AQA GCSE Biology | 8461

SPECIFICATION POINT 4.2.2.2

The heart and blood vessels

Mark schemes and examiner comments

Tier	**Foundation**
Question groups	**21**
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.

4.2.2.2 The heart and blood vessels

Answer 01 · 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

Answer 02 · Mark scheme January 2009 | BLY3F | Original Q1 | Legacy

The full source mark scheme begins on page 47. Follow original question 1 in that document.

4.2.2.2 The heart and blood vessels

Answer 03 · Mark scheme

June 2009 | BLY3F | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)(i)	bacteria		1
5(a)(ii)	8		1
5(a)(iii)	4 tonnes		1
5(b)(i)	mycoprotein contains less fat **or** less circulatory problems mycoprotein contains (more) fibre **or** reduces colon cancer	it = mycoprotein fat must be comparative	1 1
5(b)(ii)	beef contains <u>more</u> protein **or** <u>better</u> for growth / making cells / enzymes / antibodies	it = beef must be comparative	1
Total			**6**

4.2.2.2 The heart and blood vessels

Answer 03 · Mark scheme

June 2009 | BLY3F | Original Q5 | Legacy

BLY3F

4.2.2.2 The heart and blood vessels

Answer 04 · Mark scheme

June 2009 | BLY3F | Original Q6 | Legacy

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…

4.2.2.2 The heart and blood vessels

Answer 04 · Mark scheme

BLY3F

Question 6 Continued

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

4.2.2.2 The heart and blood vessels

Answer 05 · 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 removed • (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**

4.2.2.2 The heart and blood vessels

Answer 05 · Mark scheme

January 2010 | BLY3F | Original Q7 | Legacy

BLY3F

4.2.2.2 The heart and blood vessels

Answer 06 · Mark scheme

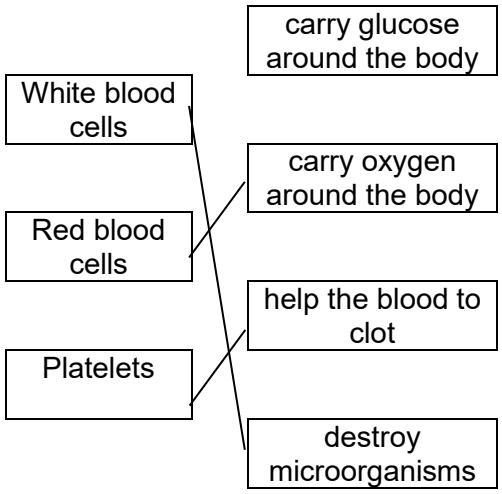
June 2013 | BL3FP | Original Q5 | Legacy

Question 5

question	answers	extra information	mark
5(a)	**A** artery	allow aorta	1
	B ventricle	ignore references to left and right	1
	C atrium	ignore references to left and right allow atria	1
	D vein	allow vena cava	1
5(b)(i)	stent		1
5(b)(ii)	keeps (artery) open		1
	so (more) blood can flow through	allow blood can flow (more) easily ignore ref to blood clots	1
Total			**7**

4.2.2.2 The heart and blood vessels

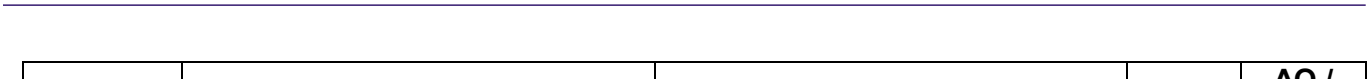
Answer 07 · Mark scheme June 2014 | BL3FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / spec ref.
1(a)(i)		one mark for each line extra line negates a mark	3	AO1 3.2.2c, d,e
1(a)(ii)	any **one** from: • carbon dioxide / CO_2 • urea	do **not** allow urine ignore water ignore ions	1	AO1 3.2.2b
1(b)(i)	B		1	AO1 3.2.1d
1(b)(ii)	D		1	AO1 3.2.1d
1(b)(iii)	vein	accept correct named examples	1	AO1 3.2.1e
1(c)(i)	any **one** from: • keeps artery / blood vessel open **or** widens artery / blood vessel • allows (more) blood to heart / cardiac muscle • (allows) blood to flow more easily • allows (more) oxygen to heart / cardiac muscle		1	AO1 3.2.1f
1(c)(ii)	any **two** from: • bleeding • infection • damaging blood vessels • damaging the heart • risk from anaesthetic	allow blood clots	2	AO3 3.2
Total			10	

4.2.2.2 The heart and blood vessels

Answer 07 · Mark scheme

June 2014 | BL3FP | Original Q1 | Legacy



4.2.2.2 The heart and blood vessels

Answer 08 · Mark scheme

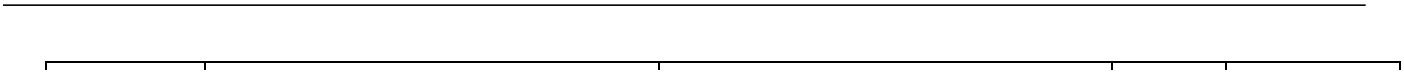
June 2015 | BL3FP | Original Q1 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
1(a)(i)	alveoli / alveolus	allow air sacs allow phonetic spelling	1	AO1 312a
1(a)(ii)	any **one** from: • protection (of lungs / heart) • help you breathe / inflate lungs		1	AO1 312a
1(b)(i)	diffusion		1	AO1 312b
1(b)(ii)	capillaries		1	AO1 311h/i/k
1(b)(iii)	any **two** from: • (have many) alveoli • large surface / area • thin (exchange) surface **or** short diffusion pathway • good blood supply / many capillaries	allow air sacs accept only one / two cell(s) thick allow (kept) ventilated or maintained concentration gradient	2	AO1 321g
Total			**6**	

4.2.2.2 The heart and blood vessels

Answer 08 · Mark scheme

June 2015 | BL3FP | Original Q1 | Legacy



4.2.2.2 The heart and blood vessels

Answer 09 · Mark scheme June 2015 | BL3FP | Original Q8 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8(a)	any **two** from: • carbon dioxide / CO_2 • urea • protein • water / H_2O • hormones / insulin	ignore food / waste / alcohol / drugs / enzymes ignore glucose and oxygen allow **two** correct hormones for 2 marks allow **two** correct food components for 2 marks allow antibodies allow antitoxins	2	AO1 321a,322b /c,331a
8(b)(i)	plasma platelets		1 1	AO1 322a
8(b)(ii)	(cardiac) muscle	allow muscular	1	AO1 321b

4.2.2.2 The heart and blood vessels

Answer 09 · Mark scheme

June 2015 | BL3FP | Original Q8 | Legacy

Question	Answers	Extra Information	Mark	AO / Spec. Ref
8(c)			6	AO3 32, 321f

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should also refer to the information on page 5 and apply a 'best-fit' approach to the marking.

