

Biology 4.2 Organisation

1. Principles of organisation

Cells are the basic building blocks of all living organisms.

A **tissue** is a group of cells with a similar structure and function.

Organs are aggregations of tissues performing specific functions.

Organs are organised into **organ systems**, which work together to form organisms.

2. Digestive System

Digestive **enzymes** convert food into small soluble molecules that can be **absorbed** into the bloodstream.

Digestive substance	Digestive Function	Site of Production
Carbohydrase (Amylase) <i>ENZYME</i>	Breaks down carbohydrates (Starch) into glucose	Mouth, pancreas and small intestine
Protease <i>ENZYME</i>	Breaks down protein to amino acids	Stomach
Lipase <i>ENZYME</i>	Break down fats to glycerol and fatty acids	Small intestine
Bile	Alkaline, neutralises stomach acid. Emulsifies fats	Produced = Liver. Stored = Gall Bladder

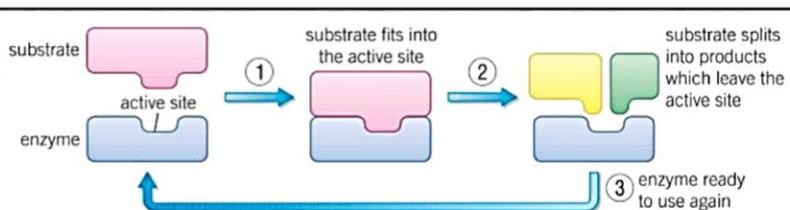


Figure 2 Enzymes act as catalysts using the 'lock and key' mechanism shown here

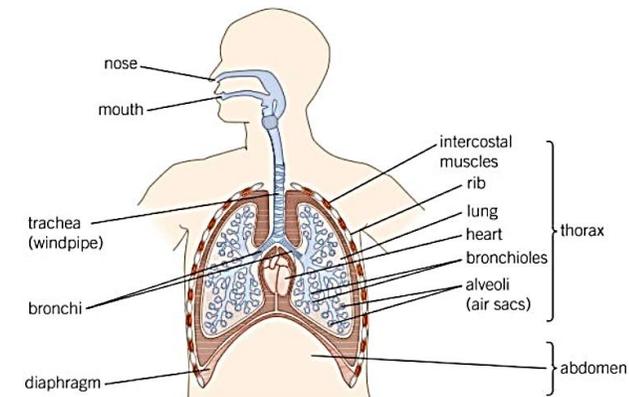
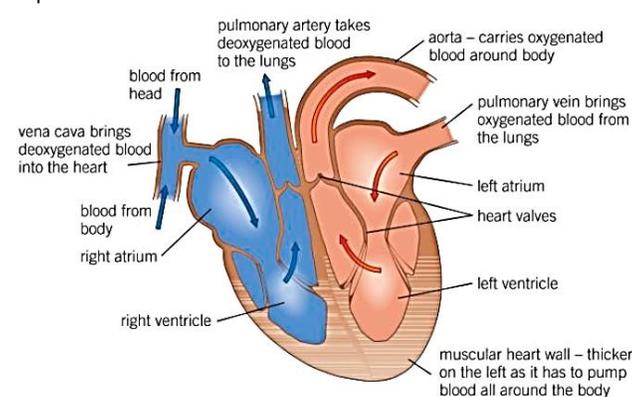
Tests for presence of:

- **Benedict's test** for **sugars**
- **iodine test** for **starch**
- **Biuret reagent** for **protein**.

Enzymes' **rate of reaction** is affected by pH, which is specific to each enzyme

3. Heat and Blood Vessels

- Heart pumps **blood** around the body in a **double circulatory system**.
- The **right ventricle** pumps blood to the lungs where **gas exchange** takes place.
- The **left ventricle** pumps blood around the rest of the body.
- The natural resting **heart rate** is controlled by a group of cells located in the **right atrium** that act as a pacemaker.



The body contains three different types of **blood vessel**: **Arteries, veins and capillaries**.

Vessel	Structure	Function	Diagram
Artery	Thick elastic walls, small circumference	Transports blood AWAY from the heart	
Vein	Thin, less elastic walls with valves, large circumference	Transports blood TOWARDS the heart	
Capillary	Very thin wall, smallest circumference	Materials are exchanged between the blood and the body	

4. Blood

Tissue consisting of:

- **Plasma** – transports blood cells and other substances around the body
- **Red blood Cells** – transport oxygen from the alveoli in the lungs to the rest of the body
- **White blood cells** – part of the body's defence against harmful microorganisms
- **Platelets** – cause the blood to clot at the site of a wound

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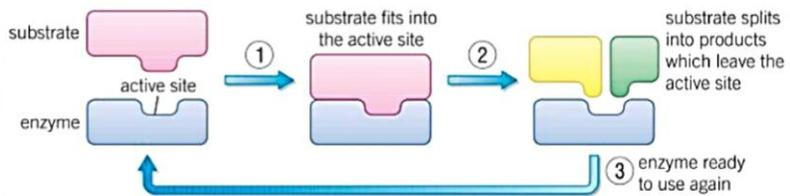


