

- 1 (a) **Figure 1** shows part of the gill of a fish as seen through a light microscope. It is magnified 400 times.

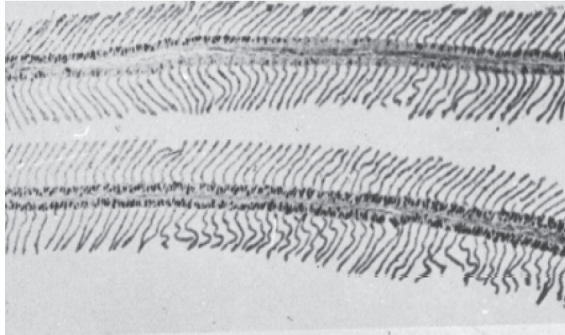


Figure 1

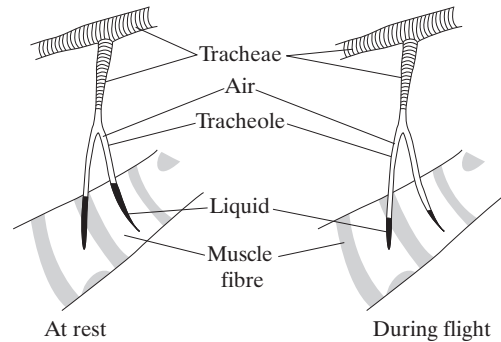


Figure 2

- (i) Explain how the structure of the gill makes oxygen uptake efficient.
 - (ii) Water containing dissolved oxygen flows over the gill in the opposite direction to the blood flow inside. Explain why this arrangement is important for efficient oxygen uptake. (4 marks)
- (b) There is a one-way flow of water over the gills of a fish whereas there is a two-way flow of air in the lungs of a mammal. Suggest **one** advantage to a fish of this one-way flow of water over its gills. (1 mark)
- (c) In insects, air is supplied directly to the tissues through a system of tubes called tracheae, which branch to form smaller permeable tubes called tracheoles. **Figure 2** shows the change that occurs in the tracheoles supplying muscle fibres during flight. During flight, the liquid in the tracheoles passes from the tracheole into the muscle fibre.
- (i) How does this change benefit gas exchange in the insect?
 - (ii) Substances which are produced during metabolism cause the liquid in the tracheoles to pass into the muscle fibre during flight. Explain how.
 - (iii) Suggest why a muscle fibre, in which the tracheoles are restricted to the outside of the fibre, cannot be larger than $20\mu\text{m}$ in diameter. (5 marks)

AQA, 2006; AQA, 2003

- 2 **Figure 3** shows tissue fluid and body cells surrounding a capillary in a leg.

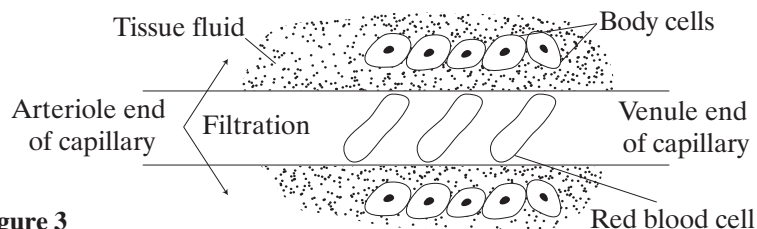


Figure 3

- (a) Name **two** substances which are at a higher concentration in the blood at the arteriole end of the capillary in a leg than at the venule end. (1 mark)
- (b) Explain how fluid may be returned to the blood. (3 marks)
- (c) (i) People with high blood pressure often have swollen ankles and feet. This is the result of an accumulation of tissue fluid. Suggest an explanation for the link between high blood pressure and the accumulation of tissue fluid.

- (ii) Suggest why tissue fluid accumulates more in the ankles and feet than in other parts of the body. (3 marks)

AQA, 2002

3 **Figure 4** shows part of a cross-section through a primary root.

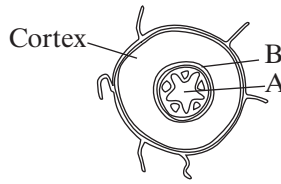


Figure 4

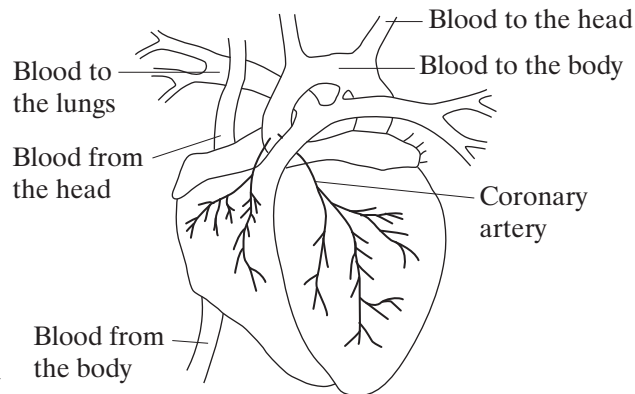
- (a) Name the tissues labelled A and B. (2 marks)
- (b) Water enters root-hair cells and moves across the cortex through both apoplastic and symplastic pathways.
- (i) Which part of the cortex cells forms the apoplastic pathway?
- (ii) Explain in terms of water potential how water enters root hair cells from the soil. (3 marks)

AQA, 2001

- 4 (a) Describe the roles of the following in moving water through the xylem:
- (i) root pressure
- (ii) cohesion–tension (8 marks)
- (b) Describe and explain how **three** structural features reduce the rate of transpiration in xerophytic plants. (3 marks)

AQA, 2001

5 **Figure 5** shows an external view of a mammalian heart.



- (a) Name the blood vessel which:
- (i) brings blood from the body
- (ii) takes blood to the lungs. **Figure 5** (2 marks)
- (b) (i) What is the function of the coronary artery?
- (ii) From which blood vessel does the coronary artery originate? (2 marks)
- (c) The information below compares some features of different blood vessels.

		Blood vessel		
		Artery	Capillary	Vein
Property	Mean diameter of vessel	4.0 mm	8.0 μm	5.0 mm
	Mean thickness of wall	1.0 mm	0.5 μm	0.5 mm
		Relative thickness (shown by length of bar)		
Tissues present in wall	Endothelium	█	█	█
	Elastic tissue	███		███
	Muscle	█████		█████

Use the information to explain how the structures of the walls of arteries, veins and capillaries are related to their functions. (6 marks)

AQA, 2004