0 marks	Level 1 (1–2 marks)	Level 2 (3–4 marks)	Level 3 (5–6 marks)
No relevant content	There is a description of at least one advantage of the cow tissue valve **or** a description of at least one disadvantage of the cow tissue valve.	There is a description of at least one advantage of the cow tissue valve **and** at least one disadvantage of the cow tissue valve.	There is a description of the advantages and disadvantages of the cow tissue valve **or** a description of several advantages of the cow tissue valve and at least one disadvantage.

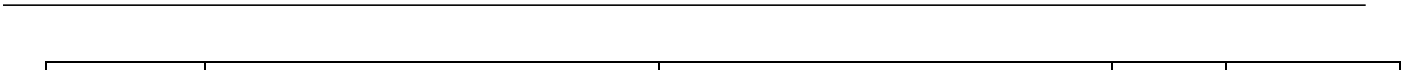
examples of the points made in the response	extra information
Advantages of cow tissue valve: • abundant supply of cows • so shorter waiting time • no need for tissue typing • quicker operation • less invasive **or** shorter recovery time • cheaper operation costs • less operation / anaesthetic risks	ignore information copied directly from the table without value added ignore can take many years to find a suitable human donor
Disadvantages of cow tissue valve: • made from cow so possible objections on religious grounds • new procedure so could be unknown risks • risks of using a stent eg. blood clots, stent breaking or valve tearing • not proven as a long term treatment • may be rejected	ignore ethical arguments allow possible transfer of disease from cow

Total			11

4.2.2.2 The heart and blood vessels

Answer 09 · Mark scheme

June 2015 | BL3FP | Original Q8 | Legacy



4.2.2.2 The heart and blood vessels

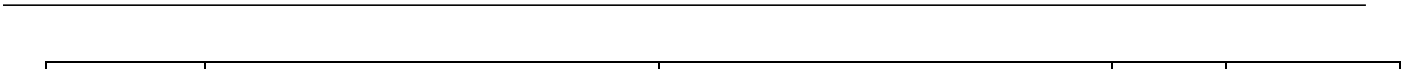
Answer 10 · Mark scheme June 2016 | BL3FP | Original Q3 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
3(a)(i)	any **one** from: • glucose • oxygen • carbon dioxide • urea • water	allow hormones allow named example of a product of digestion	1	AO1 3.2.1a
3(a)(ii)	(cardiac) muscle	allow muscular	1	AO1 3.2.1b
3(b)(i)	**B**		1	AO1 3.2.1d
3(b)(ii)	**D** atrium / atria **E** ventricle(s)	ignore references to left or right ignore references to left or right	1 1	AO1 3.21.c/d
3(c)(i)	a vein		1	AO2 3.2.1e
3(c)(ii)	an artery		1	AO1 3.2.1f
3(c)(iii)	keeps artery open / wider (so) blood / oxygen can pass through (to the heart muscle)	allow ecf from 3cii	1 1	AO1 3.2.1f
Total			**9**	

4.2.2.2 The heart and blood vessels

Answer 10 · Mark scheme

June 2016 | BL3FP | Original Q3 | Legacy



4.2.2.2 The heart and blood vessels

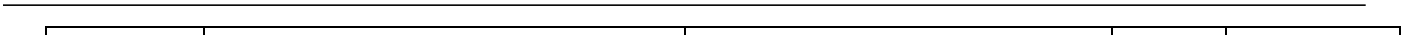
Answer 11 · Mark scheme June 2017 | BL3FP | Original Q5 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5(a)(i)	alveolus / alveoli	allow air sac(s) allow phonetic spelling	1	AO1 3.1.1k
5(a)(ii)	out / outwards down contract **or** shorten decrease / drop / fall	in this order only ignore expand allow to be flat	1 1 1 1	AO1 3.1.2c
5(a)(iii)	capillary / capillaries		1	AO1 3.1.2b 3.2.1g
5(b)(i)	villus / villi / microvilli		1	AO2 3.1.1k/l
5(b)(ii)	any **two** from: • large surface area • thin **or** one cell thick **or** short diffusion pathway • it contains many blood capillaries **or** has an efficient blood supply • (continuous) blood flow maintains the concentration gradient	allow many blood vessels	2	AO2 3.1.1k/l
Total			**9**	

4.2.2.2 The heart and blood vessels

Answer 11 · Mark scheme

June 2017 | BL3FP | Original Q5 | Legacy



4.2.2.2 The heart and blood vessels

Answer 12 · Mark scheme June 2017 | BL3FP | Original Q6 | Legacy

Question	Answers	Extra information	Mark	AO / Spec. Ref.
6(a)(i)	left ventricle		1	AO1 3.2.1c
6(a)(ii)	aorta	ignore artery allow aortic (artery)	1	AO1 3.2.1d
6(a)(iii)	(to keep) blood flowing in the right / one direction **or** prevent backflow (of blood)	ignore ref to veins	1	AO1 3.2.1e

6(b)	Reasons for: • less likely to die (44% cf. 59%) • lower risk of death from having a second operation • lower risk of heart infections • less chance of the valve stopping working • longer lasting • doesn't cause rejection • avoids religious issues of using organs from a pig **or** no ethical issue from using part of a living organism Reasons against: • chance of death by bleeding is increased • offers no advantage against clots **or** equal risk of blood clots • have to take anti-clotting drugs for life • can be noisy	max 3 marks if only reasons for or reasons against given allow converse for each point if clearly referring to the pig tissue valve ignore cost allow doesn't stop working allow been used for a longer period of time ignore religion **or** ethical unqualified	4	AO3 3.2

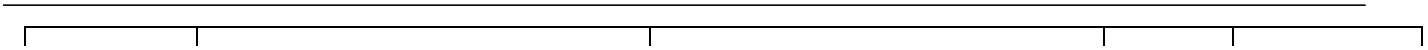
6(c)	(inserted to) keep the (coronary) artery / arteries open allows more blood to flow (to the heart muscle) **or** return blood flow to normal	do **not** allow veins allow (more) glucose / oxygen to reach the heart (muscle)	1 1	AO1 3.2.1f

