THE CIRCULATORY SYSTEM

Objectives

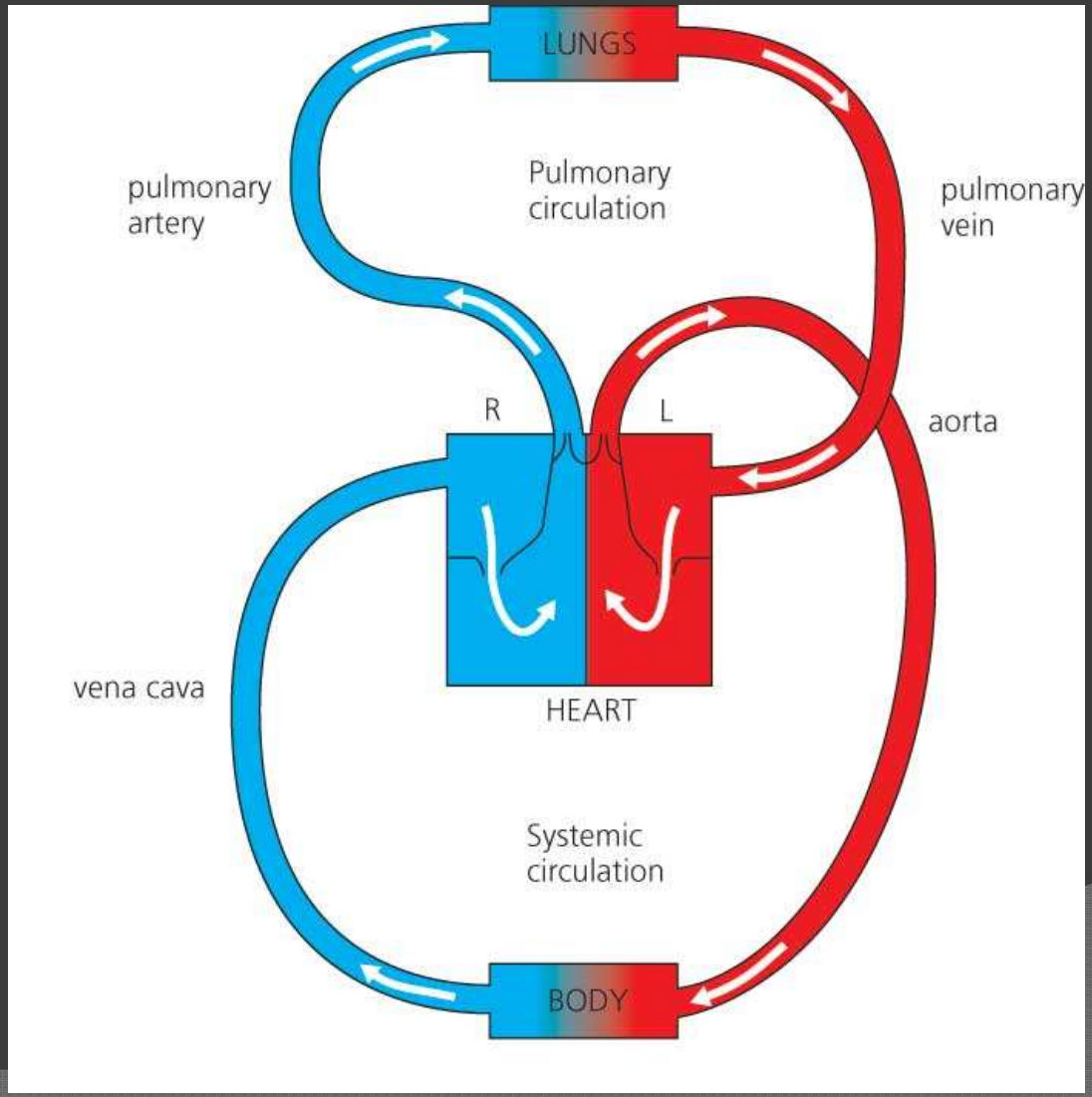
- Identify the different parts of the heart's structure
- Understand how the heart and blood vessels work together to make up the circulatory system

Functions of the Circulatory System

1. TRANSPORT
   - Move things around the body in the bloodstream
   - Oxygen, nutrients (glucose), water and waste
2. BODY TEMPERATURE CONTROL
   - More blood nearer the surface of the skin cools the body quicker
   - That's why skin is redder after exercise
3. PROTECTION
   - Moving antibodies around the body to fight disease

The circulatory System

Right side of the heart pumps blood which is low in O2 to the lungs to pick up O2 **Pulmonary Circulation**

