

## Outline the roles of nitrate ions and of magnesium ions in plants

lons	Some roles in plant	Effect of it deficiency
Nitrate, NO <sub>3</sub> <sup>-</sup>	Nitrate is used to help	Poor growth; old leaves
	make amino acids;	turn yellow (chlorosis)
	organic bases, e.g.	and die properly
	adenine; proteins;	
	nucleotides, e.g. ATP;	
	coenzymes, e.g. NAD,	
	NADP; chlorophyll.	
	Nitrate is the mineral ion	

Unloading occurs into any tissue which requires sucrose. It is probable that sucrose moves out of the phloem into these tissues using both symplast and apoplast routes, as with loading. Phloem unloading requires energy, and similar methods to those used for loading are probably used. Once in the tissue, the sucrose is converted into something else by enzymes, so decreasing its concentration gradient. One such enzyme is invertase, which hydrolysis sucrose to glucose and fructose.

## Describe the structures of arteries, veins and capillaries and be able to recognise these vessels using the light microscope;

## Explain the relationship between the structure and function of arteries, veins and capillaries;

Arteries carry blood away from the heart. The blood that flows through them is pulsing and at a high pressure. They therefore have thick, elastic walls which can expand and recoil as the blood pulses through. The artery wall also contains variable amounts of smooth muscle. Arteries branch onto smaller vessels called **arterioles**. These also contain smooth muscle in their walls, which can contract and make the lumen (space inside) smaller. This helps to control the flow of blood to different parts of the body.

Capillaries are tiny vessels with just enough space for red blood deliato conceze through. Their walls are only one cell thick, and there are often and the wall through which plasma (the liquid component of blood) can like any capillaries deliver nutrients, hormones and other requirements to be area (s) and take away their warte products. Their small size and thin walls minimize valuation distance, enabling exchange to take place rapidly between the blood and the keyl crew.

**Veins** carry low-pressure blood back to the heart. Their walls do not need to be as tough or as those of arteries as the blood is not at high pressure and is not pulsing. The lumen is larger than in arteries, reducing friction which would otherwise slow down blood movement. They contain valves, to ensure that the blood does not flow back the wrong way. Blood is kept moving through many veins, for example those in the legs, by the squeezing effect produced by contraction of the body muscles close to them, which are used when walking.

When muscle contrasts, it gets shorter. Contraction of the cardiac muscle in the walls of the heart therefore causes the walls to squeeze inwards on the blood inside the heart. Both sides of the heart contract and relax together. The complete squeeze inwards on the blood inside the heart. Both sides of the heart contract and relax together. The complete sequence of one heart beat is called the cardiac cycle.



During atrial systole, the muscle in the walls of the atria contracts, pushing more blood into the ventricles through the open atrioventricular valves.



During ventricular systole, the muscle in the walls of the ventricles contracts. This causes the pressure and in y, so the blood in the case vessels pusiter the semilupar valves out. Blood flow into the triatfrom the veins, so the case of the 10 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 19 0 20 10 0 0 20 10 0 0 20 10 0 0 20 10 0 0 0 20 10 0 0 0 0 0 0 10 0 0 0 0 0 10 0 0 0 0 0 10 0 0 0 0 10 0 0 0 0 0 10 0 0 0 0 10 0 0 0 0 10 0 0 0 0 10 0 0 0 10 0 0 0 10 0 0 0 10 0 0 0 10 0 0 0 10 0 0 10 0 0 10 0 0 10 0 0 10 0 0 10 0 0 10 0 0 10 0 10 0 0 10 of the blood inside the ventricles



During diastole, the heart muscles relax. The pressure inside the ventricles becomes less than that inside the aorta and semilunar valves sout. Blood flows