AQA GCSE Biology | 8461

SPECIFICATION POINT 4.4.2.1

Aerobic and anaerobic respiration

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**40**
Available paper years	**2008–2025**

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.

4.4.2.1 Aerobic and anaerobic respiration

Answer 01 · 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

4.4.2.1 Aerobic and anaerobic respiration

Answer 01 · Mark scheme

January 2008 | BLY2F | Original Q2 | Legacy

BLY2F

4.4.2.1 Aerobic and anaerobic respiration

Answer 02 · Mark scheme

January 2008 | BLY2F | Original Q7 | Legacy

Question 7

	answers	extra information	mark
(a)(i)	**D**		1
(a)(ii)	**A**		1
(b)(i)	air / oxygen (can enter)	ignore other factors entering or leaving	1
	for (aerobic) respiration	do **not** accept anaerobic respiration	1
(b)(ii)	(more) minerals / nutrients /salt(s) / ions **or** named mineral / element available	ignore fertility / fertiliser allow symbols allow eg mulching / reducing weeds **or** retain water	1
total			5

4.4.2.1 Aerobic and anaerobic respiration

Answer 03 · Mark scheme

June 2008 | BLY2F | Original Q1 | Legacy

question	answers	extra information	mark
1(a)	**A** nucleus **B** (cell) membrane **C** cytoplasm		1 1 1
1(b)(i)	it is thin		1
1(b)(ii)	diffusion		1
Total			**5**

Answer 04 · Mark scheme

June 2008 | BLY2F | Original Q2 | Legacy

question	answers	extra information	mark
2(a)	photosynthesis		1
2(b)	oxygen		1
2(c)	chlorophyll		1
2(d)	starch		1
Total			**4**

4.4.2.1 Aerobic and anaerobic respiration

Answer 04 · Mark scheme

June 2008 | BLY2F | Original Q2 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.4.2.1 Aerobic and anaerobic respiration

Answer 05 · Mark scheme

June 2008 | BLY2F | Original Q5 | Legacy

question	answers	extra information	mark
5(a)(i)	0		1
5(a)(ii)	osmosis		1
5(b)	0.5 no change in mass / weight **or** no (net) osmosis / same amount of water in and out	 allow 'chip / it stays the same'	1 1
5(c)	repeat / use more chips in each solution	allow use of other people's results do **not** allow 'get more results' unqualified do **not** allow leave longer / use more concentrations / better instrumentation	1
Total			**5**

4.4.2.1 Aerobic and anaerobic respiration

Answer 05 · Mark scheme

June 2008 | BLY2F | Original Q5 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: June 2008

4.4.2.1 Aerobic and anaerobic respiration

Answer 06 · Mark scheme

June 2008 | BLY3F | Original Q1 | Legacy

question	answers	extra information	mark
1(a)	A = nucleus B = cell wall		1 1
1(b)(i)	carbon dioxide		1
1(b)(ii)	respiration		1
1(c)(i)	amount of flour / yeast / water / dough **or** type of flour / yeast / dough		1
1(c)(ii)	35		1
Total			**6**

4.4.2.1 Aerobic and anaerobic respiration

Answer 06 · Mark scheme

June 2008 | BLY3F | Original Q1 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

4.4.2.1 Aerobic and anaerobic respiration

Answer 07 · Mark scheme

June 2008 | BLY3F | Original Q4 | Legacy

question	answers	extra information	mark
4(a)(i)	red cell		1
4(a) (ii)	diffusion		1
4(a) (iii)	haemoglobin		1
4(a) (iv)	a nucleus		1
4(b)	(on diagram) arrow from any part of blood to air		1
Total			**5**

4.4.2.1 Aerobic and anaerobic respiration

Answer 07 · Mark scheme

June 2008 | BLY3F | Original Q4 | Legacy

COMPONENT NUMBER: BLY3F

COMPONENT NAME: Biology

STATUS: Final

DATE: June 2008

4.4.2.1 Aerobic and anaerobic respiration

Answer 08 · Mark scheme

January 2009 | BLY2F | Original Q4 | Legacy

question	answers	extra information	mark
4(a)	respiration	clear indication eg tick, underlining, others crossed out	1
4(b)	lungs		1
4(c)	liver		1
4(d)	amino acids		1
Total			**4**

4.4.2.1 Aerobic and anaerobic respiration

Answer 08 · Mark scheme January 2009 | BLY2F | Original Q4 | Legacy

COMPONENT NUMBER: BLY2F

COMPONENT NAME: Additional Science / Biology

STATUS: Final

DATE: January 2009

Answer 09 · Mark scheme January 2009 | BLY3F | Original Q4 | Legacy

The full source mark scheme begins on page 71. Follow original question 4 in that document.

Answer 10 · Mark scheme January 2009 | BLY3F | Original Q5 | Legacy

The full source mark scheme begins on page 71. Follow original question 5 in that document.

