AQA GCSE Biology | 8461

SPECIFICATION POINT 4.4.2.2

Response to exercise

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**39**
Available paper years	**2007–2025**

Using this booklet

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

Name: _____ **Date:** _____

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

4.4.2.2 Response to exercise

Answer 01 · Mark scheme June 2007 | BLY1A | Original Q7 | Legacy

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

Answer 02 · Mark scheme November 2007 | BLY1A | Original Q3 | Legacy

Three	**A**	better than	**1**
	B	less than	**2**
	C	more than	**4**
	D	the same as	**3**

Answer 03 · Mark scheme November 2007 | BLY1A | Original Q9 | Legacy

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

4.4.2.2 Response to exercise

Answer 04 · Mark scheme

Question 3

	answers	extra information	mark
(a)(i)	lungs		1
(a)(ii)	skin		1
(a)(iii)	kidneys		1
(b)(i)	(as sweat lost,) performance falls		1
(b)(ii)	drink water / sports drink	ignore antiperspirant	1
total			5

4.4.2.2 Response to exercise

Answer 04 · Mark scheme

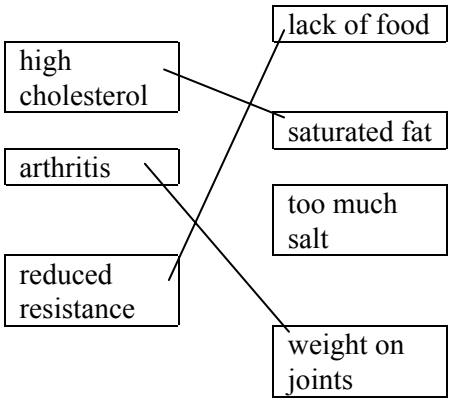
January 2008 | BLY1F | Original Q3 | Legacy

BLY1F

4.4.2.2 Response to exercise

Answer 05 · Mark scheme January 2008 | BLY1F | Original Q4 | Legacy

Question 4

	answers	extra information	mark
(a)		all three correct = **3** marks two correct = **2** marks one correct = **1** mark extra line from a statement cancels the mark	3
(b)	any **two** from: • keeps us fit / healthy • reduces mass / weight / fat • metabolic rate increased • blood pressure reduced • heart disease less likely / heart healthy • arthritis less likely • reduces cholesterol • diabetes less likely		2
total			5

4.4.2.2 Response to exercise

Answer 05 · Mark scheme

January 2008 | BLY1F | Original Q4 | Legacy

BLY1F

4.4.2.2 Response to exercise

Answer 06 · Mark scheme January 2008 | BLY2F | Original Q2 | Legacy

Question 2

	answers	extra information	mark
(a)	4000	award **both** marks for correct answer, irrespective of working 1500 + 2000 + 500 gains **1** mark	2
(b)	day 2 (no mark) any **two** from: • more (water in) breath / breathing • more (water in) sweat / sweating • less (water in) urine	max **1** mark if correct day not identified or if no day given accept a lot of sweating if no other marks awarded allow **1** mark for more water lost on day 2	2
(c)(i)	respiration		1
(c)(ii)	cools / removes heat owtte	ignore 'maintains body temperature' unqualified	1
(c)(iii)	osmosis		1
total			7

4.4.2.2 Response to exercise

Answer 06 · Mark scheme January 2008 | BLY2F | Original Q2 | Legacy

BLY2F

Answer 07 · Mark scheme January 2008 | BLY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
(a)(i)	A **or** C	allow lower case	1
(a)(ii)	B **or** D	allow lower case	1
(b)(i)	60		1

4.4.2.2 Response to exercise

Answer 08 · Mark scheme

Question 5

question	answers	extra information	mark
(a)(i)	increased / thick(er)	allow more / wide(r) / broad	1
(a)(ii)	decreased		1
(b)	1	IGNORE working or lack of working correct figures from table 2.1 and 1.1 but no answer / wrong answer = **1** mark	2
total			4

4.4.2.2 Response to exercise

Answer 08 · Mark scheme January 2008 | BLY3F | Original Q5 | Legacy

BLY3F

Answer 09 · Mark scheme June 2008 | BLY1F | Original Q6 | Legacy

question	answers	extra information	mark
6(a)	diet **or** description		1
6(b)	exercise **or** group meetings **or** same number of kilocalories per day **or** time **or** group size		1
6(c)	any **two** from: eg • scientists didn't observe amount of exercise **or** volunteers cheated on exercise • scientists didn't observe the amount of food **or** volunteers cheated on food • mass of subjects not controlled • age of subjects not controlled • gender of subjects not controlled • occupation of subjects not controlled • different proportions of subjects completed course • low number of subjects	if no marks awarded for first 2 bullet points allow don't stick to plan **or** cheated for **1** mark allow not all completed course ignore not repeated	2
6(d)	any **two** from: (yes) • low carbohydrate / Group 1 / people / they lost more mass • low carbohydrate / Group 1 / people / they lost more body fat • low carbohydrate diet / Group 1 / people / they resulted in more HDL	ignore more people lost weight allow greater change in mass ignore more people lost body fat allow greater change in body fat allow better HDL to LDL balance allow greater change in HDL	2
Total			**6**

4.4.2.2 Response to exercise

Answer 09 · Mark scheme

June 2008 | BLY1F | Original Q6 | Legacy

COMPONENT NUMBER: BLY1F

COMPONENT NAME: Science B / Biology

STATUS: Final

DATE: June 2008

4.4.2.2 Response to exercise

Answer 10 · Mark scheme

June 2008 | BLY3F | Original Q2 | Legacy

question	answers	extra information	mark
2(a)	glucose ✓ urea ✓ water ✓ sodium ions ✓ protein	all 3 correct = **2** marks 2 correct = **1** mark 0 or 1 correct = **0** marks	max 2
2(b)(i)	protein cannot pass through filter **or** protein (too) large **or** protein stays in the blood		1
2(b)(ii)	reabsorbed		1
2(c)(i)	less		1
2(c)(ii)	more		1
Total			**6**

4.4.2.2 Response to exercise

Answer 10 · Mark scheme June 2008 | BLY3F | Original Q2 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

Answer 11 · Mark scheme November 2008 | BLY1AP | Original Q6 | Legacy

Six	**2**	**3**	**4**	**1**

Answer 12 · Mark scheme January 2009 | BLY3F | Original Q7 | Legacy

The full source mark scheme begins on page 61. Follow original question 7 in that document.

Answer 13 · Mark scheme June 2009 | BLY1AP | Original Q8 | Legacy

Eight	**4**	**3**	**3**	**1**

4.4.2.2 Response to exercise

Answer 14 · Mark scheme

Question 6

question	answers	extra information	mark
6(a)	A	no mark – can be specified in reason part if B given = no marks throughout if unspecified plus two good reasons = 1 mark	
	high(er) pressure in A	allow opposite for B do not accept 'zero pressure' for B	1
	pulse / described in A	accept fluctuates / 'changes' allow reference to beats / beating ignore reference to artery pumping	1
6(b)(i)	17		1
6(b)(ii)	68	accept correct answer from candidate's (b)(i) x 4	1
6(c)(i)	oxygen / oxygenated blood	allow adrenaline ignore air	1
	glucose / sugar	extra wrong answer cancels eg sucrose / starch / glycogen / glucagon / water allow fructose as an alternative to glucose ignore energy ignore food	1

Question 6 continues on the next page…

4.4.2.2 Response to exercise

Answer 14 · Mark scheme

BLY3F

Question 6 Continued

6(c)(ii)	carbon dioxide / CO_2 / lactic acid	allow CO2 / CO^2 ignore water	1
Total			**7**

