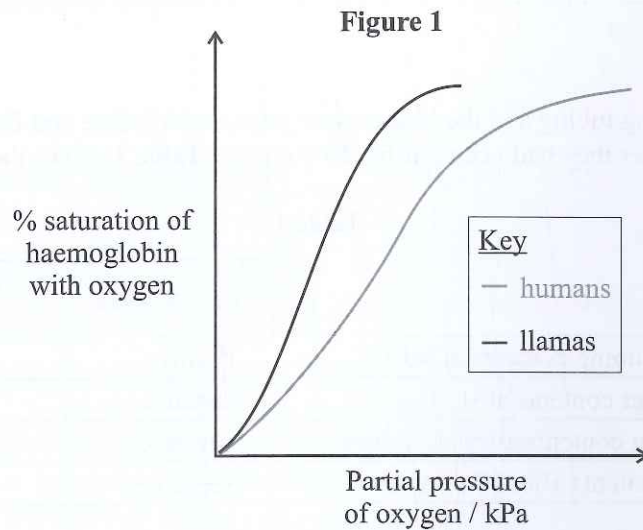


More Exchange and Transport Systems — 2

- 1 **Figure 1** shows the oxygen dissociation curves for humans and llamas, a mammal that lives at high altitudes.



- 1.1 Describe and explain the shape of the oxygen dissociation curve for humans.

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(5 marks)

- 1.2 Explain the differences between the oxygen dissociation curves for llamas and humans.

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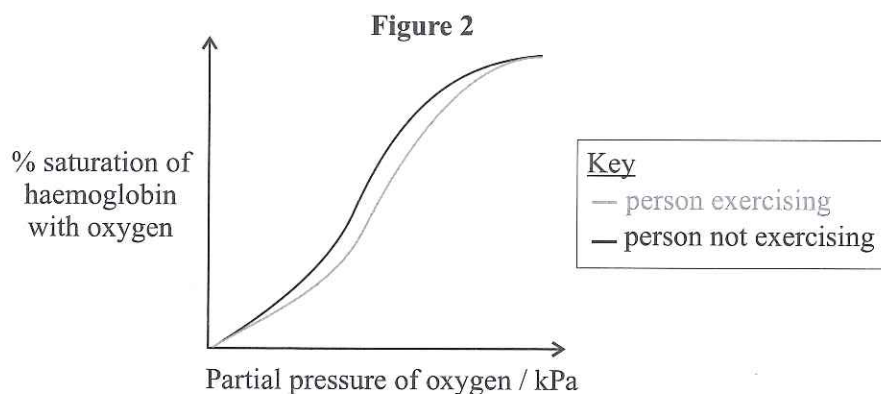
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(3 marks)

Figure 2 shows the oxygen dissociation curve for a person who is exercising, alongside a person who is not exercising.



- 1.3 Explain why the oxygen dissociation curve for the person exercising is to the right of the oxygen dissociation curve for the person who is not exercising.

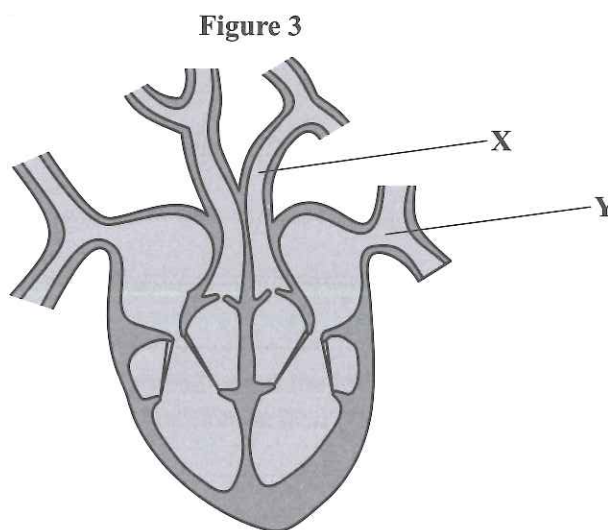
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(3 marks)

- 2 **Figure 3** shows a diagram of a mammalian heart.



- 2.1 Name the parts of the heart labelled X and Y.

Name of X

Name of Y

(2 marks)

A student carried out a dissection of a mammalian heart.

- 2.2 State **three** precautions that must be taken in order to safely carry out a dissection.

1.

2.

3.

(3 marks)

The student produced a biological drawing of the heart.