4.4.2.1 Aerobic and anaerobic respiration

Answer 11 · Mark scheme

June 2009 | BLY2F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	A		1
2(b)(i)	diffusion		1
2(b)(ii)	respiration		1
2(b)(iii)	mitochondria		1
2(b)(iv)	photosynthesis		1
Total			**5**

4.4.2.1 Aerobic and anaerobic respiration

Answer 11 · Mark scheme

June 2009 | BLY2F | Original Q2 | Legacy

BLY2F

4.4.2.1 Aerobic and anaerobic respiration

Answer 12 · Mark scheme

June 2010 | BLY2F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	C and D		1
1(a)(ii)	cell wall		1
1(b)(i)	A		1
1(b)(ii)	D		1
1(c)	respiration		1
Total			**5**

4.4.2.1 Aerobic and anaerobic respiration

Answer 12 · Mark scheme

June 2010 | BLY2F | Original Q1 | Legacy

BLY2F

4.4.2.1 Aerobic and anaerobic respiration

Answer 13 · Mark scheme June 2010 | BLY2F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	microorganisms		1
2(b)	moist		1
2(c)	respiration		1
2(d)	roots		1
Total			**4**

4.4.2.1 Aerobic and anaerobic respiration

Answer 13 · Mark scheme

June 2010 | BLY2F | Original Q2 | Legacy

BLY2F

4.4.2.1 Aerobic and anaerobic respiration

Answer 14 · Mark scheme

June 2010 | BLY2F | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)(i)	20		1
7(a)(ii)	one tenth / 0.1 / 10% / 1:9 / 1 in 10 / 1 out of 10 / $\frac{1}{10}$	for correct answer irrespective of working **2** marks ignore any units accept equivalent fractions eg $\frac{4}{40}$ / $\frac{2}{20}$ do **not** allow eg 1:10 / 1 to 10 if answer is incorrect clear selection of 2 **and** 20, **or** equivalent **or** 1:4:5 / 1:5:4 gains **1** mark	2
7(b)	any **two f**rom: • (body) heat / maintaining body temperature • movement (max 2) • growth / cell division / repair / reproduction / building molecules • accept active transport	do **not** accept sweating / cooling / excretion allow keep warm allow **2 different** examples of movement, internally and / or externally eg breathing / exercise / eating / circulation allow muscle contraction if no other muscle action is credited movement + breathing = 1 mark allow examples eg making proteins (from amino acids) ignore 'chemical reactions' / digestion	2

Question 7 continues on the next page

4.4.2.1 Aerobic and anaerobic respiration

Answer 14 · Mark scheme

June 2010 | BLY2F | Original Q7 | Legacy

BLY2F

Question 7 continued

question	answers	extra information	mark
7(c)	more movement / have to hunt / catch food	allow converse if stated for herbivore eg herbivores food is all around ignore reference to size **or** predator unqualified	1
7(d)	any **two** from • less movement • less heat loss • less respiration	ignore reference to food allow no movement allow less space to move ignore less space unqualified allow no heat loss **or** they are kept warm	2
Total			**8**

4.4.2.1 Aerobic and anaerobic respiration

Answer 15 · Mark scheme

June 2019 | BLY3F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	A higher concentration would be difficult to stir		1
5(b)(i)	methane		1
5(b)(ii)	60	100 – (5 + 35) but incorrect answer allow **1** mark	2
5(c)(i)	aerobic respiration		1
5(c)(ii)	oxygen		1
Total			**6**

4.4.2.1 Aerobic and anaerobic respiration

Answer 15 · Mark scheme

June 2010 | BLY3F | Original Q5 | Legacy

BLY 3F

4.4.2.1 Aerobic and anaerobic respiration

Answer 16 · Mark scheme June 2019 | 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**

4.4.2.1 Aerobic and anaerobic respiration

Answer 16 · Mark scheme

June 2010 | BLY3F | Original Q6 | Legacy

BLY 3F

4.4.2.1 Aerobic and anaerobic respiration

Answer 17 · Mark scheme

June 2010 | BLY3F | Original Q7 | Legacy

Question 7

question	answers	extra information	mark
7(a)(i)	A = (cell) wall B = cytoplasm	ignore cellulose	1 1
7(a)(ii)	any **one** from • bacterial cell / it has no nucleus • DNA free in cytoplasm • has no vacuole / no vesicles	 accept has DNA instead of a nucleus but **not** just has DNA allow no mitochondria ignore size ignore strands of DNA	1
7(b)(i)	yeast grows best / better / well **or** optimum temperature for yeast / more yeast present CO_2 made(by yeast) **or** respires / respiration (by yeast)	allow yeast works best / better / well allow fermentation (ignore anaerobic/aerobic)	1 1
7(b)(ii)	bacterium grows best / better / well / more bacteria present **or** optimum temperature for bacterium (lactic) acid made (by bacterium)	ignore micro organism / microbes allow works / respires best / better / well (ignore anaerobic/aerobic) do **not** allow wrong acid	1 1
7(b)(iii)	bread still rises (in acid conditions) **or** no need to control / monitor pH		1
Total			**8**

