Respiratory and circulatory systems

UNTAMED EDUCATION

1.2 Anatomy and physiology

Respiratory System **Gaseous Exchange**

Heart

Oxyhaemoglobin **Inspiration**

The structure and functions of the cardio-vascular system

Expiration

Spirometer **Stroke Volume**

Blood Vessels

Cardiac Output

Respiratory and circulatory systems

1. Respiratory system

Mouth/Nose - has three functions.

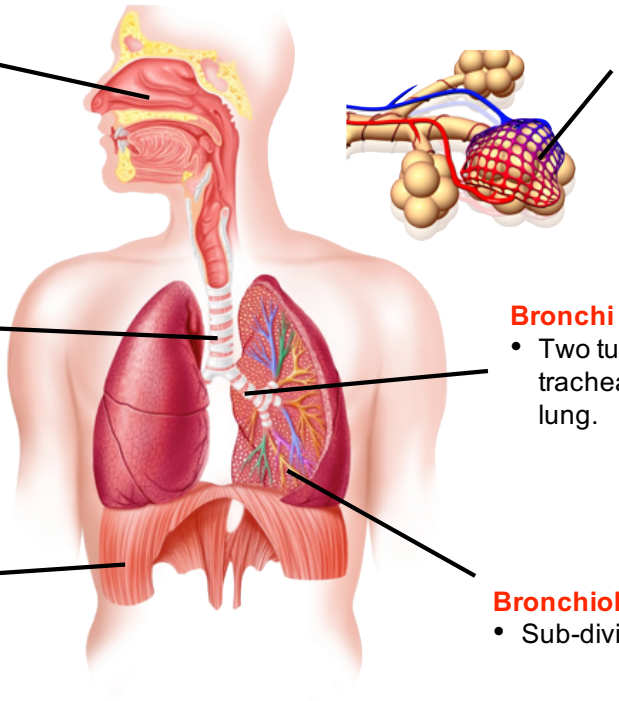
- **Warms** the air to internal temperatures.
- **Cilia** hairs filter the air and remove small particles.
- **Moistens** the air so it can be absorbed more easily.

Trachea

- **Cartilage rings** keeps the windpipe open.

Diaphragm

- A sheet of **muscle** below the lungs.
- **Flattens** to move air into the lungs.
- **Relaxes** into a dome shape to expire air.



Bronchi

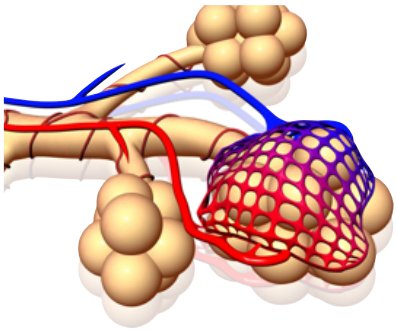
- Two tubes branch from the trachea into the left and right lung.

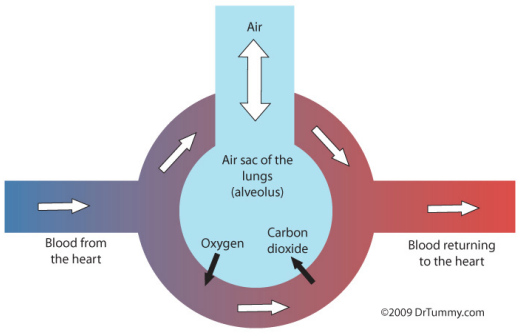
Bronchioles

- Sub-divisions of the bronchi.

2. Gaseous exchange

1. **Oxygen** breathed in travels **to the** _____ which are surrounded by **capillaries**. Gases pass through the **capillary walls**.
2. Oxygen combines with haemoglobin to form _____ and is carried around the body.
3. At the same time _____ _____ is **released** by haemoglobin into the alveoli to be breathed out.



