Atherosclerosis, Blood Clotting and CVD Treatment (Topic 1): Edexcel SNAB A Level Biology Exam Questions by To

20 questions · 61 marks · about 73 minutes. Answer in the spaces, then check the mark schemes at the end.

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Question 1 · AS Paper 1 · June 2016 · Q4(b) · 4 marks

(b) It is possible to reduce the risk of CVD by taking medication or changing diet.

Explain the role of antihypertensive drugs in reducing the risk of atherosclerosis.

(4)

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Question 2 · AS Paper 1 · June 2017 · Q6(b)(i) · 3 marks

(b) A person with very high blood pressure has an increased risk of developing atherosclerosis.

(i) Describe how very high blood pressure could result in atherosclerosis.

(3)

Question 3 · AS Paper 1 · June 2017 · Q6(b)(ii) · 2 marks

(ii) Explain how atherosclerosis in one part of an artery could increase the likelihood of it developing in another part of the same artery.

(2)

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Question 4 · AS Paper 1 · June 2018 · Q7(a)(ii) · 5 marks

(ii) Explain the effect that a diet high in salt could have on a person's risk of developing cardiovascular disease.

(5)

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Question 5 · A level Paper 1 · June 2018 · Q1(b)(i) · 3 marks

(b) It has been suggested that magnesium ions are involved in regulating the ratio of HDL to LDL in the blood.

(i) Describe the role of LDLs in the development of atherosclerosis.

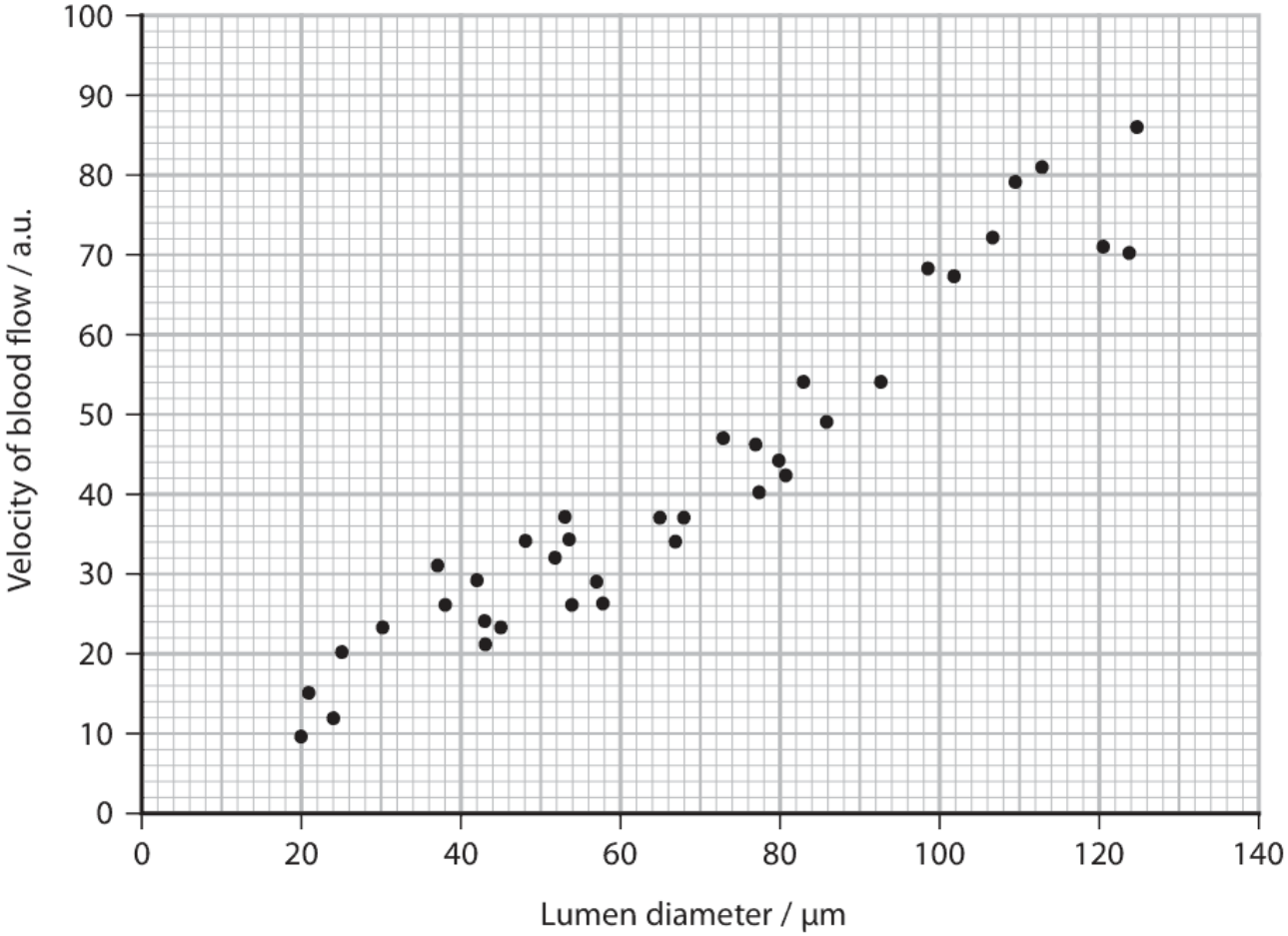
(3)