- 2.3 Give **one** instruction that the student would need to follow in order to produce a clear and useful drawing.

.....
(1 mark)

- 3 Buerger's disease is a type of cardiovascular disease. It causes the small and medium arteries and veins in the hands and feet to experience thrombosis (blood clotting) and become inflamed.

- 3.1 People with Buerger's disease may eventually need to have fingers or toes amputated. Suggest why.

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(2 marks)

Buerger's disease causes a reduction in the volume of tissue fluid that passes through capillary beds.

- 3.2 Describe how tissue fluid is formed in healthy tissues, and how it is returned to the circulatory system.

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(5 marks)

Capillary beds are important exchange surfaces.

- 3.3 Explain **one** way in which the structure of capillaries helps them carry out their function.

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(1 mark)



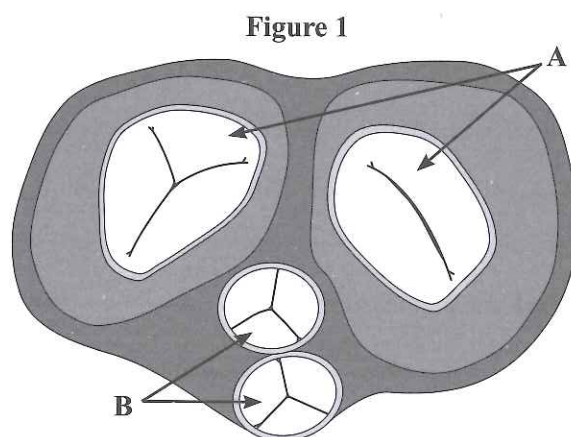
Don't forget that you should also revise the practicals you did in class — the exam will test you on your practical skills as well as the theory. By the time you're sitting the exam, it might have been a while since you did some of the practicals, so make sure you've reminded yourself of what you did, the equipment you used, and the safety precautions you had to take.

Score

25

More Exchange and Transport Systems — 3

- 1 **Figure 1** shows a cross-section of the human heart.



- 1.1 What is the role of the valves labelled **A** in **Figure 1**?

.....

.....

.....

(2 marks)

- 1.2 In terms of pressure changes in the heart, explain what causes the valves labelled **B** in **Figure 1** to open.

.....

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(1 mark)

Cardiac output is the volume of blood pumped out of the left ventricle in one minute. Scientists investigated the effect of body position on heart rate and cardiac output.

Table 1 shows their results.

Table 1

	Standing up	Lying down
Mean heart rate / bpm	74	57
Mean cardiac output / $\text{cm}^3 \text{ min}^{-1}$	4700	4700
Mean stroke volume / cm^3		

- 1.3 The stroke volume is the volume of blood that is pumped out by the left ventricle in one cardiac cycle. Use the information in **Table 1** to complete the table to show the mean stroke volume.

(1 mark)

Use the information you've been given in the question to come up with a formula linking stroke volume, cardiac output and heart rate. Then substitute in the numbers from the table.

- 1.4 The scientists ensured that the participants of the investigation had been in the required position for five minutes before they recorded these measurements. Suggest why.

.....

 (1 mark)

- 1.5 Suggest why there is a difference in heart rate between standing up and lying down in Table 1.

.....