4.4.2.2 Response to exercise

Answer 15 · Mark scheme

Question 7

question	answers	extra information	mark
7(a)(i)	B **or** D		1
7(a)(ii)	A **or** B		1
7(b)	any **four** from: • increased blood (flow) • (more) oxygen supplied **or** aerobic respiration • (more) glucose / sugar / food supplied • (higher rate of) respiration • (more) energy needed / released • (more) carbon dioxide <u>removed</u> • (muscles) doing (more) work **or** muscles contracting • remove heat / cooling • remove lactic acid **or** less lactic acid formed	more / faster must be implied at least once for full marks ignore reference to breathing allow less anaerobic (respiration) **or** and prevents oxygen debt ignore feeding allow made	4
Total			**6**

4.4.2.2 Response to exercise

Answer 15 · Mark scheme

January 2010 | BLY3F | Original Q7 | Legacy

BLY3F

Answer 16 · Mark scheme

March 2010 | BLY1AP | Original Q5 | Legacy

Five	**A** energy		**2**	
	B enzymes		**3**	
	C mass		**4**	
	D sweat		**1**	
	A	**B**	**C**	**D**

Answer 17 · Mark scheme

June 2010 | BLY1AP | Original Q9 | Legacy

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

4.4.2.2 Response to exercise

Answer 18 · Mark scheme June 2010 | BLY3F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	150		1
4(a)(ii)	any **two** from: • lower resting rate • lower rate during exercise • recovers faster after exercise	accept correct use of numbers accept pulse rate allow a general statement about lower rate if neither of the first two points given	2
4(b)	glucose oxygen		1 1
Total			**5**

4.4.2.2 Response to exercise

Answer 18 · Mark scheme

June 2010 | BLY3F | Original Q4 | Legacy

BLY 3F

4.4.2.2 Response to exercise

Answer 19 · Mark scheme June 2010 | BLY3F | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)(i)	too large to pass through the filter		1
6(a)(ii)	passed through the filter, then reabsorbed into blood		1
6(a)(iii)	water is reabsorbed from the filtrate into the blood		1
6(a)(iv)	water, urea and sodium ions		1
6(b)(i)	less urine		1
6(b)(ii)	more concentrated		1
Total			**6**

4.4.2.2 Response to exercise

Answer 19 · Mark scheme

June 2010 | BLY3F | Original Q6 | Legacy

BLY 3F

4.4.2.2 Response to exercise

Answer 20 · Mark scheme

Question 7

question	answers	extra information	mark
7(a)(i)	brain		1
7(a)(ii)	skin		1
7(a)(iii)	1/25 **or** 4% **or** 0.04 **or** 1 in 25 **or** 1:25 **or** 1 out of 25	allow $\frac{1000}{25000}$	1
7(b)	any **two** from: • increased / high heart rate / pulse rate • dilation / widening of <u>arteries / arterioles</u> (to skeletal muscles) **or** less blood flow to other organs • increased stroke volume / described	do **not** allow pumps more blood unqualified accept vasodilation unqualified do **not** accept reference to veins / capillaries	2
7(c)	<u>more</u> respiration / description **or** <u>more</u> energy required **or** to provide <u>more</u> energy	ignore references to breathing	1
	respiration / process described → CO_2	do **not** accept anaerobic respiration	1
	CO_2 <u>diffuses</u> into blood		1
Total			**8**

4.4.2.2 Response to exercise

Answer 20 · Mark scheme January 2011 | BLY3F | Original Q7 | Legacy

BLY3F

Answer 21 · Mark scheme June 2011 | BLY1AP | Original Q7 | Legacy

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

4.4.2.2 Response to exercise

Answer 22 · Mark scheme

June 2011 | BLY3F | Original Q4 | Legacy

Question 4

question	answers	extra information	mark
4(a)(i)	glycogen		1
4(a)(ii)	respiration		1
4(b)(i)	483 kJ		1
4(b)(ii)	oxygen		1
4(b)(iii)	dilate		1
4(c)	supplies more / a lot of oxygen **or** removes more carbon dioxide **or** release more energy / faster respiration		1
Total			**6**

4.4.2.2 Response to exercise

Answer 22 · Mark scheme

June 2011 | BLY3F | Original Q4 | Legacy

BLY3F

4.4.2.2 Response to exercise

Answer 23 · Mark scheme

June 2012 | BL2FP | Original Q9 | Legacy

Question 9

question	answers	extra information	mark
9(a)(i)	any **three** from: • age (of athlete) • gender (of athlete) • starting concentration of glycogen • type / intensity of exercise • length of exercise period • number of training sessions • time interval between exercise sessions • exercise at same time of day	if diet given as answer = max **2** if none of these points gained amount of exercise = **1** mark if last four points not awarded allow time (for exercise) for **1** mark ignore references to amount of energy ignore they are both athletes	3
9(a)(ii)	any **two** from: • intensity of exercise • amount of exercise between sessions • starting concentration of glycogen • fitness / health • metabolic rate / respiration rate • amount / mass of muscle / physique • aspects of diet qualified, eg amount of food eaten	do **not** accept amount of carbohydrate if no other marks awarded allow height / mass / weight for **1** mark	2

4.4.2.2 Response to exercise

Answer 23 · Mark scheme

9(a)(iii)	(B has) less glycogen **or** (B's glycogen) fell more **or** (B's glycogen) built up less	he = B accept use of approximate figures allow other correct observations from graph eg A is lower at end of first session ignore rate of fall	1
9(b)	athlete **A** (no mark) athlete **A** had more glycogen / **B** has less (only if A chosen to complete marathon) (glycogen / glucose) used in respiration (more) energy released / available in athlete **A** **and either** energy used for movement / muscle action / to run **or** (extra) glycogen → (more) glucose	to gain full marks 'more' must be given at least once accept converse argument for **B** ignore anaerobic allow 'energy made'	 1 1 1 1
Total			**10**

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

4.4.2.2 Response to exercise

Answer 24 · Mark scheme

January 2013 | BL2FP | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)	any **two** from: • constant speed • constant effort • constant temperature	**or** allow converse for outdoors • variable speed • variable terrain • traffic conditions • variable temperature • wind (resistance) • rain / snow } allow weather allow pollution only if qualified by effect on body function but ignore pollution unqualified if no other marks obtained allow variable conditions outdoors	2
6(b)	Brain		1
6(c)(i)	20 800	correct answer with or without working gains **2** marks if answer incorrect, allow **1** mark for use of 1200 and 22 000 only	2
6(c)(ii)	oxygen glucose / sugar	apply list principle do **not** accept other named substances eg CO_2 water allow glycogen ignore food / carbohydrate	1 1
6(c)(iii)	respire aerobically		1
6(c)(iv)	carbon dioxide lactic acid		1 1
6(d)	increased heart rate	ignore adrenaline / drugs accept heart beats more but not heart pumps more	1
Total			**11**

4.4.2.2 Response to exercise

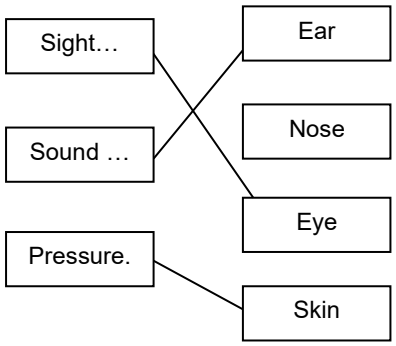
Answer 24 · Mark scheme January 2013 | BL2FP | Original Q6 | Legacy

BL2FP

4.4.2.2 Response to exercise

Answer 25 · Mark scheme

Question 1

question	answers	extra information	Mark
1(a)(i)		**1** mark for each line do **not** award a mark for a 'change' that has two lines	3
1(a)(ii)	receptor cells		1
1(b)	used to provide (extra) energy	allow (more) used in respiration allow suitable reference to muscles do **not** accept used for sweat	1
1(c)(i)	growth of muscles		1
1(c)(ii)	(these drugs have) possible side / harmful effects **or** answers that refer to 'fairness of competition' e.g. cheating		1
Total			**7**

