still	allow can ask person to do a (specific) task allow to see which part of the brain is working allow examples such as children **or** patients with Parkinson's disease allow may be better for people who are claustrophobic	3	AO3 4.5.2.2
06.4	(cells in) retina sensitive to light impulse passes along (sensory) neurone (along) optic nerve	allow retina detects light allow rods / cones detect light allow electrical signal **or** electrical message passes along (sensory) neurone allow chemical transmission across synapse	1 1 1	AO1 4.5.2.1 4.5.2.3

4.6.2.2 Evolution

Answer 45 · Mark scheme

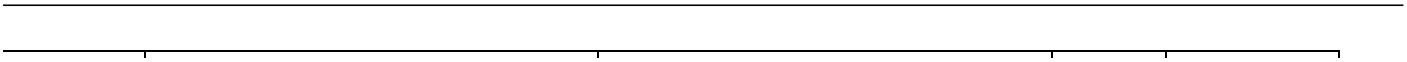
November 2020 | 8461/2H | Original Q6

Question	Answers	Mark	AO / Spec.
06.5	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	4.5.2.3 4.6.2.1 4.6.2.2 4.6.3.1 4.6.3.4 4.7.1.3 4.7.1.4
	Indicative content • mutation (in gene / DNA) • randomly **or** due to chance • causes new / different protein / (visual) pigment to be made • in the retina of bird • (so more) variation in the wavelengths of light birds retinas could detect • birds with the mutation **or** birds able to detect UV are more likely to see fruits (that reflect UV) • birds with the mutation **or** birds able to detect UV are more likely to see where small mammals are or have been • therefore get more food (small mammals or fruit) • avoid being eaten (by small mammals) • out competing those birds without the mutation **or** birds not able to detect UV • so more likely to survive **and** reproduce **or** have offspring • by natural selection • passing on allele / gene / mutation to offspring • repeated over many generations For Level 3 a link to UV vision is required		
Total			**14**

4.6.2.2 Evolution

Answer 45 · Mark scheme

November 2020 | 8461/2H | Original Q6



4.6.2.2 Evolution

Answer 46 · 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	

4.6.2.2 Evolution

Answer 46 · 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

4.6.2.2 Evolution

Answer 46 · 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

4.6.2.2 Evolution

Answer 46 · 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		

4.6.2.2 Evolution

Answer 46 · 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**	

4.6.2.2 Evolution

Answer 47 · 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	

	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**

4.6.2.2 Evolution

Answer 48 · 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

4.6.2.2 Evolution

Answer 48 · 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

4.6.2.2 Evolution

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

4.6.2.2 Evolution

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

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Dr Michael Cresswell, Director General.

4.6.2.2 Evolution

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.

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.

4.6.2.2 Evolution

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

4.6.2.2 Evolution

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

4.6.2.2 Evolution

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

4.6.2.2 Evolution

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

4.6.2.2 Evolution

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

4.6.2.2 Evolution

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 each embryo has identical genetic information / genes / DNA / chromosomes	ignore cloning	1 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

4.6.2.2 Evolution

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

4.6.2.2 Evolution

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

4.6.2.2 Evolution

AQA

GCSE
BIOLOGY
8461/1H

Paper 1 Higher Tier

Mark scheme

June 2020

Version: 1.0 Final

206G8461 1H/MS

4.6.2.2 Evolution

MARK SCHEME – GCSE BIOLOGY – 8461/1H – JUNE 2020

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' 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 from aqa.org.uk

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4.6.2.2 Evolution

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
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

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 and underlining

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 bullet points 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.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students 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.

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

[1 mark]

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

Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student 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

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

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 is 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 ecf 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 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

3.10 Do <u>not</u> accept

Do **not** accept means that this is a wrong answer which, even if the correct answer is given as well, will still mean that the mark is not awarded.

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

4.6.2.2 Evolution

Step 1: Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this.

