**4.2 Organisation – Knowledge organiser**

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| **Topic 1 – Principles of Organisation** |
| 1 | **Cells** | Cells are the basic building blocks of all living organisms. |
| 2 | **Tissues** | A **Tissue** is a **group of cells** with a similar structure and function. |
| 3 | **Organs** | **Organs** are made up of a number of **tissues**, which work together to perform a specific function. Example- the **heart.** |
| 4 | **Organ System** | An **organ system** is a group of **organs** which work together to form organisms. Example- the **digestive system.** |
| 5 | **Organisation** | https://lh4.googleusercontent.com/UMsg-cu_WLzF_VkwBsVoZRQD5P9WQ84tu03wt8z4-oBFzRn5VZRYTxsE-LBBfhRCj5tT7xCCnru_qnYBvDX6LNyTKfQMIJofUhg8K-_C3dIfyN5NzHg3TVGsZJ6FG7vtcT70s0NW |
| **Topic 2 – Animal tissues, Organs and Organ Systems** |
| 1 | **The Digestive system** | Is an **organ system** in which several **organs** work together to **digest** and **absorb food**.**The digestive system** is made up of the following parts:* **Glands-** pancreas and salivary glands- produce digestive juices
* **Stomach & small intestine-** where digestion occurs
* **Liver-** produces **bile**
* **Small Intestine-** where digested food nutrients are absorbed
* **Large Intestine-** wherewater is absorbed from any undigested food, producing faeces.
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|  | **Bile** | **Bile** is made in the **liver** and stored in the **gall bladder**. It is **alkaline** to **neutralise hydrochloric acid** from the stomach. It also **emulsifies fat** to form small droplets which **increases the surface area.** The alkaline conditions and large surface area **increase the rate** of fat breakdown by lipase. |
| 2 | **Enzymes**https://lh5.googleusercontent.com/xJviqAu8RcBDugci_6pJZg6i2vFOT_ikVTU1e6hl-sr6Qs9O1dlrn7sZy-anF7rw3ggmw5BrFsCpI3FSpmXKFWYlUEjlsFWTx-fIH1snNbSIrnfPHd-7vg8S_gJOXtTSYHUbQAmu | **Enzymes** are **biological catalysts** (speed up chemical reactions in organisms). **Metabolism** is the sum of all the chemical reactions in the body.**Lock and key model****Enzymes** are folded into complex shapes that allow smaller molecules to fit into them. The place where these molecules fit is called the **active site**.The shape of the **active site** matches the shape of its substrate molecules. This makes enzymes highly **specific** – each type of enzyme will only work with one type of reaction.**Enzymes** are used in digestion to covert food into **small soluble molecules** which can be absorbed into the bloodstream. |
|  | **Enzyme Activity**https://lh6.googleusercontent.com/YgzRGO9z4-fB1WJNjnDGTVN0kDhUxouXC9ILz_I0aQL0EDhlGKNoZ1UEGbbaNfEgEUB4tWLb_RzvQHT4FE-o21gQjX9e5ocHzECLE-i-Nf9RDxCBN5PIumU-fAJb7vYK95Rx_vY6 | **Temperature****High temperatures** change the shape of enzymes. If the temperature gets too high the enzyme will be **denatured**.**pH** Different enzymes work best at different **pH** values. This is called the **optimum pH** |
| 3 | **Carbohydrase****Amylase****Starch → sugars** | **Carbohydrase** breaks down carbohydrates into simple sugars. **Amylase** is an example of a **carbohydrase**.The **enzyme amylase** is produced in the **salivary gland**, **pancreas** and **small intestine**. It catalyses the breakdown of **starch** into **sugars** in the **mouth** and **small intestine.** |
| 4 | **Protease****Protein → amino acids** | **Protease** enzymes are produced in the **stomach**, pancreas and **small intestine**. It catalyses the breakdown of **proteins** into **amino acids.** |
| 5 | **Lipase****Lipids → Fatty acids + glycerol** | **Lipase** enzymes are produced in the **pancreas** and **small intestine**. It catalyses the breakdown of **lipids (fats)** into **fatty acids** and **glycerol** in the **small intestine.** |
|  | **Products of digestion** | The products of digestion are used to **build new carbohydrates, lipids and proteins**. Some glucose is used in **respiration**. |
|  | **Food tests** | **Benedict’s Solution**Tests for **sugars (glucose**)Positive result green, **orange**, red | **Iodine Solution**Tests for **starch**Positive result **blue/black** colour | **Biuret Solution**Tests for **protein**Positive result **violet** |