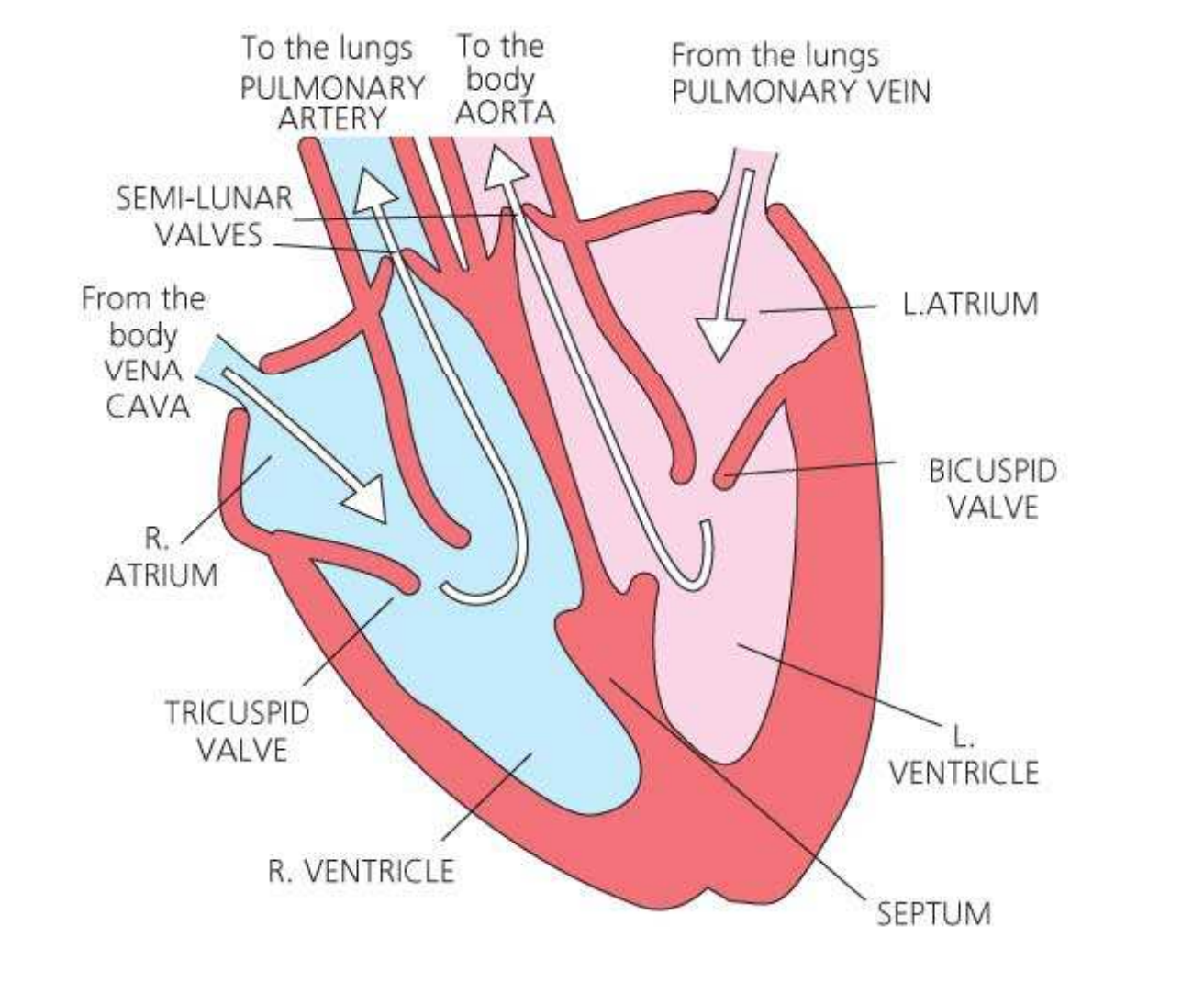


Left side of the heart pumps blood that is rich in O2 to all the parts of the body **Systemic Circulation**