Total		**9**

4.2.2.2 The heart and blood vessels

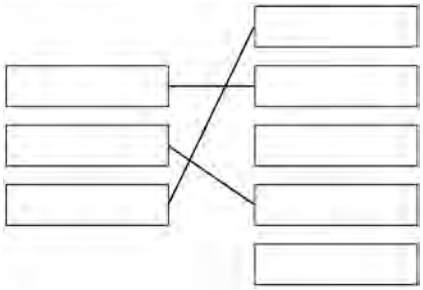
Answer 12 · Mark scheme

June 2017 | BL3FP | Original Q6 | Legacy



4.2.2.2 The heart and blood vessels

Answer 13 · Mark scheme June 2018 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1		additional line from a blood component negates the mark for that component	1 1 1	AO1 4.2.2.3
04.2	C		1	AO3 4.2.2.2
04.3	(vessel) B thick walls **or** thick muscle / elastic tissue **or** lumen is small / narrow	 do **not** accept ref to 'cell walls' allow description of 'lumen'	 1 1	AO1 4.2.2.2
04.4	95		1	AO2 4.2.2.2
04.5	(because coronary) arteries / they are narrower	allow (because the coronary) arteries are blocked / clogged (with fat)	1	AO2 4.2.2.4
04.6	 250 × 60 (= 15 000) **or** 15 000 15	an answer of 15 scores **2** marks allow 0.25 × 60 allow $\frac{\text{answer to marking point 1}}{1000}$ an incorrect conversion to dm^3 in calculation does not negate marking point 1	 1 1	AO2 4.2.2.2

4.2.2.2 The heart and blood vessels

Answer 13 · Mark scheme

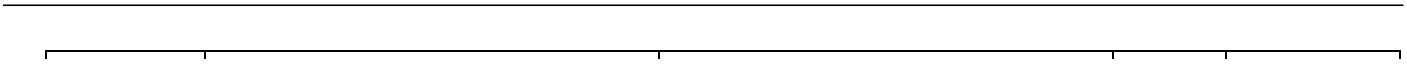
June 2018 | 8461/1F | Original Q4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.7	any **two** from: • no need to stay as long in hospital (after procedure) **or** can go home sooner / same day • not as / less invasive **or** no need for a major operation **or** no need for general anaesthetic • shorter recovery time **or** can get back to normal lifestyle quicker **or** less time needed off work • lower risk of a heart attack (during procedure)	allow only need to stay 2–3 hours in hospital (after procedure) allow less scarring allow less chance of infection allow only a small cut needed allow only 7 days recovery ignore reference to cost ignore idea that it takes less time overall	2	AO3 4.2.2.4
04.8	lower chance of failure (within one year) only need one operation to treat multiple blockages **or** can treat multiple blockages at one time	allow only a 5% chance of failure ignore ref to anaesthetic or CABG being a long-term treatment	1 1	AO3 4.2.2.4
Total			**14**	

4.2.2.2 The heart and blood vessels

Answer 13 · Mark scheme

June 2018 | 8461/1F | Original Q4



4.2.2.2 The heart and blood vessels

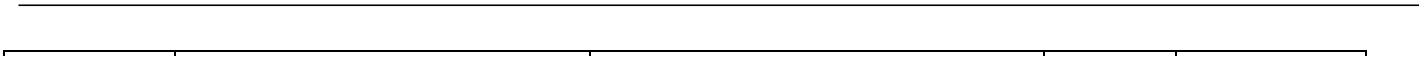
Answer 14 · Mark scheme June 2019 | 8461/1F | Original Q2

02.1	the movement of particles from a high concentration to a low concentration		1	4.1.3.1 AO1
02.2	(gills) have (many) projections (for) large(r) surface / area **or** (gills) are on the outside of the body (1) for good access to water (1)	allow description of projections allow have lots of / five gills	1 1	4.1.3.1 AO2
02.3	differentiation		1	4.1.2.3 AO1
02.4	mitosis	do **not** accept meiosis	1	4.1.2.2 AO1
02.5	hair		1	4.1.2.2 4.1.2.3 AO1
02.6	axolotls are cheap to feed axolotls are easy to breed		1 1	4.1.2.3 AO3
02.7	D		1	4.2.2.2 AO1
02.8	trachea	allow windpipe allow cartilage (ring)	1	4.2.2.2 AO1
02.9	pulmonary artery		1	4.2.2.2 AO1
Total			**11**	

4.2.2.2 The heart and blood vessels

Answer 14 · Mark scheme

June 2019 | 8461/1F | Original Q2



4.2.2.2 The heart and blood vessels

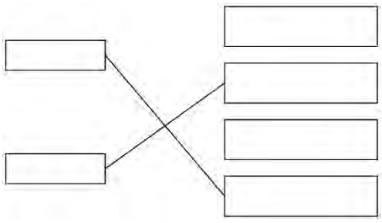
Answer 15 · Mark scheme June 2019 | 8461/1F | Original Q6

06.1	circulatory / circulation (system)	allow cardiovascular (system) ignore blood (system) ignore cardiorespiratory system	1	4.2.2.2 4.2.1 AO1
06.2	any valve ringed 	allow more than one valve separately ringed	1	4.2.2.2 AO1
06.3	prevent backflow (of blood) **or** ensure one-way flow	allow correct description of backflow allow maintains (correct) direction of blood	1	4.2.2.2 4.2.2.4 AO1
06.4	vein	allow correctly named veins	1	4.2.2.2 AO1
06.5	any **two** from: (referring to mechanical valves) • long lasting **or** durable **or** does not break / tear **or** does not wear out • do not need to go into hospital / surgery again • no ethical issues (surrounding use of living / animal tissue) • no risk of rejection • no need for anti-rejection / immunosuppressant drugs • no risk of transmission of disease	allow reliable allow less likely to need a replacement (after 5 years) ignore no need for a replacement	2	4.2.2.4 AO3

4.2.2.2 The heart and blood vessels

Answer 15 · Mark scheme

June 2019 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec.Ref.
06.6	no need to take anti-clotting medication	allow can't hear a pig valve allow can get a better fit with a pig valve allow less leaky with a pig valve allow less likely to get a heart attack / stroke ignore will not get blood clots (around the valve)	1	4.2.2.4 AO3
06.7		an additional line from a medical condition negates the mark	2	4.2.2.2 AO1
Total			**9**	

4.2.2.2 The heart and blood vessels

Answer 15 · Mark scheme

June 2019 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.