The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

4.6.2.2 Evolution

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	*before arrow* carbon dioxide **and** water *after arrow* glucose	allow correct chemical symbols ignore any attempt at balancing equation ignore light / chlorophyll either order ignore sugar / carbohydrate do **not** accept starch	 1 1	AO1 4.4.1.1
01.2	<u>light</u> (light) is captured / trapped / absorbed by chlorophyll / chloroplasts	ignore description of subsequent parts of the photosynthesis reaction allow sun<u>light</u> ignore sun allow (light) is used by chlorophyll / chloroplasts	1 1	AO1 4.1.1.2 4.4.1.1
01.3	$\frac{18.5 + 19.3 + 19.5}{3}$ **or** $\frac{57.3}{3}$ 19.1 (cm^3/hour)	 allow an answer correctly calculated using only two correct values	1 1	AO2 4.4.1.2 RPA 6
01.4	a ring around 14.2	allow clear indication of correct result	1	AO3 4.4.1.2 RPA 6

4.6.2.2 Evolution

01.5	any **one** from: • scale / value was misread • there was air / oxygen in the syringe / measuring cylinder / apparatus • the lamp / light was moved • temperature changed • had different mass / length of pondweed • pondweed had not acclimatised	ignore human error ignore references to counting bubbles or time allow measurement error allow light intensity changed ignore different bulb / lamp unqualified	1	AO3 4.4.1.2 RPA 6
01.6	did not use it in calculation (of mean)		1	AO3 4.4.1.2 RPA 6
01.7	any **one** from: • light (intensity) • carbon dioxide (concentration) • pondweed size / amount • pondweed species	do **not** accept temperature ignore time allow distance / power / colour of lamp / light allow same (piece of) pondweed	1	AO3 4.4.1.2 RPA 6
01.8	enzyme(s) lose the shape of the active site	allow enzyme(s) (start to) denature allow enzyme(s) destroyed / damaged do **not** accept enzyme(s) killed	1	AO2 4.2.2.1

4.6.2.2 Evolution

01.9	y-axis labelled '(rate of) photosynthesis in cm^3/hour'		1	AO2 4.4.1.2 RPA 6
	suitable scale on y-axis	must take up half or more of grid provided	1	
	all points plotted to within ± ½ small square	allow 3 or 4 correct plots for **1** mark ignore any attempt to plot a point at 20 °C	2	
	correct curved line of best fit	ignore line joined point to point with straight lines ignore extrapolation	1	
Total			**16**	

4.6.2.2 Evolution

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	movement / spreading out of molecules / particles	allow movement / spreading out of (named) substances / chemicals / gases / liquids ignore reference to membranes / cells	1	AO1 4.1.3.1
	from (an area of) high(er) concentration to (an area of) low(er) concentration	allow down / with the concentration gradient ignore along / across the concentration gradient do **not** accept movement from / to a concentration gradient	1	
02.2	increased carbon dioxide concentration in the air		1	AO2 4.1.3.1 4.2.3.2
	increased number of stomata that are open		1	

4.6.2.2 Evolution

02.3	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO1 4.1.3.1 4.2.2.2 4.2.2.3
	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	

	Indicative content
	• (many) alveoli
	  • provide a large(r) surface area (**:** volume)
	
	• capillaries are thin
	  or alveoli / capillary walls are thin **or** one cell thick
	  or capillaries are close to the alveoli
	  • which provides short diffusion path (for oxygen / carbon dioxide)
	
	• breathing (mechanism) moves air in and out
	or lungs are ventilated
	  • to bring in (fresh) oxygen
	  • to remove carbon dioxide
	  • to maintain a concentration / diffusion gradient
	
	• large capillary network (around alveoli)
	or good blood supply
	  • to remove oxygen(ated blood) quickly
	  • to bring carbon dioxide to the lungs quickly
	  • to maintain a concentration / diffusion gradient		

