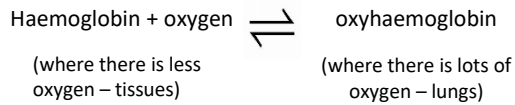
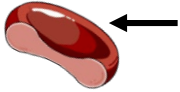


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Blood is a tissue consisting of:

plasma (55%) Pale yellow fluid that transports carbon dioxide, hormones and waste. Red blood cells, white blood cells and platelets are also suspended in this.

red blood cells (45%) Carries oxygen from the lungs to all cells in the body. Is adapted by having a large surface area (biconcave disc shape), no nucleus, it is also full of haemoglobin which is a red pigment that binds with oxygen.

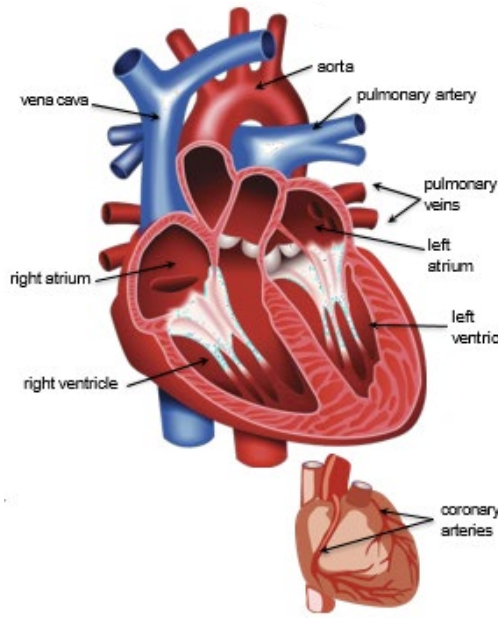


white blood cells (less than 1%) Part of the immune system to defend against disease. Some make antibodies and antitoxins, and others engulf pathogens by changing shape.

platelets (less than 1%) Clump together to form blood clots and scabs.

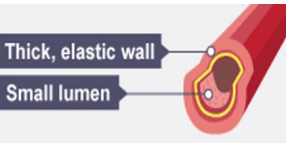
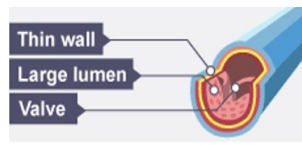
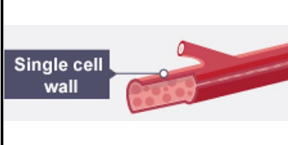
The heart

The heart pumps blood around the body in a double circulatory system.

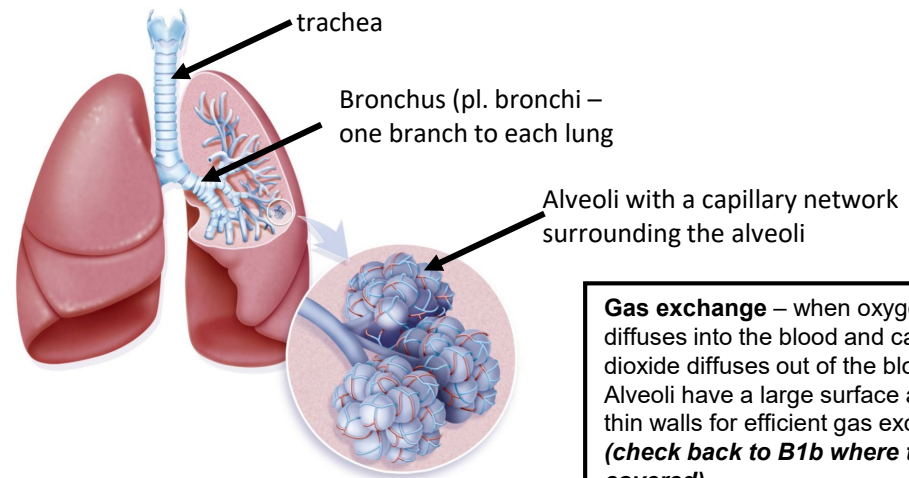


right ventricle	Pumps blood to the lungs for gas exchange
left ventricle	Pumps blood around the rest of the body
aorta	Carries blood from the left ventricle to the body
vena cava	Carries blood from the body to the right atrium
pulmonary artery	Carries deoxygenated blood to the lungs
pulmonary vein	Carries oxygenated blood to the left atrium
pacemaker cells	A group of cells in the right atrium that control the natural resting heart rate
coronary arteries	Carry oxygenated blood to the heart muscle
valves	Prevent blood from flowing the wrong way

Blood vessels

artery	vein	capillary
Carry blood away from the heart	Carry blood to the heart	Connect arteries and veins
		
Thick muscular walls, small lumen, carry blood under high pressure, carry oxygenated blood (except for the pulmonary artery). Thick strong elastic walls to maintain blood pressure.	Thin walls, large lumen, carry blood under low pressure, have valves to stop flow in the wrong direction due to this low pressure, carry deoxygenated blood (except for the pulmonary vein).	One cell thick to allow diffusion, Carry blood under low pressure and carry blood really close to every cell in the body.