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Question 6 · information from earlier in the question

1 The diameter of the inside of a blood vessel (lumen diameter) affects the speed of blood flow.

The graph shows the relationship between the lumen diameter of blood vessels and the velocity of blood flow.



Question 6 · A level Paper 3 · October 2020 · Q1(b)(i) · 2 marks

(b) (i) Explain how the development of cardiovascular disease (CVD) could affect the velocity of blood flow.

(2)

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Question 7 · information from earlier in the question

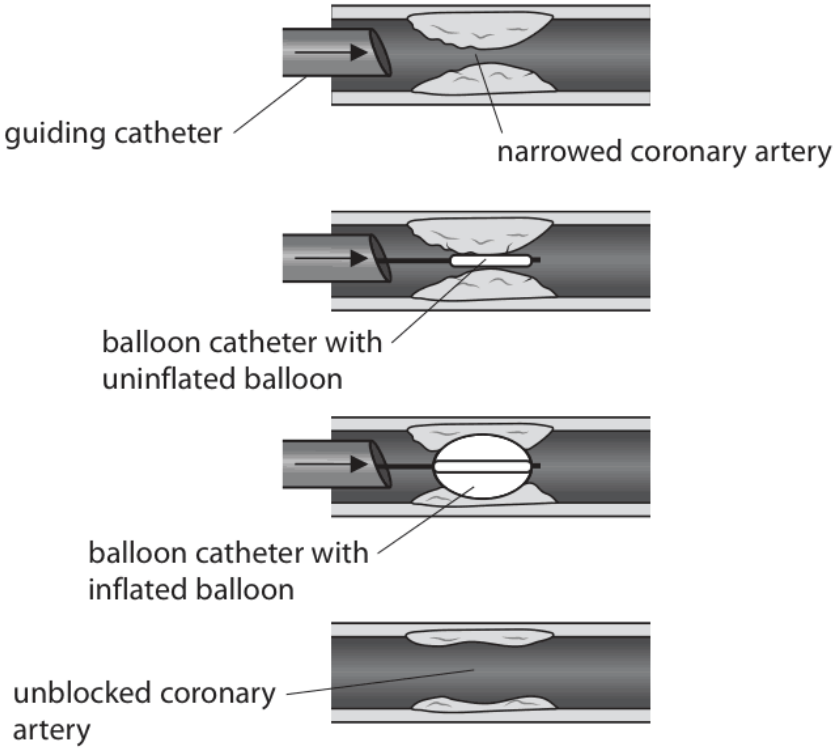
(d) Atherosclerosis is a type of cardiovascular disease (CVD) that causes the narrowing of coronary arteries.

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The diagram shows a procedure called balloon angioplasty.

Balloon angioplasty can reduce the immediate risk of a person having a heart attack.

It will not prevent further narrowing of coronary arteries due to atherosclerosis.



(ii) Explain why balloon angioplasty could reduce the immediate risk of a person having a heart attack.

(4)

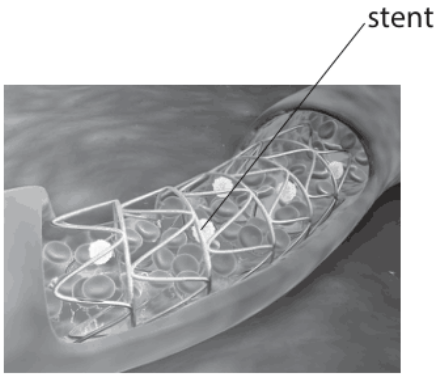
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Question 8 · AS Paper 1 · June 2025 · Q5(b)(i) · 2 marks

(b) The lumen of a coronary artery can be widened by a technique called angioplasty.

A stent can be used to maintain the lumen width of the coronary artery after angioplasty has occurred.

The image shows a stent in a coronary artery.



(Source: © Stocktrek Images, Inc. / Alamy Stock Photo)

(i) Explain why a patient might need this treatment.

