

# 8 Transport in mammals – Part 2

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

## Vocabulary

*Write each word three times.*

| English                      | Write it 3 times (English) |       |       |
|------------------------------|----------------------------|-------|-------|
| oxygen                       | _____                      | _____ | _____ |
| haemoglobin                  | _____                      | _____ | _____ |
| atria                        | _____                      | _____ | _____ |
| ventricles                   | _____                      | _____ | _____ |
| sinoatrial node              | _____                      | _____ | _____ |
| pacemaker                    | _____                      | _____ | _____ |
| atrioventricular<br>node     | _____                      | _____ | _____ |
| Purkyne tissue               | _____                      | _____ | _____ |
| oxygen dissociation<br>curve | _____                      | _____ | _____ |
| saturation                   | _____                      | _____ | _____ |
| partial pressure             | _____                      | _____ | _____ |
| carbon dioxide               | _____                      | _____ | _____ |
| Bohr shift                   | _____                      | _____ | _____ |

## Recall

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From Part 1 you know the heart is a double pump. Here we look inside it, and at how the blood carries **oxygen** .

- The heart has four chambers (you met them at IGCSE).
- Oxygen is carried by **haemoglobin** in the red blood cells.

## New ideas

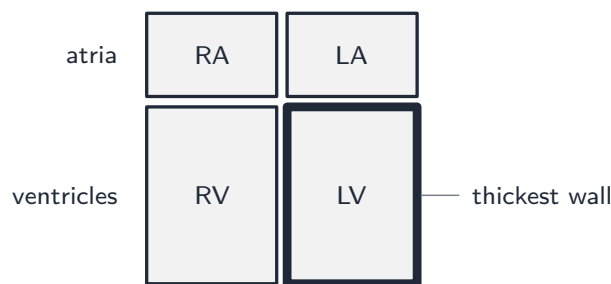
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Read these first, then do the Practice.

### ■ 1 The four chambers

The two upper chambers are the **atria** (thin walls – they only push blood to the chambers below). The two lower chambers are the **ventricles** (thick muscular walls – they pump blood out).

The **left ventricle** wall is the thickest, because it pumps blood all the way round the **body**, while the right side only pumps to the nearby **lungs**.



### ■ 2 Controlling the heartbeat

The heart sets its own rhythm:

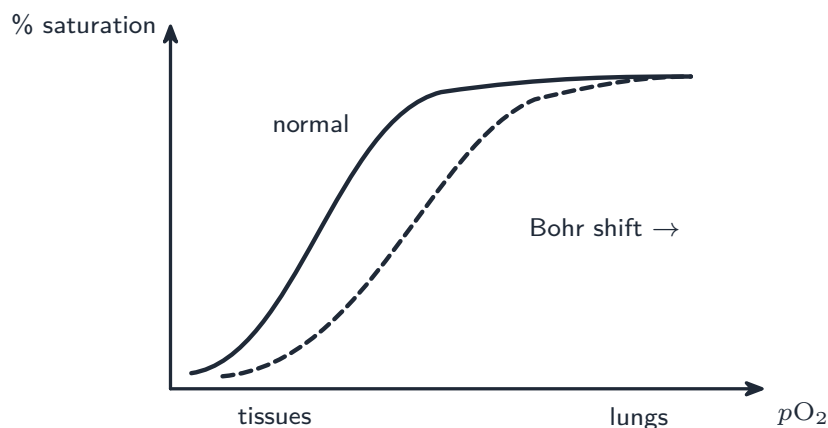
- the **sinoatrial node** (SAN) is the **pacemaker** ; it starts each beat and makes the atria contract.
- the **atrioventricular node** (AVN) passes the signal on, after a short delay so the atria empty first.
- the **Purkyne tissue** carries the signal down the ventricle walls so they contract from the bottom up.

### ■ 3 Carrying oxygen

**Haemoglobin** in the red blood cells carries oxygen. The **oxygen dissociation curve** (an S-shape) plots **saturation** (how full of oxygen) against the **partial pressure** of oxygen:

- where oxygen is **high** (lungs), haemoglobin loads up and becomes almost full.
- where oxygen is **low** (active tissues), haemoglobin unloads its oxygen.

When tissues are active they release **carbon dioxide**, which makes haemoglobin give up oxygen more easily – the curve shifts right. This is the **Bohr shift**.



**Watch out:** the *left* ventricle wall is thickest because it pumps to the whole body. The SAN is the pacemaker; the AVN delay lets the atria empty first. On the dissociation curve, high oxygen (lungs) → haemoglobin loads; low oxygen (active tissues) → it unloads.

## Practice

Try these in order.

**8.1** Name (a) the two upper chambers, (b) the two lower chambers of the heart. [2]

**8.2** Explain why the left ventricle wall is thicker than the right. [2]

**8.3** Which part of the heart acts as the pacemaker? [1]

**8.4** The atrioventricular node delays the signal for a moment. Explain why this delay is useful. [2]

**8.5** Using the oxygen dissociation curve, describe what haemoglobin does where the partial pressure of oxygen is (a) high, (b) low. [2]

**8.6** What is the Bohr shift? [1]

**8.7 Challenge.** During exercise, muscles release more carbon dioxide. Using the Bohr shift, explain how this helps the muscles get more oxygen. [2]