Blood Vessels and Tissue Fluid: AQA A Level Biology Exam Questions b

14 questions · 35 marks · about 46 minutes. Answer in the spaces, then check the mark schemes at the end.

Question 1 · A level Paper 1 · June 2024 · Q08.1 · 2 marks

0 8 . 1 Give **two** structural features of an aorta wall and explain how they are related to the function of an aorta.

[2 marks]

1

2

Question 2 · AS Paper 2 · November 2020 · Q03.1 · 2 marks

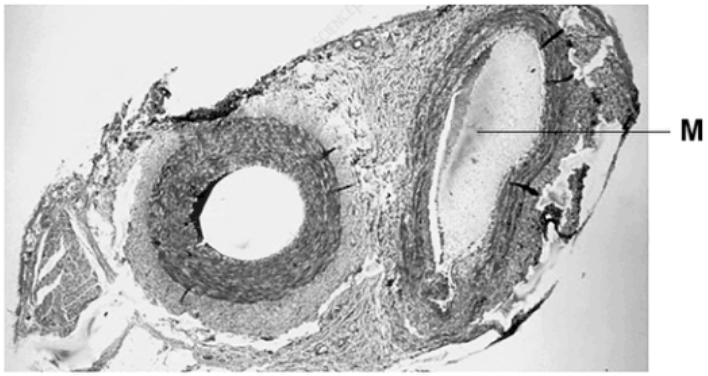
0 3 . 1 Explain how an arteriole can reduce the blood flow into capillaries.

[2 marks]

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Figure 6 shows a section through two types of blood vessels observed using an optical microscope.

Figure 6



0 6 . 2 Identify the type of blood vessel labelled **M** in **Figure 6**.

Explain your answer.

[2 marks]

Type of blood vessel _____

Explanation _____

_____

_____

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Question 4 · AS Paper 2 · June 2023 · Q04.3 · 3 marks

Medium-intensity exercise to high-intensity exercise _____

0 4 . 3 Name the type of blood vessel that controls blood flow to muscles **and** explain how these blood vessels change blood flow during exercise.

[3 marks]

Name of blood vessel _____

Explanation _____

Question 5 · AS Paper 2 · June 2016 · Q09.4 · 2 marks

0 9 . 4 Some drugs used to reduce high ventricular blood pressure cause widening of blood vessels.

Suggest how widening of blood vessels can reduce ventricular blood pressure.

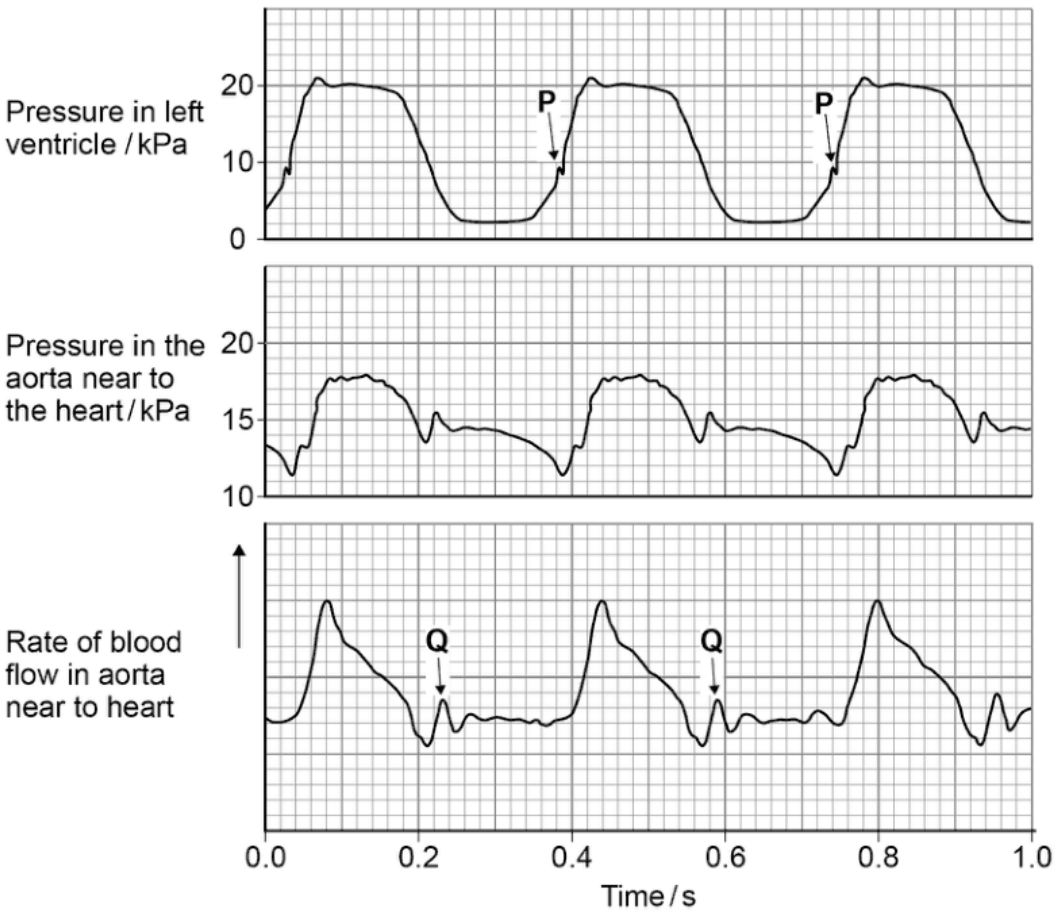
[2 marks]