(2)

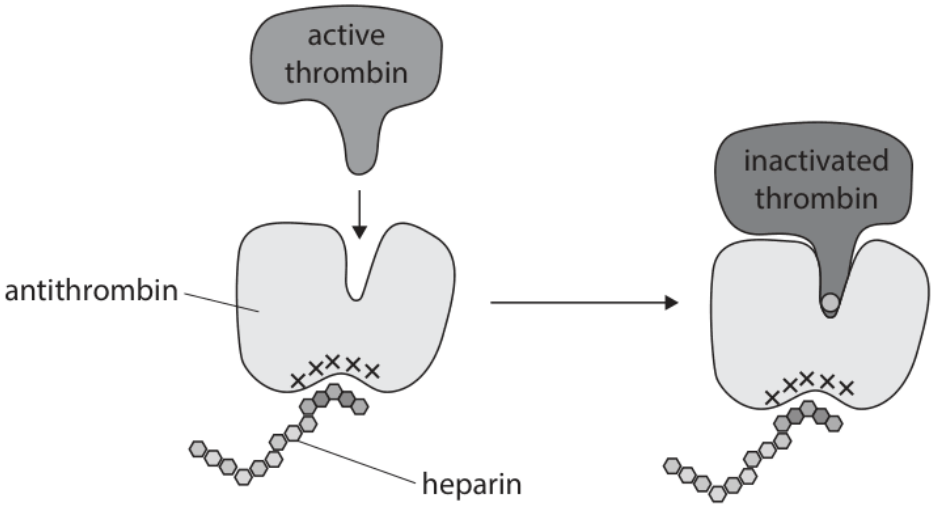
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Question 9 · AS Paper 1 · June 2025 · Q5(b)(ii) · 4 marks

(ii) Anticoagulant drugs, such as heparin, are given to patients who have been fitted with a stent.

Heparin binds to antithrombin in the blood to form an antithrombin-heparin complex.

The diagram shows the effect of an antithrombin-heparin complex binding to active thrombin.

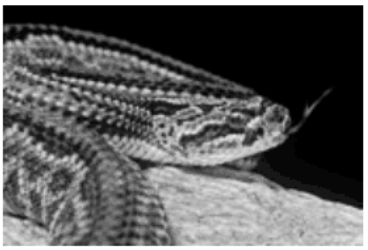


Explain how an antithrombin-heparin complex will prevent blood clots forming in a coronary artery.

(4)

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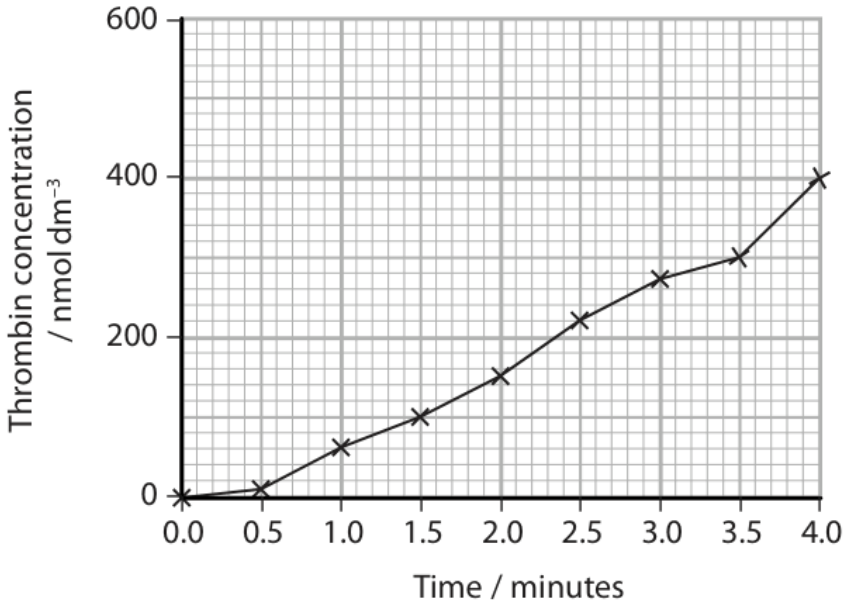
2 The photograph shows the tropical rattlesnake, *Crotalus durissus terrificus*.



This snake produces a toxin called convulxin (CVX), which activates platelets leading to blood clotting.

(a) The effect of CVX on the rate of thrombin production was investigated.

The graph shows the concentration of thrombin in a sample of blood treated with CVX.

