AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.2.3

The eye (biology only)

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**12**
Available paper years	**2008–2024**

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.

4.5.2.3 The eye (biology only)

Answer 01 · Mark scheme

June 2008 | BLY1AP | Original Q4 | Legacy

Four	**A**	blinking	**2**
	B	cells in the eye	**4**
	C	insect	**3**
	D	muscle in the eye lid	**1**

4.5.2.3 The eye (biology only)

Answer 02 · Mark scheme

June 2008 | BLY2F | Original Q4 | Legacy

question	answers	extra information	mark
4(a)(i)	1400	award **2** marks for correct answer if no working shown 2400 – (300 + 600 + 100) or equivalent for **1** mark	2
4(a)(ii)	$\frac{1}{3}$		1
4(b)	**A**: chemical reactions **B**: food **C**: drinking	all **three** required for **1** mark	1
4(c)	cools / reduces temperature	allow 'maintaining body temperature' owtte do **not** allow regulate unqualified ignore reference to urea numerical references to temperature should be correct	1
4(d)	more sweat produced less urine produced		1 1
Total			**7**

4.5.2.3 The eye (biology only)

Answer 02 · Mark scheme June 2008 | BLY2F | Original Q4 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

Answer 03 · Mark scheme March 2009 | BLY1BP | Original Q9 | Legacy

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

Answer 04 · Mark scheme November 2009 | BLY1AP | Original Q9 | Legacy

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

4.5.2.3 The eye (biology only)

Answer 05 · Mark scheme January 2010 | BLY2F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	fatty acids glycerol		1 1
5(b)(i)	any **one** from: • (same) amount / 1cm^3 fat • (same) amount / 10cm^3 lipase / enzyme • (kept for) 24 hours **or** (same length of) time		1
5(b)(ii)	temperature	allow heat / warmth	1
5(c)	(carry out experiments) using more temperatures / smaller intervals between 20 and 60 °C / around 40 °C	ignore repeat unqualified do not accept longer time accept extra single temperature in range 20 °C – 60 °C but cannot be 20 °C, 40 °C or 60 °C	1 1
5(d)(i)	'strong' acid		1
5(d)(ii)	enzyme works / not destroyed / not denatured / not damaged	do **not** accept enzyme not killed accept any indication that the fat is digested accept same as tube 3 / tube at 40 °C accept optimum temperature / at or near body temperature	1
Total			**8**

4.5.2.3 The eye (biology only)

Answer 05 · Mark scheme

January 2010 | BLY2F | Original Q5 | Legacy

BLY2F

4.5.2.3 The eye (biology only)

Answer 06 · Mark scheme

January 2011 | BLY2F | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)(i)	colour of light / bulb / lamp	allow wavelength for colour allow bulb alone do **not** accept light / colour unqualified	1
7(a)(ii)	any **one** from eg • temperature • light intensity **or** distance between lamp and plant / tube • carbon dioxide • other light in room • mass / size / amount / age / type of pondweed • volume / amount of water	 allow heat allow amount / brightness of light ignore light unqualified allow symbols allow use a dark room allow same piece of pondweed ignore pondweed unqualified ignore reference to time	1
7(a)(iii)	improved reliability **or** can spot anomalies / changes	allow for reliability **or** less likely to lose count allow reference to calculating a mean / average ignore reference to accuracy / precision / fair	1
7(b)(i)	green		1

Question 7 continues on the next page

4.5.2.3 The eye (biology only)

BLY2F

Question 7 continued

question	answers	extra information	mark
7(b)(ii)	any **two** from: • least / less bubbles / gas / oxygen / mean • least / less photosynthesis • least / less glucose / sugar / carbohydrate / food made	ignore references to colour reference to least / less needed only once, in context, for **2** marks only penalise no once, ie no bubbles = **0** mark no bubbles so no photosynthesis = **1** mark allow most / more green light reflected (by chloroplasts)	2
Total			**6**

4.5.2.3 The eye (biology only)

Answer 06 · Mark scheme

January 2011 | BLY2F | Original Q7 | Legacy

BLY2F

4.5.2.3 The eye (biology only)

Answer 07 · Mark scheme

June 2012 | BL2FP | Original Q8 | Legacy

Question 8

question	answers	extra information	mark
8(a)(i)	(white) clover		1
8(a)(ii)	reed sweet-grass	allow reed allow grass	1
8(a)(iii)	(only) found in swamp and aquatic zones **or** only found in water **or** doesn't grow in marsh	ignore wet conditions	1

8(b) — 6

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.