Answer 16 · Mark scheme

November 2020 | 8461/1F | Original Q6

The full source mark scheme begins on page 60. Follow original question 6 in that document.

4.2.2.2 The heart and blood vessels

Answer 17 · Mark scheme November 2021 | 8461/1F | Original Q5

05.1	less blood flows through **or** less blood flows to the heart (muscle / cells / tissue) less oxygen (reaches the heart muscle)	 allow less respiration allow less energy released do **not** accept less energy produced / made / created	1 1	AO1 4.2.2.3 4.2.2.4
05.2	D		1	AO3 4.2.2.4
05.3	B		1	AO3 4.2.2.4
05.4	is more likely to get a blockage (with high cholesterol) **or** blockage could be biggest	ignore has the highest blood cholesterol concentration	1	AO2 4.2.2.4
05.5	4 **and** 5.6 $\left(\frac{5.6}{4}\right) = 1.4$	 allow correct division using either 5.3 or 5.8 (for person D)	1 1	AO2 4.2.2.4
05.6	opens / widens (artery) so (more) blood can flow through	allow pushes blockage to the side allow (more) oxygen(ated blood) can flow through	1 1	AO1 4.2.2.4
05.7	platelets		1	AO1 4.2.2.3

Answer 17 · Mark scheme

November 2021 | 8461/1F | Original Q5

05.8	**Level 2:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.	3–4	AO3 4.2.2.4
	Level 1: Relevant points are made. They are not logically linked.	1–2	
	No relevant content	0	
	Indicative content: *Advantages:* • **only** have to take the tablet once a day • **only** a tablet so easy to take **or only** a tablet so not painful to take • (drugs are effective so) less likely to get a blood clot • drugs are cheap so less cost to NHS **or** drugs are cheap so (more) people can afford them • drugs have been used for a long time so must be safe / trusted *Disadvantages:* • patients have to make sure they always have a supply of drugs • patients could forget to take the drugs (every day) • patients could still get a blood clot in the first week • restrictions on lifestyle because patients have to have a blood test every few weeks • restrictions on lifestyle because patient can't eat certain foods • patients may get a blood clot if they eat the wrong food • risks associated with puncturing skin / infection • patient may have a fear of needles • higher risk of bleeding / bruising For **Level 2** students must evaluate, including consideration of, the advantage and disadvantage of anti-clotting drugs.		

Total			**14**

4.2.2.2 The heart and blood vessels

Answer 17 · Mark scheme

November 2021 | 8461/1F | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.

4.2.2.2 The heart and blood vessels

Answer 18 · Mark scheme

June 2022 | 8461/1F | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1 View with Table 4	$\frac{3\ 600}{1\ 200}$ 3	if no answer in answer space allow answer in **Table 4** allow 3:1 do **not** accept if a unit is given	1 1	AO2 4.1.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	as size increases, (surface area to volume) ratio decreases	allow as one increases, the other decreases allow as size decreases, (surface area to volume) ratio increases	1	AO3 4.1.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	any **one** from: • carbon dioxide • glucose / sugar • water • ions / minerals / salts	allow a correct chemical formula allow named ions allow other correct substances eg amino acids / fatty acids / glycerol ignore nutrients / food	1	AO1 4.1.3.2 4.1.3.1

4.2.2.2 The heart and blood vessels

Answer 18 · Mark scheme June 2022 | 8461/1F | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.4	any **two** from: • concentration gradient • surface area • thickness of exchange surface • presence of a blood / circulatory system • temperature	allow description allow surface area : volume ratio ignore size unqualified allow thickness of skin	2	AO1 4.1.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	gills		1	AO1 4.1.3.1

4.2.2.2 The heart and blood vessels

Answer 18 · Mark scheme

June 2022 | 8461/1F | Original Q6

Question	Answers	Mark	AO / Spec. Ref.
06.6	**Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	4.1.3.1 4.2.2.2
	Indicative content • large number of alveoli • large surface / area • alveolus and blood vessel / capillary are in close proximity • alveoli / capillaries have thin walls **or** alveoli / capillaries have walls that are one cell thick • to reduce diffusion distance • has a good blood supply **or** has a capillary network • to maintain concentration gradient • to remove oxygen quickly **or** to deliver carbon dioxide quickly • (capillary network) increases surface area (for diffusion) • lungs are ventilated **or** lungs continually move air in and out • (ventilation) brings in oxygen **or** removes carbon dioxide • to maintain concentration gradient Types of adaptation of the lungs are required for **Level 3.**		

Total Question 6		**13**

4.2.2.2 The heart and blood vessels

Answer 19 · Mark scheme

June 2023 | 8461/1F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.1	A		1	AO1 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.2	C		1	AO1 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.3	right atrium		1	AO1 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.4	any **two** from: • (artery) has a thick**er** muscle (tissue) • (artery) has a thick**er** elastic (tissue) • (artery) has a narrow**er** lumen • (artery) does not contain valves	allow converse if clearly referring to a vein if neither mark awarded allow **1** mark for artery has a thick**er** wall allow description of lumen	2	AO1 4.2.2.2

4.2.2.2 The heart and blood vessels

Answer 19 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.5	as the percentage of the (coronary) artery that is blocked increases, blood flow decreases	allow converse allow the greater the blockage, the less blood flows allow negative correlation **or** inversely proportional allow as one increases, the other decreases	1	AO2 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.6	scale on y-axis	must take up at least 50% of axis	1	AO2 4.2.2.2
	all points plotted	allow 3 or 4 correct plots for **1** mark allow a tolerance of ± ½ small square	2	
	correct curved line of best fit	ignore line joined point to point with straight lines ignore extrapolation	1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.7	correct answer from student's line in **Figure 7**	allow a tolerance of ± ½ small square if no line drawn on **Figure 7**, allow a value from 18 to 24 (cm^3/minute)	1	AO3 4.2.2.2

