Circulatory system

Three components: **HUMANS**

- Central pump → Heart
- Vascular system → Blood vessels
- Circulating fluid → Blood
Blood Vessels

- Arteries
- Veins
- Capillaries

Cross section of artery and vein.
Capillaries

(a) Capillaries.

(b) Chemical exchange.
Location of Heart in Thorax
The heart

- A muscular organ
- Divided into chambers – Why?
- Relaxes and contracts regularly (cardiac cycle)
Double Circulatory System

(a) Pulmonary circuit.

(b) Systemic circuit.
Heart Wall
Control of heart rate

- **Pacemaker**, also called sinoatrial (SA) node, sets heart rate.

(a) The heart's natural pacemaker
Control of heart rate

(b) Artificial pacemaker
Blood

**Blood**

- **Plasma (55%)**
  - Water (90% of plasma)
  - Proteins
  - Salts (e.g., sodium, potassium, calcium)
  - Substances being transported (e.g., O₂, CO₂, nutrients, wastes, hormones)

- **Cellular elements (45%)**
  - Red blood cells (erythrocytes)
  - White blood cells (leukocytes)
  - Platelets (thrombocytes)

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Red blood cells
(erythrocytes)

- Most numerous
- Contain hemoglobin protein
- No nuclei or mitochondria
White blood cells
(leukocytes)

- Fight infections

- Contain nuclei & organelles, but no hemoglobin
Platelets (thrombocytes)

- Function in blood clotting
- Activate fibrin (clotting protein)