Breathing and gas exchange:



Gas exchange – when oxygen diffuses into the blood and carbon dioxide diffuses out of the blood. Alveoli have a large surface area and thin walls for efficient gas exchange (**check back to B1b where this is covered**)

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Helping the heart

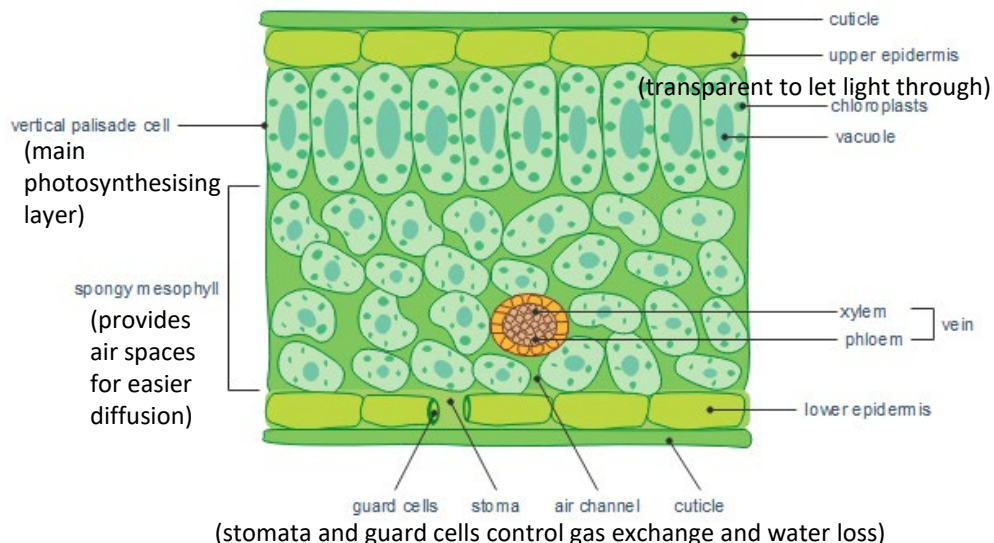
Problem	Treatment	Advantages and disadvantages
Faulty valves – valves don't open fully or can develop a leak. This causes blood to flow in the both directions – blood doesn't circulate effectively.	Mechanical valves (man-made) Biological valves (from animals)	(+) Last a long time (-) need to take medicines for life, surgery complications (+) Last 10 years, no medicines needed. (-) surgery complications
Faulty pacemaker – heart rate is incorrect	Artificial pacemaker	Regular check ups needed
Heart failure	Artificial heart (man-made) – temporary use while waiting for a donor heart or to allow the heart to rest. Transplant of donor heart (and sometimes lungs)	(+) Don't have to wait for a donor heart (-) blood might clot, surgery complications (-) Have to wait for donor, risk of operation.
Coronary heart disease – layers of fatty material build up inside the coronary arteries, narrowing them. Blood flow is reduced, resulting in a lack of oxygen for the heart muscle.	Stent – metal mesh inserted into blocked artery to keep it open Statins – drugs to reduce LDL cholesterol which slows the rate of fatty deposit build up	(+) Effective for a long time (-) Risks of surgery (heart attack, infections) (+) Reduce risk of strokes and heart attacks, increase HDL cholesterol (good cholesterol) (-) Forget to take drug, risk of side effects e.g. headaches, kidney failure etc.

Plant organs

Leaves – for photosynthesis
Leaves contain many types of tissue:

stem – contain xylem tissue to transport water from roots to leaves, and phloem tissue to transport sugars from leaves to roots

roots – absorb water through root hair cells.

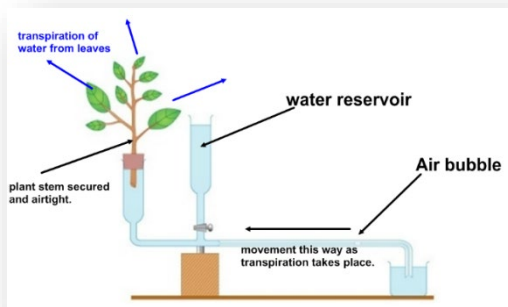


Transpiration

Transpiration is the loss of water from the leaves of a plant (through the stomata). Water moves up the roots, stem and through the leaves in a column of water called the transpiration stream.

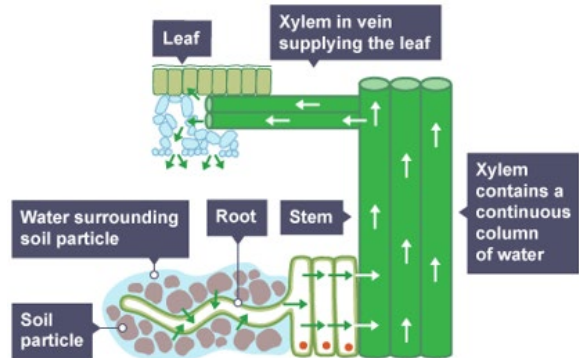
Measuring the rate of transpiration

We can measure the rate of transpiration using a potometer. There is a little air bubble inside the tubing that moves along as the plant loses water by transpiration. The faster the movement of the air bubble, the higher the rate of transpiration.



Factors affecting transpiration

Transpiration is similar to drying clothes on a washing line. Transpiration will be faster if it is hotter, there is more wind, there is more sun or if the air is less humid.



Guard cells are adapted to open and close stomata. When the plant has lots of water, the guard cells swell up and open the **stomata**. When the plant is short of water, **guard cells** become flaccid and close the **stomata**. This stops too much water vapour escaping.