4.2.2.2 The heart and blood vessels

Answer 19 · Mark scheme

June 2023 | 8461/1F | Original Q7

Question	Answers	Mark	AO / Spec Ref.
07.8	**Level 3**: Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.	5-6	AO1 AO2 4.2.2.2 4.2.2.4 4.4.2.1 4.4.2.2
	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: • reduced blood flow to heart (muscle / tissue / cells) • (so) less oxygen to heart (muscle / tissue / cells) • (so) less glucose to heart (muscle / tissue / cells) • (so) less (aerobic) respiration (in heart / body cells) • (more) anaerobic respiration • (so) less energy (released) • (so) less muscle contraction • (so) less blood / oxygen / glucose around the body (from heart) **or** slower flow of blood / oxygen / glucose to body (from heart) • less carbon dioxide removed from body (muscle / tissue / cells) • (resulting in) breathlessness • (resulting in) tiredness • (anaerobic respiration causes) production of lactic acid • (build-up of lactic acid) causes muscle fatigue / pain **or** chest pain For **Level 3**, students must explain the effect of reduced oxygen / glucose on respiration **or** energy release and its consequence		

4.2.2.2 The heart and blood vessels

Answer 19 · Mark scheme

June 2023 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.9	any **one** pair from:	mark as a pair		AO1 4.2.2.4
	• (insert) stent(s)	allow description	1	
	(to) open (coronary) artery	ignore unblock (coronary) artery	1	
	• (prescribe) statins (1)			
	(to) reduce (blood) cholesterol (1)	allow to slow down the rate of fatty material deposit		
	• heart (and lung) transplant (1)			
	(to) replace the diseased heart with a healthy heart (1)			
	• use an artificial heart (1)			
	(to) keep the patient alive while waiting for a transplant (1)	allow (artificial heart) pumps blood around the body in place of the heart		
	• (artery / heart) bypass (1)	allow description		
	(to) divert blood around the blockage (1)			

Total Question 7	19

4.2.2.2 The heart and blood vessels

Answer 20 · Mark scheme

June 2024 | 8461/1F | Original Q7

Question 7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.1	arteries		1	AO1 4.2.2.2 4.2.2.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.2	pushes / moves blood to get oxygen around the body	 allow description of getting oxygen around the body, such as through blood vessels **or** to get oxygen to a named organ do **not** accept to get oxygen to the lungs ignore reference to restarting the heart ignore reference to the pacemaker	1 1	AO2 4.2.2.2 4.4.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.3	provides oxygen (for respiration)	allow idea of carbon dioxide triggering breathing to restart	1	AO2 4.2.2.2 4.4.2.1

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.4	statin(s)	allow named statin	1	AO1 4.2.2.4

4.2.2.2 The heart and blood vessels

Answer 20 · Mark scheme June 2024 | 8461/1F | Original Q7

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.5	(stent) opens / widens (blocked blood) vessel	allow (stent) keeps (blocked blood) vessel open allow a description of the blood vessel being opened ignore type of blood vessel ignore unblocks (blood) vessel	1	AO1 4.2.2.4
	to allow (more) blood to flow **or** to allow (more) glucose / oxygen to the heart (cells / tissue / muscle)		1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.6	any **two** from: • smoking increases the (%) risk of **all** types of (cardiovascular) disease • smoking increases the (%) risk of having (disease) **H** more than any other type of (cardiovascular) disease • smoking increases the (%) risk of having (disease) **E** less than any other type of (cardiovascular) disease	ignore smoking causes (cardiovascular) disease allow not smoking decreases the risk of **all** types of (cardiovascular) disease allow if you smoke, you are **most** likely to get (disease) **H** allow if you smoke, you are **least** likely to get (disease) **E** allow a comparison of the effect of smoking on the risk of two (cardiovascular) diseases allow two comparisons of the effect of smoking on the risk of two (cardiovascular) diseases for **2** marks	2	AO3 4.2.2.6

4.2.2.2 The heart and blood vessels

Answer 20 · Mark scheme

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.7	*y*-axis labelled 'Percentage / % increase in risk (compared to people who have never smoked)'		1	AO2 4.2.2.6
	correct scale of 1 cm = 5% on *y*-axis		1	
	all bars plotted correctly	allow a tolerance of ±½ small square ignore bars touching ignore width of bars	1	
	all bars correctly labelled		1	

Question	Answers	Extra information	Mark	AO / Spec Ref.
07.8	any **one** from: • poor diet	ignore obesity allow descriptions of poor diet eg diet high in (saturated) fat / cholesterol ignore diet unqualified	1	AO1 4.2.2.6
	• lack of exercise	allow descriptions of lack of exercise allow high alcohol intake allow other correct lifestyle factors such as having a stressful job		

Total Question 7	14

Answer 21 · Mark scheme

June 2025 | 8461/1F | Original Q3

Question 3

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.1	pathogens antitoxins	in this order only	1 1	AO1 4.3.1.1 AO1 4.3.1.6 4.2.2.3

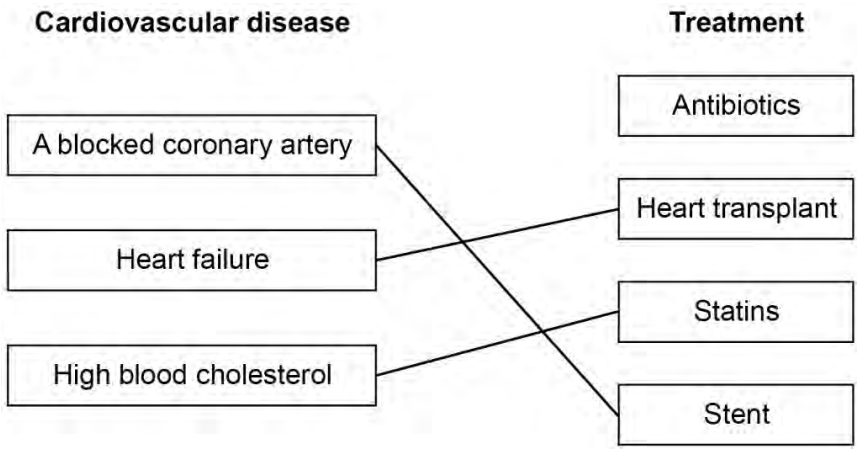
Question	Answers	Extra information	Mark	AO / Spec Ref.
03.2	*measurement* 60 (mm) *conversion* 60 000 (µm) *substitution* $= \frac{60\,000}{4\,000}$ *real width* 15 (µm)	allow measurement in the range 59 (mm) to 61 (mm) allow correct conversion from incorrect measurement allow correct substitution using incorrect conversion allow correct calculation using incorrectly converted value	1 1 1 1	AO2 4.1.1.5

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.3	capillary		1	AO3 4.2.2.2 4.2.2.3

