TRANSPORT IN HUMANS

The transport system in the human body is the circulatory system. The functions of the circulatory system are:

• to carry oxygen from the lungs to the rest of the body.
• to carry digested food from the small intestine to all areas in the body which need it.
• to fight diseases by using white blood cells.
• to help in the removal of all wastes from the body.

The circulatory system consists of:

• The heart
• The blood vessels (artery, capillary, vein)
• The blood

The circulatory system is a closed double circulatory system. The blood is confined to the blood vessels and the blood flows through the heart twice on one complete journey around the body.

Repeated circulation through the heart is necessary to maintain the blood pressure that is required to keep the circulation of blood around the body.
1. The Heart

- The function of the heart is to pump blood around the body.
- It lies in the chest region between the 2 lungs.
- It is made of cardiac muscle. This muscle contracts and relaxes regularly, throughout life.
The external appearance of the heart

The coronary arteries supply blood to the heart

The vertical section through a human heart

Wall of left ventricle is much thicker than wall of right ventricle as left ventricle has to pump blood to the rest of the body
Flow of blood

- Deoxygenated blood enters the right side of the heart from the vena cava into the right atrium. The atriums are relaxed. At the same time, the left atrium receives oxygenated blood from the lungs through the pulmonary vein.

- When both atriums are full of blood, they start to contract, pushing blood through the bicuspid (mitral) and tricuspid valves, into the relaxed ventricles.

- When the ventricles are full, they start to contract. At this time, the bicuspid and tricuspid valves close, preventing blood from flowing back into the atriums. The left ventricle pumps oxygenated blood through the aorta to the rest of the body. At the same time, the right ventricle pumps deoxygenated blood through the pulmonary artery to the lungs.

- Semi-lunar valves at the base of the pulmonary artery and aorta close preventing blood from flowing back into the ventricles. The cycle starts again with the entry of blood into the atriums.
2. The Blood Vessels

Arteries
- Thick-walled muscular tubes
- Carries blood away from the heart
- Blood in the arteries is under high pressure (which is why the walls need to be strong).
- Valves are absent
- Lumen is narrow

Veins
- Thin-walled tubes
- Carries blood back to the heart
- Blood in veins is under lower pressure.
- Blood flow is maintained by contraction of skeletal muscles
• Valves are present to prevent backflow of blood
• Lumen is wide

Capillaries
• One cell thick wall
• Exchanges materials between blood and tissue cells through the wall.
• Extremely narrow tubes
• Valves are absent

3. The Blood

Blood is a liquid tissue whose function is to transport materials around the body and to fight disease. 45% of the blood is made up of solid particles held in suspension. The solid matter consists of red blood cells, white blood cells and platelets. The remaining 55% is made up of a pale yellow fluid called plasma.
Plasma
• Liquid part of blood
• About 90% is water
• Contains plasma proteins, dissolved mineral salts, food, waste products and hormones.
• Transports useful substances to all the body tissues and removes waste produced by the body tissues.

Red Blood Cells (Erythrocyte)
• Biconcave, flattened discs with no nucleus
• Contain a red pigment called haemoglobin.
• Carries oxygen
• Made in the bone marrow (soft center of the bone)
• Life span is about 3-4 months

White Blood Cells
• Colourless and have nucleus
• Protects body against disease
• 2 types of white blood cells
  ○ Phagocytes
  ○ Lymphocytes
• Phagocytes protect the body by digesting foreign particles.
• Lymphocytes produce antibodies which can neutralise poisonous substances in the blood and also kill some types of bacteria.
• Life span of only a few days
Platelets

- Tiny pieces of cytoplasm
- Irregularly shaped and has no nucleus
- Helps in the clotting of blood to stop bleeding
- Changes a protein in the plasma, fibrinogen into a network of threads called fibrin. This network traps the red blood cells to form a blood clot. The blood clot prevents loss of blood and entry of germs into the wound.

Coronary Heart Disease (CHD)

- Coronary heart disease is the narrowing of the coronary artery.
- When these arteries get blocked by fat deposits and blood clots, the supply of oxygenated blood to the heart muscles is reduced or stopped.
- Heart muscles deprived of oxygen, will get damaged and stops contracting, leading to angina or heart attack.
- Causes of CHD:
  - Diet high in fats and carbohydrates
  - Smoking
  - Obesity
  - Lack of exercise
  - Stress