AS Level Biology B

H022/02 Biology in depth

Question Set 15

1 Pressure varies in different parts of the circulatory system throughout the cardiac cycle.
The valves in the heart are affected by these changes in pressure.

Table 1 shows pressure changes in the left side of the heart and aorta during one cardiac cycle.

Time (s)	Pressure (mmHg)		
	Left atrium	Left ventricle	Aorta
0.0	5	2	82
0.1	8	15	80
0.2	1	95	78
0.3	2	115	112
0.4	8	34	102
0.5	4	8	88
0.6	5	2	85
0.7	6	2	83

Table 1

(a) (i) Using Table 1, state the times during the cardiac cycle when the bicuspid valve is closed.
Justify your answer.

[2]

(ii) Using Table 1, state the times during the cardiac cycle when the semilunar valve is open.
Justify your answer.

[2]

(iii) Using Table 1, calculate the heart rate in beats per minute.

heart rate = ...beats per minute **[1]**

(b) Fig. 1.1 shows a device known as a 'coupler'.

A coupler is fitted between an artery and a vein in the upper leg of a patient who is suffering from hypertension (high blood pressure). It allows some of the blood to pass from the artery into the vein, through a hole in the vessel walls.

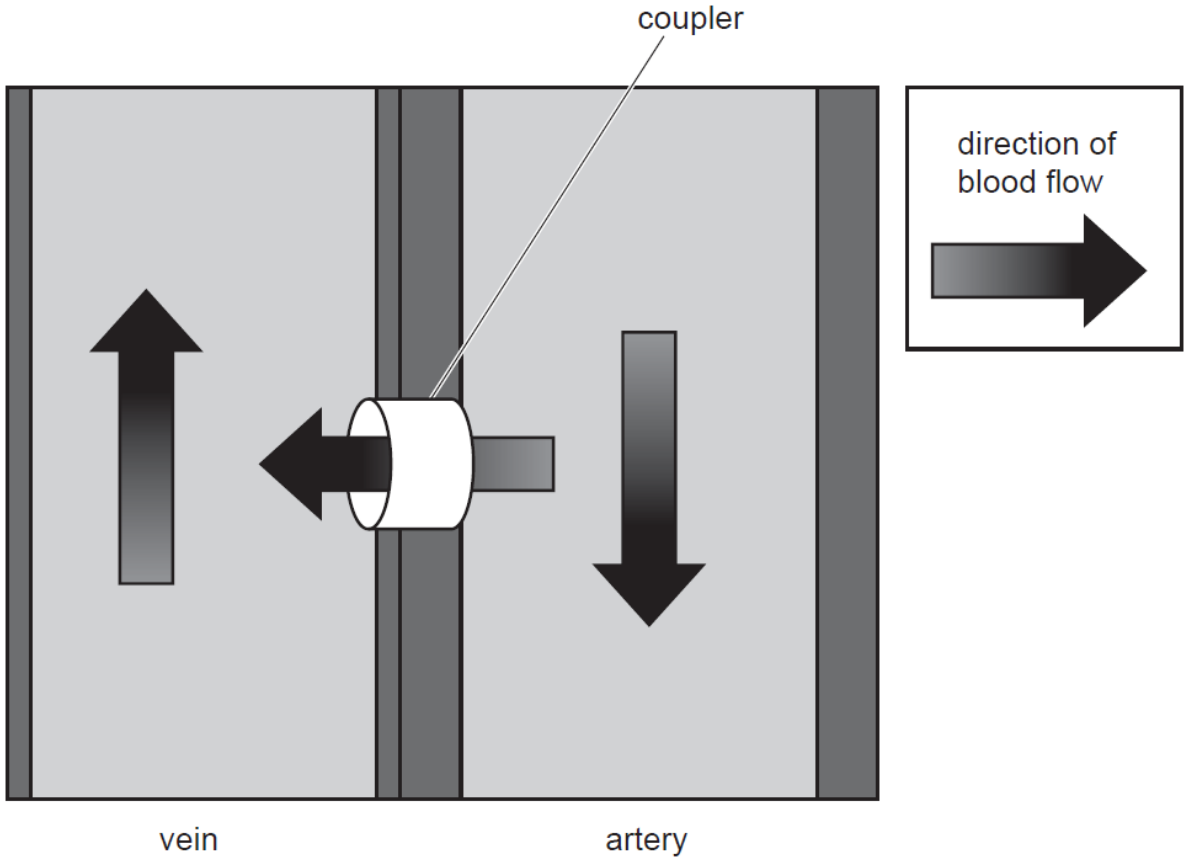

Fig. 1.1

Using your knowledge of the circulatory system, suggest **one** disadvantage of having a coupler fitted.