4.4.2.1 Aerobic and anaerobic respiration

Answer 17 · Mark scheme

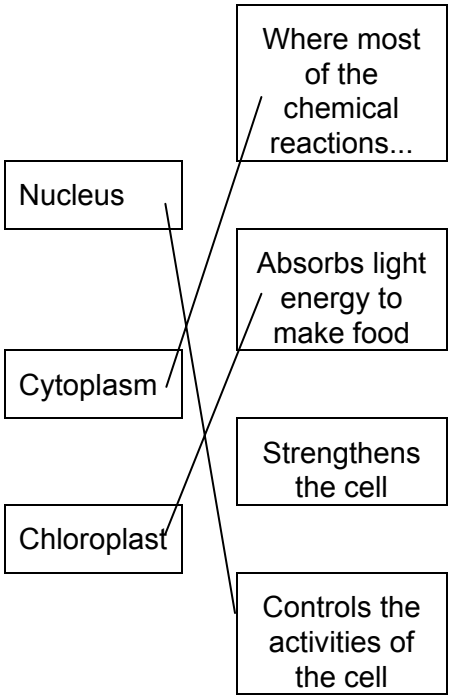
June 2010 | BLY3F | Original Q7 | Legacy

BLY 3F

4.4.2.1 Aerobic and anaerobic respiration

Answer 18 · Mark scheme January 2011 | BLY2F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)		**1** mark for each correct line mark each line from left hand box two lines from left hand box cancels mark for that box	3
1(b)	energy		1
Total			**4**

4.4.2.1 Aerobic and anaerobic respiration

Answer 18 · Mark scheme January 2011 | BLY2F | Original Q1 | Legacy

BLY2F

Answer 19 · Mark scheme January 2011 | BLY3F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	carbon dioxide		1
1(a)(ii)	fermentation		1
1(b)	25		1
Total			3

BLY3F

Answer 20 · Mark scheme January 2011 | BLY3F | Original Q3 | Legacy

Question 3

question	answers	extra information	mark
3(a)(i)	18		1
3(a)(ii)	Z		1
3(b)(i)	red blood cells		1
3(b)(ii)	haemoglobin		1
Total			4

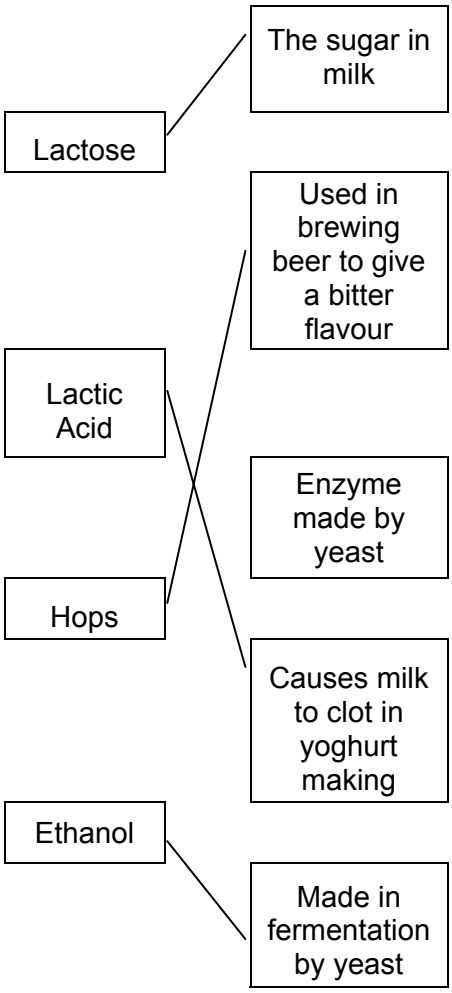
BLY3F

4.4.2.1 Aerobic and anaerobic respiration

Answer 21 · Mark scheme

June 2011 | BLY3F | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1		all four correct = **4** marks three correct = **3** marks two correct = **2** marks one correct = **1** mark extra line from a statement cancels the mark	4
Total			**4**

4.4.2.1 Aerobic and anaerobic respiration

Answer 21 · Mark scheme

June 2011 | BLY3F | Original Q1 | Legacy

BLY3F

4.4.2.1 Aerobic and anaerobic respiration

Answer 22 · Mark scheme June 2011 | BLY3F | Original Q2 | Legacy

Question 2

question	answers	extra information	mark
2(a)	guard cells		1
2(b)(i)	2.00 / 2.0 / 2		1
2(b)(ii)	0.05 or 1/20		1
2(b)(iii)	(Q has) large(r) surface area / more stomata / thinner cuticle / larger leaves	it = Q accept other sensible answers	1
2(b)(iv)	wind 30	extra box ticked cancels the mark	1
2(c)	wilting	extra ring drawn cancels the mark	1
Total			**6**