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| **Topic 3 – The Heart & Blood Vessels** |
| 1 | **Heart**https://lh6.googleusercontent.com/ZSIndNKgA99wluCC4449VHiw0xhL-c7xgwmpl74OeIBSQesvKPMACcdlqdIWlpy-5XRUYy6ifsoz-Xy-xFTxMkzKTf7MuJl2V6NhM8gh6-V0vhCXC-ofraZbTPRH6u-CobgIw5mz | The **heart** is an **organ** that 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 **whole body**. |
|  | **Heart Rate** | The natural resting **heart rate** is controlled by a **group of cells** located in the **right atrium** that act as a **pacemaker**. Artificial pacemakers are electrical devices used to correct irregularities in the heart rate. |
| 2 | **Blood Vessels** | **Arteries:**Carry blood away from the heart (except [pulmonary artery](http://www.bbc.co.uk/education/guides/zhnk7ty/revision/3#glossary-z72jhyc)),  Have **thick muscular walls,** Contain blood under high pressure**Veins:** Carry blood to the heart (except [pulmonary vein](http://www.bbc.co.uk/education/guides/zhnk7ty/revision/3#glossary-z72jhyc)), Have **thin walls**, Contain blood under low pressure, Have **valves** to **prevent the blood flowing backwards****Capillaries:**1 cell thick for effective diffusion, connect arteries to veins |
| 3 | **Lungs**https://lh6.googleusercontent.com/iDgO_IEVQrvYqHw0Y0URnYFoec_Mv-0zBTpBS_4EHSNxpK5tEYKCRjabHFTHn3xvCjRV6zPrP0ASRFo1WH6C2vCGpvcuouNaLyXz5AxW2viOdGHiWKFGEbBLwdBQQ9smpeCspFRl | **Alveoli**- have a **large surface area** and are **one cell thick** to allow fast gas exchange.The **alveoli** are surrounded by a network of **capillaries**. |
|  | **Blood** | Blood is a **tissue** which is made up of **plasma**, **red blood cells**, **white blood cells** and **platelets**.https://lh6.googleusercontent.com/FEzZd9ikfb6Lm-XkizZOhufUgbBkcxF-9vItGTntuvcqYuqwSi6di3m0d0H46I-7G63rnIe7G5fOBbDw7Qr0efgC2LbMIoxyuofNVZbP5M_ZESEx5c6n66ynw6Uj4u0VdfbIE16q**Red blood cells*** **Flattened disc shape**- large surface area for gas exchange.
* **Contains haemoglobin**- to absorb oxygen
* **No nucleus**- so the cell can hold more haemoglobin.

**White blood cells** Help to protect the body against infection **Platelets** Help the blood to clot, forming a scab.**Plasma** Contains dissolved substances and transports them around the body e.g.  glucose and carbon dioxide. |

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| **Topic 4 – Health Issues** |
| 1 | **Coronary Heart Disease** | https://lh6.googleusercontent.com/ql6mhLXQ35HSF4M3OiXvWQ3l5ir6xucPW_ux1eoTxKkMUBiQu7JVbsAt6PbwPcx9qsgZQ0jLM5V82FjKfCOAqNZFs8JCj75yczrpHUHZ62dvmnDgeq0wDMES_WqSe91f-NSAbBaK | The coronary arteries supply blood to the heart muscle.**Coronary heart disease**- layers of fatty material build up inside the coronary arteries, narrowing them. This reduces the blood flow, reducing the amount of oxygen reaching the heart muscle.  |
| 2 | **Treatments**  | **Stents** are used to keep the coronary arteries open. **Statins** are widely used to reduce blood cholesterol levels, which slows down the rate of fatty material deposit. |
| 3 | **Faulty Heart Valves** | Faulty heart valves don’t open fully which can develop a leak. This can cause a backflow of blood which results in the heart having to work harder. Faulty valves can be replaced using biological valves (transplant) or mechanical valves.  |
| 4 | **Heart Failure** | Artificial hearts are occasionally used to keep patients alive whilst waiting for a heart transplant, or to allow the heart to rest as an aid to recovery. |
| 5 | **Health** | **Health** is the state of physical and mental well-being.**Diseases** are major causes of ill health. Other factors also have an impact on health such as stress, diet and life situations.  |
| 6 | **Diseases** | **Communicable diseases**- caused by **pathogens**, they can be transmitted. **Non-communicable diseases**- not infectious diseases cannot be transmitted. Non-communicable diseases are affected by lifestyle factors such as diet, exercise, alcohol and smoking.  **Risk factors** for some non-communicable diseases:* Diet, smoking and exercise- **cardiovascular disease**
* Obesity **– type 2 diabetes**
* Smoking- **lung disease and lung cancer**
* Smoking and alcohol**- development of unborn babies**
* Carcinogens (e.g. ionising radiation)- **cancer**