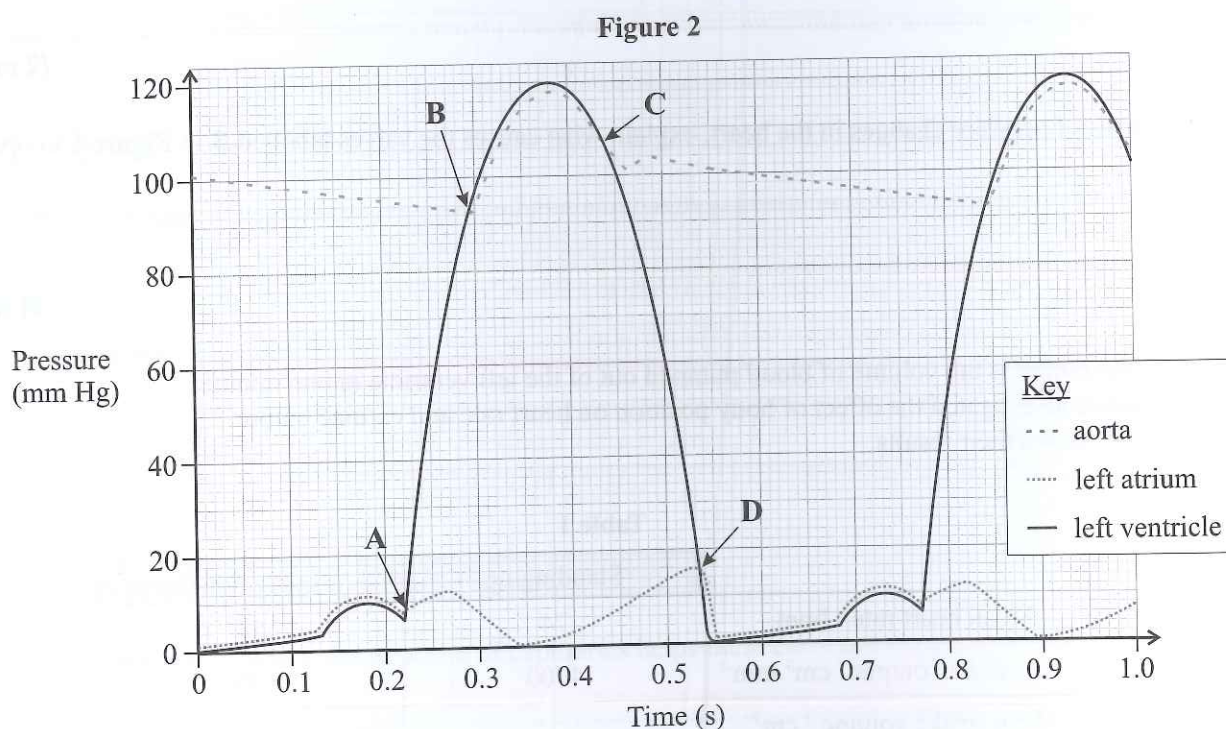
 (1 mark)

- 1.6 Explain why the scientists used 'mean' measurements.

.....

 (1 mark)

- 2 **Figure 2** shows the pressure changes in an individual's heart during the cardiac cycle.



- 2.1 Calculate the heart rate for the individual shown in **Figure 2**.

..... beats per minute
 (1 mark)

2.2 When on **Figure 2** does the left atrium start to contract?

Hint: when a chamber contracts, there's a sudden rise in pressure inside the chamber.

..... seconds
(1 mark)

2.3 Describe and explain the events that are occurring at points A to D on **Figure 2**.

[illegible]

(6 marks)

2.4 Explain the difference between the maximum pressures of the left atrium and the left ventricle of the heart.

.....

.....

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(1 mark)

2.5 Using your own knowledge and information from **Figure 2**, explain **one** way in which the aorta is adapted for its function.

.....

.....

.....

(2 marks)



When you're writing a long answer, you should think about how many marks it's worth, and make sure you've written enough separate things that would each get a mark. Don't just fill up the lines with empty waffle and assume you've written enough — you need to include specific biological terms and write in sufficient detail to get every mark available.

Score

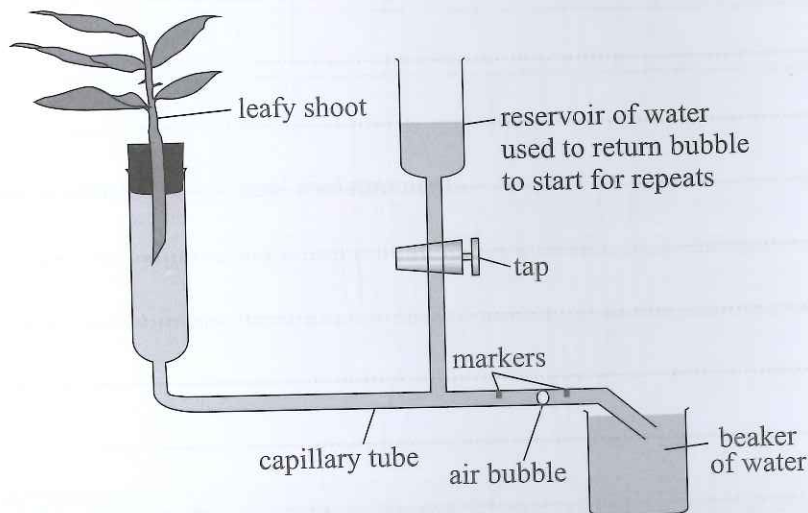
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18

More Exchange and Transport Systems — 4

- 1 A student used a potometer to investigate transpiration in a plant. **Figure 1** shows how the potometer was set up. The student closed the tap, then took the capillary tube out of the beaker of water long enough for an air bubble to form. She then recorded the amount of time it took for the air bubble to move between the two markers, and used it to calculate the transpiration rate.