[1]

(c) Researchers carried out a study into the effectiveness of a coupler in reducing hypertension.

A group of healthy people was compared with a group of patients with hypertension. Their blood pressures were taken before and after they were fitted with a coupler.

The results of this study are shown in Fig. 1.2.

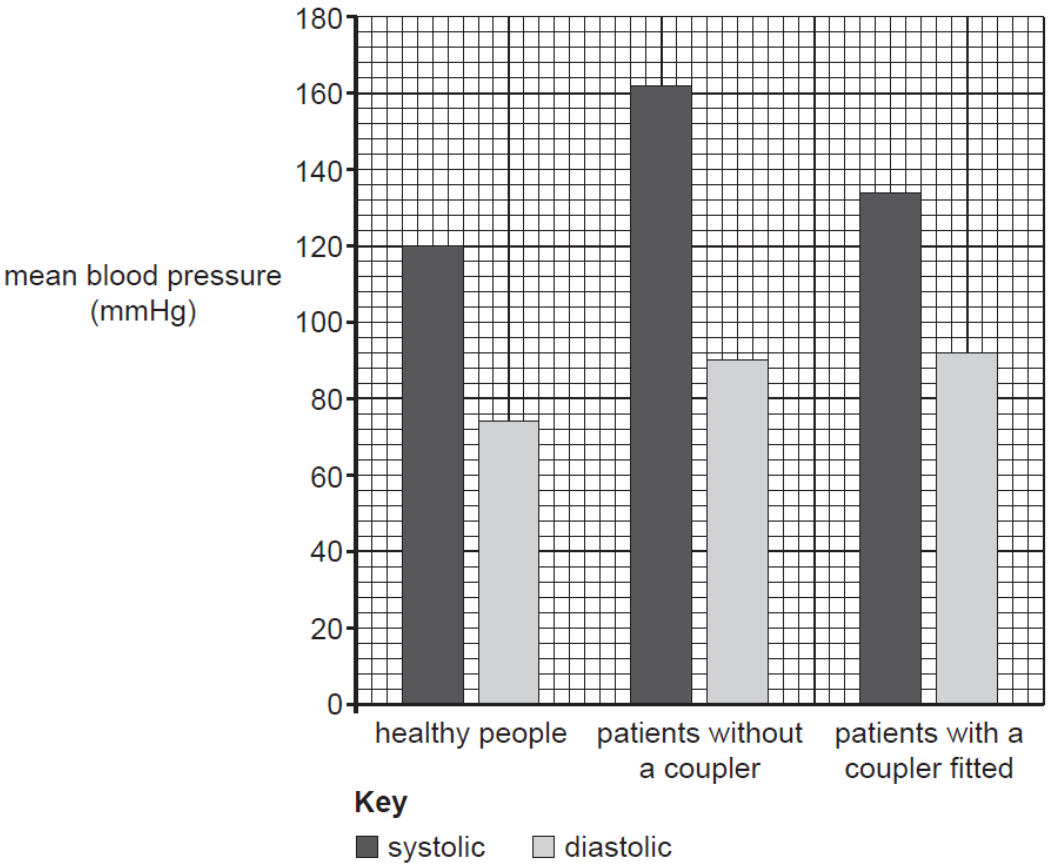

Fig. 1.2

(i) State **two** variables that would need to be controlled by the researchers in this study.

variable 1 .....

variable 2 .....

[2]

(ii) Describe and explain the effect on blood pressure in the artery **and** the vein after having a coupler fitted. **[2]**

(iii) Using the information in Fig. 1.2, calculate the mean percentage change in both systolic and diastolic blood pressure of the group of patients **after** the coupler had been fitted.

Give your answers to the **nearest whole number**.

percentage change in systolic pressure =.....%

percentage change in diastolic pressure =.....%

[4]

Total Marks for Question Set 15: 14