AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 4.2.2.4

Coronary heart disease: a non-communicable disease

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**4**
Available paper years	**2018–2024**

Using this booklet

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

Name: _____ **Date:** _____

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

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 01 · Mark scheme

June 2018 | 8464/B/1H | Original Q2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	is not caused by a pathogen / infective organism	allow not caused by a microorganism / microbe ignore not caused by infection ignore named pathogen unless bacteria, virus and fungus all mentioned	1	AO1 4.2.2.4 4.2.2.5 4.3.1.1 4.3
	(so) is not passed / spread (from person to person)	allow cannot be spread / caught allow is not infectious / contagious	1	AO2 4.2.2.4 4.2.2.5 4.3.1.1 4.3
02.2		allow 'it' for heart		AO1 4.2.2.4
	reduced / restricted / stopped blood flow	it does not matter where blood flow is restricted to – heart / body	1	
	(so) less oxygen reaches heart (muscle / cells)	must reference heart / it allow no oxygen reaches the heart (muscle / cells)	1	
	(so heart muscle / cells) cannot respire (enough)		1	
	or (so heart muscle / cells) do not release (enough) energy	do **not** accept do not make / produce / create energy ignore references to breathing / suffocation ignore blood clots / blockages		

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 01 · Mark scheme

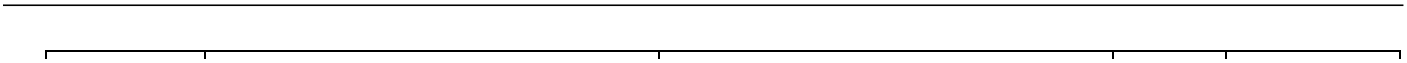
June 2018 | 8464/B/1H | Original Q2

Question	Answers	Mark	AO / Spec. Ref.
02.3	**Level 3:** Relevant points (factors / effects) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (factors / effects) are identified and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2 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	
	Indicative content **medical risk factors:** • high blood pressure • high cholesterol • diabetes • genetic factors • medications **lifestyle risk factors:** • smoking • obesity • lack of exercise • high fat / energy diet • eating insufficient fruit / vegetables • alcohol • high salt intake • exposure to air pollution • certain drugs / correct named drug **examples of links:** • smoking – high bp / cholesterol / fatty deposition • obesity – lack of exercise / high bp / cholesterol / fatty deposition / diabetes • exercise – obesity / bp /diabetes • diet – obesity / cholesterol / diabetes • alcohol – bp / cholesterol • high salt intake - high blood pressure • genetic factors – bp / cholesterol / diabetes / obesity • medication – can affect blood / blood vessels / metabolism the main discriminator is the quality of linking both lifestyle and medical factors are required for **level 3**		4.2.2.2 4.2.2.4 4.2.2.5 4.2.2.6
Total		**11**	

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 01 · Mark scheme

June 2018 | 8464/B/1H | Original Q2



4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 02 · Mark scheme

November 2021 | 8464/B/1H | Original Q5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	D		1	AO2 4.2.2.2
05.2	C		1	AO3 4.2.2.2
05.3	right atrium → right ventricle → pulmonary artery		1	AO1 4.2.2.2

4.2.2.4 Coronary heart disease: a non-communicable disease

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.4	**Level 3:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.		5–6	AO3
	Level 2: Some logically linked reasons are given. There may also be a simple judgement.		3–4	AO3
	Level 1: Relevant points are made. They are not logically linked.		1–2	AO1
	No relevant content		0	
	Indicative content Advantages of statins • easy to take **or** not invasive (procedure) • decrease blood cholesterol • slow down build-up of fatty materials in arteries • maintain blood flow to heart muscle cells • low cost (compared to stent operation) Disadvantages of statins • might be side effects of drug eg muscle pain • effects take time to happen • drug will need to be taken long term • might forget to take drug Advantages of stent • blocked artery is held open • blood flow to heart muscle cells is increased • stent will remain in place for a long time • effect of stent is immediate • rapid recovery from operation Disadvantages of stent • risk of infection from operation • risk of surgery eg heart attack **or** bleeding • risk of thrombosis **or** blood clot For Level 3, arguments for and against **both** treatments are needed.			4.2.2.4