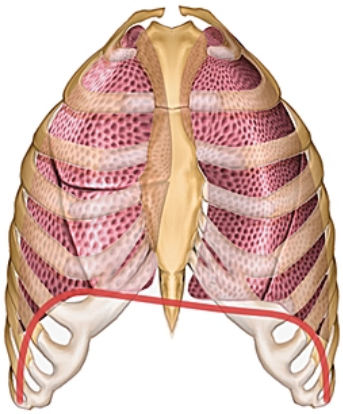


Gaseous exchange (diffusion) occurs efficiently for the following reasons:

- _____ **surface area** of alveoli and lots of capillaries allows for a large amount of oxygen and carbon dioxide to diffuse between the lungs and the blood vessels.
- The alveoli have **thin** _____ that are one cell thick. This reduces the distance of diffusion.
- The alveoli provide _____ as gases must first dissolve in liquid before they can diffuse.
- The circulatory system provides a **large** _____ **supply**. This maintains a **concentration** _____ as gases need to move from a high concentration to a low concentration.

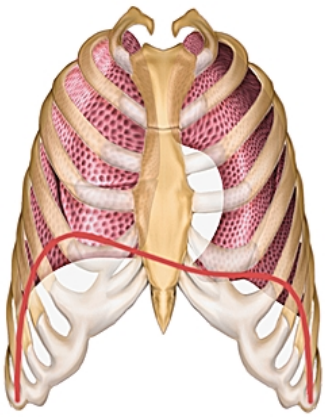
3. Inspiration and expiration

_____ (breathing in)



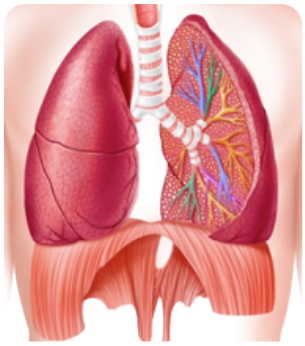
- The _____ **contracts** and **flattens**.
- The _____ **muscles contract**.
- The **ribs** move **upwards** and **outwards**.
- Air _____ **inside** the lung cavity **decreases**.
- **Air** from the atmosphere **moves into** the **lungs**.

_____ (breathing out)



- The _____ **relaxes** into a dome shape.
- The **intercostal muscles** _____.
- The **ribs** move **downwards** and **inwards**.
- Air **pressure inside** the lung cavity _____.
- Air **moves** from inside the lungs **to** the _____.

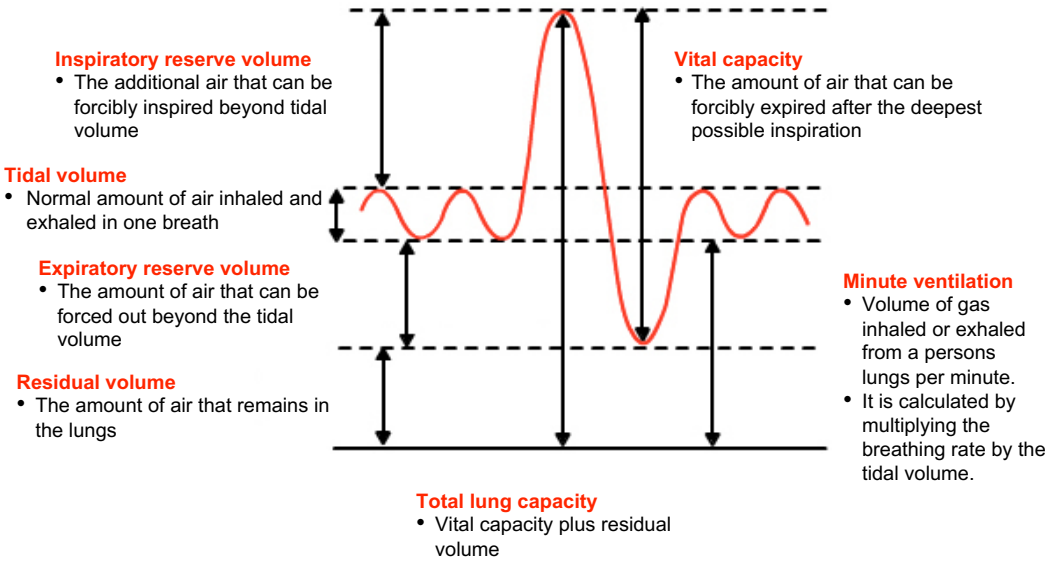
4. Respiratory changes



- Breathing rate _____.
- Depth of _____ increases due to the use of pectorals and sternocleidomastoid.
- When expiring the abdominals are used to force the air out more quickly.
- Increased gaseous _____ of oxygen and carbon dioxide at the lungs.