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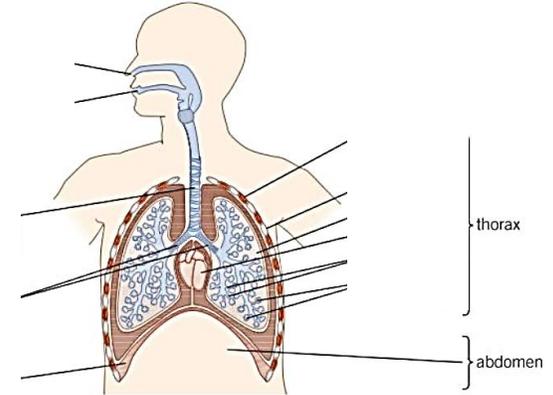
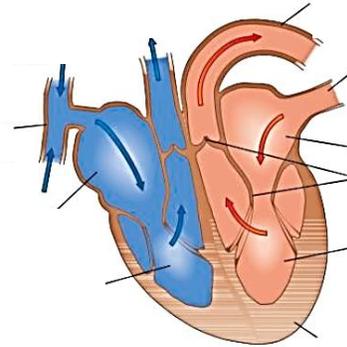
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Vein			
Capillary			

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-
-
-

5. Coronary Heart Disease

- Some treatment includes **drugs, mechanical devices** or **transplant**
- Layers of **fatty material** build up inside **coronary arteries**, narrowing them and reducing **blood flow**, reducing **oxygen** for the heart and muscle.
- **Stent** – keep coronary arteries open
- Faulty heart valves can be replaced with **biological** (donor or animal) and **mechanical valves**

6. Health Issues

Diseases, diet, stress and life situations affect physical and mental health

Immune system defects – more likely to suffer from **infectious diseases**

Viruses in cells can trigger cancers

Immune reactions caused by **pathogen** can trigger allergies

Severe physical ill health can lead to several **mental health illnesses**

7. The effect of lifestyle on some non-communicable diseases

Risk factors linked to an **increased rate of a disease**: lifestyle, substances in the body or environment

- **Cardiovascular disease** = diet, smoking, exercise
- **Type 2 diabetes** = obesity
- **Liver and brain function** = alcohol
- **Lung disease and lung cancer** = smoking
- **Affecting unborn babies** = smoking and alcohol
- **Cancers** = Carcinogens (ionising radiation)

8. Cancer

Result of changes in cells leading to **uncontrolled growth** and **division**.

Benign tumour – growth of abnormal cells contained in one area, do not invade rest of body.

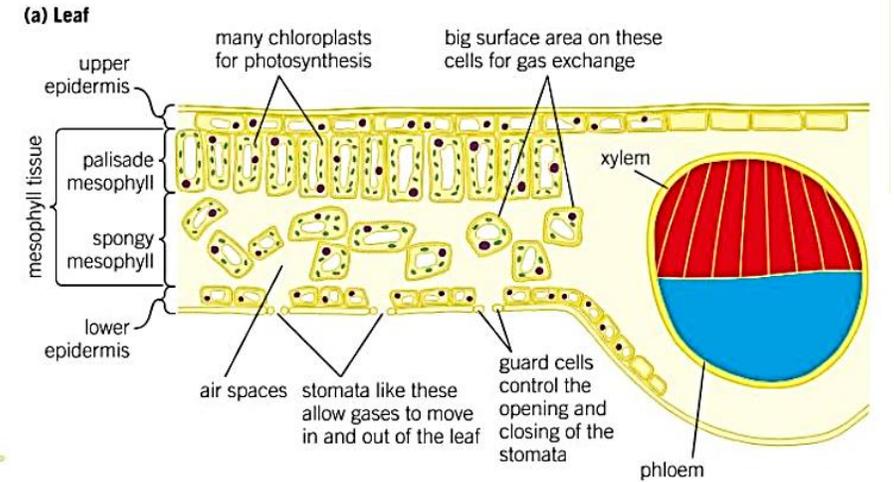
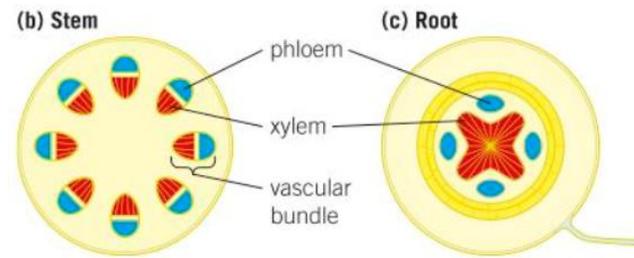
Malignant tumour – cancerous. Invade neighbouring tissues and spread in the blood causing secondary tumours.

- Lifestyle and genetic risk factors for some cancers.