4.6.2.2 Evolution

02.4	osmosis	allow diffusion	1	AO1 4.1.3.1 4.2.3.2 4.1.3.2
02.5	active transport (because) energy is needed (to move nitrate ions) from a low(er) concentration (in the soil) to a high(er) concentration (in the root / cell)	 allow (to move nitrate ions) against / up the concentration gradient allow (because) there is a lower concentration (of nitrate ions) in the soil **or** (because) there is a higher concentration (of nitrate ions) in the root / cell ignore reference to amount / number of nitrate ions ignore along / across the concentration gradient do **not** accept if reference to molecules / atoms moving	1 1 1	AO3 AO2 AO2 4.1.1.3 4.2.3.2 4.1.3.3
Total			**14**	

4.6.2.2 Evolution

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	any **two** from: (both have) • cytoplasm • (cell) membrane • DNA / genetic material • ribosomes	ignore reference to shape allow RNA ignore genetic information if no other mark awarded allow sub-cellular structures for **1** mark if no other mark awarded allow correct cellular process, e.g. respiration for **1** mark	2	AO2 4.1.1.1 4.1.1.2 4.1.2.1
03.2	any **three** from: • prokaryotic cell is smaller • prokaryotic cell has no mitochondria • prokaryotic cell has no nucleus **or** DNA is free in the cytoplasm **or** genetic material is free in the cytoplasm • prokaryotic cell has a single loop of DNA **or** prokaryotic cell has a single loop of genetic material • prokaryotic cell has plasmids	allow converse for eukaryotic cells allow reference to bacterium instead of prokaryotic cell ignore reference to features not shown in Figure **5** if neither mark awarded, allow prokaryotic cell has no membrane-bound organelles ignore genetic information ignore genetic information ignore circular / rings of DNA allow prokaryotic cells have smaller ribosomes	3	AO2 4.1.1.1 4.1.1.2 4.1.2.1

03.3	1 µm = 0.001 mm **or** 1 mm = 1000 µm **or** 0.05 mm = 50 µm **or** 0.05 × 1000 (1:) 50	 do **not** accept if a unit is given	1 1	AO2 4.1.1.1 4.1.1.2
03.4	mitosis	correct spelling only	1	AO1 4.1.2.2
03.5	35%		1	AO2 4.1.2.2
03.6	 (stage 1) DNA / chromosomes replicate / duplicate mitochondria / ribosomes / sub-cellular structures increase in number **or** mitochondria / ribosomes / sub-cellular structures replicate (stage 2) one set of chromosomes is pulled / moved to each end of the cell (stage 3) the cytoplasm **and** cell membrane divides (to form two cells)	ignore names of the stages of the cell cycle ignore genetic material ignore DNA / chromosomes double / reproduce allow cytoplasm increases ignore cell grows unqualified allow one of each chromosome is pulled / moved to each end of the cell ignore nucleus divides allow cytoplasm divides **and** (new) cell membranes form ignore nucleus divides	 1 1 1 1	AO1 4.1.2.2
Total			**13**	

4.6.2.2 Evolution

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	fatty acids glycerol		1 1	AO1 4.2.2.1 4.4.2.3
04.2	enzyme binds to the substrate because they are complementary (shapes) (so) substrate is broken down (into products) (so) products are released **or** enzyme is not changed	allow enzyme joins to the substrate because they fit together exactly allow enzyme joins to the substrate because the substrate fits the active site ignore reference to specificity do **not** accept same shape allow (so) substrate splits (into products) ignore products are formed, unqualified allow enzyme is not used up allow reference to activation energy for either marking point 2 **or** marking point 3	1 1 1	AO2 4.2.2.1
04.3	each <u>active site</u> has a specific shape (so only fits one type of lipid molecule)	allow each <u>active site</u> is a different shape do **not** accept reference to the substrate having an active site	1	AO2 4.2.2.1
04.4	add Benedict's (solution / reagent to the liquid) boil / heat (if glucose is present the blue) colour changes to yellow / green / orange / brown / (brick)red	 allow any temperature of 65 °C or above	1 1 1	AO1 4.2.2.1 RPA 4