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.4	(blood in arteries) has high pressure (so need thick walls) to withstand / maintain the pressure **or** (so need thick walls) to prevent bursting	 ignore to increase the pressure allow **2** marks for to withstand / maintain high pressure	1 1	AO3 4.2.2.2

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.5	deposits / build-up / increase of fat(ty material)	allow deposits / build-up / increase of cholesterol allow deposits / build-up / increase of plaque	1	AO1 4.2.2.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.6	less / no blood flow (so) less / no oxygen / glucose transported (to heart / body)	 allow **2** marks for less oxygenated blood flows if no other marks awarded allow **1** mark for idea that it will lead to a heart attack	1 1	AO1 4.2.2.4

Question	Answers	Mark	AO / Spec Ref.
03.7	 do **not** accept more than one line from a box on the left	1 1 1	AO1 4.2.2.4

Question	Answers	Extra information	Mark	AO / Spec Ref.
03.8	because it cannot be spread / passed on (from one person to another) **or** because it is not caused by a pathogen / bacterium / virus / fungus / protist / microorganism / microbe	allow not contagious / infectious ignore because it is a lifestyle disease	1	AO2 4.2.2.4

Total Question 3	**16**

4.2.2.2 The heart and blood vessels

Version 1: 0109

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Mark Scheme

2009 examination – January series

4.2.2.2 The heart and blood vessels

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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4.2.2.2 The heart and blood vessels

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.

4.2.2.2 The heart and blood vessels

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.

4.2.2.2 The heart and blood vessels

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**

4.2.2.2 The heart and blood vessels

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**

4.2.2.2 The heart and blood vessels

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>

4.2.2.2 The heart and blood vessels

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**

4.2.2.2 The heart and blood vessels

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**

4.2.2.2 The heart and blood vessels

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**

4.2.2.2 The heart and blood vessels

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**

4.2.2.2 The heart and blood vessels

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: • <u>more</u> / <u>faster</u> 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**

4.2.2.2 The heart and blood vessels

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**

4.2.2.2 The heart and blood vessels

AQA

GCSE
BIOLOGY
8461/1F

Paper 1 Foundation Tier

Mark scheme

June 2020

Version: 1.0 Final Mark Scheme

jun2084611F/MS

4.2.2.2 The heart and blood vessels

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

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

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

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Information to Examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the total marks available for the question
- the typical answer or answers which are expected
- extra information to help the Examiner make his or her judgement
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

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

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

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

2. Emboldening and underlining

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

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

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

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

3. Marking points

3.1 Marking of lists

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

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

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

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

[1 mark]

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

Example 2: Name two planets in the solar system.

[2 marks]

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

3.2 Use of chemical symbols/formulae

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

3.3 Marking procedure for calculations

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

3.4 Interpretation of 'it'

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

3.5 Errors carried forward

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

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

3.6 Phonetic spelling

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

3.7 Brackets

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

3.8 Allow

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

3.9 Ignore

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

3.10 Do <u>not</u> accept

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

4. Level of response marking instructions

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

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

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

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.

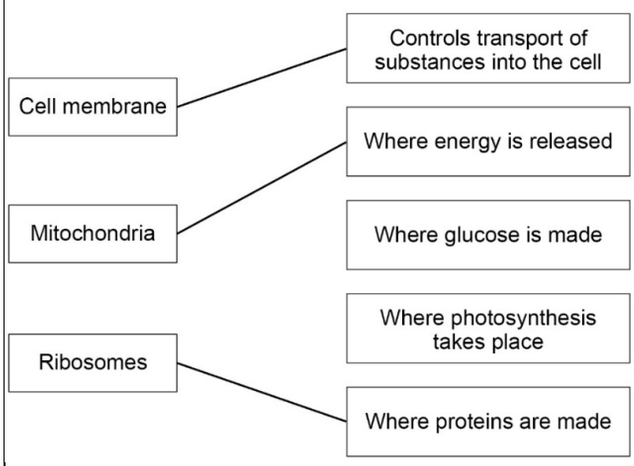
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

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.

4.2.2.2 The heart and blood vessels

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

4.2.2.2 The heart and blood vessels

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**	

4.2.2.2 The heart and blood vessels

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

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

4.2.2.2 The heart and blood vessels

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**	

4.2.2.2 The heart and blood vessels

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

4.2.2.2 The heart and blood vessels

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**	

4.2.2.2 The heart and blood vessels

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

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

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**

4.2.2.2 The heart and blood vessels

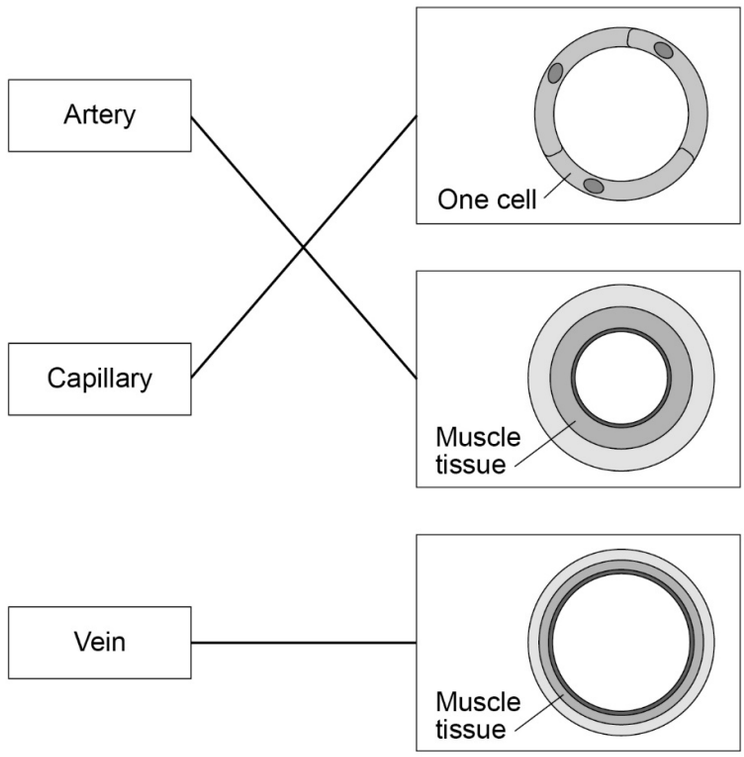
Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	will stop animals / herbivores eating it	allow it will not be eaten	1	AO3 4.3.3.2
05.2	chemical		1	AO1 4.3.3.2
05.3	thorns / spikes / spines / prickles (to stop animals / herbivores eating it)		1	AO3 4.3.3.2
05.4	for respiration to store as 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