4.4.2.1 Aerobic and anaerobic respiration

Answer 22 · Mark scheme

June 2011 | BLY3F | Original Q2 | Legacy

BLY3F

4.4.2.1 Aerobic and anaerobic respiration

Answer 23 · 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**

4.4.2.1 Aerobic and anaerobic respiration

Answer 23 · Mark scheme

June 2011 | BLY3F | Original Q4 | Legacy

BLY3F

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

Answer 24 · Mark scheme

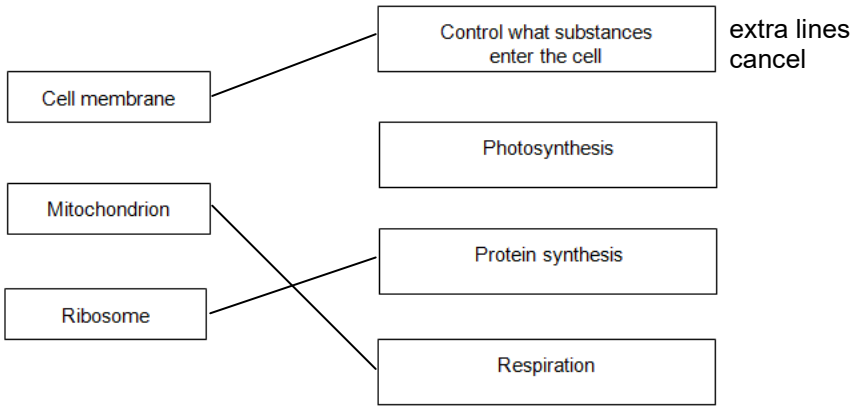
January 2013 | BL2FP | Original Q6 | Legacy

BL2FP

4.4.2.1 Aerobic and anaerobic respiration

Answer 25 · Mark scheme June 2013 | BL2FP | Original Q1 | Legacy

Question 1

question	answers	extra information	mark
1(a)(i)	A = cytoplasm B = (cell) membrane		1 1
1(a)(ii)	nucleus	accept chromosome / DNA / genes accept phonetic.	1
1(b)		extra lines cancel	3
Total			**6**

4.4.2.1 Aerobic and anaerobic respiration

Answer 26 · Mark scheme

June 2013 | BL2FP | Original Q6 | Legacy

Question 6

question	answers	extra information	mark
6(a)	LHS – glucose RHS – water	 allow H_2O / H20	1 1
6(b)	so the earthworms' body temperature would change to 20 °C		1
6(c)(i)	56 or 55 or 54	if incorrect answer given accept 60 - 5 for **1** mark or 60 – 6 for **1** mark or 60 – 4 for **1** mark	2
6(c)(ii)	one-tenth of answer to (c)(i) eg 5.5		1
6(c)(iii)	(at 10 °C / lower temperature): lower rate of respiration worms less active / worms release less energy / worms use less energy	 allow chemical reactions slower or enzymes less active ignore breathing do not allow anaerobic 	 1 1
6(d)(i)	anomalous result / not in line with other data / does not fit the pattern		1
6(d)(ii)	more representative / more reliable / can check 'repeatability' / see if get similar values / identify anomalies	ignore valid / more fair ignore reproducible ignore 'to remove' anomalies do not accept more accurate or more precise	1
Total			**10**

4.4.2.1 Aerobic and anaerobic respiration

Answer 27 · 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**	

4.4.2.1 Aerobic and anaerobic respiration

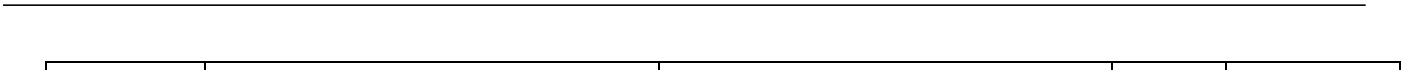
Answer 28 · Mark scheme June 2015 | BL2FP | Original Q3 | Legacy

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>3(a)</td><td>
<table>
<tr><th>Structure</th><th>Organ</th><th>Organ system</th><th>Tissue</th></tr>
<tr><td>Stomach</td><td>✓</td><td></td><td></td></tr>
<tr><td>Cells lining the stomach</td><td></td><td></td><td>✓</td></tr>
<tr><td>Mouth, oesophagus, stomach, liver, pancreas, small and large intestine</td><td></td><td>✓</td><td></td></tr>
</table>
all 3 correct = 2 marks
2 correct = 1 mark
1 or 0 correct = 0 marks
</td><td></td><td>2</td><td>AO1
2.2, 2.2.1a,b,c, d</td></tr>
<tr><td>3(b)(i)</td><td>diffusion</td><td>allow phonetic spelling</td><td>1</td><td>AO1
2.1.2a,b,c</td></tr>
<tr><td>3(b)(ii)</td><td>glucose</td><td></td><td>1</td><td>AO1
2.6.1b</td></tr>
<tr><td>3(b)(iii)</td><td>mitochondria</td><td></td><td>1</td><td>AO1
2.6.1b,d</td></tr>
<tr><td>Total</td><td></td><td></td><td>5</td><td></td></tr>
</table>