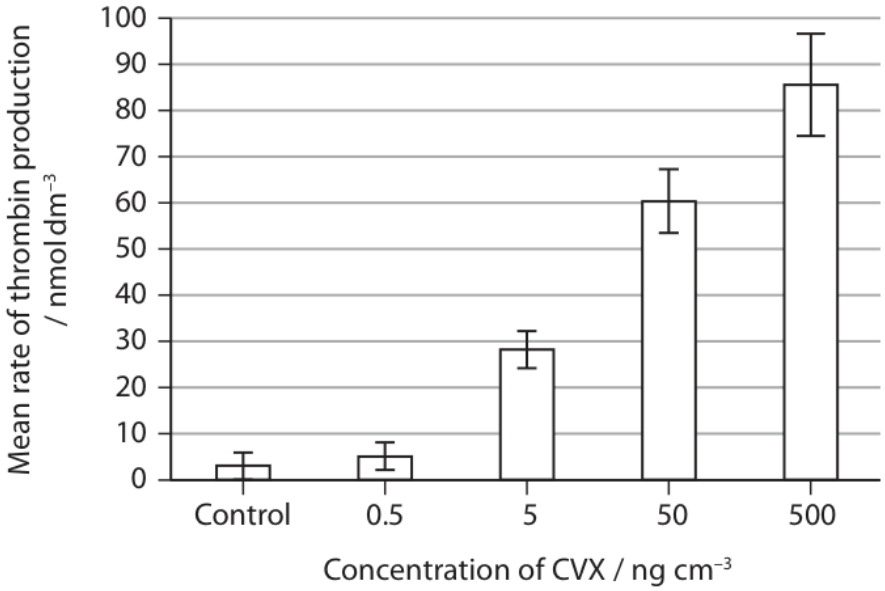


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Question 10 · AS Paper 1 · June 2016 · Q2(b) · 5 marks

(b) The effect of four different concentrations of CVX on thrombin production was investigated.

The graph shows the results of this investigation, with bars showing the standard deviation.



Analyse the data to assess the effect of CVX on the rate of blood clotting.

(5)

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Question 11 · AS Paper 1 · June 2019 · Q8(b) · 4 marks

(b) An ischaemic stroke occurs when a blood vessel in the brain is blocked by a blood clot.

Explain how a blood clot could form in a blood vessel.

(4)

Questions, mark schemes and examiners' report extracts © Pearson Education Ltd.

Question 12 · A level Paper 1 · June 2019 · Q8(a)(i) · 3 marks

8 Thrombophilia is a condition that increases the risk of blood clots forming.

This condition increases the risk of venous thromboembolism (VTE), a condition where a blood clot forms in a vein. Thrombophilia due to the production of overactive factor V can be inherited.

Factor V is involved in the conversion of prothrombin to thrombin.

(a) (i) Describe the role of thrombin in blood clotting.

(3)

Question 13 · A level Paper 1 · June 2019 · Q8(a)(ii) · 3 marks

(ii) Explain why a mutation in the gene coding for the protein factor V may increase the risk of VTE.

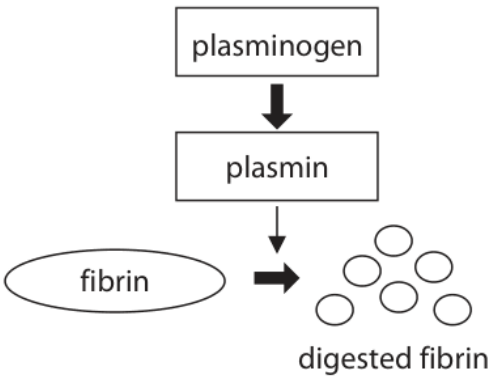
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Question 14 · A level Paper 2 · June 2018 · Q9(a) · 3 marks

9 Plasmin is an enzyme that digests fibrin.

Plasmin is produced, in the blood, from an inactive form of the enzyme called plasminogen.



Pharmaceutical companies have developed drugs that inhibit the activity of plasmin.

One of these drugs, tranexamic acid, is used in surgery to reduce blood loss.

(a) Explain why tranexamic acid will result in reduced blood loss during surgery.

(3)

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Question 15 · A level Paper 2 · June 2023 · Q5(c) · 3 marks

(c) A pathogenic strain of this bacterium, *E. coli*-STEC, produces a toxin that reduces blood platelet concentration.

Explain how an *E.coli*-STEC infection increases the time taken for a blood clot to form.

(3)

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Question 16 · A level Paper 3 · June 2025 · Q3(c) · 3 marks

(c) Atherosclerosis can increase the risk of blood clots forming.

Explain how blood clotting in atherosclerosis can result in the death of heart muscle.

(3)

Question 17 · AS Paper 1 · June 2018 · Q7(c) · 2 marks

(c) A variety of drugs can be used to reduce blood pressure. These drugs may cause side effects in some people.

