Year 8 – Summer 2

1. Cells, Tissues, Organs and Organ Systems

- **Cells** are the building blocks of life. Some cells are specially adapted to perform specific functions, these are called **specialised** cells e.g. root hair cells, sperm cells, palisade cells.
- A **tissue** is a group of the same cells working together towards a specific function. E.g. muscle tissue, bone tissue, nerve tissue.
- An **organ** is made up of different tissues working together to achieve a function e.g. heart, lungs, stomach.
- An **organ system** is a group of organs working together to complete a function e.g. the digestive system, respiratory system.

2. Respiration

- **Respiration** is a chemical reaction that happens in ALL living cells, including plant and animal cells.
- **Aerobic** respiration takes place when there is plenty of oxygen available:

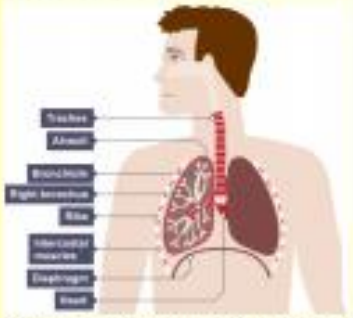
$$\text{Glucose} + \text{Oxygen} \rightarrow \text{Carbon Dioxide} + \text{Water} + \text{Energy}$$

$$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$$

- **Anaerobic** respiration takes place when there is not enough oxygen in the cells, usually during hard exercise. During anaerobic respiration glucose is converted into energy and lactic acid. **Anaerobic** respiration produces much less energy than aerobic respiration and can cause cramps and tiredness.

3. The Respiratory System

The respiratory system is made up of organs that work together to get the oxygen we need for **respiration** and get rid of the carbon dioxide.



The journey of air through the respiratory system

- Air passes from the mouth into the trachea (windpipe).
- The **trachea** divides into two **bronchi** with one **bronchus** for each lung.
- Each **bronchus** divides further in the lungs into smaller tubes called **bronchioles**.
- At the end of each **bronchioles** there is a group of tiny air sacs.
- These air sacs have bulges called **alveoli** to increase their surface area.

Ciliated cells

- **Ciliated** cells have hair like structures (**cilia**) which sweep mucus, bacteria and dirt away from the **lungs**.
- Smoking clogs the cells and stops them from working properly.

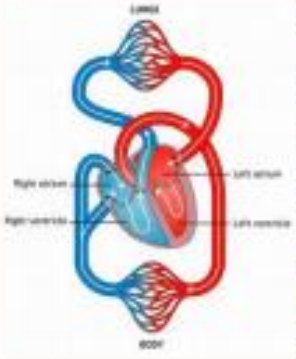
Alveoli

The alveoli are adapted to make gas exchange in lungs happen easily and efficiently. Here are some features of the alveoli that allow this:

- they give the lungs a big surface area
- they have moist, thin walls
- they have a lot of tiny blood vessels

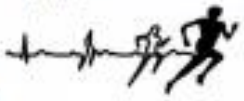
4. The Circulatory System

- The circulatory system pumps blood around the body delivering **oxygen** and **glucose** to all the cells to be used in **respiration**.
- The most important organ in the circulatory system is the **heart**.
- The circulatory system is also made up of three types of blood vessel; **arteries**, **veins** and **capillaries**.
- The human heart has a left and a right side.
- Each side has two chambers; **atria** and **ventricles**.
- The **right** side of the heart receives **deoxygenated** blood from the body and pumps it to the **lungs**.
- The **left** side of the heart receives **oxygenated** from the **lungs** and pumps it all around the body.
- The **left** side of the heart has thicker walls as it has to pump blood around the **whole** body.



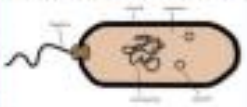
5. Exercise

- Exercise has an effect on both the circulatory and respiratory system.
- When we exercise our body uses its **energy** more quickly and so **respiration** needs to happen more quickly to replace the energy.
- For this to happen the body needs more **oxygen** which is why during exercise **breathing rate** (how quickly you breath) and **tidal volume** (the volume of every breath) increases during exercise.
- This oxygen, and the glucose from digestion need to be pumped more quickly around the body so **heart rate (pulse)** also increases during exercise.
- Some types of exercise will increase the heart rate and breathing rate more than others e.g. sprinting more than jogging.



6. Microorganisms

Microbes or **microorganisms** are tiny living things. They can be useful but can also cause disease. There are three main types; **bacteria**, **viruses** and **fungi**.



- Bacteria cause diseases such as **tuberculosis** and **salmonella**.
- They are also used in producing **yoghurt** and **cheese** and have an important role in the digestive system.

- Viruses are the smallest microbe.
- They can only reproduce inside another living thing.
- Viruses cause diseases such as **HIV, flu** and the **Common Cold**.

- Fungi cause diseases such as **ringworm, athlete's foot** and **thrush**.
- Fungi like **yeast** are important in production of bread and alcohol.

7. Spread of disease

Many harmful **microbes** can pass from one person to another. Diseases caused by such microbes are said to be **infectious diseases**. Here are some ways that harmful microbes can be spread:

- in air
- through contact with animals
- through contaminated food
- through touch
- in water

7. Antibiotics and vaccinations

- **Antibiotics** are medicines used by doctors when harmful microbes have made you ill. They are substances that harm **bacteria**. Some antibiotics stop the bacteria reproducing and others kill the bacteria directly. They do not kill viruses.
- **Vaccination** is a process that doctors use to make people immune from certain illnesses, even before they have been infected. It involves you receiving an injection containing a **vaccine**. Vaccines contain a dead or weak form of the disease-causing microbe, or some of its antigens. In response to the vaccine your immune system produces white blood cells with the correct antibody to kill the microbe, so you become immune without falling ill.