9. Plant Tissues

Meristem tissue = growing tips of shoots and roots

The leaf is a plant organ



10. Plant Organ Systems

Transpiration = Loss of water vapour through the **stomata**

Translocation = movement of food molecules in **phloem**

Root hair cells = take up water by **osmosis**, mineral ions by **active transport**

Xylem = transports water and mineral ions from roots to stems and leaves.

Composed of hollow tubes strengthened by **lignin**.

Stomata and guard cells = control gas exchange and water loss

Phloem = transports dissolved sugars from leaves to rest of plant. Composed of **elongated cells**, cell sap can move from one cell to another through pores in the end walls.

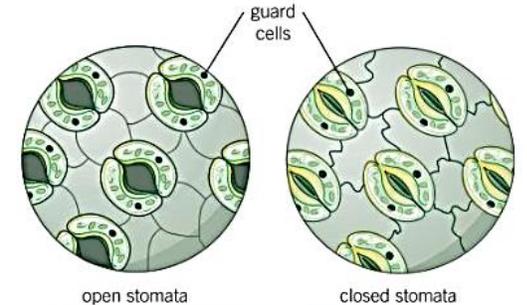


Figure 1 The size of the opening of the stomata is controlled by the guard cells. This in turn controls the carbon dioxide going into the leaf and the water vapour and oxygen leaving it

5. Coronary Heart Disease

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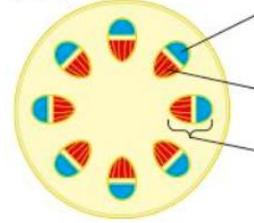
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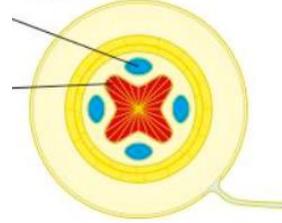
Meristem tissue =

The leaf is a plant

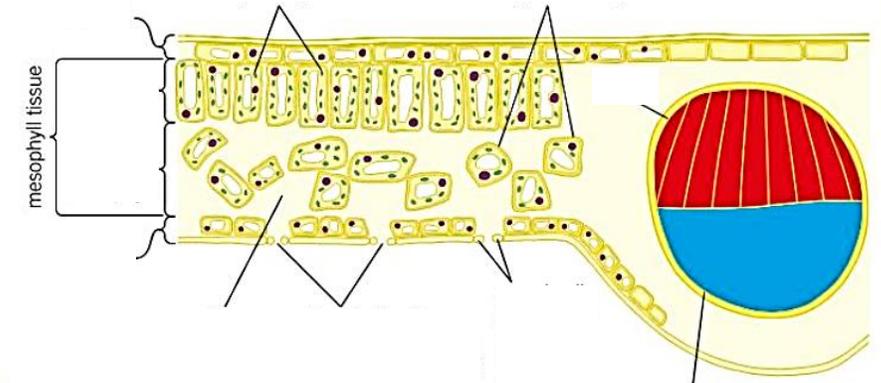
(b) Stem



(c) Root



(a) Leaf



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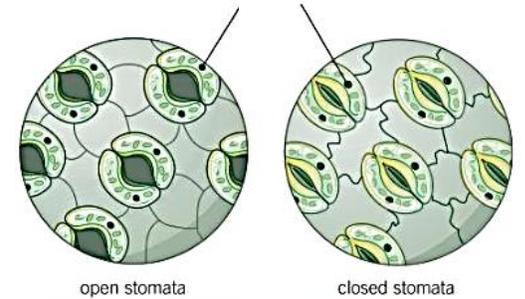


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Revision - Use the Knowledge organiser to answer the following Q

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1	What is meant by the term tissue?	16	Describe the role of platelets and WBC when scabs are formed
2	Name 3 different organ systems.	17	Describe three ways RBC are adapted to carry oxygen around the body
3	What does soluble mean?	18	What causes coronary heart disease? Suggest 3 ways we treat heart disease.
4	Name the three main food types and the enzymes that digest them.	19	What are non-communicable diseases?
5	What 2 factors effect enzymes?	20	Name 4 different plant tissues and their function
6	Where is bile produced and what does it do?	21	Name 5 different organs systems and their function
7	Names the tests for the three main food types	22	Name the different food types, the enzymes that digest them and where this mainly occurs in humans.
8	In which blood vessel are materials exchanged?	23	Describe the structure and function of the blood vessels
9	Write down the path of blood through the heart.	24	Why is the heart considered a double pump?
10	Name the part of the lungs that exchange gases.	25	How are blood cells adapted for the transport of oxygen?
11	In which blood vessel are materials exchanged?	26	Compare the effect of lifestyle on non-communicable diseases
12	Write down the path of blood through the heart.	27	What is the similarities and differences between a malignant and benign tumour?
13	Name the part of the lungs that exchange gases.	28	Name 4 different plant tissues and their function
14	What happens to enzymes at extreme pH?	29	What are stomata? Describe how they are controlled
15	Describe the difference in the structure of the 3 blood vessels	30	What are the similarities and differences of osmosis and diffusion?