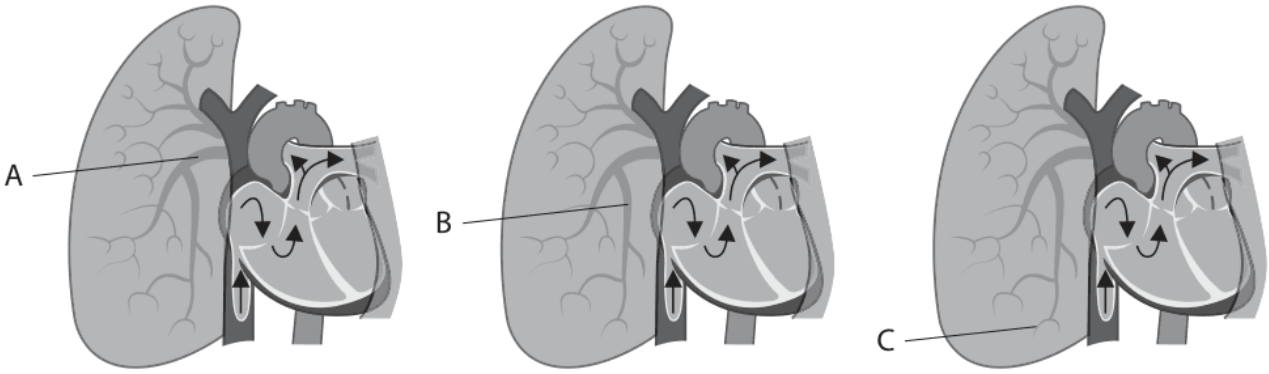
State **two** possible side effects of taking drugs to reduce blood pressure.

(2)

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(c) The location of a blood clot in the body can affect the oxygenation of the blood as well as the supply of oxygen to respiring tissues.

The diagrams show the location of three separate blood clots in arteries in the right lung.



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The table shows the effect of the location of the blood clot on the percentage oxygen saturation of the blood leaving the right lung.

Location of blood clot	Blood oxygen saturation leaving the right lung (%)
A	84
B	92
C	98

(i) State why statin medication would not be an effective treatment for a blood clot in these arteries.

(1)

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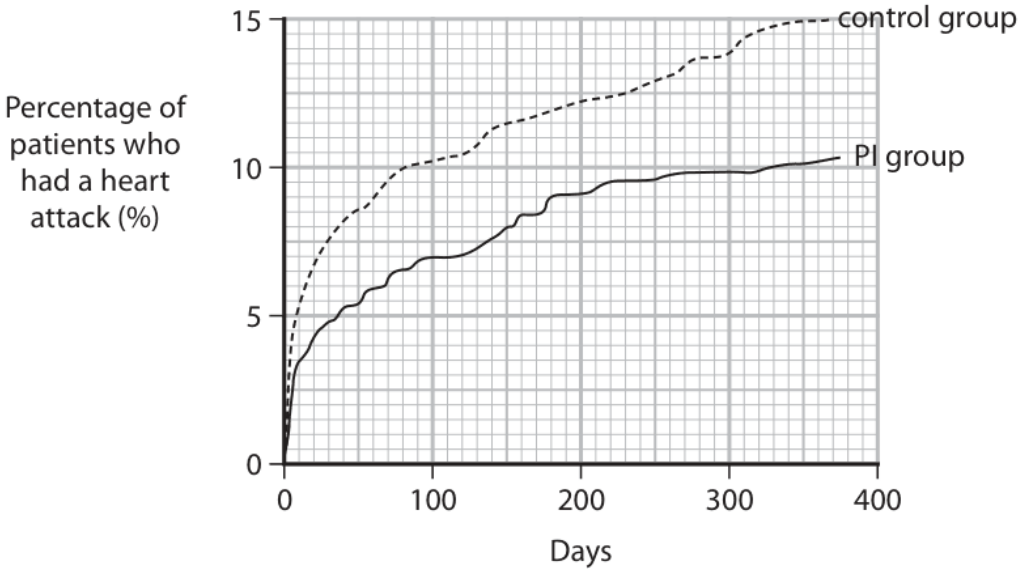
Question 19 · AS Paper 1 · June 2023 · Q5(c) · 3 marks

(c) The risk of a heart attack in humans can be reduced by treatment with platelet inhibitors.

The effectiveness of a platelet inhibitor (PI) drug was investigated.

One group of patients took a new platelet inhibitor (PI) drug whereas the control group were given no treatment.

The graph shows the percentage of these patients who had a heart attack.



Explain the results of this investigation.

(3)

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3 Doctors sometimes prescribe beta-blockers for their patients.

