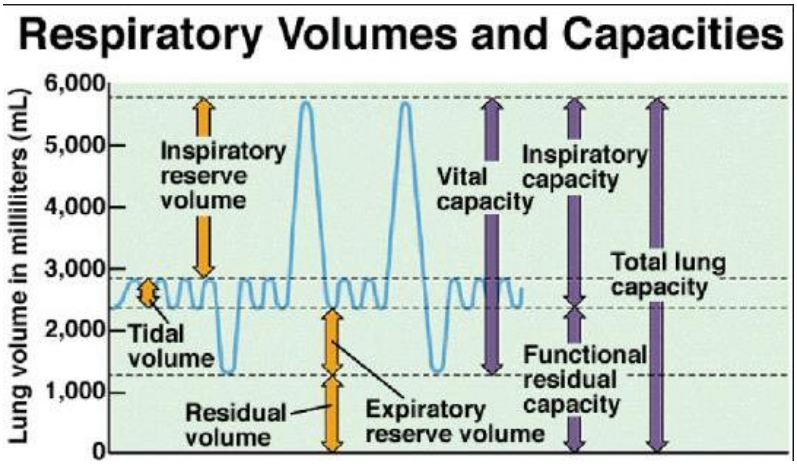
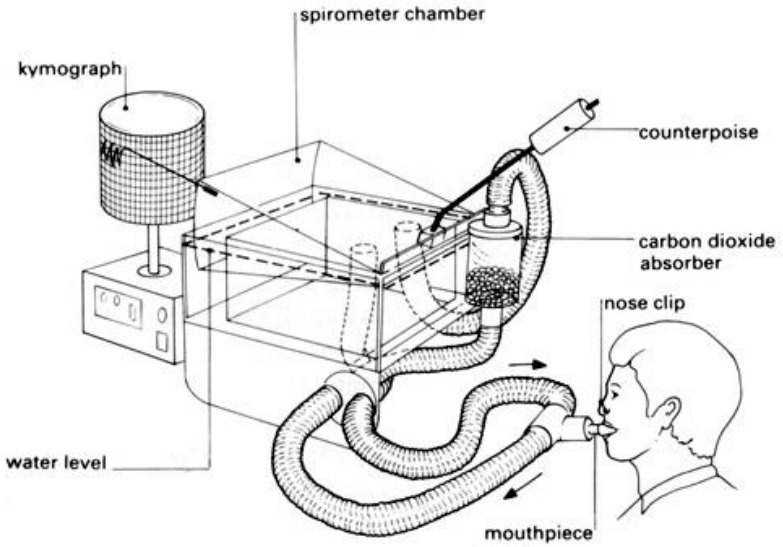


This graph shows some of the volume changes that occur in the lungs during breathing. The actual volume vary from one person to another. The tidal volume is the volume of air breathed in and out with a normal breath. This is usually about 0.5 dm^3. If you breath out as much air as possible and then breath in as much air as possible, you will breath in about 3.5 dm^3. The volume is called the vital capacity. Even when you have breathed out as much air as possible, there is still about 1.5 dm^3 of air left in the lungs. This is called the residual volume. It is important that there is some air left in the lungs when you breath out, or the walls of the alveoli would stick together and it would be difficult to re-inflate the lungs.

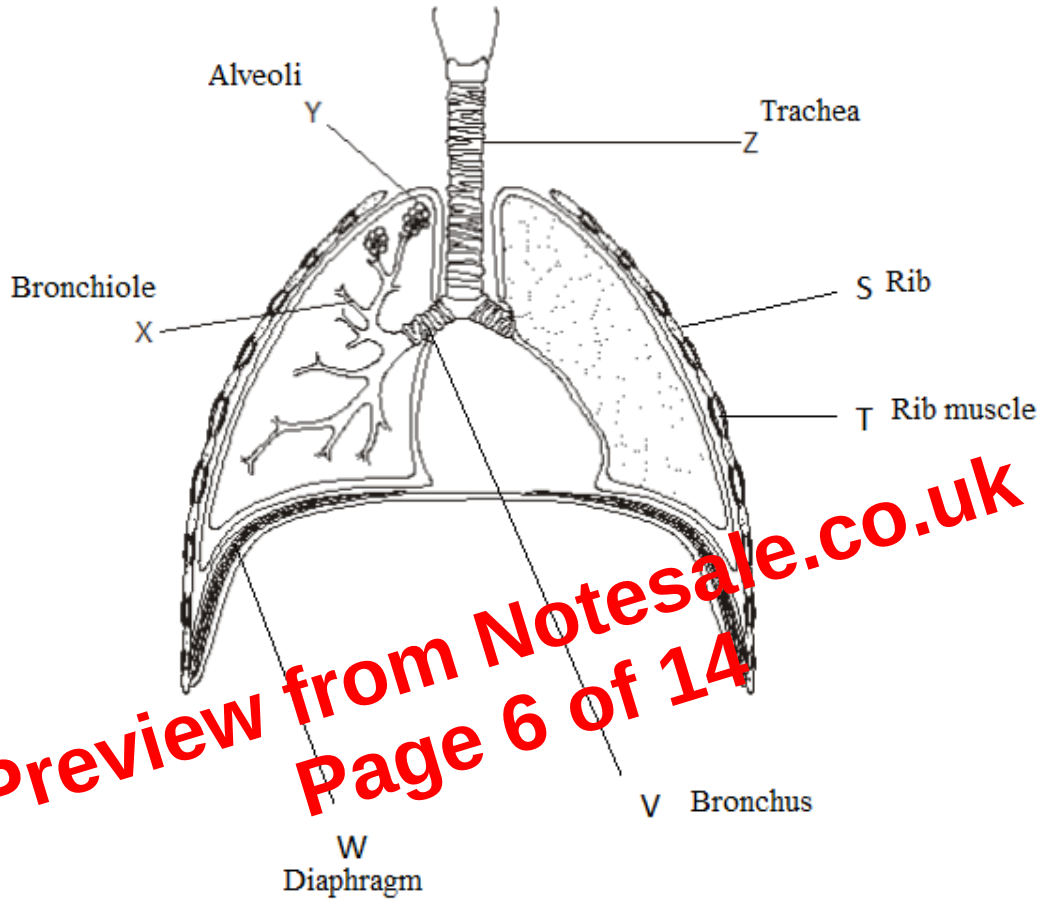
Using a spirometer: Lung volumes can be measures using a piece of equipment called a spirometer. A person breathes in air through a tube connected to a container of oxygen that floats in a tank of water. The floating container rises and falls as the person breathes in and out. The rise and fall in related to the volume of air the person is breaking in and out. The container has and arm attached to it. with a pen on the end. The pen draws a trace on some graph paper on a rotating drum. The air breathed out passes through a chamber containing soda lime which absorbs the carbon dioxide in the air breathed out before it returns to the oxygen chamber. This stops the person re-breathing carbon dioxide which would increase their breathing rate. As the oxygen in the chamber is gradually used up, the volume of oxygen in the chamber reduces gradually.



Flow rates: Medical practitioners may also wish to measure the rate at which air can be expelled from the lungs when a person forcibly breathes out. This can help to diagnose and monitor

Diagram of section through the Thorax

Label the diagram



State **3 ways** the structure of the **lungs** is adapted to allow efficient gaseous exchange:

1. The alveoli give the lungs a really big surface area
2. They have moist, thin walls (just one cell thick)
3. They have a lot of tiny blood vessels called capillaries.