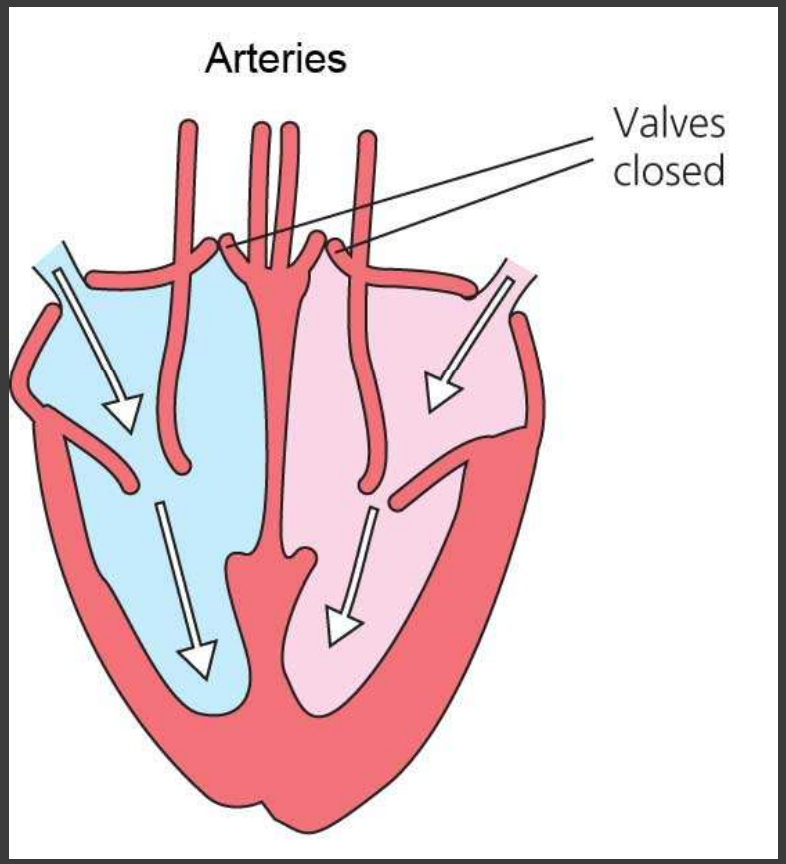
Vena Cava is a Vein, veins go towards the heart

Aorta is an Artery, Arteries go away from the heart

The Heart

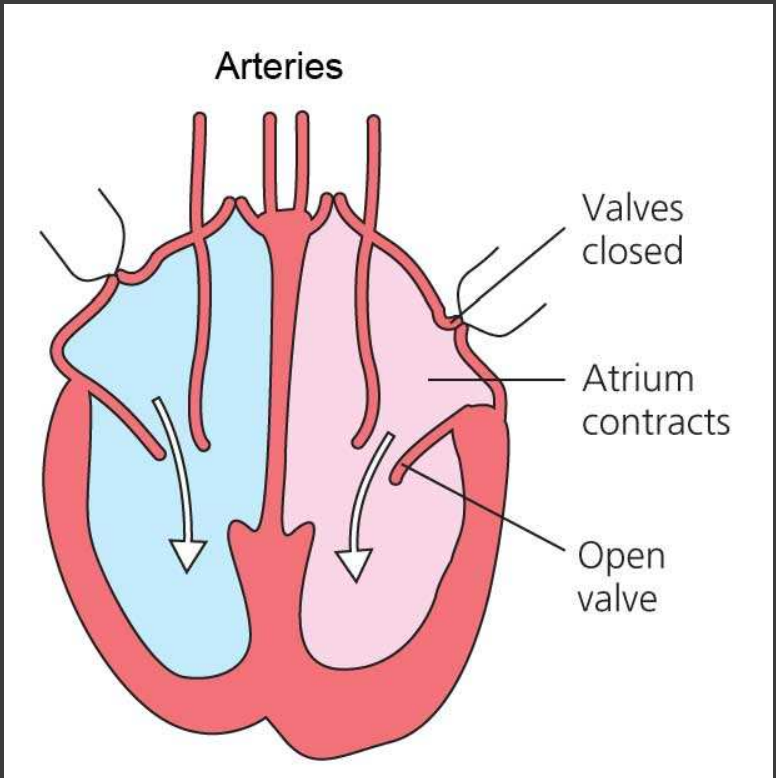

To the lungs
PULMONARY ARTERY
To the body
AORTA
From the lungs
PULMONARY VEIN
SEMI-LUNAR VALVES
From the body
VENA CAVA
L.ATRIUM
BICUSPID VALVE
R. ATRIUM
TRICUSPID VALVE
L. VENTRICLE
R. VENTRICLE
SEPTUM