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 02 · Mark scheme

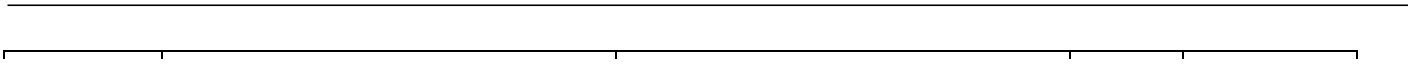
November 2021 | 8464/B/1H | Original Q5

05.5	heart (muscle) cannot contract / pump as effectively / powerfully (so) less blood pumped out of heart **or** to body (on each beat / contraction) (so) less oxygen (reaches cells / body) for (aerobic) respiration (so) breathing rate increases to supply more oxygen **or** (so) breathing rate increases to repay oxygen debt	allow heart (muscle) is not as strong ignore reference to rate of blood flow allow (so) more anaerobic respiration allow (so) breathing rate increases to break down lactic acid	1 1 1 1	AO2 4.2.2.2 4.2.2.4 4.4.2.1
05.6	stem cells are undifferentiated cells (therefore) can form heart (muscle) cells	allow stem cells can differentiate allow stem cells can develop into different types of cell ignore stem cells can become specialised ignore stem cells are not specialised allow (therefore) can form muscle cells	1 1	AO1 AO2 4.1.2.3 4.2.2.4
05.7	any **two** from: • cells will not be rejected • no risk of damage to embryo • adult can give consent	allow converse if clearly referring to embryonic stem cells allow no (potential) human life destroyed / damaged ignore unethical unqualified ignore religion unqualified	2	AO3 4.1.2.3
Total			**17**	

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 02 · Mark scheme

November 2021 | 8464/B/1H | Original Q5



4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 03 · Mark scheme

June 2022 | 8464/B/1H | Original Q6

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	it is made up of (different) tissues (that perform specific functions)		1	AO1 4.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.2	some blood would flow back into the ventricle / heart	allow not all the blood would leave the ventricle / heart allow blood clot (may form in the heart) do **not** accept blood would flow back into the right ventricle	1	AO2 4.2.1 4.2.2.2 4.2.2.4 4.4.2.1
	(so) less oxygenated blood would be pumped to the body	ignore references to glucose	1	
	cells require oxygen for respiration **or** less aerobic respiration	allow more anaerobic respiration	1	
	(so) person would become out of breath **or** (so) less energy transferred **or** (so) person would be tired	(so) lactic acid will build up allow the idea of lacking energy do **not** accept less energy produced / made / created	1	

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 03 · Mark scheme

June 2022 | 8464/B/1H | Original Q6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.3	any **four** from: (advantages of biological valve): • reduced risk of blood clots which could cause heart attack or stroke • reduced risk of blood clots during pregnancy / birth • reduced risk of bleeding during pregnancy / birth • do not need to take anti (blood) clotting drugs • no risk to foetus / baby from drugs • reduced risk of serious bleeds if in an accident • do not need to carry (anti-blood clotting) drugs when travelling • lower risk of rejection / immune reaction (disadvantages of biological valve): • may be rejected • may have to go through surgery more than once • may have to take immunosuppressant drugs • have to wait for (suitable) donor	max **three** marks if only advantages or disadvantages of biological valve given ignore do not need to take blood thinners allow do not need to take drugs for life allow problems related to losing / obtaining drugs when travelling do **not** credit reference to rejection twice allow no risk of side effects from drugs do **not** credit reference to rejection twice ignore risks from surgery unqualified allow an animal might be killed	4	AO3 4.2.2.2 4.2.2.3 4.2.2.4

Total Question 6		9

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 04 · Mark scheme

June 2024 | 8464/B/1H | Original Q7

Question 7

Question	Answers	Mark	AO / Spec. Ref
07	**Level 3:** Relevant points (factors / effects) are identified, given in detail and logically linked to form a clear account.	5–6	AO3
	Level 2: Relevant points (factors / effects) are identified and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO3
	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	4.2.2.4 4.2.2.6 4.4.2.1 4.4.2.2
	Indicative content **causes of angina / CHD:** • high cholesterol / fat (in blood / diet), obesity • a lack of exercise • smoking / alcohol • increasing age • a family history of atherosclerosis or heart problems **explanation of symptoms:** • fatty deposits in coronary arteries • narrowing of the coronary arteries • reduced blood / oxygen / glucose to the heart (muscle / tissue / cells) • reduced blood / oxygen / glucose to the body • less oxygen / glucose for respiration • less energy released • (more) anaerobic respiration • lactic acid formed • muscle fatigue **treatment using GTN:** • more blood to the heart (muscle / tissue / cells) • more oxygen / glucose to the heart (muscle / tissue / cells) • increased (aerobic) respiration For **Level 1** explanation(s) of the symptoms of angina **or** the treatment using GTN must be included For **Level 3** explanations must include the causes of angina, explanations of the symptoms of angina and treatment using GTN		