4.4.2.1 Aerobic and anaerobic respiration

Answer 28 · Mark scheme

June 2015 | BL2FP | Original Q3 | Legacy



4.4.2.1 Aerobic and anaerobic respiration

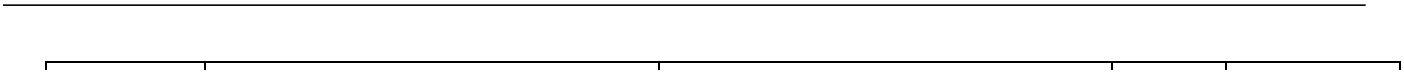
Answer 29 · Mark scheme June 2015 | BL3FP | Original Q7 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
7(a)(i)	fungus		1	AO1 344d
7(a)(ii)	oxygen / O_2	accept air accept O_2 do **not** allow O^2/ O / O2	1	AO2 344d
7(a)(iii)	glucose (syrup)	allow carbohydrate / sugar ignore food / starch allow oxygen if oxygen / air not given in (a)(ii)	1	AO1 344d
7(b)	any **two** from: • quicker • suitable for vegetarians • cheaper • more efficient **or** less land / methane	ignore high in protein ignore sustainability unqualified ignore less pollution unqualified allow less animals harmed / killed allow food chain is shorter **or** has less trophic levels allow less energy lost (from the food chain) do **not** allow no energy lost allow low(er) in calories (than some meat) allow low(er) in fat / healthier (than some meat) allow source of fibre / prevent constipation	2	AO3 344a/d
Total			**5**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 29 · Mark scheme

June 2015 | BL3FP | Original Q7 | Legacy



4.4.2.1 Aerobic and anaerobic respiration

Answer 30 · Mark scheme June 2016 | BL1FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	2400 cm^3		1	AO2 1.2.2a
1(a)(ii)	1400 (cm^3)	allow **2** marks for ecf of correct answer to [answer given in (a)(i) – 1000] allow **1** mark for 2400 – (600 + 400) or equivalent with no or incorrect answer allow **1** mark for ecf of answer given in (a)(i) – 1000 or equivalent with no or incorrect answer	2	AO2 1.2.2a
1(b)(i)	sweat(ing)	allow evaporation allow perspiration	1	AO1 1.2.2a
1(b)(ii)	any **one** from: • for cooling • to maintain body temperature		1	AO1 1.2.2a
1(c)(i)	More water was lost through the skin.		1	AO2 1.2.2a
1(c)(ii)	decrease		1	AO2 1.2.2a
Total			**7**	

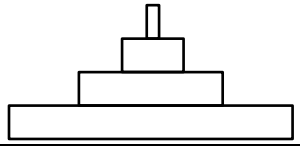
4.4.2.1 Aerobic and anaerobic respiration

Answer 30 · Mark scheme

June 2016 | BL1FP | Original Q1 | Legacy

4.4.2.1 Aerobic and anaerobic respiration

Answer 31 · Mark scheme June 2016 | BL1FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)	any **two** from: • *idea of* absorption of light / energy • transfer to chemical energy • provides food / energy for animals / caterpillar • releases oxygen	allow produce sugars / glucose / starch / carbohydrate / food / biomass	2	AO1 1.5.1a
3(b)			1	AO2 1.5.1b/c
3(c)	15(%)	allow **1** mark for $\frac{3 \times 100}{20}$ with no answer or incorrect answer **or** allow **1** mark for 0.15	2	AO2 1.5.1c
3(d)(i)	any **two** from: • markings look like eyes / face / mouth of much larger animal • looks fierce / scary / dangerous • to frighten blue tit / bird	allow it looks like a snake max 1 if reference to camouflage	2	AO2/AO3 1.4.1d/g
3(d)(ii)	any **two** from: • sharp / long / big claws • sharp / hooked beak • large wings **or** flies quickly • good eyesight	ignore strong ignore strong / big allow streamlined / aerodynamic ignore powerful wings	2	AO2 1.4.1d/f
Total			**9**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 31 · Mark scheme

