

The Respiratory System

How much we breathe



Objectives

- Understand tidal volume, respiratory rate, vital capacity
- Understand the effects of exercise and training on breathing, capacity and volume



Starter

- Count how many breathes you take in 1 minute

Respiratory Rate

- The number of breaths you take in one minute

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Tidal Volume

- The volume of air you breathe in (or out) with each breathe



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Minute Volume

- The volume of air you breathe in per minute
- Minute Volume= tidal volume x respiratory rate
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What happens when you exercise?

- All 3 increase
- Typical 18 Year old

		
Tidal Volume (Litres)	0.5	2.5
Respiratory Rate (Breaths/min)	12	30
Minute Volume (Litres/min)	6	75

Vital Capacity

- The maximum amount of air you can breathe out after breathing in as deeply as you can
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Residual Volume

- The amount of air left in your lungs after you breathe out as hard as you can.
- Usually around 1.5 litres – you can never empty your lungs completely



Lung volumes

Diagram handout



Effects of training

- Breathing muscles grow stronger which allows deeper breathes – vital capacity increases
- More alveoli become surrounded with capillaries so gas exchange is more efficient
- Aerobic / stamina work can continue longer

Lungs and exercise

1. During exercise cell respiration in your muscles increases, so the level of CO₂ rises

2. Your brain detects this, it sends a signal to your lungs to breathe faster and deeper



3. Gas exchange in your lungs speeds up. More CO₂ passes out of the blood and more O₂ passes in

4. The brain also sends a signal to your heart to beat faster so –
More blood gets pumped to the lungs for gaseous exchange
More blood gets pumped to the muscles, carrying O₂ and removing CO₂