04.5	add iodine solution / reagent (to the liquid) (if starch is present) it changes colour to blue / black (from yellow / orange / brown)	allow add a drop of iodine ignore iodine unqualified	1 1	AO1 4.2.2.1 RPA 4
04.6	glucose from photosynthesis (excess) glucose converted to starch	do **not** accept starch made in photosynthesis allow (excess) glucose is stored as starch	1 1	AO2 4.2.2.1 4.4.1.1 4.4.1.3 4.4.2.3
04.7	starch (stores) have been converted to glucose (so the glucose can be) used for respiration / (named) metabolic reactions **or** (so the glucose can be) used to release energy (because) there is no light to make (new / more) glucose by photosynthesis	ignore reference to residual glucose from previous photosynthesis do **not** accept idea of energy being produced / created / made	1 1 1	AO3 4.4.1.1 4.4.2.1 4.4.1.3
04.8	any **one** from: • test roots / stems of plants (in the light and dark) • test other species of plant • measure the concentrations of glucose **and** starch • vary the time in the dark / light • test variegated leaves	do **not** accept reference to changing the independent variable allow test other parts of the plants allow test other types of plant ignore mass / amount allow any other valid extension ignore repeats	1	AO3 4.4.1.2 4.4.1.3
Total			**17**	

4.6.2.2 Evolution

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	mechanical	allow physical allow structural	1	AO3 4.3.3.2
05.2	any **one** from: • to deter herbivores • to prevent animals damaging it	ignore to injure animals, unqualified allow to deter animals eating it do **not** accept to deter predators	1	AO2 4.3.3.2
05.3	chemical		1	AO3 4.3.3.2

4.6.2.2 Evolution

05.4	any **two** from : • lack of magnesium (ions) (1) (so) not enough chlorophyll for (efficient) photosynthesis (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1) • infection by pathogen / bacteria / virus / fungus (1) (so) leaves become discoloured / yellow so less photosynthesis (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1) • infected by aphids (1) (which) remove sugars from phloem (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1) • lack of (available) light (1) (so) chlorophyll breaks down (1) (so) not enough glucose to make proteins for growth **or** not enough glucose to release energy for growth (1)	allow (so) lack of chlorophyll produced causes yellow leaves (1), (so) not enough photosynthesis to produce glucose which is used to make proteins for growth (1) allow correctly named pathogen allow has rose black spot / TMV allow other symptoms of named pathogens / disease award once only award once only award once only	5	AO2 4.3.3.1 4.3.1.1 4.3.1.2 4.3.1.4 4.4.1.1 4.4.1.2 AO1 4.4.2.3 4.4.1.3

4.6.2.2 Evolution

05.5	(bacteria) obtain glucose / sugar (from the plant) (glucose used) for respiration **or** (glucose used) for making other named substances	 allow (glucose used) to release energy	1 1	AO3 AO2 4.2.3.2 4.4.1.3
05.6	(gorse plant) obtains nitrate (ions) needed for amino acids / proteins	 allow needed to make chlorophyll / DNA	1 1	AO2 4.1.3.3 4.4.2.3 AO1 4.3.3.1
05.7	willow bark		1	AO2 4.3.1.9
Total			**13**	

4.6.2.2 Evolution

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	any **two** from: • BMI / morphology / obesity level • smoking habits • diet • medication • family history of liver disease • fitness levels • ethnicity • area of UK they live in	ignore genetic factors allow mass / weight **and** height allow previous drinking habits allow medical conditions allow drug use allow level of exercise allow race	2	AO3 4.2.2.6
06.2	2.55 – 1.60 (= 0.95) $\left(\frac{0.95}{2.55} \times 100 = \right)$ 37 (.2549019608…) (%)	allow 1.60 – 2.55 (= –0.95) allow value for with meals in range 1.60 to 1.65 (for 1.60) allow answer correctly calculated from values in ranges 1.60 to 1.65 and 2.50 to 2.60 allow – 37(.2549019608...)(%)	1 1	AO2 4.2.2.6
06.3	12 × 2 × 7 = 168 (g/week) 1.8	 allow in range 1.8-1.9 allow correct reading from a calculation that omits the 2 **or** the 7 do **not** accept if a unit is given	1 1	AO2 4.2.2.6

