AQA GCSE PHYSICAL EDUCATION
The structure and functions of the cardio-respiratory system

Respiratory system

1) The pathway of air Identification of the pathway of air: mouth/nose – trachea – bronchi – bronchioles – lungs - alveoli.

2) Inspire/inhale Breathe in

3) Expire/exhale Breathe out

4) Deep breathing Slow, deep breaths whilst relaxed

5) Alveoli Air sacs in the lungs

6) Residual volume Air left in the lungs after maximal expiration

7) Gaseous exchange The process where oxygen in alveoli moves into the blood whilst removing carbon dioxide

8) Gas exchange at the alveoli
Oxygen that is breathed in passes through the **alveoli** and into the red blood cells in the **capillaries.**
In the capillaries the oxygen combines with **haemoglobin** to form **oxyhaemoglobin.**
Haemoglobin carries **carbon dioxide** from the blood to the capillaries which is then passed through the alveoli and breathed out.

9) Haemoglobin
The substance in the red blood cells which transports oxygen (as oxyhaemoglobin) and carbon dioxide.

10) Spirometer: equipment that measures air capacity in the lungs

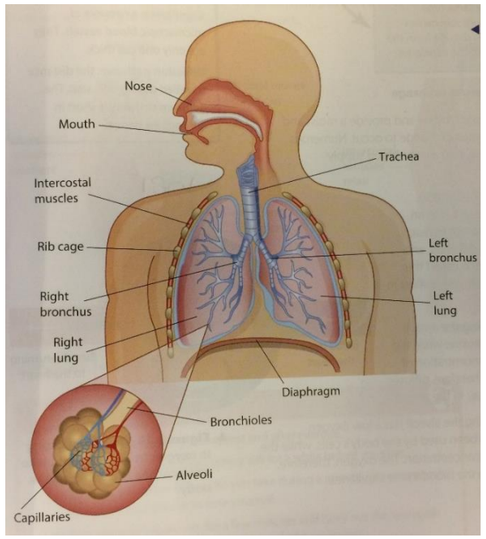
11) Spirometer trace A measure of lung volume, which includes:

- **tidal volume** – volume of air inspired or expired/exchanged per breath
- **inspiratory reserve volume** – the amount of air that could be breathed in after tidal volume
- **expiratory reserve volume** – the amount of air that could be breathed out after tidal volume
- **residual volume** – the amount of air left in the lungs after maximal expiration.

12) Mechanics of breathing

As we **inhale/inspire** the chest cavity changes shape and size. The **diaphragm** flattens and moves down. The **intercostal muscles** (which are attached to the ribs) contract, raising the **ribs** up and pushing out the **sternum**, making the chest cavity larger. This reduces the air pressure inside the chest cavity and causes air to be sucked into the lungs.
When we **exhale/expire** the reverse occurs. The **diaphragm** becomes dome shaped. The **intercostal muscles** relax, lowering the **ribs** and dropping the **sternum,** making the chest cavity smaller. This increases the air pressure inside the air cavity and causes air to be pushed out of the lungs.

Lungs can expand more during exercise (inspiration) due to the use of **pectorals** and **sternocleidomastoid.** During exercise (expiration), the rib cage is pulled down quicker to force air out quicker due to use of the **abdominal** muscles.



Cardiovascular system

13) Capillaries Microscopic blood vessels that link arteries to veins. Thin walls to allow O^2 and CO^2 to pass through during gaseous exchange.

14) Veins Carry deoxygenated blood back to heart. Thin walls but wider than arteries as pressure is lower.

15) Arteries Carry oxygenated blood away from the heart under pressure. Thick muscular walls, small diameter

16) Stroke volume The volume of blood pumped out of the heart by each ventricle during one contraction.

17) Backflow The flowing backwards of blood. Valves in the veins prevent this from happening.

18) Embolism Blockage of a blood vessel.

19) Redistribution of blood during exercise
When exercise begins, the body alters its priorities. At rest, high % of blood is directed to organs and during exercise the blood is redirected to voluntary muscles.

20) Vasoconstriction
Narrowing of internal diameter of a blood vessel to restrict the flow of blood. The arteries constrict during exercise so that less blood is delivered to inactive areas.

21) Vasodilation
Widening of internal diameter of a blood vessel to increase the volume of blood travelling through it. The arteries dilate during exercise so that more blood is delivered to active areas, increasing their O^2 supply

22) Blood pressure The pressure that blood is under. Types of pressure:

- **systolic** - when the heart is contracting
- **diastolic** - when the heart is relaxed**.**

23) Cardiac output The amount of blood ejected from the heart in one minute or stroke volume x heart rate.

24) Cardiac cycle The process of the heart going through the stages of systole (ejection) and diastole (filling) in the atria and ventricles

25) Pathway of the blood:

- deoxygenated blood into right atrium
- then into the right ventricle
- the pulmonary artery then transports deoxygenated blood to the lungs
- gas exchange occurs (blood is oxygenated)
- pulmonary vein transports oxygenated blood back to the left atrium

then into the left ventricle before oxygenated blood is ejected and transported to the body via the aorta

26) Heart attack It occurs when the flow of oxygen-rich blood to a section of heart muscle suddenly becomes blocked.

27) Heart chambers The right and left atria and ventricles.

28) Heart rate The number of times the heart beats (usually measured per minute).