5. Spirometer

A spirometer measures air capacity of the lungs

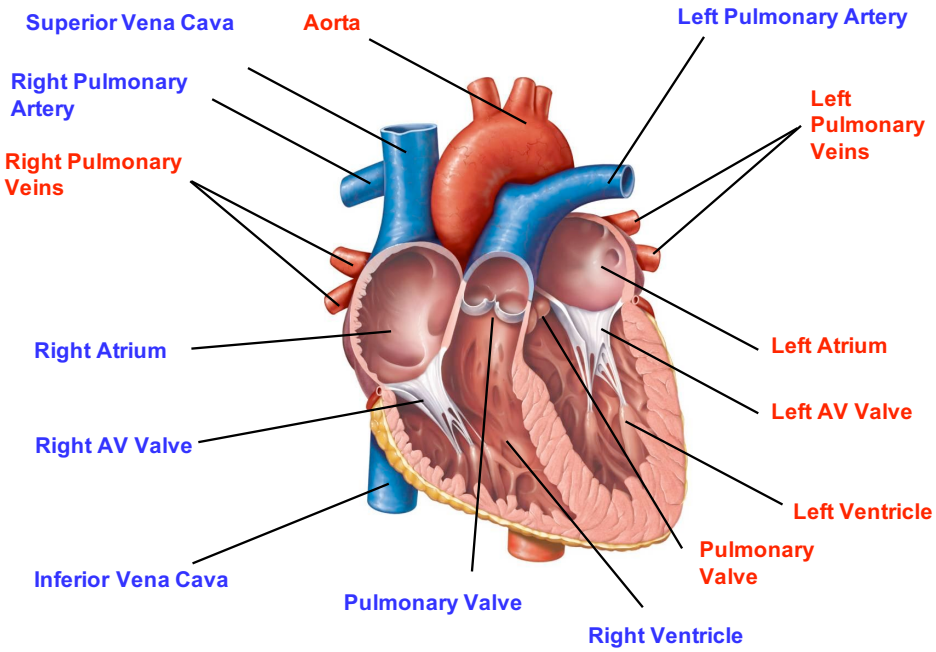


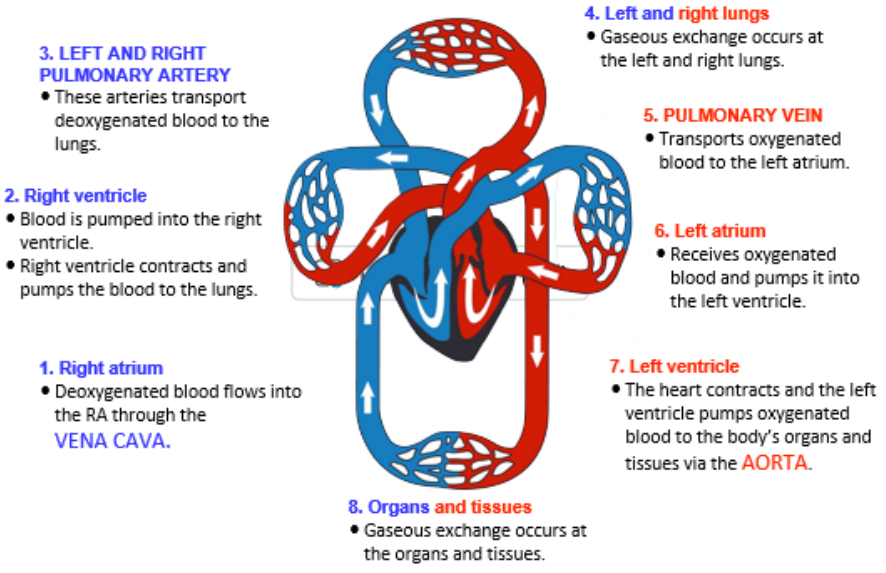
6. Effects of exercise

- **Breathing rate _____.**
- **Tidal volume _____.**
- **Minute volume _____.**
- **Expiratory reserve volume _____.**
- **Inspiratory reserve volume _____.**

- **Residual volume does not** _____.
- **Vital capacity does not** _____.
- **Total lung volume does not** _____.
- **Long term** effects include an increased **vital** _____ **and minute** _____.

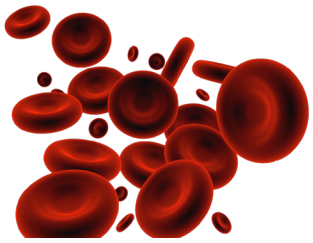
7. The heart





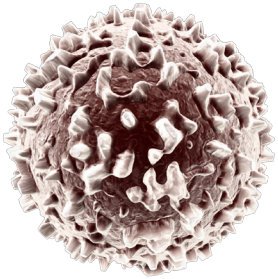
8. Components of blood

a. Red Blood Cells (RBC)



- RBC's main function is to **carry** _____ to the working muscles.
- _____, found in RBCs, is the **oxygen carrying protein**.
- **Altitude training** can **increase** the number of _____.
- The **more RBCs** the **more** _____ can be **delivered** to the working **muscles**.
- The more RBCs the _____ **the performer can participate**.

b. White Blood Cells (WBC)



- WBCs are our _____ against **infection and disease**.
- They **fight** _____ and reduce illness.
- This **aids** _____ and allows the participant to **continue training and performing**.

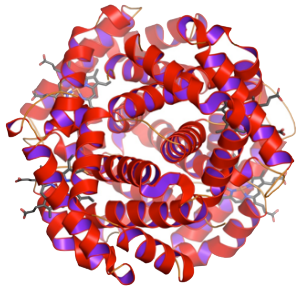
c. Platelets