4.6.2.2 Evolution

06.4	any **two** from: • consuming alcohol increases the RR (with / without meals) **and** supporting data • consuming less than 50 g/week of alcohol with meals does not increase the RR • even (small amounts of alcohol at) 25 g/week increases the RR if not with meals	allow risk for RR throughout allow data in terms of number of glasses of wine allow increasing alcohol consumption increases the RR at an increasing rate allow any value between 35 and 60 g/week	2	AO3 4.2.2.6
06.5	any **two** from: • large number in survey • long term / 15 year survey • well controlled	allow 800 000 in survey if neither mark awarded allow large study allow many controls	2	AO3 4.2.2.6
06.6	any **one** from: • people underestimate / overestimate alcohol consumption • people may change (lifestyle / drinking) habits over time • some people may drink all their weekly alcohol at once	allow people lie about alcohol consumption **or** people lie about other named control variables ignore survey only tested women	1	AO3 4.2.2.6

06.7	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	3-4	AO2 4.4.2.3 4.2.2.1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1-2	AO1 4.4.2.2 4.2.2.6 4.2.2.5 4.5.3.3
	No relevant content	0	
	Indicative content Responses may refer to either total or partial liver failure • no bile made (in the liver) ○ fats / lipids are not emulsified ○ surface area of fats / lipids not increased ○ pH of small intestine will not be alkaline / neutralised ○ enzymes (in small intestine) will not work effectively **or** (named) food not digested / absorbed ○ so may lose weight • lactic acid not broken down / oxidised ○ accumulation of lactic acid in blood / body ○ lactic acid is toxic **or** body will be poisoned ○ oxygen debt higher / prolonged ○ so muscle pain / fatigue • proteins / amino acids will not be broken down (in liver) ○ (amino acids) not deaminated ○ amino acids not made into urea **or** will not form ammonia ○ (however) any ammonia formed is toxic ○ so accumulation of amino acids in blood / body • liver does not break down / remove other toxins (like alcohol) ○ toxins accumulate in blood / body ○ body will be poisoned ○ so pain **or** jaundice **or** swollen liver **or** portal hypertension occurs • glycogen stores will not be formed ○ cannot control blood glucose ○ so hyperglycaemia / hypoglycaemia / diabetes / coma may occur		

Total			**15**

4.6.2.2 Evolution

Question	Answers	Extra information	Mark	AO / Spec.Ref.
07.1		ignore add mAbs and dye to slide (unbound)		AO2 4.3.2.2
	bind fluorescent dye to mAbs		1	
	put (bound) fluorescent mAbs on the slide (and rinse off)		1	
	mAbs will bind to Candida albicans / pathogens and show up under the microscope	allow mAbs will bind to Candida albicans / pathogens and show up under UV (lamp)	1	
07.2	more Candida albicans / pathogens will be engulfed / killed by phagocytes / white blood cells	allow Candida albicans / pathogens will be engulfed / killed by phagocytes / white blood cells more quickly do **not** accept white blood cells produce antibodies do **not** accept lymphocytes engulf Candida albicans	1	AO2 4.2.2.3 4.3.1.6 4.3.1.7
	therefore less damage to cells / tissues / organs	ignore less toxin released (by Candida albicans)	1	