4.2.2.2 The heart and blood vessels

05.9	placebos		1	AO1 4.3.1.9
Total			**14**	

4.2.2.2 The heart and blood vessels

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

4.2.2.2 The heart and blood vessels

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

4.2.2.2 The heart and blood vessels

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**	

4.2.2.2 The heart and blood vessels

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

4.2.2.2 The heart and blood vessels

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

4.2.2.2 The heart and blood vessels

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**	

4.2.2.2 The heart and blood vessels

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	

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

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		

4.2.2.2 The heart and blood vessels

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**	

4.2.2.2 The heart and blood vessels

Answer 16 · Examiner comments

November 2020 | 8461/1F | Original Q6

Question 6 (low & standard demand)

A lack of specificity in use of scientific language meant that few students were able to accurately articulate their ideas in **06.2**, resulting in a high level of discrimination between lower- and higher-attaining students. Many students referenced thick cell walls, lots of muscle in cells, as well as arteries having a large surface area.

06.3 highlighted that some students may not have been exposed to alternative images of blood cells, and many thought that the blood cells were actually cell parts, such as nuclei and cytoplasm. Half of the students gained marks in this question.

In **06.7** several students were able to make the link between platelets and blood clotting, but many incorrectly stated that the blood would clot too much as a result of reduced platelets.

4.2.2.2 The heart and blood vessels

Answer 18 · Examiner comments — June 2022 | 8461/1F | Original Q6

Question 6 (Low and standard demand)

06.1 77% of students gained full marks in this question.

06.2 Nearly 60% of students scored zero marks on this question. Many confused the idea of surface area to volume ratio with surface area or volume, therefore making their explanations contradictory.

06.3 Over 70% of students were able to name one substance that enters cells by diffusion with the most popular answers being carbon dioxide and water. Nitrogen was occasionally seen but was not credited.

06.4 Less than 10% of students gained both marks in this question and lots of responses about size were seen, which was not enough to gain the mark. Some students wrote about the concentration of oxygen in the water but failed to go on to mention the concentration gradient. The most common correct responses were temperature and surface area.

06.5 Nearly 70% of students were able to name the gills as the was exchange organs in fish. Common incorrect answers included lungs, heart, fins and scales.

Answer 18 · Examiner comments — June 2022 | 8461/1F | Original Q6

06.7 Over 40% of students scored zero marks in this question and the most common score after zero was one mark. In this levelled response question, students were asked to explain how the breathing system is adapted to maximise the rate of gas exchange. Logical linking was required to reach both levels 2 and 3 of the mark scheme, and this is where most students fell down. A minority of students were able to describe some feature of the lungs, but many failed to even state that the lungs have a large surface area. Very few students were able to make the link between gas exchange and diffusion. Many students wrote lengthy responses about the journey of oxygen or the mechanism of breathing, neither of which were asked about in the question.

4.2.2.2 The heart and blood vessels

Answer 19 · Examiner comments June 2023 | 8461/1F | Original Q7

Question 7 (Standard demand)

4.2.2.2 The heart and blood vessels

Answer 19 · Examiner comments June 2023 | 8461/1F | Original Q7

07.1 Nearly 44% of students could identify part A as the part that received oxygenated blood from the lungs.

07.2 Around quarter of students could identify part C as the part that pumps deoxygenated blood to the lungs.

07.3 Approximately 35% of students could identify the right atrium as the part where the pacemaker was found.

07.4 This question was generally attempted well with all of the marking points seen, and just over 38% of students scored the full 2 marks, and a further 22% scoring 1. A common error seen was to fail to use comparative language, for example 'artery has thick muscle' or 'vein has wide lumen'. Commonly seen uncreditworthy responses referred to cell walls, made general reference to the size of the vessels or, occasionally, mis-identified the two vessels completely.

07.5 80% of students were able to describe the trend well, and indeed it appears students are more prepared than in the previous years to describe a trend. Many students did so by using the whole of the headings from the table columns in their answers. A minority of students gained the mark by using the term 'inversely proportional' or 'negative correlation' but this language was rare. Some students negated a correct description of the trend with an incorrect term.

07.6 Only around 6% of students did not attempt to construct the graph, and as such many of the students that attempted gained some marks, with almost 65% scoring 3 or 4 marks. The scale mark was frequently awarded with only a few students squashing it into less than half of the grid available or using strange intervals with a significant number having non-linear scales. The points were well plotted in more than half of responses, with the most frequent error being the failure to spot that they were not evenly spread along the x-axis and therefore plotting them in the wrong places. By far the main stumbling block seemed to be the student's ability to draw a reasonable line of best fit 'free hand', with many still joining point-to-point with a ruler. The most commonly seen errors were points plotted with a large spot or a tiny mark rather than a cross, both of which made it very difficult to judge the accuracy of the plot, or thick, smudged or feathery lines, which again were too inaccurate to be awarded the mark.

07.7 Nearly 44% of students found identifying the correct value at 35 from their own graph challenging and failed to gain the mark. However, over half of students were able to read accurately from their graph even if their line had not been creditworthy. Some effectively drew construction lines but other attempts were in the wrong place, reading from 25 or 30 on the x-axis.

07.8 This levelled response question required students to explain the effect of a partly blocked coronary artery on the human body. This proved a very challenging question for the majority of students, but proved a very good discriminator with only around 1% of students reaching level 3. Over 10% of students made no attempt at this question, whilst a further 20% of students failed to score any marks. Answers generally lacked the specific biological detail required in order to gain marks. Consequently, the majority of student responses were seen at level 1, with around 55% of students gaining 1 or 2 marks. The lack of understanding about the position and function of the coronary arteries was evident, and there were many suggestions that these arteries took the blood to the lungs or around the rest of the body, and reference to blood going through, rather than to the heart. Other students referred only to what normally happens rather than what is happening in this scenario and there were many lengthy responses that mentioned little that was creditworthy apart from a heart attack.

4.2.2.2 The heart and blood vessels

Answer 19 · Examiner comments

June 2023 | 8461/1F | Original Q7

07.9 Almost 30% of students achieved 2 marks on this question, with the most common route to doing so via reference to stents. These students could usually name them (and describe how they are fitted) although some did have to rely on describing them. Statins were also often seen although often without gaining the explanation mark as they were often described as being able to remove / breakdown existing fat deposits. On the rare occasion reference to 'bypass' was encountered, it was generally described quite well along with some reasonable descriptions of how it worked. The most common errors were seen when students opted for surgery to physically open the vessel to remove the blockage. Over 13% of students did not attempt this question, which could be an indicator they ran out of time.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.

