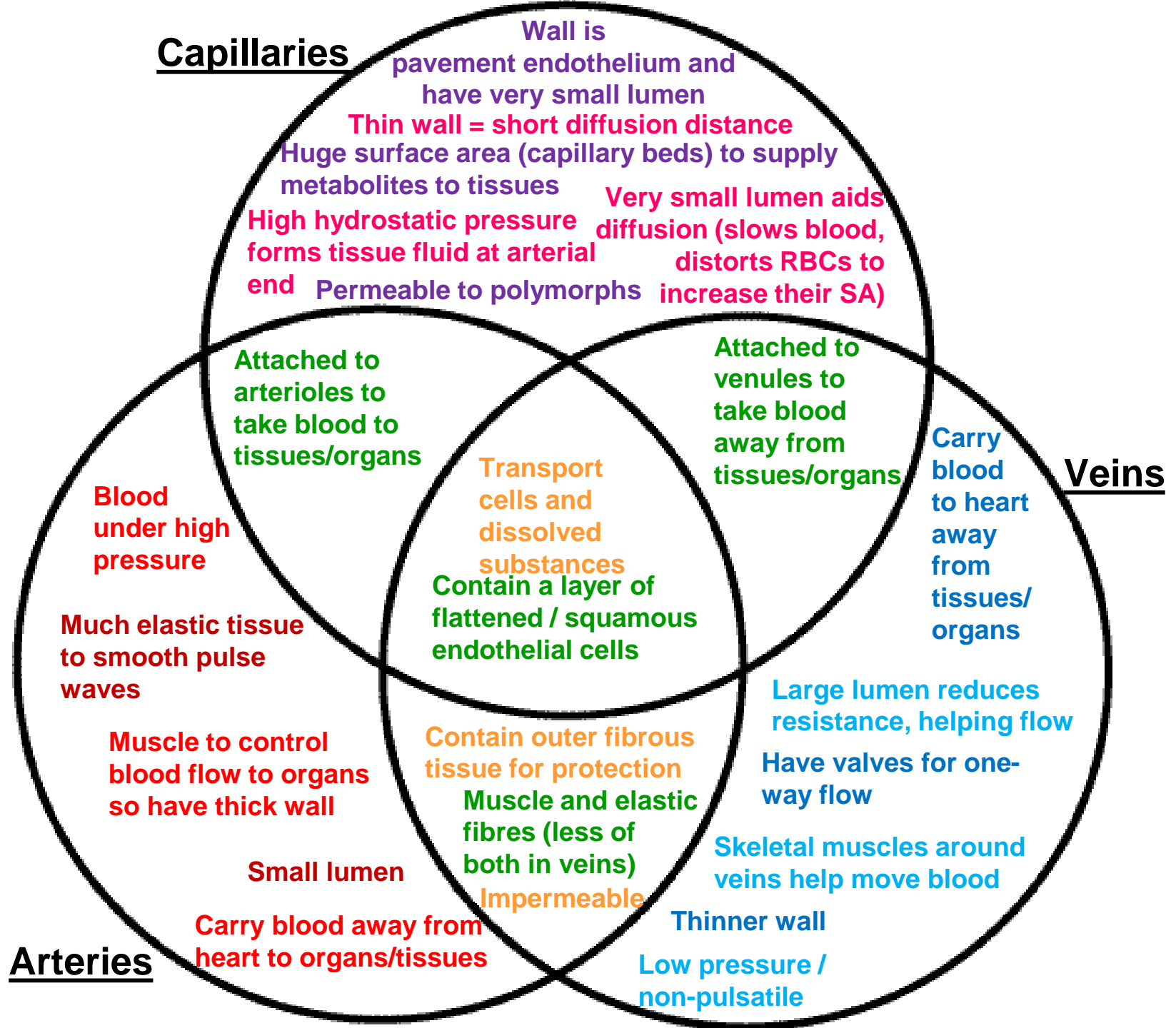


AS2 Circulation

Answers to questions on...

- **Blood vessels**
- **The cardiac cycle**
- **Coordination of the cardiac cycle**



- 3 Fig. 3.1 provides information about the blood pressure in different parts of the mammalian blood circulatory system.

Fig. 3.1 also shows the **total** cross-sectional area of the vessels, relative to one another, in parts of the blood circulatory system.