4.4.2.2 Response to exercise

Answer 26 · Mark scheme June 2014 | BL2FP | Original Q9 | Legacy

9(a)	anaerobic respiration	allow phonetic spelling	1	AO1 2.6.2a, b,d
9(b)(i)	4.4	4.2, 4.3, 4.5 or 4.6 with figures in tolerance (6.7 to 6.9 and 2.3 to 2.5) and correct working gains 2 marks 4.2, 4.3, 4.5 or 4.6 with no working shown or correct working with one reading out of tolerance gains 1 mark correct readings from graph in the ranges of 6.7 to 6.9 **and** 2.3 to 2.5 but no answer / wrong answer gains 1 mark	2	AO2 2.6.2a, b,d
9(b)(ii)	more energy is needed / used / released (at 14 km per hour) not enough oxygen (can be taken in / can be supplied to muscles) so more anaerobic respiration (to supply the extra energy) **or** more glucose changed to lactic acid	do **not** allow energy production ignore work allow reference to oxygen debt do **not** allow less / no oxygen allow not enough aerobic respiration	1 1 1	AO1 / AO2 2.6.2a, b,d
Total			**6**	

4.4.2.2 Response to exercise

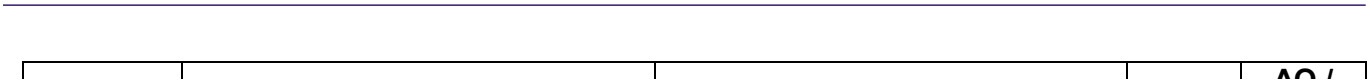
Answer 27 · Mark scheme

Question	Answers	Extra information	Mark	AO / spec ref.
2(a)	brain blood sweat	in correct order only	1 1 1	AO1 3.3.2a, b,c
2(b)(i)	A		1	AO3 3.1.1e
2(b)(ii)	to replace ions lost (in sweat)	accept salts allow named examples, eg. prevent cramps	1	AO1 3.1.1e
2(b)(iii)	any **one** from: • there is too much glucose / sugar in the sports drink • they shouldn't have too much glucose / blood sugar • it would cause their blood glucose / sugar to rise (too high)		1	AO2 3.1.1d, 3.3.3d
Total			6	

4.4.2.2 Response to exercise

Answer 27 · Mark scheme

June 2014 | BL3FP | Original Q2 | Legacy



4.4.2.2 Response to exercise

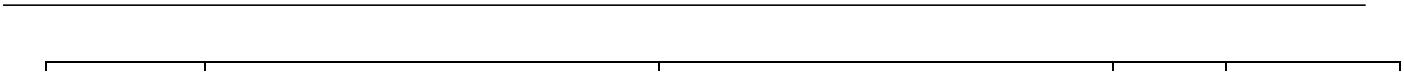
Answer 28 · Mark scheme June 2015 | BL1FP | Original Q2 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
2(a)(i)	64		1	AO2 1.1
2(a)(ii)	36	allow e.c.f from (a)(i) i.e. 100 – answer given in (a)(i)	1	AO2 1.1
2(a)(iii)	any **one** from: • only considers 16-year-olds • only about some / 5 countries	ignore lack of evidence allow does not refer to all ages allow does not refer to all countries	1	AO3 1.1
2(b)	the more exercise done the healthier a person is	allow the more exercise done the higher the health rating allow the less exercise done the lower the health rating	1	AO3 1.1.1e
2(c)	having a high cholesterol level		1	AO1 1.1.1d
2(d)(i)	antibodies		1	AO1 1.1.2c/d/e
2(d)(ii)	antibiotics		1	AO1 1.1.2i
Total			**7**	

4.4.2.2 Response to exercise

Answer 28 · Mark scheme

June 2015 | BL1FP | Original Q2 | Legacy



4.4.2.2 Response to exercise

Answer 29 · Mark scheme

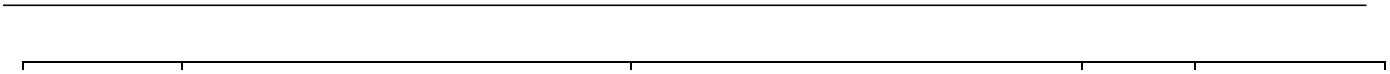
June 2016 | BL2FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	without <u>oxygen</u>	allow not enough oxygen ignore air ignore production of CO_2 ignore energy	1	AO1 2.6, 2.6.2a
7(a)(ii)	more/high/increased lactic acid (at end)	allow approximate figures (to show increase) ignore reference to glucose	1	AO3 2.6, 2.6.2b
7(b)(i)	1.5	allow only 1.5 / 1½ / one and a half	1	AO3 2.6, 2.6.1g/h
7(b)(ii)	increases at first **and** levels off suitable use of numbers eg rises to 10 / by 9 (dm^3 per min) **or** increases up to 1.5 (min) / levels off after 1.5 (min) (of x axis timescale) **or** after the first minute (of the run)	ignore subsequent decrease allow answer in range 1.4 to 1.5	1 1	AO2 2.6, 2.6.1g/h
7(b)(iii)	supplies (more) oxygen supplies (more) glucose for (more) respiration releases (more) energy (for muscle contraction)	need 'more/faster' once only for full marks allow removes (more) CO_2 /lactic acid / heat as an alternative for either marking point one **or** two, **once** only do **not** allow energy production or **for** respiration	1 1 1 1	AO1 2.6.1b/e/f/g/h 2.6.2d
Total			**9**	

4.4.2.2 Response to exercise

Answer 29 · Mark scheme

June 2016 | BL2FP | Original Q7 | Legacy



4.4.2.2 Response to exercise

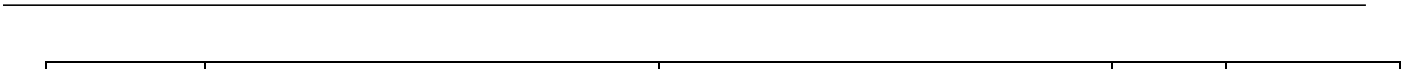
Answer 30 · Mark scheme June 2016 | BL3FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	thorax		1	AO1 3.1.2a
1(b)(i)	The ribs move up and out.		1	AO1 3.1.2c
1(b)(ii)	(they) contract	allow shorten	1	AO1 3.1.2c
1(c)(i)	The damaged alveolus has a smaller surface area.		1	AO3 3.1.1h
1(c)(ii)	Less oxygen is taken in.		1	AO2 3.1.2b
Total			5	

4.4.2.2 Response to exercise

Answer 30 · Mark scheme

June 2016 | BL3FP | Original Q1 | Legacy



4.4.2.2 Response to exercise

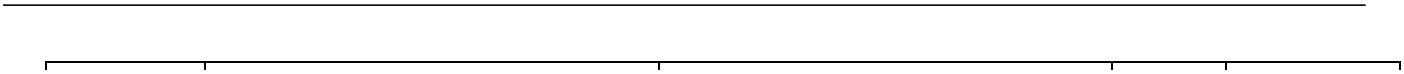
Answer 31 · Mark scheme June 2017 | BL1FP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec ref.
6(a)	valid		1	AO2 1.3.1i
6(b)(i)	any **two** from: • loss of reputation • loss of (future / past) earnings • (possible) changes to body chemistry / physiology • it gives an unfair advantage	 ignore loss of medals allow example eg may cause increased body hair growth in females allow may cause addiction **or** side effects ignore cheating unqualified	2	AO3 1.3.1i
6(b)(ii)	any **one** from: • increased prestige (from winning) • (potential) to earn more money	 allow more likely to win allow other physiological advantages, eg increased number of red blood cells **or** slows heart rate **or** increases heart rate allow athletes think they won't be caught	1	AO3 1.3.1i
6(b)(iii)	(anabolic) steroids	allow named (anabolic) steroids eg testosterone ignore sex hormone	1	AO1 1.3.1i
Total			**5**	