0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There is a basic description which describes how a quadrat **or** a metre tape could be used to collect data	There is a clear description of how a quadrat **and** a metre tape could be used to collect data along a line	There is a clear, logical and detailed description of a method that will produce valid, repeatable results across / at intervals along the stream.

examples of procedural points made in the response:

- use of tape measure to produce transect
- placing of quadrats
- transect placed across stream
- score presence of each plant species
- use quadrat at regular intervals along tape
- repeat transect several times (≥ 3)
- along stream
- at random **or** regular intervals

Total			9

4.5.2.3 The eye (biology only)

Answer 07 · Mark scheme

June 2012 | BL2FP | Original Q8 | Legacy

BL2FP

4.5.2.3 The eye (biology only)

Answer 08 · Mark scheme June 2018 | 8461/2F | Original Q9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	releasing saliva when food enters the mouth withdrawing the hand from a sharp object		1 1	AO2 4.5.2.1
09.2	bright light	allow described method of increasing light ignore light unqualified allow correctly named drug eg morphine / heroin	1	AO1 4.5.2.3
09.3	iris		1	AO1 4.5.2.3
09.4	muscle contraction	allow muscles shorten ignore radial / circular ignore muscles relax / constrict do **not** accept muscles expand do **not** accept ciliary muscle contracts	1	AO1 4.5.2.3

4.5.2.3 The eye (biology only)

Answer 08 · Mark scheme

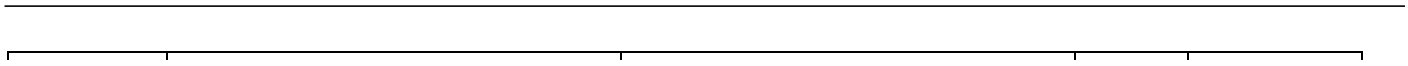
June 2018 | 8461/2F | Original Q9

Question	Answers	Mark	AO / Spec. Ref.
09.5	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.	4–6	AO1 4.5.2.1
	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 • receptor detects stimulus • eg receptor detects pressure • receptor generates impulses / electrical signals • neurones conduct impulses / electrical signals • neurone A conducts impulses to spinal cord • neurone A = sensory neurone • synapse between neurones • chemical (/ neurotransmitter) crosses synapse • chemical stimulates impulse(s) in neurone B • neurone B = relay neurone • neurone C = motor neurone • effector carries out response • eg muscles of the arm / leg contract • muscles contract **or** gland secretes chemicals to access **level 2**, candidates need to consider, in terms of the indicative content, the receptor, the neurones and the effector in the correct sequence		
Total			**11**

4.5.2.3 The eye (biology only)

Answer 08 · Mark scheme

June 2018 | 8461/2F | Original Q9



4.5.2.3 The eye (biology only)

Answer 09 · Mark scheme

November 2020 | 8461/2F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	(A) cerebellum (B) pituitary gland (C) cerebral cortex		1 1 1	AO1 4.5.2.2 AO1 4.5.3.1 AO1 4.5.2.2
05.2	cerebellum		1	AO1 4.5.2.2
05.3	coordinator		1	AO1 4.5.1 4.5.2.1
05.4	neurone	allow nerve (cell) ignore names of neurone	1	AO1 4.5.2.1
05.5	retina		1	AO1 4.5.2.3
05.6	can see fruit / food (so) get more food	allow can find fruit / food	1 1	AO2 4.5.2.3 4.7.1.4
05.7	accommodation		1	AO1 4.5.2.3
05.8	light rays are refracted less		1	AO1 4.5.2.3
05.9	any **one** from: • myopia • short-sightedness	allow near-sightedness	1	AO1 4.5.2.3
Total			**12**	