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Question 6 · information from earlier in the question

0 3 **Figure 3** shows pressure and blood flow during the cardiac cycle in a dog.

Figure 3



Question 6 · A level Paper 1 · November 2020 · Q03.2 · 2 marks

0 3 . 2 At **Q** on **Figure 3** there is a small increase in pressure **and** in rate of blood flow in the aorta.

Explain how this happens **and** its importance.

[2 marks]

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Question 7 · AS Paper 2 · June 2025 · Q09.2 · 5 marks

0 9 . 2 Describe **and** explain how tissue fluid is formed and how it is returned to the circulatory system.

[5 marks]

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Question 8 · AS Paper 1 · June 2017 · Q04.3 · 2 marks

0 4 . 3 Explain the role of the heart in the formation of tissue fluid.

[2 marks]

Question 9 · AS Paper 1 · June 2017 · Q04.4 · 1 mark

0 4 . 4 Lymphoedema is a swelling in the legs which may be caused by a blockage in the lymphatic system.

Suggest how a blockage in the lymphatic system could cause lymphoedema.

[1 mark]

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Question 10 · AS Paper 2 · June 2016 · Q09.3 · 2 marks

0 9 . 3 Some people produce a much higher ventricular blood pressure than normal. This can cause tissue fluid to build up outside the blood capillaries of these people.

Explain why.

[2 marks]

Question 11 · A level Paper 1 · June 2017 · Q03.3 · 2 marks

0 3 . 3 High absorption of salt from the diet can result in a higher than normal concentration of salt in the blood plasma entering capillaries. This can lead to a build-up of tissue fluid.

Explain how.

[2 marks]

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Question 12 · A level Paper 1 · June 2023 · Q09.6 · 2 marks

0 9 . 6 The dengue virus causes damage to capillaries so that blood proteins move out of the capillaries into the tissue fluid.

Explain how this would affect the return of tissue fluid into the capillaries.

[2 marks]