4.4.2.2 Response to exercise

Answer 31 · Mark scheme

June 2017 | BL1FP | Original Q6 | Legacy



4.4.2.2 Response to exercise

Answer 32 · Mark scheme June 2017 | BL2FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	any **one** from: • less likely to lose count • if longer time, pulse slows / person begins to recover • reading would not relate to his exercise level	allow ref. to unreliable results / invalid results	1	AO3 2.6 2.6.1g
5(a)(ii)	60	allow answer in table answer on answer line takes precedence over different answer in table	1	AO2 2.6 2.6.1g
5(b)(i)	Heart rate decreases Range / zone narrows / decreases	allow 2 marks for top of zone decreases faster than bottom of zone	1 1	AO2 2.6 2.6.1g
5(b)(ii)	120 to 180	allow 180 to 120	1	AO2 2.6 2.6.1g
5(b)(iii)	8	allow ecf from 5bii	1	AO2 2.6 2.6.1g
5(b)(iv)	may damage the heart **or** may have a heart attack	ignore will get tired	1	AO3 2.6 2.6.1g

4.4.2.2 Response to exercise

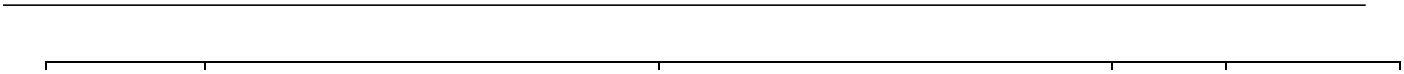
Answer 32 · Mark scheme

5(b)(v)	decrease		1	AO3 2.6 2.6.1g
5(c)(i)	glycogen		1	AO1 2.6, 2.6.1i
5(c)(ii)	oxygen / O_2	do **not** allow O^2	1	AO1 2.6 2.6.1h
5(c)(iii)	respiration	ignore aerobic / anaerobic	1	AO1 2.6 2.6.1b
Total			**11**	

4.4.2.2 Response to exercise

Answer 32 · Mark scheme

June 2017 | BL2FP | Original Q5 | Legacy



4.4.2.2 Response to exercise

Answer 33 · Mark scheme June 2018 | 8461/1F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	any **one** from: • respiration • formation of proteins • formation / breakdown of glycogen • breakdown of (excess) protein **or** formation of urea • photosynthesis **or** formation of glucose / starch (in plants)	allow other correct reference to metabolic reactions in cells ignore reference to digestion ignore formation of carbohydrates	1	AO1 4.4.2.3
08.2	males have a higher metabolic rate than females after five years of age the mean metabolic rate of females decreases faster than males up to 25 years of age	each additional tick negates a mark	1 1	AO3 4.4.2.3
08.3	$\frac{17}{53} \times 100$ 32.075472… 32.1	an answer of 32.1 scores **3** marks allow correct rounding of this to at least 4 significant figures allow a correct reduction to 3 significant figures from an incorrect calculation for marking point 2	1 1 1	AO2 4.4.2.3

4.4.2.2 Response to exercise

Answer 33 · Mark scheme

June 2018 | 8461/1F | Original Q8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.4	any **two** from: • (person) R heart rate rose / increased more slowly than (person) S • (person) R heart rate levelled off whereas (person) S continued to increase • (person) R heart rate rose less (overall / after 5 minutes of exercise) than S	allow converse allow correct use of figures eg R increased (overall) by 39 bpm / 65% and S by 54 bpm / 69% ignore lack of units	2	AO3 4.4.2.2
08.5	correct scale and axis labelled all points plotted correctly (to within ± ½ square) line joined point to point or correct curved line of best fit	allow min(s) do **not** accept 'm' the zero is not required on the *x*-axis allow 4 or 5 correct plots for **1** mark	1 2 1	AO2 4.4.2.2
08.6	$\frac{132 - 78}{12}$ 4.5 (minutes) / 4½ minutes / 4 minutes 30 seconds / 4:30	an answer of 4.5 minutes scores **2** marks allow $\frac{54}{12}$ allow sequential deductions of 12 four or five times do **not** accept 4:50 **or** 4 minutes 50 seconds	1 1	AO2 4.4.2.2

4.4.2.2 Response to exercise

Answer 33 · Mark scheme

June 2018 | 8461/1F | Original Q8

Question	Answers	Mark	AO / Spec. Ref.
08.7	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO3 4.4.2.2
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content • two groups of people - non-smokers and smokers • have at least five people in each group or large groups • get each person to do (named) exercise • controlled variables: - same number of people in each group or large groups - same gender - same level of activity / exercise - same age - no health issues / illnesses - same type of exercise - same time for exercise • record heart rate for each person before and after exercise • calculate increase in heart rate for each person after exercise • compare results for each group for **level 3**, students should refer to at least 5 smokers and 5 non-smokers, carrying out exercise with control variables and a means of determining an increase in heart rate for **level 2**, students should refer to 'groups' of smokers and non-smokers exercising		
Total			**20**

4.4.2.2 Response to exercise

Answer 34 · Mark scheme June 2019 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	protein		1	AO1 4.4.2.3 4.5.3.3
06.2	urea is a waste (product)	allow toxic / poisonous **or** may damage cells **or** denatures proteins ignore harmful / dangerous	1	AO1 4.5 4.5.3.3
06.3	respiration breathing	in this order	1 1	4.4.2.1 4.4.2.2 4.7.4.3 AO1
06.4	least medium most	in this order 3 correct = **2** marks 1 or 2 correct = **1** mark	2	AO3 4.5.2.4 4.5.3.3
06.5	diffusion		1	AO1 4.1.3.1 4.5.3.3
06.6	protein (molecules too) large	this mark may only be awarded if mp1 is correct or not attempted allow pores in membrane are too small	1 1	AO3 4.5.3.3
06.7	3	allow three	1	AO3 4.5.3.3
06.8	increases	ignore numbers	1	AO3 4.5.3.3

4.4.2.2 Response to exercise

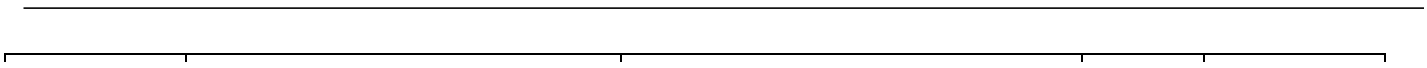
Answer 34 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.9	any **two** from: • has a low(er) concentration of urea • constant urea concentration / level • less time attached to machine **or** fewer hospital visits • no / less restriction on travel • not piercing skin repeatedly • less chance of infection / blood clots • cheaper in the long term • no restrictions on diet	allow converse points for person **A** / dialysis allow substance (if named must be correct) ignore cheaper unqualified	2	AO3 4.5.3.3
Total			**13**	

4.4.2.2 Response to exercise

Answer 34 · Mark scheme

June 2019 | 8461/2F | Original Q6



Answer 35 · Mark scheme

November 2020 | 8461/1F | Original Q4

The full source mark scheme begins on page 74. Follow original question 4 in that document.