4.5.2.3 The eye (biology only)

Answer 09 · Mark scheme

November 2020 | 8461/2F | Original Q5

4.5.2.3 The eye (biology only)

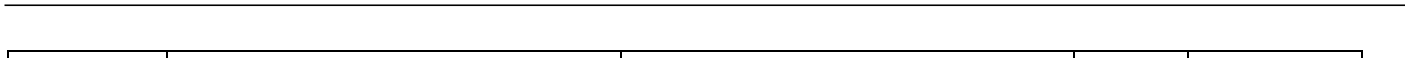
Answer 10 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	A = cornea B = lens C = optic nerve		1 1 1	AO1 4.5.2.3
04.2	by becoming thicker		1	AO1 4.5.2.3
04.3	ciliary muscles suspensory ligaments		1 1	AO1 4.5.2.3
04.4	retina	allow rods / cones / fovea	1	AO1 4.5.2.3
04.5	retina brain muscles	in this order only 3 correct = **2** marks 1 or 2 correct = **1** mark	2	AO2 4.5.2.1
Total			**9**	

4.5.2.3 The eye (biology only)

Answer 10 · Mark scheme

November 2021 | 8461/2F | Original Q4



4.5.2.3 The eye (biology only)

Answer 11 · Mark scheme

June 2023 | 8461/2F | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.1	accommodation		1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.2	B		1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.3	E		1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.4	becomes fatter / thicker / wider	allow more convex / curved / rounded ignore larger / smaller	1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
08.5	any **two** from: • (muscles in the iris) contract • reduce size of pupil • reduces (amount of) light entering	 allow (muscles in the iris) shorten ignore circular / radial muscles ignore (muscles in the iris) relax do **not** accept ciliary muscles contract allow constrict pupil allow reduce size of aperture / gap / hole allow reduces (amount of) light reaching retina	2	AO1 4.5.2.3

4.5.2.3 The eye (biology only)

Question	Answers	Mark	AO / Spec Ref.
08.6	**Level 2:** The method would lead to the production of a valid outcome. The key steps are identified and logically sequenced.	3–4	AO2
	Level 1: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	1–2	AO1
	No relevant content	0	
	Indicative content • identification of method eg ruler drop • correct details of method chosen eg hold ruler above thumb • repetitions – at least two more times • repeat with (at least 2 more) other students • tested without coffee **and** with coffee **or** with different amounts of coffee • calculate mean value with coffee and without coffee • compare results with and without coffee • correct control variables for method chosen, eg: o same age o sex o BMI o amount of sleep o volume / concentration / type of coffee o time interval between drinking and testing o control variable within method described For **level 2** reference to collecting results with and without coffee along with how the investigation is designed to create valid results is required		4.5.2.1 RPA7

Total Question 8	**10**

4.5.2.3 The eye (biology only)

Answer 12 · Mark scheme

June 2024 | 8461/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.1	(A) optic nerve (B) lens		1 1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.2	contract		1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.3	thicker		1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.4	iris		1	AO1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.5	any **one** from: • (sent as) impulses • along sensory neurone(s)	allow (sent as) electrical signals ignore messages	1	AO1 4.5.2.1 4.5.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.6	the light rays do not meet / focus / converge on the retina	allow the light rays meet / focus / converge before the retina allow the light rays do not meet / focus / converge at the back of the eye allow lens is too thick allow eyeball is too long	1	AO3 4.5.2.3

4.5.2.3 The eye (biology only)

Answer 12 · Mark scheme

June 2024 | 8461/2F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec Ref.
04.7	any **one** from: • (hard / soft) contact lenses • (laser) surgery • replacement lens (in the eye)	ignore spectacles / glasses	1	AO1 4.5.2.3