- The role of platelets is to **clot our** _____ when it comes into contact with air.
- If we sustain a cut, platelets will clot the blood to form a _____.
- Cuts and grazes can happen frequently in contact sport so platelets **prevent heavy blood loss** and **aid** _____.

d. Plasma

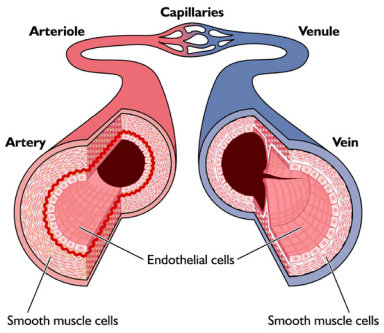
- Plasma is the **blood** _____ **system**.
- It carries vital nutrients (**glucose**, **vitamins**, **minerals**, etc.) and hormones such as _____, which is important in readying a performer to participate.
- It **removes** _____ **products** such as **carbon dioxide** and **lactic acid**.
- Plasma **regulates the body's** _____ by balancing our water content.
- It also maintains the **correct** _____ **balance**.

e. _____ is a protein found in red blood cells.



- It has a number of functions:
  - Carries **oxygen** to muscle cells.
  - **Transports carbon dioxide** from cells to lungs.
  - Regulates **blood** _____ by combining with nitric oxide.
  - Helps _____ blood flow.
  - Regulates _____ levels.

9. Blood vessels



1. _____

- Carry oxygenated blood **away** from the **heart**.
- Thick walls withstand **high blood** _____.

1. _____

- These are the _____ **blood vessels** with walls that are only one cell thick.
- They are very **efficient at gaseous** _____ at the lungs and muscles.