4.4.2.2 Response to exercise

Answer 36 · Mark scheme November 2021 | 8461/1F | Original Q6

06.1	trachea		1	AO2 4.2.2.2
06.2	any **two** from: • only one air space (per balloon) **or** alveoli not represented • blood vessels / capillaries not represented • bronchioles not represented • glass tube not flexible (like trachea / bronchi) • bell jar does not move during breathing (like ribs) • ribs have gaps between them • rib cage contains muscles • pleural cavity not represented	do **not** accept bronchi not represented	2	AO3 4.2.2.2
06.3	any **two** from: • speed (of treadmill) • type of exercise **or** all were running • (biological) sex **or** all male • all were non-smokers • time spent running	allow ran for 8 minutes ignore reference to time interval for counting breaths	2	AO2 4.4.2.2
06.4	0 minutes = 20 8 minutes = 42 (42 - 20) ÷ 20 × 100 **or** 22 ÷ 20 × 100 110 (%)	allow value for 8 minutes in the range 41.5 to 42.5 allow correct substitution from incorrect graph readings (i.e. ±1 small square) at 0 minutes and / or 8 minutes allow correct calculation from incorrect graph readings from previous step	1 1 1	AO2 4.4.2.2

4.4.2.2 Response to exercise

Answer 36 · Mark scheme

06.5	to get more oxygen (into the blood) for use in respiration **or** for releasing energy (for muscle contraction) **or** to remove more carbon dioxide (1) produced in respiration (1)	allow using more oxygen (in muscles) allow to reduce anaerobic respiration do **not** accept produces / makes / creates energy	1 1	AO2 4.4.2.2 4.4.2.1
06.6	any **one** from: • heart / pulse rate • depth / volume of breathing • volume of sweat • body temperature	allow heart beat per minute allow amount of sweat allow body mass / measurement	1	AO3 4.4.2.2
06.7	any **one** from: • (lung) cancer • increased blood pressure • lung disease • low birth weight in babies of mothers who smoke • increased risk of heart / cardiovascular disease	allow named example of lung disease e.g. asthma allow persistent cough ignore cough unqualified	1	AO1 4.2.2.6
Total			**12**	

4.4.2.2 Response to exercise

Answer 36 · Mark scheme

November 2021 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.4.2.2 Response to exercise

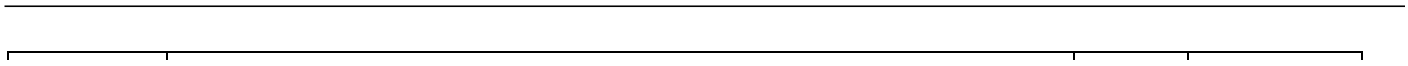
Answer 37 · Mark scheme November 2021 | 8461/2F | Original Q10

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10.1	any **one** from: • movement would release (extra) heat • movement would increase body temperature • movement would increase sweating		1	AO2 4.5.1 4.5.2.4
10.2	37.4 °C		1	AO2 4.5.1 4.5.2.4
10.3	blood is cooled at stomach / mouth (cooled) blood flows to the brain		1 1	AO2 4.5.1 4.5.2.4
10.4	via nerve(s) / neurones **or** via (nerve) impulse(s)	ignore type of neurone allow electrical signals allow via the nervous system	1	AO2 4.5.1 4.5.2.4
10.5	less sweating occurs so less heat is lost **or** less cooling	allow less sweat evaporates do **not** accept no sweating allow less heat used for evaporation of sweat / water	1 1	AO3 AO2 4.5.1 4.5.2.4
10.6	dilation of blood vessels in the skin		1	AO2 4.5.1 4.5.2.4
Total			**8**	

4.4.2.2 Response to exercise

Answer 37 · Mark scheme

November 2021 | 8461/2F | Original Q10



4.4.2.2 Response to exercise

Answer 38 · Mark scheme

June 2022 | 8461/2F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	(lowest) 1 (ºC) (highest) 34 (ºC)	both correct for **1** mark allow a tolerance of ± 0.2 (ºC) allow a tolerance of ± 0.2 (ºC)	1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	5 / five		1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	so stored food **or** glycogen does not run out **or** to replace stored food **or** glycogen	allow so stored fat does not run out **or** to replace stored fat **or** because stored food **or** glycogen / fat has run out ignore to provide energy	1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	respiration		1	AO1 4.5.2.4 4.4.1.3 4.4.2.1

4.4.2.2 Response to exercise

Answer 38 · Mark scheme June 2022 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	any **one** from: • movement • muscle contraction • keeping warm • growth / repair • active transport	allow functioning of internal organs – eg heartbeat allow synthesis / described	1	AO1 4.5.2.4 4.1.3.3 4.4.2.1 4.4.2.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.6	3200 × 2.5 8000 (kJ)		1 1	AO2 4.5.2.4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.7	$\frac{6000}{24\,000} \times 100$ 25 (%)	if no other mark awarded allow for **1** mark 0.25	1 1	AO2 4.5.2.4

4.4.2.2 Response to exercise

Answer 38 · Mark scheme

June 2022 | 8461/2F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.8	reduced	do **not** accept no sweating	1	AO2 4.5.2.4

Total Question 6		**10**

4.4.2.2 Response to exercise

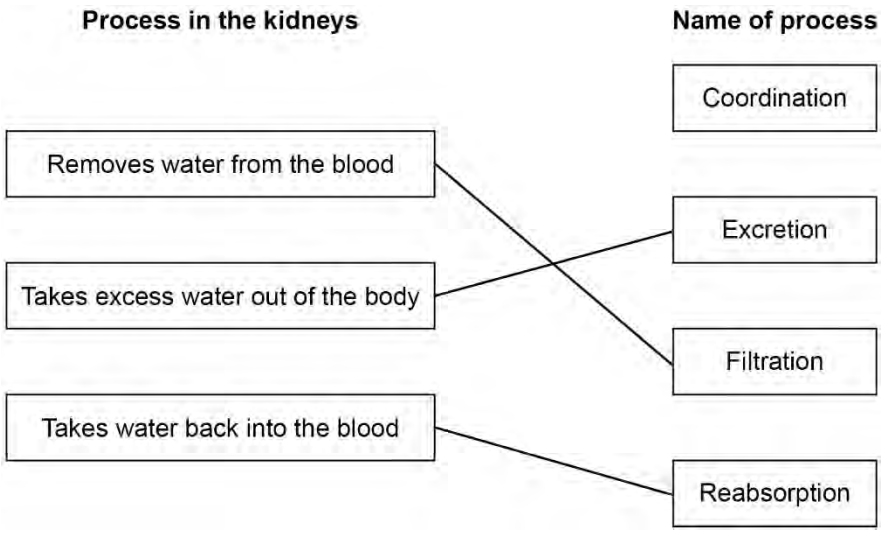
Answer 39 · Mark scheme

June 2025 | 8461/2F | Original Q4

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	bars plotted at 420 **and** 340 bars correctly labelled	allow a tolerance of ± ½ a small square allow bars touching ignore width of bars ignore shading	1 1	AO2 4.5.3.3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.2	increase		1	AO3 4.5.2.4

Question	Answers	Mark	AO / Spec. Ref.
04.3	 do **not** accept more than one line from a box on the left	1 1 1	AO1 4.5.3.3

4.4.2.2 Response to exercise

Answer 39 · Mark scheme

June 2025 | 8461/2F | Original Q4

Question	Answers	Mark	AO / Spec. Ref.
04.4	**Level 2:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	3–4	AO3 4.5.3.3
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content **in favour of a kidney transplant** • no need for regular / long hospital visits • could last for rest of lifetime • flexible lifestyle eg as can go on holidays • may not live near a hospital **or** reference to transport costs • no risk of infection from frequent piercing of skin **or** no risk of infection from blood exposed to equipment • no need for controlled diet • maintains correct concentration of substances in blood / body • cheaper in long term **against a kidney transplant** • may be rejected • need to keep taking anti-rejection drugs **or** immunosuppressants • (suitable) donor may not be available **or** donor may need tissue matching • risk from surgery (anaesthetic or infection) • recovery from surgery may take a long time • may need replacing eventually For **Level 2**, points for and against a kidney transplant must be given.		

Total Question 4	10

4.4.2.2 Response to exercise

Version 1: 0109

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Mark Scheme

2009 examination – January series

4.4.2.2 Response to exercise

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.

