

The Pathway of Air



The Respiratory System

The Mechanics of Breathing

In order for us to get oxygen into our bodies, we have to breathe. Outlined below are the mechanics of how we breathe:

	Expiration	Inspiration
Intercostal Muscles		
External	Relax	Contract
Internal	Contract	Relax
Ribs	Lower	Rise
Diaphragm	Relaxes into dome shape	Contracts and flattens
Lung Volume	↓	↑
Air pressure in lungs	↑	↓
Air pressure is relatively high in...	The lungs	The environment

Expiration:
air out
As air pressure in the lungs increases, it forces air out of the lungs.

Inspiration:
air in
As air pressure in the lungs decreases, air is sucked into the lungs.

As we exercise, the abdominal muscles support expiration by pulling the ribs down more forcefully so air can be pushed out more quickly.

As we exercise, the pectoral and sternocleidomastoid muscles support inspiration by allowing the lungs to expand and take in more oxygen.



Features that assist gaseous exchange at the alveoli:

- Large surface area
- Moist, thin walls (one cell thick)
- Short distance for diffusion
- Vast number of capillaries
- Large blood supply
- Movement of gas from high concentration to low concentration

Gaseous Exchange

- Oxygen breathed in moves from an area of high concentration (in the lungs) to an area of low concentration (in the capillaries).
- Oxygen combines with haemoglobin found in red blood cells to form oxyhaemoglobin.
- Haemoglobin also carries carbon dioxide.
- Carbon dioxide is taken to the lungs, passes through alveoli and is passed out.

O₂

CO₂

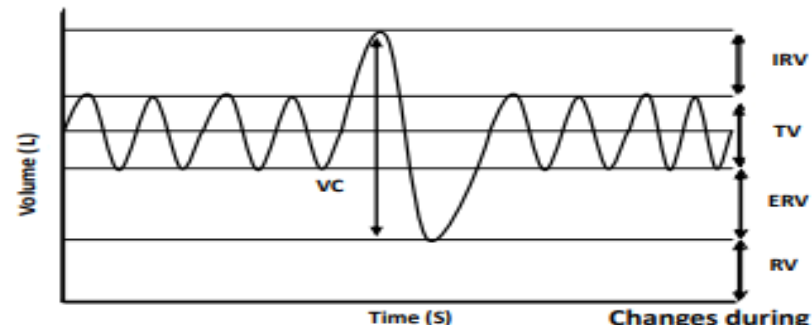


Red Blood Cells

Respiratory System During Exercise

A spirometer trace shows the volume of air inhaled and exhaled.

Spirometer trace at rest



Changes during Exercise:

TV	Tidal Volume: normal amount of air inspired/expired	↑
ERV	Expiratory Reserve Volume: amount of air forced out after tidal volume	↓
IRV	Inspiratory Reserve Volume: amount of air forced in after tidal volume	↓
RV	Residual Volume: the air left in the lungs prior to maximal expiration	No change
VC	Vital Capacity: largest volume of air that can be forcibly expired following largest inspiration	

Spirometer trace during exercise

