Your notes

GCSE PE: revision notes

The respiratory system

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The pathway of air

- Air enters through the mouth and nose, then passes down the trachea (windpipe).
- The trachea splits into two bronchi, one to each lung, which divide into smaller bronchioles.
- The bronchioles end in millions of tiny air sacs called **alveoli**, where gas exchange happens.

Breathing in and out

- Breathing in (inspiration): the **diaphragm** contracts and flattens, and the external intercostal muscles pull the ribs up and out. The chest gets bigger, the pressure inside falls, and air rushes in.
- Breathing out at rest (expiration): the **diaphragm** and intercostals relax, the chest gets smaller, the pressure rises and air is pushed out. This is passive.
- During exercise, extra muscles help: the pectorals and sternocleidomastoid lift the ribs further when breathing in, and the abdominals pull the ribs down to force air out.

Lung volumes

- **Tidal volume**: the amount of air breathed in or out in one normal breath. It increases during exercise.
- Inspiratory reserve volume: the extra air that can be breathed in after a normal breath in. It decreases during exercise.
- Expiratory reserve volume: the extra air that can be breathed out after a normal breath out. It decreases slightly during exercise.
- **Residual volume**: the air left in the lungs after breathing out as hard as possible, so the lungs don't collapse.

- **Vital capacity**: the most air that can be breathed out after the deepest breath in. A **spirometer** trace shows these volumes.

Gaseous exchange at the alveoli

- Oxygen diffuses from the **alveoli** (high concentration) into the blood in the capillaries (low concentration). Carbon dioxide diffuses the other way.
- **Alveoli** are suited to this: a huge surface area, walls one cell thick for a short **diffusion** distance, a moist lining, and a rich supply of capillaries.

Key terms

Alveoli	Tiny air sacs in the lungs where gas exchange happens.
Diaphragm	The sheet of muscle below the lungs that contracts to help breathing in.
Tidal volume	The amount of air breathed in or out in one normal breath.
Vital capacity	The most air that can be breathed out after the deepest breath in.
Residual volume	The air that stays in the lungs after breathing out as hard as possible.
Gaseous exchange	The swapping of oxygen and carbon dioxide between the alveoli and the blood.
Diffusion	The movement of a gas from a high to a low concentration.
Spirometer	A device that measures and records lung volumes.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Where does gas exchange happen in the lungs?
2. What happens to the diaphragm when you breathe in?
3. What is tidal volume?
4. What happens to tidal volume during exercise?
5. What is residual volume?
6. In which direction does oxygen diffuse at the alveoli?
7. Why are the walls of the alveoli only one cell thick?
8. Which muscles pull the ribs up and out when breathing in?

Answers

1. In the alveoli
2. It contracts and flattens
3. The amount of air breathed in or out in one normal breath
4. It increases
5. The air left in the lungs after breathing out as hard as possible

Your notes

6. From the alveoli into the blood
7. To give a short distance for diffusion
8. The external intercostals

What to do next

Practise 12 questions on this topic

Try 5 exam questions, with mark schemes

Read the lesson, one step at a time

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