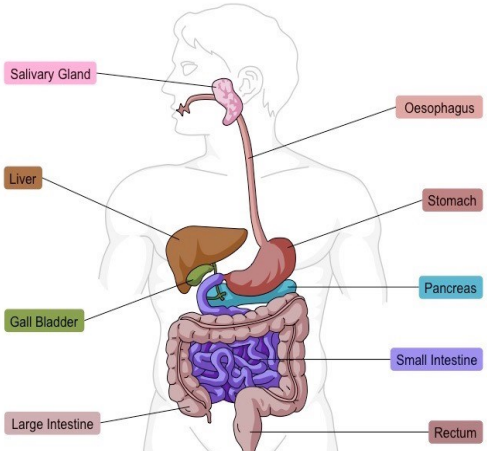
SCIENCE

Year 8: Systems

1. Balanced diet

There are 7 nutrients in a balanced diet:

- **Carbohydrates,** found in breads and pasta, needed for quick energy release.
- **Protein,** found in nuts and fish, needed for growth and repair of body tissue.
- **Fats,** found in oils and spreads, needed for cell membranes and slow energy release.
- **Fibre,** found in cereals, fruit and vegetables, needed to push food through the digestive system and to prevent constipation.
- **Minerals,** such as calcium and iron, needed for development and body function.
- **Vitamins,** found in fruits and vegetables, needed for healthy body function
- **Water,** needed for transport in the body and chemical reactions.



2. Enzymes and the digestive system

- Enzymes in the digestive system break down large **insoluble** molecules into small **soluble** molecules.
- The small soluble molecules are able to pass through the wall of the **small intestine** into the blood stream, so they can be used in the body.
- The small intestine is adapted for diffusion of small molecules by being **long**, having **thin walls**, having a **good blood supply** and having **small villi** (folds on the surface) to increase it's surface area.

Large nutrient molecule to be broken down	Enzyme	Small molecule product	Where does this happen?
Starch	Amylase	Glucose	Mouth
Protein	Protease	Amino acid	Stomach
Fat (Lipid)	Lipase	Fatty acids and glycerol	Small intestine

Keyword	Meaning	Keyword	Meaning
Artery	An organ in the circulatory system that carries blood away from the heart	**Organ system**	Lots of different organs working together for a particular role.
Balanced diet	A diet that includes to correct amounts of all nutrients needed for health.	**Vein**	An organ in the circulatory system that carried blood towards the heart.
Capillary	An organ in the circulatory system linking the arteries and veins	**Vital capacity**	The greatest volume of air that can be expelled from the lungs after taking the deepest possible breath
Enzymes	A biological catalyst made of protein that speeds up the rate of reaction.	**Limitation**	Characteristics of a method that impacted or influenced the interpretation of the findings from your results.
Emphysema	a condition in which the air sacs of the lungs are damaged and enlarged, causing breathlessness	**Quantitative**	Measuring the amount of something (uses numbers)
Organ	Something made of different types of tissues working together for a particular role.	**Qualitative**	Measuring the quality of something eg. Colour change

3. Food tests

Nutrient to be tested	Name of the test	Method	Colour if the nutrient is present	Colour if the nutrient isn't present
Glucose	Benedict's test	Add Benedict's solution to the food sample and heat in	Orange/ Brick red	Blue
Starch	Iodine test	Add iodine to the food sample	Blue/black	Orange
Protein	Biuret test	Add potassium hydroxide to the food sample and stir, then add 2 drops of copper	Purple	Blue

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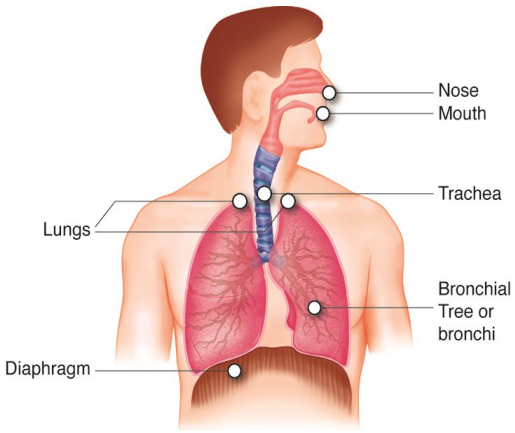
4. Respiratory system and breathing



Inhalation (Breathing in):

- The diaphragm and intercostal muscles contract.
- The ribs move up and out
- The diaphragm moves down
- The thorax volume increases
- The pressure in the thorax decreases
- Air moves into the lungs.