Total Question 7	6

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 01 · Examiner comments

June 2018 | 8464/B/1H | Original Q2

Question 2 (standard demand)

02.1 Few students scored the first marking point for saying that a non-communicable disease is not caused by a pathogen. Some students gave examples of non-communicable diseases, such as CHD, diabetes and cancer. Others gave a cause, such as genetics, lifestyle or diet. These were ignored.

89% of students achieved one mark, usually for saying a non-communicable disease cannot be caught or is not infectious. 5% of students achieved full marks.

02.2 The majority of students gained the first marking point for stating that blood flow is reduced in people with CHD.

For the second marking point it had to be clear that this would result in less oxygen reaching the cells of the heart, as the question asked how CHD can cause a heart attack. Many students wrote about less oxygen reaching other parts of the body.

The last marking point needed a link to less respiration or insufficient energy release. Students often incorrectly referred to less energy being made, created or produced.

There were very few three-mark answers seen (2%). Of these, some gave a complete story linking reduced respiration to there being insufficient energy released for the heart muscle to contract.

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 01 · Examiner comments

June 2018 | 8464/B/1H | Original Q2

02.3 This was a 'level marked', 'extended response question'. The command word was 'Explain', so the main discriminator between the three different levels was the quality of linking ideas. Students were asked to explain how lifestyle and medical risk factors increase the chance of developing CHD. Therefore examples of both types of factor had to be included, with several examples of logical linking of ideas, in order to enter level 3. 77% of students achieved a minimum of three marks. 41% of students gave a level 3 response.

Many students phrased their response in terms of how to reduce the chance of developing CHD, which could achieve full credit if explanations were included. References to doing exercise and not eating too many fatty foods were often seen, but if these were not linked to explanations the answer was limited to level 1. References to bad or unhealthy diets were too vague without going on to mention high levels of fat, sugar or salt.

An answer such as a fatty diet and not enough exercise can lead to obesity, which increases the chance of CHD, gained 3 marks as there is an attempt to link ideas. To be awarded 4 marks better links had to be made, or more factors referred to. Smoking and alcohol consumption were sometimes mentioned. With reference to smoking, a number of students were under the impression that smoking leads to the build-up of tar in the coronary arteries.

Many responses were limited to level 2 because there was no reference to any medical risk factors. Where medical factors were included it was often in relation to diabetes or genetic factors. A family history of heart problems was sufficient for this idea. High blood cholesterol was sometimes given as a medical risk factor.

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 02 · Examiner comments

November 2021 | 8464/B/1H | Original Q5

Question 5 (standard/high and high demand)

This question assessed the understanding of blood flow through the heart and heart attacks. About a third of students identified the blood vessel that transported blood with the highest oxygen concentration into the heart, and a similar proportion identified the vessel which transports blood at the highest pressure. Almost half knew the route of blood flowing through the heart to the lungs.

05.4 was an extended response question, set at high demand, to evaluate the use of statins or a stent to reduce the risk of a heart attack. A quarter of students scored 1 or 2 marks, often stating blood flow to the heart muscle would increase. References to surgery being required for a stent was also seen. Both treatments had to be discussed to move above Level 1. Many students simply repeated the stem of the question, which did not gain any marks, or they mixed up the two treatments. Just over a quarter of students scored 3 marks or above. For Level 3, advantages and disadvantages of both treatments were needed, as well as a judgement.

Few students could explain why people who survive a heart attack get out of breath easily. Three-quarters of students scored zero for this question; a quarter scored 1 mark. This was usually for saying the heart is not as strong after a heart attack. Students did not include enough detail for the other marks, for example they did not link oxygen to respiration.

The last two items were about the use of stem cells to repair damaged heart tissue. Fewer than half the students scored any marks for **05.6**. Most did not understand the difference between differentiation and specialised cells. Just over half the students scored 1 mark for saying that stem cells made from the patient's own cells would be less likely to be rejected, or that they would not involve risking the life of an embryo.