Total Question 4	**8**

4.5.2.3 The eye (biology only)

Answer 09 · Examiner comments — November 2020 | 8461/2F | Original Q5

Question 5 (low & standard demand)

This question was about the brain and vision. In **05.6**, whilst many students realised that being able to detect UV light would enable a bird to feed, very few went on to explain that this would mean they would get more food (than their competitors). Some students suggested that this ability would enable the birds to detect predators, although there was no information that would lead them to this conclusion. Whilst others thought that only rotten fruit would reflect UV light, so being able to detect this would prevent them eating such fruit. **05.8** was not answered well, with the correct response, 'light rays are refracted less' when looking at a distant object being by far the least commonly chosen answer. More light being reflected was the preference of nearly half of the students.

Answer 11 · Examiner comments — June 2023 | 8461/2F | Original Q8

Question 8

This was the second of three questions common to both the Foundation and Higher Tier papers. It was about the functioning of the eye and included a description of an investigation of reaction time.

08.1 Only a quarter of students correctly selected accommodation as the term relating to adjustment of focus. Adaptation was chosen by many more.

08.2 Around one-third of students knew that the image would be focused on structure B in Figure 3 (the retina).

08.3 Just over half knew that structure E (the ciliary muscle) would contract to focus on a near object.

08.4 Students experienced some difficulty in describing what happened to the shape of the lens when focusing on a near object. Acceptable terms included becoming fatter / thicker / rounder or more convex or more curved. Terms such as 'larger' were considered ambiguous and 'more concave' (used by many) was simply incorrect. Only 1 in 7 gave acceptable answers.

08.5 Given that the iris contains muscles, students had to desribe the role of these muscles for assisting in clear vision when moving into a brightly-lit area. Some evidently did not read the question carefully and described the precise opposite – moving into a dimly-lit area. Many were confused between iris muscles and ciliary muscles. Reference to radial and circular muscles were ignored as this went beyond the detail required by the Specification.
A surprising number suggested that, in brightly-lit areas, having more light entering the eye would be necessary, to see more.

Students were required to give two details from the muscles contracting, reducing the size of the pupil and a decrease in the amount of light entering the eye. Approximately one-third scored one mark but only 1 in 10 gained two.

08.6 This was an Extended Response style of question in which students had to plan an investigation to test the effect of drinking coffee on reaction time. Most opted for the ruler drop practical but the level of detail included was highly variable. The instruction in the question was 'You should include...how to make the investigation valid' which incorporates the concepts of control variables, repetitions and the calculation of mean values. Many students omitted such details, and only 1 in 7 scored full marks.
Some insisted on measuring the time taken for the ruler to be caught using a stop-clock. And it appeared that some students had omitted this practical from their revision as ideas about timing catching a ball thrown at them were not uncommon.

4.5.2.3 The eye (biology only)

Answer 12 · Examiner comments

June 2024 | 8461/2F | Original Q4

Question 4 (low and standard demand)

04.1 Over half of students correctly labelled both the optic nerve and the lens, with a further 40% labelling at least one of them correctly for a mark.

04.2 60% of students knew that to focus on a near object the ciliary muscles contract.

04.3 Just under 50% of students knew that the lens becomes thicker to focus on a near object.

04.4 One third of students knew that the size of the pupil is controlled by the iris, with the most common wrong answer being suspensory ligaments.

04.5 15% of students were able to achieve this mark, with many falling short by using poor terminology such as 'messages' or referring to 'signals' unqualified.

04.6 A little over 10% of students were able to articulate themselves clearly enough to gain the mark. All of the different options on the mark scheme were seen with some good descriptions given as to why the image would not be clear. Many students stated that the light rays had crossed without specifying where this has happened and fell short of the mark. Other students talked about the light rays not meeting, but at the wrong part of the eye such as the sclera or optic nerve so again did not gain the mark.

04.7 A well answered question with 75% of students gaining credit, mostly for referring to either 'laser eye surgery' (or simply just 'surgery') or to contact lenses.

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