1. _____

- Carry deoxygenated blood **to** the _____.
- They have a **larger** _____.
- They work under **low** _____ so have _____ to prevent the back flow of blood.

10. Cardio-vascular measurements

Heart Rate

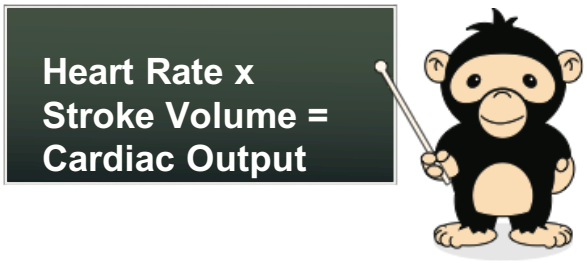
- This is the amount of times your heart **beats per** _____.
- A **low** _____**v heart rate** indicates an _____ **heart** and circulatory system. Delivering more oxygen per minute.

Stroke Volume

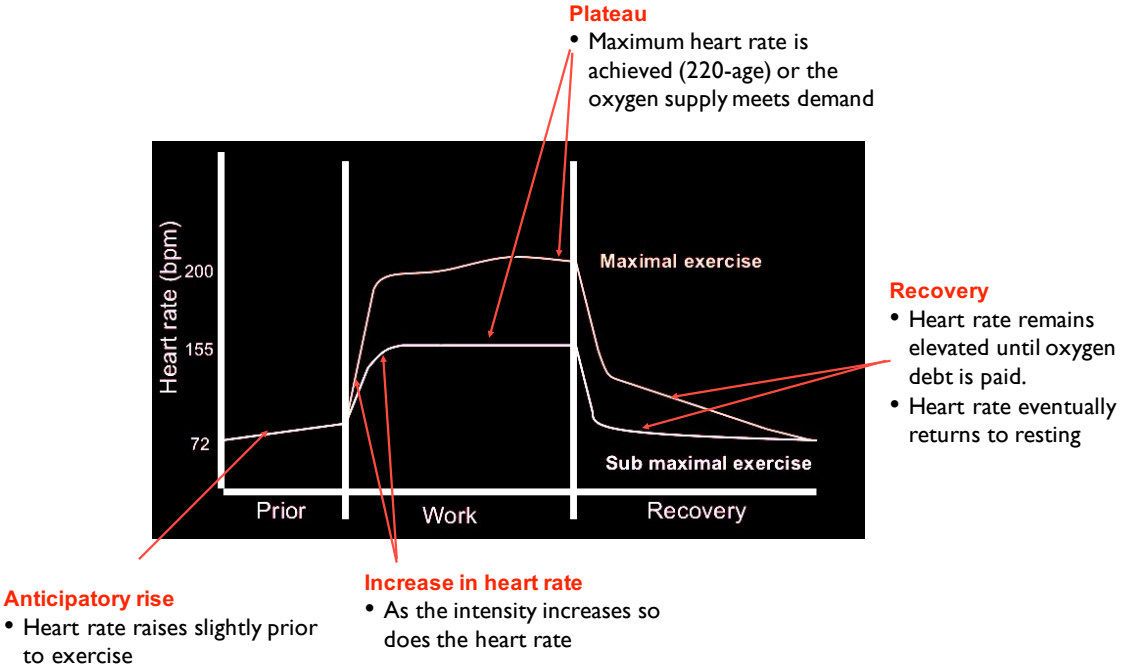
- This is the **volume of blood** the **left** _____ **of your heart pumps** in **one beat**.
- An **improved** _____ **volume** increases gaseous exchange, delivering **more** _____ and **removing more waste products**.

Cardiac Output (Q)

- This is the _____ **of blood pumped** from the left ventricle **in 1 minute**.



11. Heart rate graph



12. Long-term effects of exercise on the heart

- The heart grows larger and more muscular so it can hold more blood. This is called _____.
- Resting **heart rate** _____.
- **Stroke volume** _____.
- **Cardiac output** _____.
- **Decreased** _____ **time**.