Beta-blockers are a type of drug with antihypertensive properties.

(a) In one study, the effect of beta-blockers on the heart rate during exercise was investigated.

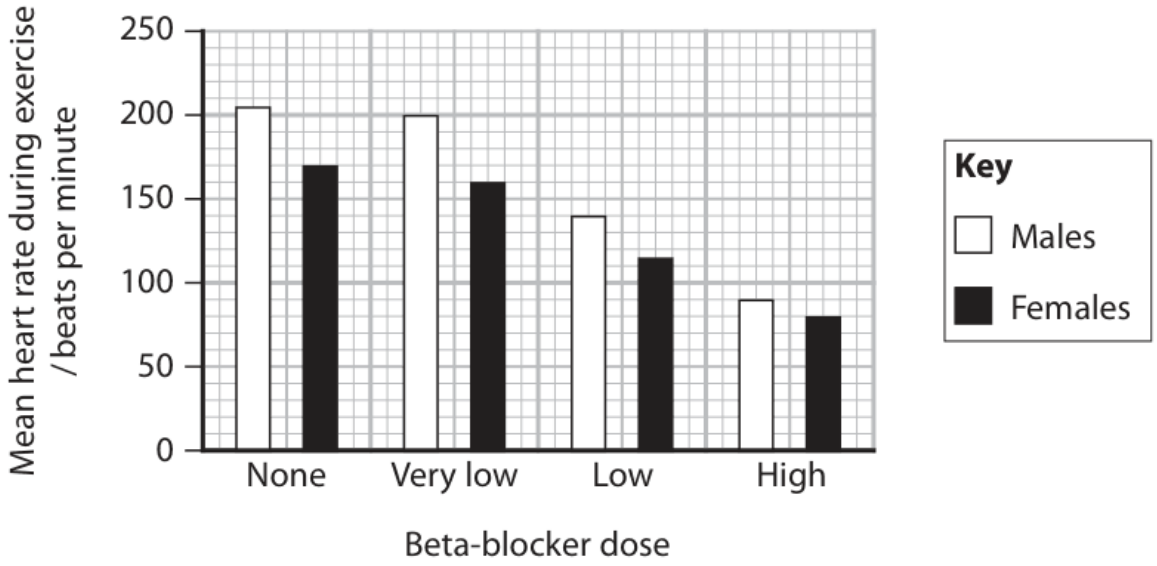
In this study, volunteers were placed randomly into one of four groups shown in the table.

Group	Dose of beta-blocker
A	none
B	very low
C	low
D	high

The heart rate of each volunteer was recorded during a period of exercise.

A mean value was calculated separately for the males and females in each group.

The graph shows the results of this study.



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Question 20 · A level Paper 3 · November 2021 · Q3(b) · 2 marks

(b) Explain why beta-blockers are prescribed for some people.

(2)

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Mark schemes

Question 1 · AS Paper 1 · June 2016 · Q4(b) · 4 marks

Question Number	Answer
4(b)	An explanation which includes reference to the following: • antihypertensive drugs lower blood pressure (1) • lower blood pressure reduces risk of damage to endothelium of the artery (1) • reduced risk of inflammatory response (1) • reduced risk of { atheroma / plaque } formation (1)

Additional Guidance	Mark
Accept converse argument for marking points 2, 3 and 4 Ignore epithelium Allow description of an inflammatory response	(4)

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Question 2 · AS Paper 1 · June 2017 · Q6(b)(i) · 3 marks

Question Number	Answer
6 (b)(i)	A description that makes reference to three of the following: • (high blood pressure) damages the endothelium of the artery (1) • causing an inflammatory response (1) • {white blood cells / cholesterol} accumulate / atheroma forms (1) • calcium salts and fibrous tissue build up / formation of a plaque (1)

Additional Guidance	Mark
	(3)

Question 3 · AS Paper 1 · June 2017 · Q6(b)(ii) · 2 marks

Question Number	Answer
6 (b)(ii)	An explanation that makes reference to the following: • {plaques / atherosclerosis} narrow the lumen (1) • increasing blood pressure (further) (1)

Additional Guidance	Mark
ALLOW narrowing of artery ALLOW atheroma	(2)

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Question 4 · AS Paper 1 · June 2018 · Q7(a)(ii) · 5 marks

Question Number	Answer
7(a)(ii)	An explanation which makes reference to five of the following: • (diet high in salt) increases risk of CVD (1) • (high salt intake causes) higher blood pressure (1) • (which increases risk of) { damage to endothelium of artery / atherosclerosis } (1) • (therefore increases risk of) inflammatory response (1) • (leading to increased risk of) { atheroma / plaque formation } (1) • narrowing of arteries { increases risk of blood clots / increases blood pressure / reduces blood flow to cardiac muscle } (1)