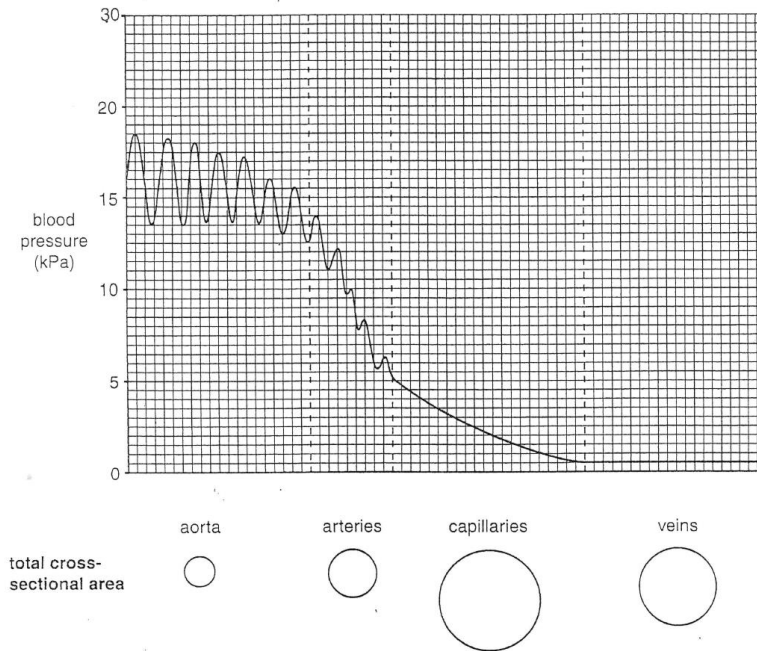


Fig. 3.1

- (a) Place a tick (✓) in the box below that most closely describes the mammalian blood circulatory system.

	open circulatory system	closed circulatory system
single circulatory system		
double circulatory system		✓

[1]

- (b) The pressure fluctuates as the blood flows along the aorta, as shown in Fig. 3.1.

(i) Explain what causes this fluctuation.

- systole / contraction increases pressure;
- diastole / relaxation / blood flowing onwards decreases p;
- contraction of left ventricle

[2]

(ii) State the term used to describe the number of fluctuations per minute.

pulse / heart rate

[1]

- (c) Using the information in Fig. 3.1, describe the pressure changes in the blood as it flows through the circulatory system from the aorta to the veins.

- pressure change {
- p ↓ as distance from heart increases;
 - greatest / rapid / sig drop while blood in arteries;
 - p constant / not drop in veins;

- fluctuations {
- fluctuation decreases from aorta to arteries;
 - no fluctuations in capillaries / veins;
 - use of comparative figures with units;

[3]

- (d) (i) Using the information in Fig. 3.1, explain what causes the 'overall change in pressure as blood flows from the aorta to the arteries and from the arteries to the capillaries.

- blood flow into larger number of vessels;
- (total) CS area of arteries > aorta;
- (total) CS area of capillaries > aorta / arteries;

[2]

3 Large animals, such as mammals, need efficient transport systems.

(a) Fig. 3.1 shows a section through the mammalian heart.

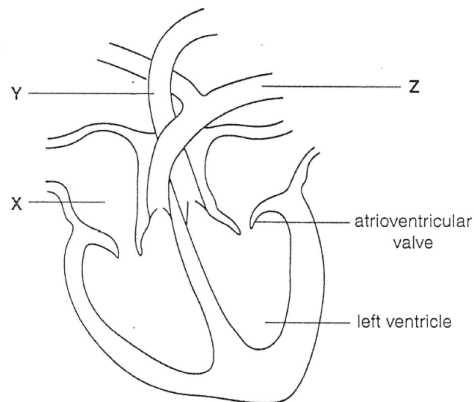


Fig. 3.1

(i) Name the parts labelled X, Y and Z.

X Right atrium

Y Aorta

Z (left) pulmonary artery

[3]

(ii) Explain why the wall of the left ventricle is thicker than the wall of the left atrium.

1. (more muscle) to create more force / more powerful contraction;
2. (needs to create) higher pressure;
3. push blood against greater resistance / friction;
4. (LV) pumps blood further / pumps blood to all parts of body / supplies systemic circulation;

[3]

(iii) Explain how pressure changes in the heart bring about the closure of the atrioventricular (bicuspid) valve.

1. Ventricular systole / Ventricle wall / muscle, contracts;
2. (ventricular contraction) raises ventricular pressure;
3. (ventricular pressure) higher than atrial pressure;
4. idea of pressure / movement of blood generated by ventricular contraction pushes valve shut;
5. chordae tendinae prevent inversion;

[2]

(b) The mammalian transport system is a double circulatory system.

An efficient circulatory system consists of a pump, a means of maintaining pressure, a transport medium and exchange surfaces.

