

Tissue  
Blood is an organ it consists of cells, solutes and liquid that are transported around the body.

Blood is pumped away from the heart at <sup>high</sup> low pressure in arteries and returns to the heart at <sup>low</sup> high pressure in <sup>veins</sup> capillaries.

Red blood cells transport <sup>oxygen</sup> nitrogen from the lungs to tissues. Red blood cells are efficient at transport because: there are <sup>high</sup> low numbers of red blood cells; the cells are <sup>small</sup> large to allow them to pass through narrow capillaries; the cells have a <sup>biconcave</sup> biconvex shape to <sup>increase</sup> decrease surface area allowing rapid diffusion of oxygen; they contain <sup>haemoglobin</sup> immunoglobulin which absorbs oxygen in the <sup>lungs</sup> heart and releases oxygen in the rest of the body.

Oxygen passes from the alveoli into the red blood cells in the capillaries by <sup>diffusion</sup> osmosis to form <sup>oxyhaemoglobin</sup> deoxyhaemoglobin.

White blood cells protect against disease. <sup>phagocytes</sup> Lymphocytes can engulf bacteria and other pathogens by phagocytosis. They can change shape easily and produce <sup>antibodies</sup> hormones that digest the pathogens. <sup>enzymes</sup> Phagocytes produce antigens that kill pathogens by causing them to enter the bladder. <sup>clump together</sup>

Blood platelets help the blood to clot. When damaged they change the blood <sup>protein</sup> carbohydrate fibrin into fibrinogen. This is important in sealing over wounds and forming scabs.

Plasma is a straw-coloured liquid. It transports dissolved substances around the body, including: hormones; antibodies; nutrients, such as water, glucose, amino acids, minerals and vitamins; and waste substances, such as carbon dioxide and urea.

Blood is pumped at high pressure away from the heart in <sup>arteries</sup> xylem. It travels through networks of thin <sup>capillaries</sup> veins, where it can exchange materials with the tissues. It's then collected up and returned to the heart at low pressure in <sup>veins</sup> valves. The thick layer of <sup>muscle & elastic</sup> fat in the walls of the arteries helps them to stretch and recoil due to the high pressure created as the blood is pumped out of the heart. The veins contain valves which ensure that blood flows <sup>does not</sup> backwards as it moves back to the heart at low pressure.

The heart is a pump that sends some blood to the lungs and some blood to the rest of the body each time it beats. The blood on the left side is kept separate from the blood on the right side. This is called <sup>double</sup> triple circulation.

Blood enters the heart through an <sup>vein</sup> artery and collects in an atrium. The atrium is emptied into a <sup>ventricle</sup> valve which contracts to put the blood under pressure. The blood is forced out through <sup>an artery</sup> a vein. The <sup>valves</sup> veins stop blood flowing back into the ventricles.

The <sup>left</sup> right ventricle has a thicker muscular wall than the <sup>right</sup> left ventricle because it must create a bigger pressure to push the blood all way round the body. The walls of the atria are <sup>thinner</sup> thicker than the walls of the ventricles because they only have to pump the blood a short distance to the lungs. <sup>ventricles</sup>

The <sup>coronary</sup> cardiac artery carries oxygen and <sup>glucose</sup> starch to the heart muscle cells. These are needed for <sup>respiration</sup> photosynthesis, which releases energy to allow the heart to <sup>contact</sup> relax and pump blood around the body.