## **4.2 Organisation II – The Circulatory System and Heart Disease**

**4.2.2.2 The Heart and Blood Vessels**Students should know the structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange.

The heart is an organ that pumps blood around the body in a double circulatory system. The right ventricle pumps blood to the lungs where gas exchange takes place. The left ventricle pumps blood around the rest of the body.

Knowledge of the blood vessels associated with the heart is limited to the aorta, vena cava, pulmonary artery, pulmonary vein and coronary arteries. Knowledge of the names of the heart valves is not required.

Knowledge of the lungs is restricted to the trachea, bronchi, alveoli and the capillary network surrounding the alveoli.

The natural resting heart rate is controlled by a group of cells located in the right atrium that act as a pacemaker. Artificial pacemakers are electrical devices used to correct irregularities in the heart rate.

The body contains three different types of blood vessel:

* arteries
* veins
* capillaries.

### Students should be able to explain how the structure of these vessels relates to their functions.

Students should be able to use simple compound measures such as rate and carry out rate calculations for blood flow.

#### **4.2.2.3 Blood**

Blood is a tissue consisting of plasma, in which the red blood cells, white blood cells and platelets are suspended.

Students should know the functions of each of these blood components.

Students should be able to recognise different types of blood cells in a photograph or diagram, and explain how they are adapted to their functions.

#### **4.2.2.4 Coronary heart disease: a non-communicable disease**

Students should be able to evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant.

In coronary heart disease layers of fatty material build up inside the coronary arteries, narrowing them. This reduces the flow of blood through the coronary arteries, resulting in a lack of oxygen for the heart muscle. Stents are used to keep the coronary arteries open. Statins are widely used to reduce blood cholesterol levels which slows down the rate of fatty material deposit.

In some people heart valves may become faulty, preventing the valve from opening fully, or the heart valve might develop a leak. Students should understand the consequences of faulty valves. Faulty heart valves can be replaced using biological or mechanical valves.

In the case of heart failure a donor heart, or heart and lungs can be transplanted. Artificial hearts are occasionally used to keep patients alive whilst waiting for a heart transplant, or to allow the heart to rest as an aid to recovery.