Figure 1



- 1.1 When setting up this experiment, it is important that water does not touch the leaves. Using your knowledge of water transport in plants, explain why.

.....

.....

.....

(2 marks)

The student used the potometer to investigate the effect of temperature on the transpiration rate. The results are shown in **Table 1**.

Table 1

Temperature / °C	Mean transpiration rate / cm ³ per minute
20	0.20
30	0.34
40	0.85
50	1.24
60	1.36

- 1.2 Describe and explain the relationship between the temperature and the transpiration rate in **Table 1**.

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(3 marks)

- 2 Xylem vessels are found running from the roots to the leaves in plants. Scientists measured the rate of water flow through the xylem of a plant in its natural environment at different times of the day. The results are presented in **Table 2**.

Table 2

Time of day	Rate of water flow in xylem / mm ³ second ⁻¹
00:00	0.8
06:00	2.8
12:00	4.5
18:00	3.0

- 2.1 Using your knowledge of water transport in the xylem, explain the difference in the results between 00:00 and 12:00 in **Table 2**.

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(3 marks)

In order to investigate the structure of the xylem, the scientists also carried out a dissection on a leaf of the plant.

- 2.2 Suggest why the scientists kept the dissected plant tissue in water until they were ready to view the cells.

.....

.....

(1 mark)

- 2.3 Suggest a step in the dissection that the scientists would have carried out in order to observe the xylem vessels under a microscope.

.....

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(1 mark)

- 3 Translocation in a plant describes the movement of solutes to where they are needed within the plant.

- 3.1 When treated with metabolic inhibitors, translocation in a plant stops. Explain why.

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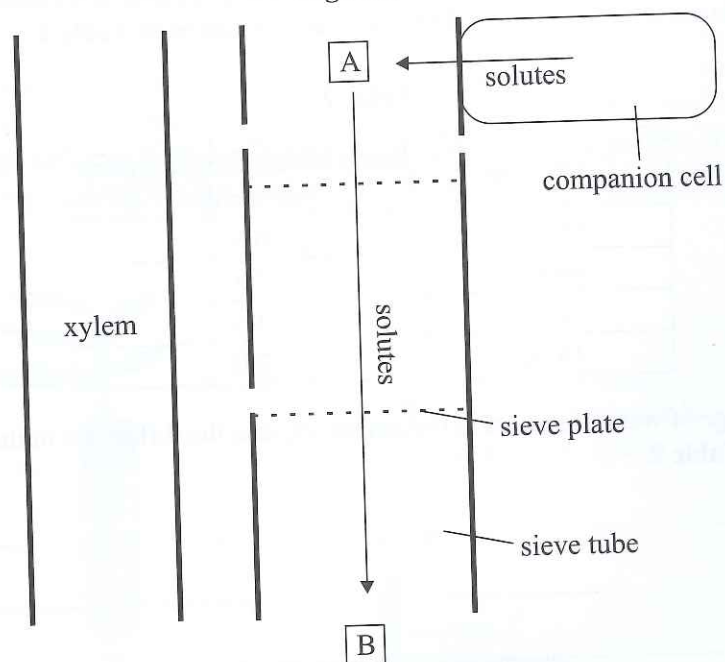
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(2 marks)

Figure 2 represents the flow of solutes in the phloem of a tree, according to the mass flow hypothesis.

Figure 2



- 3.2 Describe and explain how the level of pressure at point A in Figure 2 differs to that at point B.

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(3 marks)

A ring of bark is removed from the tree at point B.

- 3.3 Explain how this would affect the concentration of solutes at point A, according to the mass flow hypothesis.

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(2 marks)

- 3.4 Other than a ringing experiment, describe **one** other type of experiment that could be carried out to monitor translocation in trees.

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(3 marks)



If a question asks you to 'describe and explain' something, make sure you do both. 'Describing' means giving an account of something, e.g. saying how a variable changes in a table or graph, whereas 'explaining' means setting out reasons, e.g. saying why the variable changes. Doing just one or the other will mean you miss out on marks.

Score

.....

20