June 2016 | BL1FP | Original Q3 | Legacy

4.4.2.1 Aerobic and anaerobic respiration

Answer 32 · Mark scheme

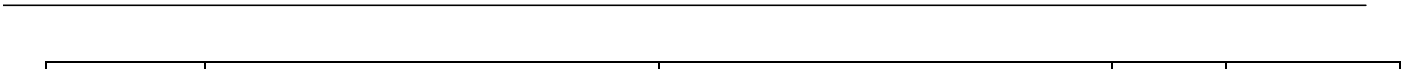
June 2016 | BL2FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)	**Cell part** → **Function** Cell membrane → Controls the movement of substances into and out of the cell Mitochondria → Where most energy is released in respiration Nucleus → Controls the activities of the cell Where proteins are made extra lines cancel		3	AO1 2.1.1a
1(b)	Cell wall Chloroplast	in either order allow (permanent) vacuole	1 1	AO1 2.1.1b
Total			**5**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 32 · Mark scheme

June 2016 | BL2FP | Original Q1 | Legacy



4.4.2.1 Aerobic and anaerobic respiration

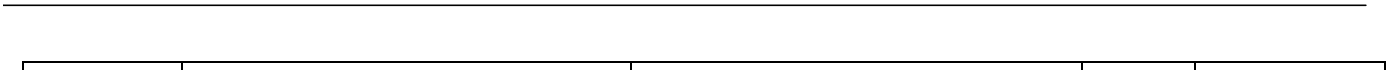
Answer 33 · Mark scheme June 2016 | BL2FP | Original Q7 | Legacy

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**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 33 · Mark scheme

June 2016 | BL2FP | Original Q7 | Legacy



4.4.2.1 Aerobic and anaerobic respiration

Answer 34 · 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

4.4.2.1 Aerobic and anaerobic respiration

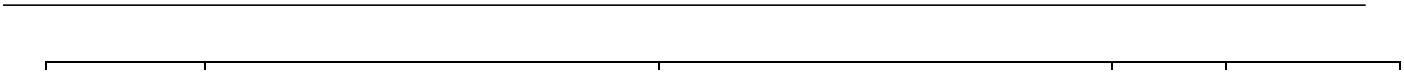
Answer 34 · Mark scheme

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**	

4.4.2.1 Aerobic and anaerobic respiration

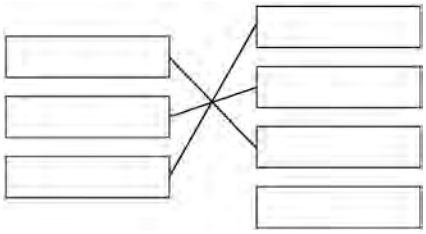
Answer 34 · Mark scheme

June 2017 | BL2FP | Original Q5 | Legacy



4.4.2.1 Aerobic and anaerobic respiration

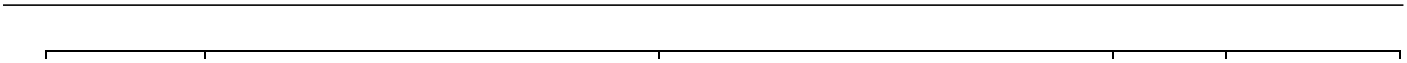
Answer 35 · Mark scheme June 2018 | 8461/2F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1		extra line from a scientific term cancels the mark	1 1 1	AO2 4.7.4.1
01.2	$\frac{10}{200} \times 100$ 5 / 5.0	an answer of 5 / 5.0 scores **2** marks	1 1	AO2 4.7.4.3
01.3	digestion respiration excretion	in this order only	1 1 1	AO2 4.5.3.3 4.7.4.3
01.4	fewer are eaten (by small fish)	allow there are fewer (small) fish eating them do **not** accept none are eaten	1	AO2 4.7.4.1
Total			**9**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 35 · Mark scheme

June 2018 | 8461/2F | Original Q1



4.4.2.1 Aerobic and anaerobic respiration

Answer 36 · Mark scheme June 2019 | 8461/1F | Original Q1

01.1	rice		1	4.2.2.1 AO3
01.2	25 (%)	allow an answer between 23 and 27 (%) ignore ¼ / 0.25	1	4.2.2.1 AO2
01.3	(beans) contain all (four) food groups	allow converse for chicken allow chicken contains no / less carbohydrate **or** beans contain carbohydrate allow beans contain more nutrients ignore references to water / fat / protein	1	4.2.2.1 AO3
01.4	amylase		1	4.2.2.1 AO1
01.5	Benedict's reagent		1	4.2.2.1 AO1
01.6	(brick) red / green / yellow / orange / brown		1	4.2.2.1 AO1
01.7	C		1	4.2.2.1 AO3
01.8	small intestine	allow ileum ignore intestine unqualified do **not** accept large intestine / duodenum	1	4.1.3.3 4.2.2.1 AO1
01.9	active transport osmosis		1 1	4.1.3.2 4.1.3.3 AO1 AO1
Total			**10**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 36 · Mark scheme

June 2019 | 8461/1F | Original Q1

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.4.2.1 Aerobic and anaerobic respiration