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Dr Michael Cresswell Director General

4.4.2.2 Response to exercise

MARK SCHEME

Information to Examiners

1. General

The mark scheme for each question shows:

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

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

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

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

2. Emboldening

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

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

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

3. Marking points

3.1 Marking of lists

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

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

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

4.4.2.2 Response to exercise

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.

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
1(a)(i)	artery		1
1(a)(ii)	capillary		1
1(b)	alveoli		1
	red blood cells		1
	nucleus		1
Total			**5**

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
2(a)(i)	energy		1
2(a)(ii)	microorganisms		1
2(b)(i)	25°C		1
2(b)(ii)	pathogens		1
Total			**4**

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

<table>
<tr><th>question</th><th>answers</th><th>extra information</th><th>mark</th></tr>
<tr><td>3(a)</td><td>178</td><td>ignore working or lack of working

correct working: 180 – 2 but no answer / wrong answer = 1 mark</td><td>2</td></tr>
<tr><td>3(b)</td><td><table><tr><th>Man A</th><th>Man B</th></tr><tr><td>higher</td><td>lower</td></tr><tr><td>lower</td><td>higher</td></tr><tr><td>lower</td><td>higher</td></tr></table></td><td>all 4 cells correct = 2 marks
2 or 3 cells correct = 1 mark
0 or 1 cells correct = 0 mark</td><td>2</td></tr>
<tr><td>Total</td><td></td><td></td><td>4</td></tr>
</table>

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
4(a)	yeast		1
4(b)(i)	**two** sensible suggestions, each linked to correct explanation:	max **4** marks	
	does not release CO		1
	gas is toxic / harms living organisms		1
		allow ethanol <u>only</u> releases CO_2 and H_2O for **1** mark	
	does not release NO_x / SO_2	do **not** allow more pollution / more gases released	1
	gas(es) cause acid rain / eq / harms organisms		1
	or		
	does not cause acid rain (1)		
	(acid rain) damages building / harms organisms (1)		
	made from crops / not a fossil fuel (1)		
	crops can re-grow / source is renewable / fossil fuels are non-renewable (1)		
4(b)(ii)	any **one** from • releases less energy (per litre) • need to burn more to cover same distance / travel shorter distance • land not being used for food crops / less food available • raises food prices		1
Total			**6**

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
5(a)	40–60 hours		1
5(b)(i)	decrease 1st slowly then faster / appropriate detail from the graph eg from 7.8 to 0 / faster after 4-10 h		1 1
5(b)(ii)	oxygen after glucose oxygen less than glucose	extra box ticked cancels **1** mark	1 1
5(b)(iii)	aerobic respiration		1
Total			**6**

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
6(a)(i)	kill / destroys (micro)organisms / bacteria / fungi / living things	do **not** allow get rid of microorganisms	1
6(a)(ii)	entered from environment / already in flask **or** insufficient heating to kill all microorganisms		1
6(b)	any **two** from: • heated more thoroughly / for longer / higher temperature • destroyed / killed all microorganisms • sealed better eg flask melted / sealed immediately after heating / no pouring through air • microorganisms unable to enter (from air) / can only enter when neck broken / open		2
6(c)	biogenesis		1
Total			**5**

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
7(a)(i)	19 800	for correct answer ignore working or lack of working 165 × 120 but no answer / wrong answer = **1** mark (ignore extras)	2
7(a)(ii)	any **two** from: • for respiration • energy released • prevents anaerobic respiration • prevents build-up of lactic acid	 ignore oxygen debt allow energy produced	2
7(b)	any **two** from: • increased breathing rate • increased depth of breathing **or** deep breathing • dilation of arteries / vasodilation • blood diverted from elsewhere	 } more breathing is max **1** mark ignore increase in heart rate allow heavier breathing do **not** allow harder breathing allow blood vessels dilate do **not** allow veins / capillaries dilate ignore name of organ	2
Total			**6**

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
8(a)	transpiration / evaporation / diffusion	ignore osmosis	1
8(b)(i)	D		1
8(b)(ii)	any **two** from: • more / faster diffusion **or** evaporation **or** transpiration • molecules move faster • maintains concentration gradient **or** keeps water concentration low in the air **or** brings in more dry air **or** removes damp air / water		2
Total			**4**

4.4.2.2 Response to exercise

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: January 2009

question	answers	extra information	mark
9(a)	prevents denaturation / change / damage of proteins / enzymes **or** prevents bacteria being killed / destroyed	allow protein is 'destroyed' do **not** allow 'bacteria denatured' **or** 'protein killed'	1
9(b)(i)	any **two** from: • anaerobic respiration • lactic (production) • acid (produced)	do **not** allow 'bacteria are acidic' allow max **1** mark if incorrect named acid	2
9(b)(ii)	any **one** from: • thickens / clots / solidifies (milk) • kills other microorganisms **or** prevents other microbes growing • preserves yoghurt **or** prevents yoghurt going off **or** makes yoghurt last longer **or** keeps it fresh • reference to (improved) flavour	allow reference to germs	1
9(c)	reduce / prevent growth / reproduction of microorganisms **or** to prevent decay **or** to preserve it **or** to keep it fresh **or** to prevent it becoming <u>too</u> sour	allow reference to germs ignore curdling	1
Total			**5**

4.4.2.2 Response to exercise

AQA

GCSE
BIOLOGY
8461/1F

Paper 1 Foundation Tier

Mark scheme

June 2020

Version: 1.0 Final Mark Scheme

jun2084611F/MS

4.4.2.2 Response to exercise

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

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4.4.2.2 Response to exercise

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.

4.4.2.2 Response to exercise

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.

4.4.2.2 Response to exercise

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.

4.4.2.2 Response to exercise

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.

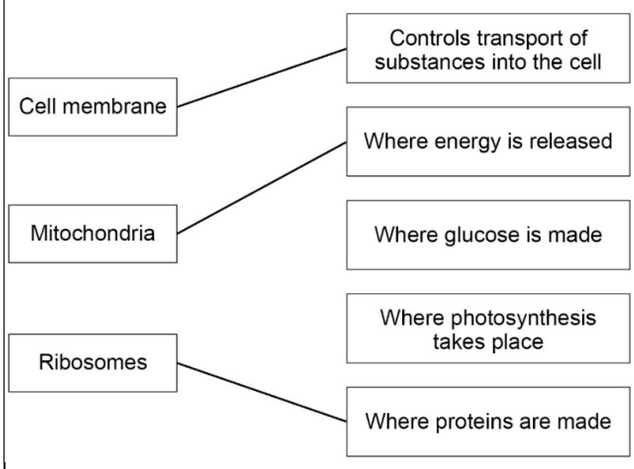
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

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.