How the Heart Pumps Blood



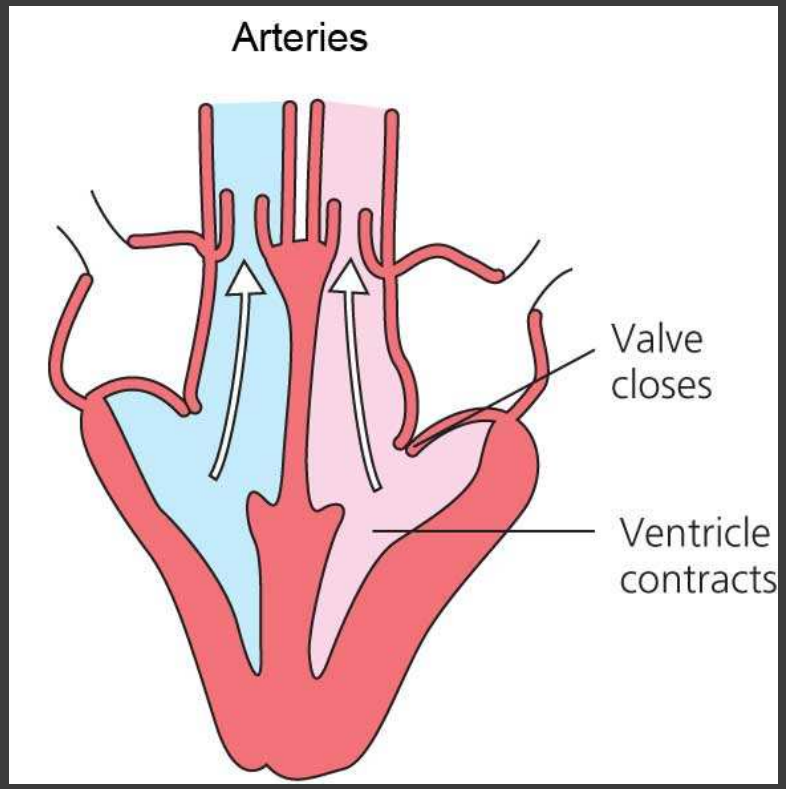
- When the heart is relaxed both sides fill with blood from the veins
- No blood can flow from the arteries as the semi-lunar valves are shut

How the Heart pumps blood



- The atria contract.
- The veins contract where they join the aorta
- Blood from the atria is forced into the ventricles

How the Heart pumps blood



- The ventricles contract
- The valves between the ventricles and atria close
- Blood is forced out of the heart into the arteries

Blood Pressure

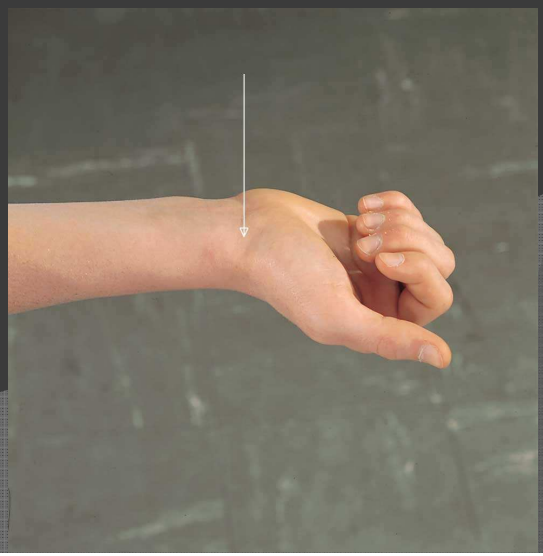
- *Systolic Pressure* = pressure of the blood in the arteries when the left ventricle *contracts*
- *Diastolic Pressure* = pressure of the blood in the arteries when the left ventricle *relaxes*

Heart Rate

- ***The number of times your heart beats in one minute***
- One expansion and contraction = ***Pulse***