Answer 37 · Mark scheme June 2019 | 8461/1F | Original Q4

04.1	temperature volume of yeast and water		1 1	4.4.2.1 AO3
04.2	28		1	4.4.2.1 AO2
04.3	carbon dioxide		1	4.4.2.1 AO2
04.4	the greater the mass of sugar, the greater the volume of foam / gas produced	allow reference to weight / amount of sugar allow reference to amount of foam / gas allow positive correlation ignore names of gases ignore directly proportional	1	4.4.2.1 AO3
04.5	no respiration occurs **or** sugar / glucose is needed for respiration	ignore no reaction occurs	1	4.4.2.1 AO2
04.6	for comparison / to compare **or** to check that no other factor / variable is influencing the results **or** to ensure validity	allow as a control (experiment) allow as a base line do **not** accept as a control variable allow answers in the context of the investigation e.g. to prove that the results obtained were due to the sugar (and nothing else) ignore fair test / accuracy	1	4.4.2.1 AO2
04.7	(it) stops the oxygen / air getting in / through	ignore (it) stops the oxygen / air getting out ignore gases unqualified	1	4.4.2.1 AO2

4.4.2.1 Aerobic and anaerobic respiration

Answer 37 · Mark scheme

June 2019 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	ethanol		1	4.4.2.1 AO1
Total			**9**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 37 · Mark scheme

June 2019 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.4.2.1 Aerobic and anaerobic respiration

Answer 38 · 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

4.4.2.1 Aerobic and anaerobic respiration

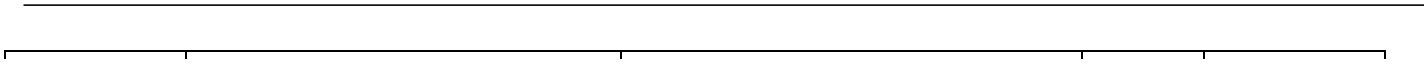
Answer 38 · Mark scheme June 2019 | 8461/2F | Original Q6

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**	

4.4.2.1 Aerobic and anaerobic respiration

Answer 38 · Mark scheme

June 2019 | 8461/2F | Original Q6



4.4.2.1 Aerobic and anaerobic respiration

Answer 39 · Mark scheme

June 2023 | 8461/1F | Original Q1

Question 1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.1	a leaf		1	AO2 4.2.1 4.2.3.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.2	$\frac{1.1 + 1.1 + 1.4}{3}$ **or** $\frac{3.6}{3}$ 1.2 (grams)	if no answer given on answer lines, allow an answer in **Table 1**	1 1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.3	ring around −32.4 (grams)	table takes precedence allow (−)32.4 (grams) written by question	1	AO3 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.4	did not include it	allow ignored it	1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.5	control variable		1	AO1 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.6	time in the salt solution		1	AO3 4.1.3.2 RPA3

4.4.2.1 Aerobic and anaerobic respiration

Answer 39 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.7	osmosis		1	AO2 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.8	some particles		1	AO1 4.1.3.2 RPA3

Question	Answers	Extra information	Mark	AO / Spec Ref.
01.9	use more concentrations of salt solution		1	AO3 4.1.3.2 RPA3

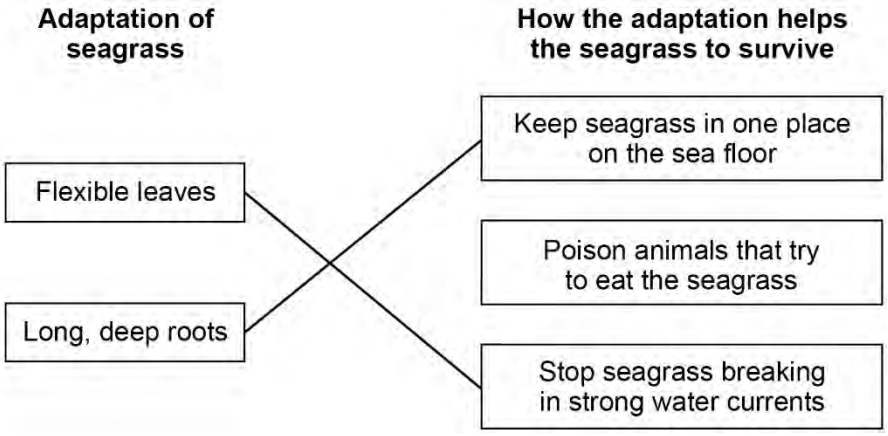
Total Question 1	**10**

4.4.2.1 Aerobic and anaerobic respiration

Answer 40 · Mark scheme

June 2025 | 8461/1F | Original Q5

Question 5

Question	Answers	Mark	AO / Spec Ref.
05.1	 do **not** accept more than one line from a box on the left	1 1	AO2 4.3.3.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.2	lungs	ignore alveoli	1	AO1 4.1.3.1 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.3	gills have a large surface area gills have thin walls		1 1	AO1 4.1.3.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.4	$\frac{944}{484}$ 1.9(50413…) 2	 allow correct rounding from incorrect division	1 1 1	AO2 4.4.2.3