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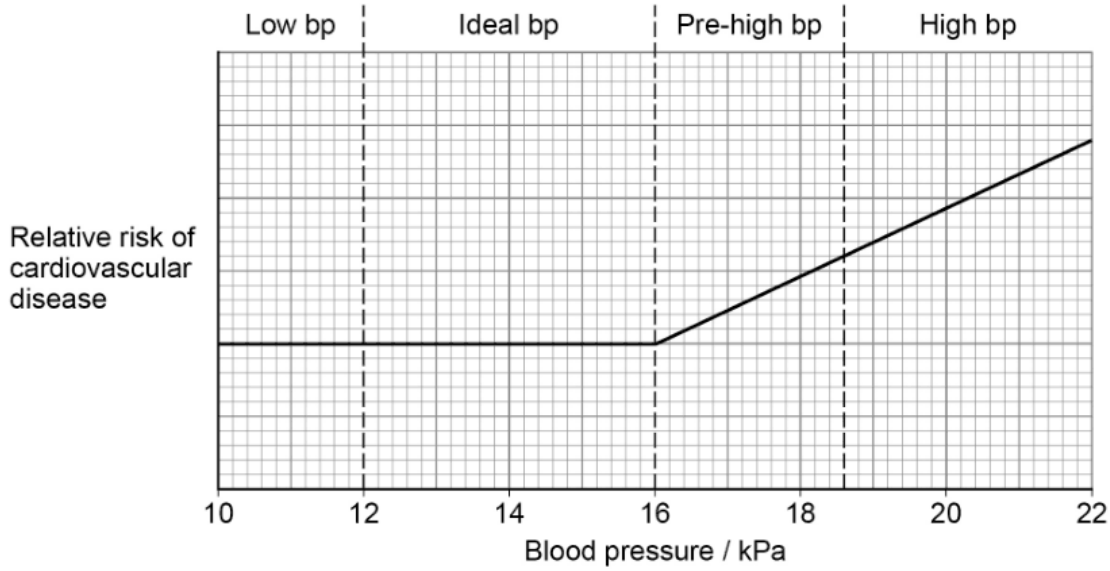
Question 13 · AS Paper 2 · June 2022 · Q06.3 · 4 marks

Scientists investigated the correlation between patients' blood pressure (bp) and the risk of these patients developing cardiovascular disease.

They grouped the blood pressure measurements into four health categories: low, ideal, pre-high and high blood pressure.

Figure 6 shows the scientists' results.

Figure 6



In a separate investigation, a doctor measured the effect of blood pressure medicines on treating a large number of patients with a mean blood pressure of 22 kPa

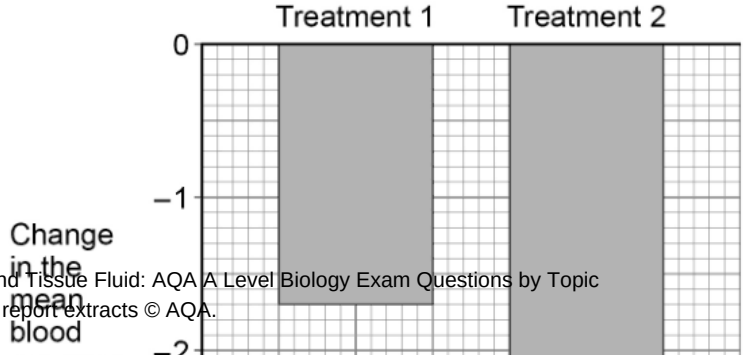
The doctor used two different treatments.

- Treatment 1 contained one blood pressure medicine.
- Treatment 2 contained three blood pressure medicines.

He measured the change in the mean blood pressure after each treatment in these patients.

Figure 7 shows his results.

Figure 7



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Cell walls make up much of the fibre that people eat.

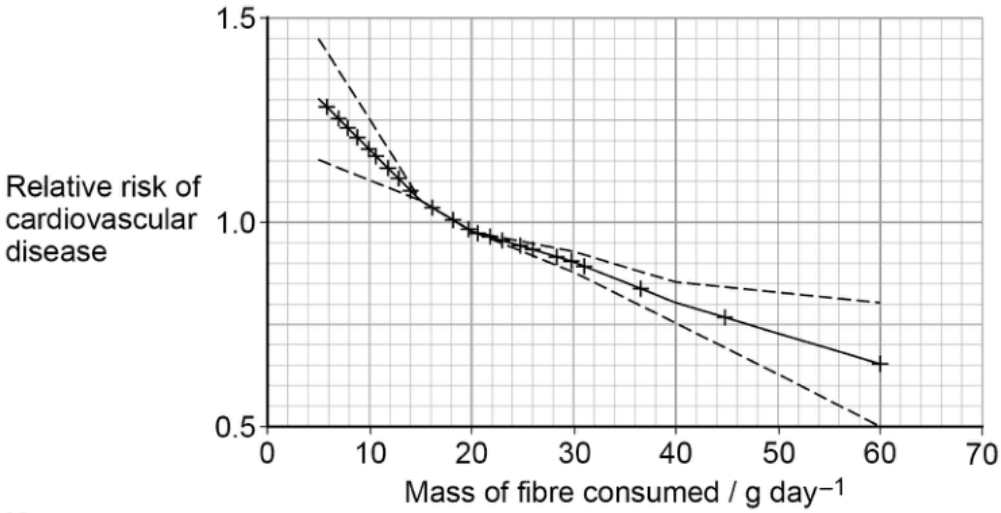
Scientists investigated the relationship between the mass of fibre people ate each day and their risk of cardiovascular disease (CVD).