07.3	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.		4-6	AO1 4.3.1.9
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.		1-3	
	No relevant content		0	
	Indicative content • given first to healthy volunteers ○ at (very) low dose ○ to test it is safe **or** to test for toxicity **or** to check for any side effects • then to some patients (with the disease) **or** people with the disease ○ to test for the correct / optimum dose ○ to check for any side effects ○ to test for efficacy **or** to test if it works ○ in a double blind trial ○ where neither patients nor doctors know who has the mAbs and who has a placebo (or alternative treatment) • reference to large trial **or** long duration **or** control variables			
07.4	any **one** from: • (the body will) not reject the mAbs **or** (the body is) less likely to reject the mAbs • mouse mAbs are (more likely to be) rejected • the human lymphocytes have already responded to that infection / cancer cell so they are known to work against the disease	do **not** accept idea of rejection of cells	1	AO3 4.3.2.2 4.3.2.1 4.3.1.6
Total			**12**	

4.6.2.2 Evolution

Answer 44 · Examiner comments

November 2020 | 8461/1H | Original Q5

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

Some students referred incorrectly to herbivores as predators in **05.2**. In **05.4**, many students were able to correctly name two reasons for the symptoms, but explanations were either not worded well or underdeveloped. Several students were unclear about the distinctions between chlorosis, chloroplasts and chlorophyll.

Very few students answered **05.5** correctly (89% scored zero marks), because they were so focussed on the nitrates mentioned in the question that they missed the other requirements of the bacteria. Many students found the novel context regarding root nodules perplexing and didn't score any marks.

4.6.2.2 Evolution

Answer 45 · Examiner comments

November 2020 | 8461/2H | Original Q6

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

This question was about the brain and vision, and applications to the use of MRI scanners and to the evolution of a sight adaptation in birds. Many students lacked precision in their explanations for **06.3**. In order to explain the advantage of the functional MRI (fMRI) scanner, using the given information, the majority of successful students stated that it would enable doctors to see which part of the brain was active / inactive in a certain situation in order to ascertain the location of any brain damage. Some were more explicit and explained that the context for this would be having the patient perform a particular task. Some suggested, correctly, that the scan could be compared with one from a person without brain damage, or that the fMRI scanner could be used on a person who had difficulty staying still such as a young child or a person with Parkinson's.

06.4 was not answered at all well by many students. The question asked for how the brain received information from the eye, *not* how the eye produced an image or made adjustments for different light intensities, *nor* for the coordination of any response, some or all of which were included in the answers of many. Several important details were also omitted in many answers – eg light is not just focused on 'the back of the eye' but on the *retina*, and the latter is actually *sensitive* to the light or contains *receptors* rather than just being the passive recipient of an image; *impulses* are then sent along *neurones* (not just 'messages' or 'signals' in 'nerves') in the *optic nerve*.

Given that some birds had an adaptation allowing them to detect UV light, and that some fruits and the urine of small mammals reflected UV light, students had to explain how this feature in the birds might have evolved in **06.5**. Many students suggested correctly that a mutation might have occurred in an ancestral bird, although very few went on to state that this would have been a random occurrence. Very few students related this to a possible structural change in the cells of the retina. However, many did realise that the mutation, or ability to detect UV, would enable the birds to see fruits and thus obtain more food than non-mutant birds and/or see where small mammals had been and hence either avoid predation or manage to catch these mammals as food. Many students then went on to explain that the birds with UV vision would be more likely to survive and reproduce, passing on their favourable allele (or 'the mutation') to their offspring, perhaps over many generations, and that this was an example of natural selection. Some students interpreted this as a 'speciation' question and hence gave an answer they had prepared previously. Students need to read the question carefully in order to assess what aspects of their knowledge may be applied *appropriately* in answering it. The question differentiated very well across the entire ability range of the students.

4.6.2.2 Evolution

Answer 46 · 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.

4.6.2.2 Evolution

Answer 46 · 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.

4.6.2.2 Evolution

Answer 46 · 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.

4.6.2.2 Evolution

Answer 47 · 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.

4.6.2.2 Evolution

Answer 47 · 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.

4.6.2.2 Evolution

Answer 48 · 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.

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Answer 48 · 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.