4.4.2.1 Aerobic and anaerobic respiration

Answer 40 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.5	*LHS* oxygen	allow formulae	1	AO1 4.4.2.1
	RHS carbon dioxide	in either order	1	
	water		1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.6	(stingray is) moving	ignore swimming	1	AO2
	(so) muscles (contract)		1	AO2
	(which) needs energy (from respiration)	do **not** accept energy produced / made / created do **not** accept energy released for respiration	1	AO1 4.4.2.1 4.4.2.3
	OR			
	(when swimming) muscles (1)			
	(muscles) contract (1)			
	(which) needs energy (from respiration) (1)	do **not** accept energy produced / made / created do **not** accept energy released for respiration		

Question	Answers	Extra information	Mark	AO / Spec Ref.
05.7	carbon dioxide		1	AO1 4.4.2.1
	ethanol		1	

Total Question 5	**16**

4.4.2.1 Aerobic and anaerobic respiration

Version 1: 0109

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Mark Scheme

2009 examination – January series

4.4.2.1 Aerobic and anaerobic respiration

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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4.4.2.1 Aerobic and anaerobic respiration

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.

4.4.2.1 Aerobic and anaerobic respiration

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.

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

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>

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

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**

4.4.2.1 Aerobic and anaerobic respiration

Answer 39 · Examiner comments June 2023 | 8461/1F | Original Q1

Question 1 (Low demand)

01.1 Over 70% of students correctly selected the leaf as the largest part of the plant.

01.2 Students were asked to calculate a mean and nearly 75% were able to do this correctly. Errors included multiplication (rather than addition) of the three numbers before dividing by 3, and the selection of tests 1 and 2 only, reflecting the anomaly in the 3rd test for concentrated salt solution. Students are always asked to show their working out and if this was correct, but linked with a final wrong answer, one mark could still be awarded.

01.3 Almost 6% of students did not attempt this question possibly because they did not read the instruction and missed the mark unintentionally. Answers that ambiguously showed a ring around more than one result failed to gain credit.

01.4 Two thirds of students were able to gain the mark here. Some failed to answer the question, however, which specifically asked for what they should do with the result when calculating the mean. The idea of doing another test was clearly inappropriate. Others gave general descriptions of how to work out mean values; others suggested using a figure of 0.7 (the mean of the first 2 tests); others attempted to 'explain' the anomaly instead. None of these answers gained credit.

01.5 A pleasing number of students correctly identified the control variable here, with around 40% of students missing out on the mark.

01.6 Only 20% of students failed to identify the variable that students kept the same as 'Time in the salt solution'.

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01.7 Almost 80% of students knew that osmosis was the process described.

01.8 Over 85% of students knew that some particles can pass through a partially permeable membrane.

01.9 Over two thirds of students correctly identified 'use more concentration of salt solution' as a means to improving the investigation.

4.4.2.1 Aerobic and anaerobic respiration

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Question 5 (low and standard demand)

05.1 77% of students achieved 2 marks in this question.

05.2 71% of students were able to identify the lungs as the site of gas exchange in humans. A wide range of other suggested organs was also seen, for which credit was not awarded. Students should be reminded of the list rule as stated in section 3.1 at the start of the mark scheme; an answer of 'lungs and heart' would score no credit in this question.

05.3 65% of students scored full marks in this question, with a further 30% achieving one mark.

05.4 Just over half of all students gained full credit in this question, with a minority achieving 2 marks as they neglected to give the final rounded figure. One mark was awarded for a division where the numerator and denominator were reversed but where correct rounding, in this case to 1, was evident. The most frequent error was to subtract 484 from 944 with a final response of 460. Students occasionally made simple mistakes when copying down the figures from the question. 33% of students scored no credit at all.

05.5 Nearly 60% of students scored full marks in this question, with over a third scoring zero. Of the incorrect answers seen, the majority had the correct words, but in the wrong position in the equation.

05.6 The most common mark awarded in this question was 1 (with over 40% of students scoring this mark), with less than 3% scoring full marks and 30% scoring zero. In the majority of responses, a lack of understanding of respiration was noted, and confusion between breathing and respiration was common. Common incorrect ideas were that 'more oxygen will be needed so the fish respires more', 'more respiration happens because the oxygen debt has to be repaid' or 'during swimming, more water moves over the gills, so more oxygen gets in as the fish respires'. Other answers suggested an increased rate of respiration was due to the 'heart beating faster'. Reference to 'swimming' (as given in the question) gained no additional credit unless there was reference to 'movement' or 'muscle' involvement. Students continue to write about energy in incorrect contexts and credit was not awarded for responses suggesting that energy was being 'produced' or being 'used for respiration'.