State the component of the mammalian circulatory system that fulfils each of these roles.

The first one has been done for you.

pump

means of maintaining pressure

transport medium

exchange surface

heart
 aorta / named artery / arterioles / arterioles
 blood plasma
 capillary / capillary wall / endothelium.

[3]

[Total: 11]

also smooth muscle / elastic tissue / narrow lumen

- 6 (a) (i) Name the type of muscle found in the walls of the heart chambers.

cardiac [1]

- (ii) Name the process that creates pressure inside the heart chambers.

muscle contraction / systole [1]

- (b) Fig. 6.1 shows the changes in pressure inside the heart chambers during one heart beat.

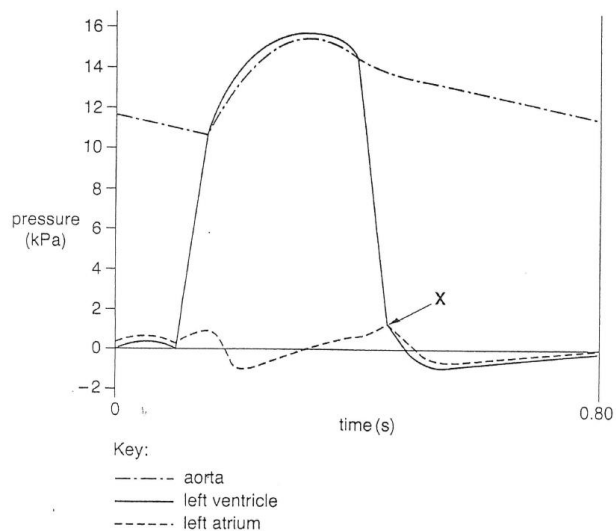


Fig. 6.1

- (i) Calculate the heart rate from the information in Fig. 6.1.

Show your working and give your answer to the nearest whole number.

$$\begin{aligned}
 1 \text{ beat} &= 0.80 \text{ s} \\
 \therefore \text{bpm} &= \frac{60}{0.8} \\
 &= 75 \quad 1 \text{ mark}
 \end{aligned}
 \quad \left. \vphantom{\begin{aligned} 1 \text{ beat} &= 0.80 \text{ s} \\ \therefore \text{bpm} &= \frac{60}{0.8} \\ &= 75 \end{aligned}} \right\} 1 \text{ mark}$$

Answer = beats min^{-1} [2]

- (ii) Describe and explain what happens immediately after X on Fig. 6.1.

☐ In your answer, you should use appropriate technical terms, spelt correctly.

- pressure in ventricle < atrium;
or atrium > ventricle
 - bicuspid / atrioventricular valve opens;
 - blood moves into ventricle (& atrium).
- ↑
NOT pushed/pumped

[Total: 8]

END OF QUESTION PAPER

5 Fish have a single, closed circulatory system.

(a) State the meaning of the terms *single circulatory system* and *closed circulatory system*.

NOT
Needed

single circulatory system

blood passes through heart once for each
circulation / circuit / cycle of body

closed circulatory system

blood maintained in vessels

[2]

(b) The heart of a mammal contains four main chambers. The action of these chambers is coordinated by electrical activity in specialised tissues.

Fig. 5.1 shows where these tissues are found in the heart.

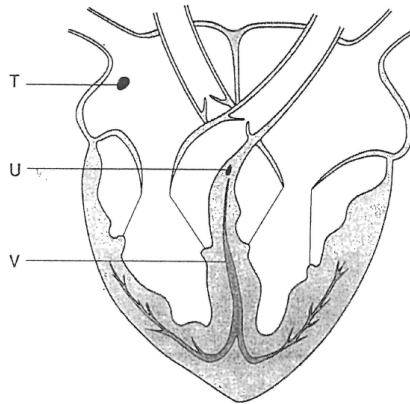


Fig. 5.1

(i) Name the tissues labelled T, U and V.

T SAN / sino atrial node

U AVN / atrioventricular node

V bundle of His / Purkyne / Purkinje fibres [3]

(ii) Describe how the action of the heart is initiated and coordinated.



In your answer, you should use appropriate technical terms, spelt correctly.

1. T / SAN creates / generates / starts / initiates / originates excitation
2. wave (of excitation) spreads over atrial wall / muscle;
3. reference to AVN / V;
4. atria contract / atrial systole;
5. contraction is synchronised;
6. delay at AVN;
7. excitation spreads down non-conductive septum; [Total: 10]
8. reference to bundle of His / Purkyne / Purkinje fibres;
9. ventricles contract / ventricular systole from apex / bottom;