4.2.2.2 The heart and blood vessels

Answer 20 · Examiner comments

June 2024 | 8461/1F | Original Q7

Question 7 (standard demand)

07.1 74% of students answered this question correctly.

07.2 Half of the students achieved one mark in this question, with 12% gaining full marks. Many students believed that the principle reason for putting pressure on the heart was to restart the heart first and then to get the blood flowing generally to the lungs to get rid of carbon dioxide and to collect oxygen.

07.3 As was evident in answers to question 07.2, it was clear that many students are confused about the relationship between the heart moving blood through the body and the mechanism of breathing, and many believe that there is a direct dependency of one on the other. As a result, just over half of students gained the mark in this question. Responses were seen that suggested the inflation of the lungs started the heart beating again. Other answers which gained no credit simply repeated the question wording and added no value, by saying that the person's lungs would then 'get air'.

07.4 18% of students were able to recall the term 'statins' from the specification with a number giving answers such as 'blood thinners' or 'anti-cholesterol drugs'. 18% of students left this question blank.

07.5 A third of students achieved full marks in this question, with just over 20% achieving one mark. For the award of the first marking point, the name of the type of blood vessel was ignored as this had already been asked for in question 07.1. Various descriptions of the vessel being opened were acceptable such as it was 'expanded' or the fat was 'pushed to the sides'. Answers referring to 'unblocking' or 'clearing' the vessels, however, were not credited. A few students incorrectly suggested that stents kept the 'valves' or 'heart chambers' open. References to stents 'stopping blood clotting' or to 'keeping the heart beating' were not credited for the second marking point, but were commonly seen.

07.6 80% of students gained no credit in this question and found making conclusions based on the results in Table 5 very difficult. The data showed to what extent the percentage risk of getting four different cardiovascular diseases increased as a result of smoking when compared with people who had never smoked. As a result, all conclusions had to reflect both the increased risk and its association with smoking. They also needed to be comparative, either on the basis of one disease over all others, by using words such as 'most' or 'least', or on the basis of one disease over one other by using words such as 'more' or 'less'. Answers invariably failed to match all of these requirements. Some students also mistakenly believed that the results reflected the 'risk' or 'danger' of the diseases rather than the risk of 'developing' them. Other answers revealed the misconception by some that the letters E to H referred to individual people rather than to the different diseases.

07.7 Students' graph drawing skills were generally good, with 54% of students achieving full marks and 28% achieving three marks. Just 1% of students gained no credit at all. The most commonly omitted feature was the *y*-axis label, and some students truncated their label so much as to omit the reference to 'risk', which was not creditworthy. When marking on their scale, a few students lost track with the middle numbers on the scale they gave.

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4.2.2.2 The heart and blood vessels

Answer 20 · Examiner comments June 2024 | 8461/1F | Original Q7

07.8 53% of students gained credit in this question. The most common incorrect answers were those that lacked qualification, such as references to 'drinking alcohol' or to 'eating fatty foods' which needed the added idea of consumption of these being 'high'. Obesity was a common incorrect answer, as it is not a lifestyle factor.

Answer 21 · Examiner comments June 2025 | 8461/1F | Original Q3

Question 3 (low demand)

03.1 85% of students scored both marks in this question. The most commonly seen error was confusion between antitoxins and antibiotics.

03.2 Over half of all students scored full marks in this question, with the next most common mark being 3, indicating that the majority of students found this question easy to access. Guidance was provided through the use of scaffolding for each of the steps involved and this allowed many students to access at least 3 marks. A mistake made in one step did not necessarily preclude credit being awarded elsewhere. Common errors included:

- incorrect measurements of the white blood cell, giving answers in cm or inches, or referring to the vertical line rather than to the horizontal line for width.
- incorrectly carrying out the conversion by dividing, rather than multiplying, by 1000
- incorrectly transferring numbers from one step to another by omitting or adding zeros
- using the original pre-conversion width, rather than the calculated one in micrometres, in the final substitution.

03.3 Just under half of all students were able to identify the capillary shown in the figure.

4.2.2.2 The heart and blood vessels

Answer 21 · Examiner comments June 2025 | 8461/1F | Original Q3

03.4 Although some students had a clear appreciation of why arteries needed to have thick walls, many (40%) were unable to gain even one mark here. The reasons behind this reflected both a lack of understanding and ineffective expression. MP1 required reference to high pressure, i.e. the conditions that made thick walls essential, and not just to 'pressure' without qualification that the pressure was 'high'. References to volume, rate of flow, direction of flow or the concentration of blood were also not creditworthy. To achieve MP2, responses then had to go on further, with an explanation of what the thick walls allowed or prevented. Responses that did not gain credit here were either:

- too vague, such as 'to stop damage', 'to prevent bleeding' or 'to keep the blood inside'.
- incorrect, such as 'to pump blood around', 'stop backflow' or 'protect from pathogens'.

03.5 10% of students did not attempt this question and a further 60% did not score credit. Many misinterpreted what was being asked for and answered in terms of risk factors, such as 'smoking', outcomes such as 'reduced blood flow' or treatments such as 'stents'. In some cases, responses were too vague to be creditworthy, such as 'blockages occur'. Incorrect answers included 'muscles in the walls contract', 'they shrink' or 'fatty acids build up'.

03.6 Many students gave answers which matched MP1 but fewer gained MP2 and as such, 50% of students scored one mark, with a further 15% scoring two marks. Responses such as 'it will create a blockage', 'it can lead to a reduction (or increase) in blood pressure', 'it causes blood to clot', 'it leads to blood flowing backwards' or 'the vessels are more likely to burst' were either insufficient or incorrect and gained no credit.
A significant number of students gained the fall-back mark by referring to the idea of the narrowed arteries leading to a heart attack.

03.7 Nearly half of all students scored full marks in this question, with the most common being a link between 'high blood cholesterol' and 'antibiotics'. The majority of students correctly associated 'heart failure' with 'heart transplant'.

03.8 Nearly three quarters of students gained credit in this question. Responses which were unable to gain credit included 'it cannot be treated', 'it is caused by the build-up of plaque', 'it has symptoms which are not easy to see' and 'it happens inside the body'.