They gathered data from a large sample of people and used this to calculate a relative risk.

- A relative risk of 1 means there is no difference in risk between the sample and the whole population.
- A relative risk of < 1 means CVD is less likely to occur in the sample than in the whole population.
- A relative risk of > 1 means CVD is more likely to occur in the sample than in the whole population.

Their results are shown in **Figure 3**. A value of ± 2 standard deviations from the mean includes over 95% of the data.

Figure 3



Key

—— Mean relative risk

– – – Line of best fit showing ± 2 standard deviations from the mean

Each '+' plotted point represents 1000 people

0 2 . 2 A student concluded from **Figure 3** that eating an extra 10 g of fibre per day would significantly lower his risk of cardiovascular disease.

Evaluate his conclusion.

[4 marks]

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Mark schemes

Question 1 · A level Paper 1 · June 2024 · Q08.1 · 2 marks

08.1	1. (Smooth) muscle absorbs/resists/withstands high (blood) pressure; 2. Elastic (tissue/layer) stretches **and** recoils maintains/smooths blood pressure; 3. (Smooth) endothelium reduces friction; 4. Protein (coat) prevents (artery) wall splitting **OR** Protein (coat) absorbs/resists/withstands high (blood) pressure;

2 max (2 x AO1)	1. Ignore contraction 1. Ignore maintains pressure 2. Reject contracts/ relaxes for recoils 2. Accept dilate **OR** expand for stretch 4. Accept fibrous **OR** collagen for protein

Question 2 · AS Paper 2 · November 2020 · Q03.1 · 2 marks

03.1	1. Muscle contracts; 2. Constricts/narrows arteriole/lumen;	2	2. Accept decreases for constricts/narrows 2. Accept vasoconstriction for 1 mark

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Question 3 · AS Paper 1 · November 2021 · Q06.2 · 2 marks

06.2	1. Vein; 2. Wide(r) lumen **OR** Thinner wall;	2

Question 4 · AS Paper 2 · June 2023 · Q04.3 · 3 marks

04.3	1. Arteriole; 2. (Circular/smooth) muscle relaxes; 3. Vasodilation increases blood flow **OR** Widens/dilates (lumen of) blood vessel so increases blood flow;	3 (1 x AO1, 2 x AO2)

Question 5 · AS Paper 2 · June 2016 · Q09.4 · 2 marks

09.4	1. Larger lumen/volume (of blood vessels); 2. Reduces (blood) pressure (in blood vessels); 3. Less friction/resistance (in blood vessels);	2	1. Accept: more 'space' or more 'room' (in blood vessels). 1. Accept: more blood flow (in blood vessels). 1. Accept: reduces stroke volume or less blood in ventricle.

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Question 6 · A level Paper 1 · November 2020 · Q03.2 · 2 marks

03.2	1. Elastic recoil (of the aorta wall/tissue); 2 2. Smooths the blood flow OR Maintains rate of blood flow OR Maintains blood pressure;	1. Reject muscle contracting. 1. Ignore reference to muscle relaxing. 2. Ignore reference to preventing backflow of blood.

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09.2	(Formation at arterial end) 1. Water/small molecules/glucose/ions (forced) out of the capillary/blood; 2. (Due to) high hydrostatic/blood pressure (at arterial end); 3. (Plasma) proteins remain in capillary/blood; (Return at venous end) 4. (Plasma) proteins create water potential gradient **OR** (Plasma) proteins reduce/low(er) water potential (of blood/in capillary) **OR** (Plasma) proteins cause more negative water potential (of blood/in capillary); 5. Water moves (into blood/capillary) by <u>osmosis</u>; 6. Excess (tissue) fluid enters lymph (system/capillaries/vessels);	5 max (5 x AO1)