4.4.2.2 Response to exercise

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	bacterium		1	AO2 4.1.1.1
01.2	to strengthen the cell		1	AO1 4.1.1.1 4.1.1.2
01.3	chloroplast		1	AO2 4.1.1.2 4.2.3.1
01.4	**Structure** **Function**  additional line from a box on the left negates the mark for that box		3	AO1 4.1.1.2 4.1.3.1
01.5	adjust the focus knob		1	AO3 4.1.1.2 RPA1
01.6	(A =) 15 (mm) (B =) 60 (mm)	allow a tolerance of ± 1mm	1 1	AO2 4.1.1.2 RPA 1
01.7	$\frac{60}{15} = 4(.0)$	allow ecf from question **01.6**	1	AO2 4.1.1.2 RPA 1

4.4.2.2 Response to exercise

01.8	$\frac{40}{0.1}$ 400	 do **not** accept if a unit is given	1 1	AO2 4.1.1.5 RPA 1
Total			**12**	

4.4.2.2 Response to exercise

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	mitosis		1	AO1 4.1.2.2
02.2	all lines correct = **2** marks 1 or 2 lines correct = **1** mark **Stage of cell cycle** / **What happens during that stage** Stage 1 → The cell grows and the chromosomes replicate Stage 2 → One set of chromosomes is pulled to each end of the cell Stage 3 → The cytoplasm and cell membrane divide to form two new cells additional line from a box on the left negates the credit for that box		2	AO1 4.1.2.2
02.3	$\frac{7}{10} \times 100$ 70(%)	allow $\frac{252}{300} \times 100$ allow answer calculated from angle in range 250° to 254° if no other mark awarded, allow 0.7 for **1** mark	1 1	AO2 4.1.2.2
02.4	3		1	AO2 4.1.2.2
02.5	DNA	allow deoxyribonucleic acid	1	AO1 4.1.2.1 4.1.2.2
02.6	a gene		1	AO1 4.1.2.1

4.4.2.2 Response to exercise

02.7	(bone marrow) cells differentiate into many / other types of (named) cell (so) will cure diseases where new cells are needed **or** will cure diseases where cells are damaged	allow (bone marrow) cells can become many / other types of (named) cell allow (so) will cure anaemia / leukaemia **or** blood cancer **or** blood disorders allow (so) will cure paralysis / diabetes	1 1	AO1 AO2 4.1.2.3
Total			**10**	

4.4.2.2 Response to exercise

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	any **one** from: • bacteria • fungi • protists	allow singular allow names of pathogens e.g. Salmonella ignore virus / germ	1	AO1 4.3.1.1 4.3.1.3 4.3.1.5
03.2	hydrochloric acid is produced by the stomach the skin is a barrier covering the whole body		1 1	AO1 4.2.2.1 4.3.1.6
03.3	white blood cells engulf the microorganisms.		1	AO1 4.2.2.3 4.3.1.6
03.4	weakened fast	in this order only	1 1	AO1 4.3.1.7
03.5	by coughs / sneezes	allow 'by droplets in the air' do **not** accept other means of transmission e.g. touch	1	AO1 4.3.1.1 4.3.1.2
03.6	(from day) 10 (to day) 18	allow (from day) 18 (to day) 10	1	AO2 4.3.1.2
03.7	14 (days)	allow in the range 13 to 15 (days)	1	AO3 4.3.1.2
03.8	any **one** from: • they had been vaccinated • they already had antibodies • they were immune • they had had it before • they did not get any / enough virus from infected child • they did not play (much) with the infected child	 ignore they were resistant ignore they wore a mask unqualified	1	AO3 4.3.1.2 4.3.1.7

4.4.2.2 Response to exercise

03.9	antibiotics do not kill viruses	allow antibiotics do not work on viruses allow antibiotics only kill bacteria	1	AO3 4.3.1.8
Total			**11**	

4.4.2.2 Response to exercise

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	increased (at first) until 4 minutes **or** 50 breaths per minute (then) stayed constant (from 4 minutes **or** at 50 breaths per minute)		1 1 1	AO2 4.4.2.2
04.2	175 (beats per minute)		1	AO2 4.4.2.2
04.3	140 (beats per minute)		1	AO2 4.4.2.2
04.4	because his rate is lower than the maximum safe rate	allow ecf for incorrect values in question **04.2** and question **04.3**	1	AO3 4.2.2.2 4.4.2.2

4.4.2.2 Response to exercise

04.5	**Level 3:** Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO3
	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	AO2
	No relevant content	0	

	Indicative content
	
	• heart rate increased
	  ○ to increase blood flowing to muscles / lungs
	  ○ to provide more oxygen (to muscles)
	  ○ to provide more glucose (to muscles)
	  ○ to remove carbon dioxide more quickly (from the muscles / blood)
	  ○ to remove lactic acid more quickly (from the muscles)
	
	• breathing rate increased
	  ○ supplies more oxygen / air to lungs
	  ○ so more oxygen to blood
	  ○ more carbon dioxide removed
	
	• more oxygen to muscles
	  ○ needed for (increased) respiration
	  ○ to release / provide energy
	  ○ for muscle contraction
	
	• anaerobic respiration occurs
	  ○ due to lack of oxygen
	  ○ which causes a build-up of lactic acid
	  ○ oxygen debt
	  ○ muscle fatigue / pain
	
	To reach **Level 3**, there must be reference to heart rate, breathing rate and respiration
			4.2.2.2
			4.2.2.3
			4.4.2.1
			4.4.2.3
			4.4.2.2

Total			**12**

4.4.2.2 Response to exercise

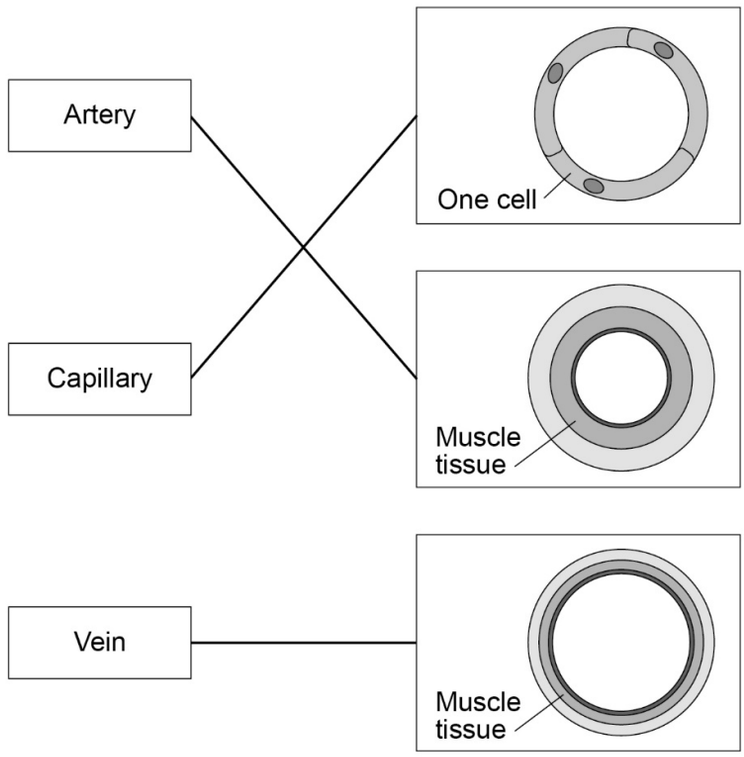
Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	will stop animals / herbivores eating it	allow it will not be eaten	1	AO3 4.3.3.2
05.2	chemical		1	AO1 4.3.3.2
05.3	thorns / spikes / spines / prickles (to stop animals / herbivores eating it)		1	AO3 4.3.3.2
05.4	for respiration to store as starch		1 1	AO1 4.4.1.3 4.4.2.1
05.5	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
05.6	(nitrate ions are needed) to make proteins / amino acids which are needed for growth / enzymes / new cells	allow to make chlorophyll / DNA / ATP / nucleic acid allow correct process for named molecule in mp1	1 1	AO1 AO2 4.1.3.3 4.4.1.3 4.4.2.3
05.7	in / on the (soil) water	allow through air (spaces) in the soil	1	AO3 4.3.1.1 4.3.1.4
05.8	dosage toxicity		1 1	AO1 4.3.1.9

4.4.2.2 Response to exercise

05.9	placebos		1	AO1 4.3.1.9
Total			**14**	

4.4.2.2 Response to exercise

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

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	all lines correct = **2** marks 1 **or** 2 lines correct = **1** mark **Type of blood vessel** / **Structure of blood vessel**  additional line from a box on the left negates the credit for that box		2	AO2 4.2.2.2