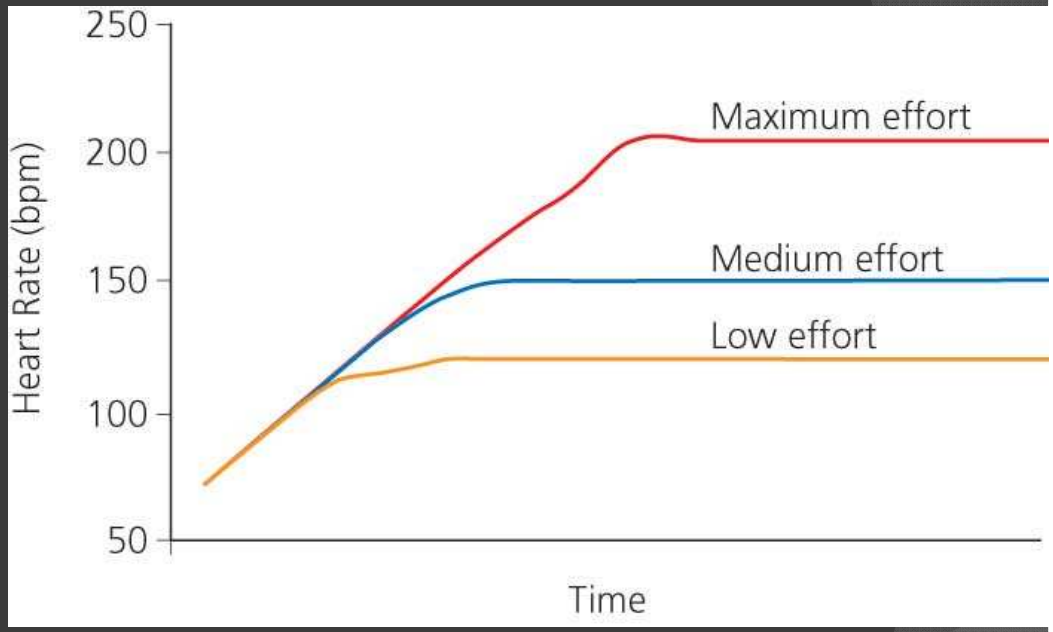
Carotid Artery Pulse

Radial Artery Pulse



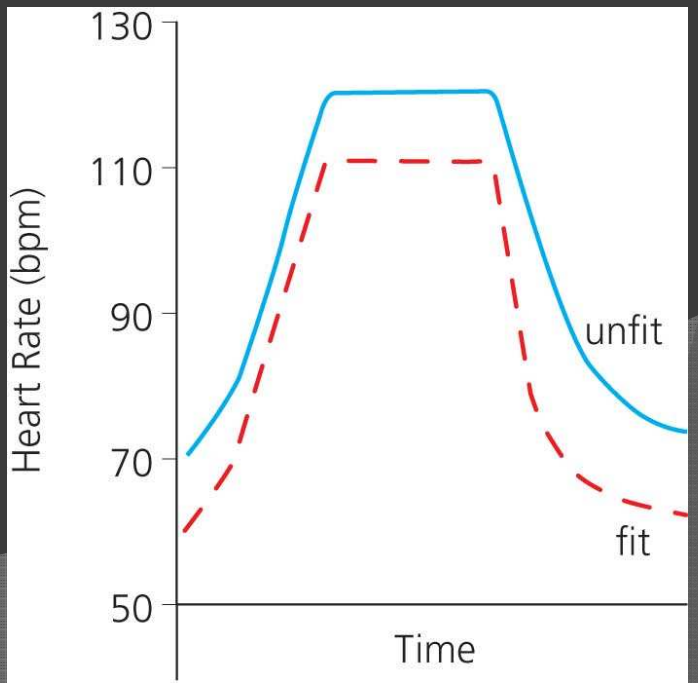
Heart rate and exercise (short term effects of exercise)

- At rest average heart rate = 70bpm
- Start to exercise it rises
- Maximum heart rate = 220-age
- Body desperate for O2 and getting rid of CO2



Heart rate and exercise (long term effects of exercise)

- Heart grows bigger and stronger – hypertrophy
- Heart can hold more blood and contract more strongly – bigger stroke volume
- Resting pulse rate decreases
- A fit person has
  - Lower resting heart rate
  - Lower heart rate during exercise
  - Quicker recovery



Stroke Volume

- *The volume of blood pumped out of the heart by each ventricle during one contraction*
- How increases stroke volume during exercise
  - Contracting muscles squeeze on your veins, causing more blood to squirt back into the heart
  - The heart gets fuller – fibres stretch more
  - Because fibres are more stretched the heart contracts strongly- stronger contraction forces more blood out

Cardiac Output

- *The amount of blood ejected from the heart in one minute*
- Heart rate x stroke volume = cardiac output

  e.g 70bpm x 70ml = 4.91
- At rest – two identical people

  Unfit 4.91 = 70ml x 70bpm

  Fit 4.91 = 90ml x 55bpm
- During exercise (15 years old)

  Unfit = 120ml x 205 bpm = 24.61

  Fit = 150ml x 205 bpm = 30.81

Age and the Cardiovascular System

- As you get older
  - Maximum heart rate drops
  - Cardiac output is less
  - Intense exercise cannot be sustained for as long

  - However … A good aerobic (endurance) based training programme can up to the age of 80 give a person the oxygen transporting system of someone 20 years younger

Homework

- Questions page 99 1-7
- Questions page 101 1-4