Additional Guidance	Mark
ALLOW increases risk of heart attack / stroke	**(5)**

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Question 5 · A level Paper 1 · June 2018 · Q1(b)(i) · 3 marks

Question Number	Answer
1(b)(i)	A description that makes reference to the following: • (LDL / lipoproteins carry) cholesterol in the blood (1) • (cholesterol) is deposited to form atheroma (1) • in the endothelium of an artery (1)

Additional Guidance	Mark
ALLOW LDLs increase blood cholesterol ALLOW plaque formation ALLOW artery wall	**(3)**

Question 6 · A level Paper 3 · October 2020 · Q1(b)(i) · 2 marks

Question number	Answer
1(b) (i)	An explanation that makes reference to the following: • atheroma {reduces the diameter of / narrows} the lumen of arteries (1) • therefore reducing (the velocity of) blood flow (1)

Additional guidance	Mark
ALLOW {atherosclerosis / plaques} reduce the diameter of the lumen of arteries ALLOW {atheroma / atherosclerosis / plaques} partially block the arteries	**(2)**

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Question 7 · AS Paper 1 · June 2024 · Q7(d)(ii) · 4 marks

Question Number	Answer
7(d)(ii)	An answer that makes reference to four of the following: • (balloon angioplasty) widens the {lumen / coronary artery} (1) • increasing blood flow (1) • reduces {blood pressure / risk of a blood clot} (1) • (resulting in) {oxygen / oxygenated blood} supplied to {heart / cardiac muscle (cells)} (1) • to allow aerobic respiration (reducing risk of heart attack) (1)

Additional Guidance	Mark
ALLOW the {lumen / coronary artery} is no longer narrowed ALLOW heart attacks occur when heart cells {do not receive oxygen / respire anaerobically} ALLOW release of ATP for muscle contraction	(4)

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Question 8 · AS Paper 1 · June 2025 · Q5(b)(i) · 2 marks

Question Number	Answer
5(b)(i)	An explanation that makes reference to the following: • {lumen narrowed / oxygen supply reduced / blood flow reduced} due to {atherosclerosis / atheroma / plaque} / (1) • to allow {heart / cardiac} muscle to contract (normally) / more aerobic respiration by {heart / cardiac} {muscle / cells} (1)

Additional Guidance	Mark
ALLOW artery for lumen ALLOW {wider lumen / treatment} allows (more) {oxygen delivery / blood flow} ALLOW to prevent {a heart attack / MI} IGNORE respiration unqualified / CHD	**(2)**

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Question 9 · AS Paper 1 · June 2025 · Q5(b)(ii) · 4 marks

Question Number	Answer
5(b)(ii)	An explanation that makes reference to four of the following: • antithrombin has a complementary shape (to thrombin) (1) • {heparin-antithrombin / complex} binds to (active) thrombin (1) • which inactivates thrombin (1) • so thrombin cannot convert fibrinogen (to fibrin) (1) • (therefore) mesh will not be made / blood cells will not be trapped (in mesh / by fibrin) / fewer blood cells trapped (1)

Additional Guidance	Mark
ALLOW deactivates thrombin / no active thrombin ALLOW reduced fibrin production	(4)

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Question 10 · AS Paper 1 · June 2016 · Q2(b) · 5 marks

Question Number	Answer
2(b)	An answer which makes reference to five of the following: • increased thrombin production as CVX concentration increases (1) • the relationship between CVX concentration and rate of thrombin production is not { directly proportional / linear } (1) • little difference between control and 0.5 ng cm^{-3} (CVX) / greatest increase from 5ng cm^{-3} to 50 ng cm^{-3} (1) • { no significant difference / standard deviations overlap } between the control and 0.5 (1) • greater thrombin production leads to { faster / increased } conversion of fibrinogen to fibrin (1) • greater thrombin production leads to { faster / increased } clotting of blood (1)

Additional Guidance	Mark
Allow control and 0.5 ng cm^{-3} are similar **ACCEPT** reference to bars instead of standard deviation	(5)

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Question 11 · AS Paper 1 · June 2019 · Q8(b) · 4 marks

Question Number	Answer
8(b)	An explanation that makes reference to the following: • collagen is exposed when wall of blood vessel is damaged (1) plus any three from the following • leading to release of thromboplastin (1) • (thromboplastin catalyses) conversion of prothrombin to thrombin (1) • (thrombin catalyses) conversion of fibrinogen to fibrin (1) • fibrin forms a mesh of fibres and traps (red) blood cells (to form a clot) (1)