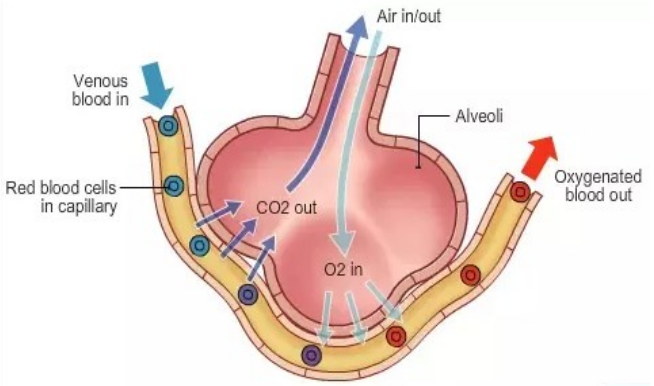
Exhalation (Breathing out):

- The diaphragm and intercostal muscles relax.
- The ribs move in and down.
- The diaphragm moves up.
- The thorax volume decreases
- The pressure in the thorax increases

5. Gas exchange and smoking

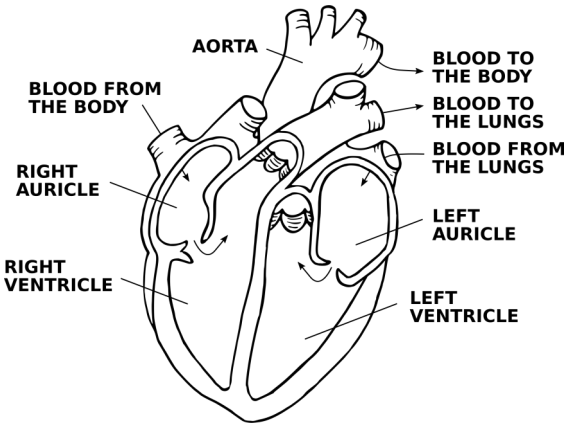
The alveoli is adapted for gas exchange by diffusion:

- It has a **large surface area** to allow for more places to exchange gases.
- It has a good blood supply to maintain the concentration gradient.
- It has **thin walls** so the diffusion distance is short
- It has a **moist surface** so the gases can dissolve into the lining.



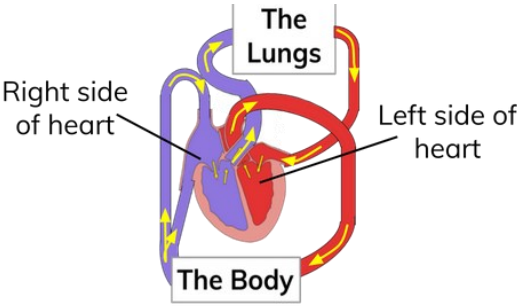
Smoking can cause tar to build up in the lungs leading to more infections like bronchitis. It can also lead to emphysema where coughing damage the alveoli and make them less efficient at gas exchange. This leads to breathlessness.

6. Circulatory System - The heart



- The heart pumps blood around the body.
- The blood is vital in getting **oxygen** from the lungs and **glucose** from the small intestine to the cells for **respiration.**
- The blood then takes the **water** and **carbon dioxide** made in respiration to the lungs to be exhaled.
- The **left ventricle** in the heart has the thickest muscle because it pumps the blood further to get it around the body.
- There are **valves** in the heart to ensure the blood gets pumped in the right direction (no backflow)

- The human body has a **double circulatory system.**
- This means the blood is pumped twice in one circulation. (Once to get to the lungs to oxygenate the blood, the other to pump oxygenated blood to the rest the body)
- This helps the blood to **maintain pressure** so the it can complete the full circuit.



7. Circulatory System - Blood vessels

Name	Function	Adaptations
Artery	To carry blood away from the heart. (Largest is the aorta)	Thick muscular walls to maintain pressure. Small lumen Carries oxygenated blood (except the pulmonary artery)
Vein	Carries blood to the heart (largest is the vena cava)	The muscle in the walls are thinner Large lumen that contains valves to prevent backflow. Carries deoxygenated blood (Except pulmonary vein)
Capillary	Connects the artery and vein	Very thin walls to allow diffusion to the cells Lumen is 1 cell thick