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 03 · Examiner comments

June 2022 | 8464/B/1H | Original Q6

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

06.1 42% of students scored the mark for saying the heart is an organ because it is made up of different tissues working together. Some said it is made up of similar tissues, which was ignored.

06.2 Students were asked to explain the effect that a leaky heart valve would have on a person. 56% of the students scored at least one mark, which was usually for saying that some blood would flow back into the heart. If the wrong chamber was named then this mark could not be awarded. As the question required an explanation the remaining marks had to link logically, so just saying the person would get tired was insufficient.

06.3 Information about biological and mechanical heart valves was given in the question. When describing advantages and disadvantages of the biological valves, the student had to add some value to the information provided. Saying that biological valves have a reduced risk of blood clots adds little to the information given, so is not creditworthy. Something extra had to be added, as detailed in the mark scheme, as the question was set at high demand.

The advantage of a biological valve that the woman would not need to take anti-blood clotting drugs was often given, but reference to blood thinners was insufficient. If students just said ‘they wouldn’t have to take drugs’ this had to be qualified by adding ‘…for life’.

The disadvantage that the valve may be rejected was seen, and saying that it is unethical to use valves from animals was allowed.

Some students evaluated the use of biological and mechanical valves. To score marks they had to make the advantages and disadvantages for a biological heart valve over a mechanical valve clear.

4.2.2.4 Coronary heart disease: a non-communicable disease

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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

4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 04 · Examiner comments

June 2024 | 8464/B/1H | Original Q7

Question 7 (standard/high & high demand)

07 This was an 'extended response' style of question and is marked holistically. There are overall generic descriptions for the three levels of response at the top of the mark scheme, giving a hierarchy of responses. Within each level there are 2 marks.

This question was generally not well answered although 98% of students made an attempt, there were some very good responses, with 39% gaining 3 or more marks. However, many students only gave part of the story and therefore were limited in the level they could achieve with less than 3% giving a Level 3 response.

The question was in the context of angina and reduced blood flow to the heart. Some students referred to complete blockages rather than a narrowing of the coronary artery, which was incorrect for this context and the level of demand of the question.

For Level 1 students needed to give an explanation of the effects of angina. Many students *only* referred to the causes of angina, which was insufficient at this level and so gained no marks; however, where students gave an explanation linked to the causes this was then given credit.

To enter Level 2 students needed to link two of their ideas together: for example, 'fatty deposits in the coronary artery lead to reduced blood flow to the heart'. However, many students were not able to articulate where the reduced blood flow was to, limiting their response to Level 1. Some students gave excellent explanations of angina and how the treatment worked but then did not give any causes of angina, which limited their response to Level 2.

Some students stated that GTN spray acted as a stent despite being told in the stem that it widens the coronary arteries. Others just repeated the stem of the question without explaining how widened arteries would help reduce the symptoms.

Very few students could link the idea that the coronary arteries supply the heart with blood/oxygen which results in less respiration ultimately reducing blood flow around the body leading to muscle fatigue.

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4.2.2.4 Coronary heart disease: a non-communicable disease

Answer 04 · Examiner comments June 2024 | 8464/B/1H | Original Q7

0 7 Angina is a condition many people get as coronary heart disease (CHD) develops.

Angina can cause chest pain and tiredness.

People with angina are sometimes treated with a drug called GTN.

GTN widens the coronary arteries.

Explain:

- the causes and symptoms of angina
- how GTN reduces the symptoms of angina.

[6 marks]

people who eat more saturated fatty foods, allows more plaque to build up in the coronary arteries, this causes the blood to clot, so less oxygenated blood carried to the heart, so less respiration can occur in cells resulting in more anaerobic respiration causing muscle fatigue, so less oxygenated blood pumped around the body so less blood to cells causing tiredness. Another cause is excessive alcohol use, which results in high blood pressure so more clots due to plaque build up. By taking GTN, the arteries are widened to allow more oxygenated blood carried to the heart so more diffusion occurs, so more respiration occurs, so less fatigue as less anaerobic respiration takes place, and more oxygenated blood carried to body cells for growth and repair and to carry more energy to cells.

In this response, the student clearly gives symptoms of angina, an excellent explanation of the cause of angina and an excellent explanation how GTN reduces these symptoms. This is a top Level 3 answer and gained 6 marks.

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4.2.2.4 Coronary heart disease: a non-communicable disease

Contact us

Our friendly team will be happy to support you between 8am and 5pm, Monday to Friday.

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