Additional Guidance	Mark
ALLOW damage to endothelium exposes collagen ALLOW platelets release thromboplastin	**(4)**

Question 12 · A level Paper 1 · June 2019 · Q8(a)(i) · 3 marks

Question Number	Answer
8(a)(i)	A description that makes reference to the following: • thrombin is an enzyme (1) • (which catalyses) the conversion of fibrinogen into fibrin (1) • a mesh of fibrin traps { platelets / red blood cells } to form a clot (1)

Additional guidance	Mark
IGNORE 'platelet plug'	**(3)**

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Question 13 · A level Paper 1 · June 2019 · Q8(a)(ii) · 3 marks

Question Number	Answer
8(a)(ii)	An explanation that makes reference to the following: • (mutation in the gene) changes the sequence of the amino acids (in the factor V molecule) (1) • (overactive factor V will) increase the production of thrombin (1) • increases blood clotting (1)

Additional guidance	Mark
ALLOW the mutation results in a change to the {primary structure/ polypeptide chain} ALLOW increased risk of blood clotting	**(3)**

Question 14 · A level Paper 2 · June 2018 · Q9(a) · 3 marks

Question Number	Answer
9(a)	An explanation that makes reference to the following: • fibrin forms a mesh that collects {platelets / red blood cells} (1) • (tranexamic acid) { prevents plasmin digesting fibrin / stops the breakdown of fibrin } (1) • allowing clots to remain in place (1)

Additional Guidance	Mark
ALLOW fibrin is involved in forming blood clots	**(3)**

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Question 15 · A level Paper 2 · June 2023 · Q5(c) · 3 marks

Question Number	Answer
5(c)	An explanation that makes reference to three of the following: • less thromboplastin (released from fewer platelets) (1) • (so less/slower) prothrombin converted to thrombin (1) • (so less/slower) {fibrinogen converted to fibrin / fibrin formed} (1) • fewer platelets to be trapped in the fibrin mesh (1)

Additional Guidance	Mark
ALLOW less thrombokinase ALLOW: slower formation of fibrin ALLOW: slower blood clotting / cascade reduced ALLOW: smaller platelet plug formed / slower platelet plug formation	[3]

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Question 16 · A level Paper 3 · June 2025 · Q3(c) · 3 marks

Question number	Answer
3(c)	An explanation that makes reference to three of the following: • (clots) narrow lumen of coronary artery (1) • reducing blood flow (to cardiac muscle/heart) (1) • reducing supply of oxygen (to heart muscle) (1) • for aerobic respiration (1)

Additional guidance	Mark
ALLOW blocked lumen of coronary artery ALLOW no blood flow / stops blood flow IGNORE volume of blood ALLOW ischemia Note: 'reduced flow of oxygenated blood' gains both second and third marking points	(3)

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Question 17 · AS Paper 1 · June 2018 · Q7(c) · 2 marks

Question Number	Answer
7(c)	An answer which makes reference to two of the following: • nausea (1) • muscle cramps (1) • dizziness / fainting / hypotension (1) • kidney failure (1)

Additional Guidance	MGNOark
ALLOW other correct side effects of antihypertensives if not listed IGNORE references to anticoagulants, platelet inhibitors and statins ALLOW vomiting	**(2)**

Question 18 · AS Paper 1 · June 2019 · Q8(c)(i) · 1 mark

Question Number	Answer	Additional Guidance	Mark
8(c)(i)	An answer that makes reference to the following: • statins do not break down blood clots	ALLOW statins lower LDL / blood cholesterol / risk of a blood clot	**(1)**

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Question 19 · AS Paper 1 · June 2023 · Q5(c) · 3 marks

Question Number	Answer
5(c)	An explanation that makes reference to the following: • treatment with {PI / platelet inhibitor} reduced the percentage of patients who had a heart attack (1) • (because) fewer blood clots were formed (in coronary arteries) (1) • (therefore) sufficient oxygen supplied to {cardiac / heart} muscle for respiration / {cardiac / heart} muscle cells did not die due to insufficient oxygen (1)

Additional Guidance	Mark
ALLOW the PI group had fewer patients who had a heart attack / converse for control group ALLOW reduced risk of blood clots forming	(3)

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Question 20 · A level Paper 3 · November 2021 · Q3(b) · 2 marks

Question number	Answer
3(b)	An explanation that makes reference to the following: • beta-blockers reduce blood pressure (1) • therefore reducing the risk of {atherosclerosis / heart disease / CVD} (1)

Additional guidance	Mark
ALLOW prescribed to people with {high blood pressure / irregular heart beat / anxiety} ALLOW because high blood pressure can {cause atherosclerosis / damage the endothelium} ALLOW heart attack	(2)

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