2. Accept hydrostatic/blood pressure greater than osmotic effect

3. Accept named plasma proteins

4. and 5. Accept Ψ for water potential but not wp/WP

6. Accept lacteals

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Question 8 · AS Paper 1 · June 2017 · Q04.3 · 2 marks

04.3	1. Contraction of ventricle(s) produces **high** blood / hydrostatic pressure; 2. (This) forces water (and some dissolved substances) out (of blood capillaries);	2	1. Do not accept contraction/pumping of the heart 2. Reject blood / plasma / tissue fluid forced out

Question 9 · AS Paper 1 · June 2017 · Q04.4 · 1 mark

04.4	Excess tissue fluid cannot be (re)absorbed / builds up;	1	The idea of excess is important Accept 'drained' for absorbed

Question 10 · AS Paper 2 · June 2016 · Q09.3 · 2 marks

09.3	1. More fluid forced/filtered out of capillary/blood (due to high pressure); 2. Less return of fluid (into capillary/blood) due to pressure **OR** Lymph(atic) (system) cannot drain away all excess fluid;	2	1. Accept: water for fluid. 1. Must convey idea of 'more'. 1. Reject: more tissue fluid is forced out. 1. Do not credit 'more plasma forced out'. 2. Accept: water for fluid.

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3.3	1. (Higher salt) results in lower water potential of tissue fluid; 2. (So) less water returns to capillary by osmosis (at venule end); **OR** 3. (Higher salt) results in higher blood pressure/volume; 4. (So) more fluid pushed/forced out (at arteriole end) of capillary;

2	For 'salt' accept 'sodium ions'. Do not allow mix and match of points from different alternative pairs 3. Accept higher hydrostatic pressure.

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09.6	1. Increases water potential of blood/capillary **OR** Decreases water potential of tissue fluid; 2. (So) less <u>water</u> returns to blood/capillaries (by osmosis) **OR** (So) more <u>water</u> leaves blood/capillaries (by osmosis);

2 (2 x AO2)	1. Accept Ψ for water potential 1 Ignore WP 1. Accept reduces water potential gradient 2. Ignore tissue fluid 2. Accept 'no' for less

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06.3	1. Treatment 2 reduces bp/risk more (than treatment 1) **OR** Treatment 2 is more effective (than treatment 1) 2. Neither treatment achieves ideal bp **OR** Neither treatment achieves low(est) risk; 3. With treatment 1, patients (still) have high bp/ 20.3 bp so (still) at high risk 4. With treatment 2, patients in pre-high bp/18 bp so (still) at higher risk than normal; 5. No statistics test so do not know if changes/differences (in bp) are significant **OR** No statistics test so do not know if changes/differences (in bp) are due to chance; 6. Unknown side effects of treatment(s); 7. Unknown duration of treatments; 8. Large sample size so results representative;

4 max (4 x AO3)	5. Reject 'results are significant'

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Question 14 · A level Paper 1 · June 2019 · Q02.2 · 4 marks

2.2	1. Negative <u>correlation</u> (between fibre eaten per day and risk of cardiovascular disease); 2. Original/current fibre intake (of student) not known; 3. (Idea of) significance linked to (2x) standard deviation overlap (at 10 g day^{-1} change); 4. If current intake between 5 and 30 (g day^{-1}) then (eating 10g more results in a significant) decrease in risk **OR** If current intake between 30 and 50 (g day^{-1}) then (eating 10g more results in) **no** significant decrease in risk; 5. Correlation does not mean causation **OR** Another **named** factor may be involved; 6. Little evidence/data for higher mass of fibre per day; 7. Large (2x) standard deviation at high/low mass of fibre makes (mean) less precise **OR** Large (2x) standard deviation at high/low amounts of fibre means there is a greater uncertainty; 8. No statistical test (to show if differences are significant);	4 max	1. Accept positive <u>correlation</u> with reduced risk 2. Accept 'it depends on original/current fibre intake'. 3. This is for the correct concept, ignore stated values. 3. Ignore reference to probability and chance. 4. Accept stated values between 5 and 30 for (significant) decrease in risk. 4. Accept stated values between 30 and 50 for no significant decrease in risk. 4. Ignore stated values less than 5 or more than 50. 5. Examples of named factors - smoking, exercise, age, sex, genes, other aspects of diet. 7. For 'precise' accept reliable or description of precise/reliable.

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