4.4.2.2 Response to exercise

06.2	any **one** from: • thick(er) (muscle) walls / tissue (1) to push blood (all) around the body (1) **or** • thick(er) elastic walls / tissue (1) to maintain / withstand high (blood) pressure **or** to retain / regain shape (1) **or** • narrow lumen (1) to maintain high (blood) pressure (1)	allow to withstand high (blood) pressure do **not** accept to pump blood (all) around the body	2	AO1 4.2.2.2
06.3	(A) – white (blood) cell(s) (B) – platelet(s)	allow any named white (blood) cell(s)	1 1	AO2 4.2.2.3
06.4	(no nucleus) more space for haemoglobin / oxygen (has haemoglobin) to bind / carry oxygen	allow to carry more oxygen ignore carries carbon dioxide	1 1	AO3 4.1.1.2 4.1.1.3 4.2.2.3
06.5	plasma		1	AO1 4.2.2.3
06.6	platelets		1	AO3 4.2.2.3

4.4.2.2 Response to exercise

06.7	any **one** from: • (continued) bleeding • (more) bruising	allow described allow blood does not clot (at cuts) allow ecf from answer to question **06.6**	1	AO3 4.2.2.3
Total			**11**	

4.4.2.2 Response to exercise

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1		allow correct chemical symbols ignore any attempt at balancing equation ignore light / chlorophyll		AO1 4.4.1.1
	before arrow carbon dioxide **and** water	either order	1	
	after arrow glucose	ignore sugar / carbohydrate do **not** accept starch	1	
07.2		ignore description of subsequent parts of the photosynthesis reaction		AO1 4.1.1.2 4.4.1.1
	light	allow sunlight ignore sun	1	
	(light) is captured / trapped / absorbed by chlorophyll / chloroplasts	allow (light) is used by chlorophyll / chloroplasts	1	
07.3	$\frac{(18.5 + 19.3 + 19.5)}{3}$ **or** $\frac{57.3}{3}$		1	AO2 4.4.1.2 RPA 6
	19.1 (cm^3/hour)	allow an answer correctly calculated using only two correct values	1	
07.4	a ring around 14.2	allow clear indication of correct result	1	AO3 4.4.1.2 RPA 6

4.4.2.2 Response to exercise

07.5	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
07.6	did not use it in calculation (of mean)		1	AO3 4.4.1.2 RPA 6
07.7	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
07.8	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

4.4.2.2 Response to exercise

07.9	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**	

4.4.2.2 Response to exercise

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	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	
08.2	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	

4.4.2.2 Response to exercise

08.3	**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		

4.4.2.2 Response to exercise

08.4	Osmosis	allow diffusion	1	AO1 4.1.3.1 4.2.3.2 4.1.3.2
08.5	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**	

4.4.2.2 Response to exercise

Answer 35 · Examiner comments November 2020 | 8461/1F | Original Q4

Question 4 (low & standard demand)

Students are advised to take care when reading the stem of each question; several students described the heart rate in **04.1**. In **04.4**, a comparative answer was required, and stating numbers, without qualification, was not creditworthy; just over half of students achieved this mark.

In **04.5**, very few students (28%) accessed Level 2 and above. Many students didn't realise that the question was asking for an explanation of the effects of exercise, and not a further description of the trends shown in the graph. In those responses that did address the effect of exercise, respiration was commonly used as a synonym for breathing, and many students talked about sweating and 'burning calories' unnecessarily. Many students made a comment about the age of the man and the fact his age had an (often negative) implication on his fitness levels.

Answer 38 · Examiner comments June 2022 | 8461/2F | Original Q6

Question 6

This question was about temperature variation in a primitive mammal, the echidna, and in a human.

06.1 Reading the highest and lowest values for the echidna's body temperature from the graph in **Figure 9** should have been very straightforward. Whereas some students misread the small divisions on the scale as representing 0.5 or 2°C (rather than 1°C), others misunderstood the question and gave the highest and lowest values of the peaks or of the troughs. Thus only three-quarters gained credit.

4.4.2.2 Response to exercise

Answer 38 · Examiner comments

June 2022 | 8461/2F | Original Q6

06.2 Almost 90 percent of students successfully counted the five peaks in the graph as representing the times when the echidna woke up from hibernation.

06.3 This question was particularly poorly answered, with fewer than one in twenty gaining credit. Very few students referred to food stores at all and of those who did, hardly any included the idea that waking up from hibernation to hunt for food resulted in replacement, or prevented the stores running out.

06.4 A liitle over one third of students selected the answer *respiration*, the other two options, 'diffusion' and 'excretion', being almost as common.

06.5 The most common correct answers for the use of energy in the echidna's body referred either to movement in one form or another (usually locomotion) or to keeping the echidna warm. A small proportion suggested growth or muscle contraction and a very small number gave 'active transport'. Just under half of the students were successful in this question.

Questions **06.6** to **06.8** related to temperature control in humans by sweating.

06.6 Most students (almost two-thirds) completed the calculation correctly to find the amount of energy the athlete used each day for evaporation of sweat. Of those who did not, the most common answer was 1280 kJ, achieved by dividing 3200 by 2.5, rather than multiplying the two values to give a correct value of 8000 kJ.

06.7 Just over half the students successfully calculated that the athlete used 25 percent of the daily energy intake to evaporate sweat, with just a few forgetting to multiply the fraction by 100, thus gaining just the one mark. As in question **06.6**, the most common error resulted from inverting the fraction and dividing 24000 by 6000, so arriving at 400%, there being no evidence of students questioning this answer and reconsidering their calculations.

06.8 Although almost two-thirds understood that resting would reduce the amount of sweat produced, a surprisingly high minority of students believed that resting, rather than running, would increase sweat production. Some of the latter showed they had misunderstood the question by stating that resting would allow the athlete to 'store up sweat' to be released when next exercising, thus increasing sweating then.

4.4.2.2 Response to exercise

Answer 39 · Examiner comments

June 2025 | 8461/2F | Original Q4

Question 4 (Low and Standard demand)

04.1
Students were given data showing how much water a person gained and lost by different methods and were asked to complete a bar chart. Generally, this question was answered very well, with 75% of students gaining both marks. Around 5% of students did not attempt the question. There was some mis-plotting seen, usually due to misreading the scale. A common error was not labelling the bars, so mark point 2 could not be awarded.

04.2
Over 70% of students knew that the volume of water lost by sweating on the day of a race would be greater.

04.3
In this question, the students were told to draw one line from each box on the left to the appropriate box on the right. Some students drew two lines from a box on the left and thus did not gain the mark for that process. A pleasing 66% of students gained full marks. A common error was to have 'Excretion' linked to 'Removes water from the blood' or 'Filtration' linked to 'Takes excess water out of the body'. Only just over 5% of students did not understand the processes in the kidney and scored no marks at all.

04.4
This was a levelled response question, in which students were given some facts about kidney transplants and dialysis, and asked to evaluate the two methods of treating kidney failure. They were also told to draw on their own knowledge in their answer. 10% of students did not attempt this question.
A significant proportion of students simply copied the information given in the question without any modification or comment and were among the 20% of students that scored no marks. There had to be some original content in the answer for it to be worthy of credit.
It was apparent that several students had little awareness of the processes involved with either type of treatment giving comments such as 'Transplants only take a couple of hours – you just need a donor'.

A pleasing number of students identified the improvement to lifestyle due to not needed to go for regular/long hospital visits, and similar numbers of students considered the issue of rejection. Over 40% of students that gave both an idea in favour and against kidney transplant were given credit in Level 2.

Many students gave a partial reason in their arguments which did not gain credit such as 'It is less expensive', 'You have to take drugs', 'It's risky'. The source of the donor organ was seldom referred to, and when it was, was generally assumed to be a living relative or a kind stranger. A large number thought that the cost of treatment was the responsibility of the patient and that might affect their choice of treatment. Giving a one-sided argument – that is - giving only points for or points against transplant, limited the student to one mark in Level 1.