Many diseases are caused by the **interaction of a number of risk factors**.  |

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| 7 | **Cancer** | **Cancer** is uncontrolled cell division.**Benign tumour-** growth of abnormal cells which are contained in one area. They do not invade other parts of the body.**Malignant tumour**- cancer cells that invade neighbouring tissues. They spread to different parts of the body through the blood stream causing secondary tumours. Cancers are caused by lifestyle risk factors and genetic risk factors. |

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| **Topic 5 – Plant Tissues, Organs and Systems** |
| 1 | **Plant Organs & Tissues** | Plant **organs** include the stem, roots and leaves.Plant **Tissues** include:* **Epidermal tissue**- which covers the plant
* **Mesophyll**- carries out **photosynthesis**
* **Xylem-** transports **water & minerals** up the stem from the roots to the leaves
* **Phloem**- transports **glucose** from the leaves **up and down** the stem to the rest of the plant
* **Meristem**-found at the growing tips of the shoots and roots (actively dividing cells)
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| 2 | **Structure of the leaf** | 1. **Wax cuticle**: prevents water loss2 & 6. **Epidermis (upper & lower)**: top and bottom layers of cells3. **Palisade cells**: packed with chloroplasts, where most photosynthesis happens (get most light as at the top of the leaf)4. **Spongy Mesophyll**: contains air spaces between the cells to allow carbon dioxide to reach the palisade cells (large surface area)5. **Guard cells**: open and close the stomata, which helps to prevent too much water loss7. **Stoma/stomata**: holes on the underside of the leaf that allow carbon dioxide to diffuse into the leaf, and water and oxygen to diffuse out of the leaf. |
| 3 | **Transpiration** | **Transpiration** is the movement of water in a plant (from the roots up to the leaves)The rate of **transpiration** is affected by the **temperature, humidity, air movement and light intensity.**  |
| **Root hair cells**Plants **absorb** water from the soil by **osmosis**. **Root hair cells** are adapted for this by having a **large surface** area to speed up osmosis. Root hair cells use **active transport** to take **minerals and ions** from the soilhttps://lh5.googleusercontent.com/gaRRUsU6Z094L1fM-85d8bg115p3gkpgwjP0zJcwhQoxCgFo4SKXZsoavvz3L6BX77sJ34I9_6n0OMNy379ZiUmbxaqzkRogqTQGVSND0ICtJe9comoyVxIy-0jpGmBc1N0YrGp8 | **Xylem**https://lh5.googleusercontent.com/TF2Cyfx3PC0g2-7dJmdqb-luZEY3nHtIKLvTWLO7cfpZJWsZAfR4Tej6_1acbVtuqgHGjGXsybUWLA3kSH1pxyHAMHbVkCFCPl5ioaJV6rEaafDMvT8PXphjq2Mw6KD11yYgkkBp**Xylem** tissue transports **water** and **mineral ions** from the roots to the stems and leaves. It is composed of**hollow tubes** strengthened by lignin adapted for the transport of water in the transpiration stream. | **Phloem****Phloem** tissue transports **dissolved sugars** from the leaves to the rest of the plant for immediate use or storage. The movement of food molecules through **phloem** tissue is called **translocation**. Phloem is composed of **tubes of elongated cells**. Cell sap can move from one phloem cell to the next through pores in the end walls.https://lh4.googleusercontent.com/1jvSV5RFydNsknnVQxuDaBFhMSDPE2xJk9vKHswMJA2o4pKlvssFuCgYtaq-SlhnH4EjdHASRkTsuYgQEe_n67imVGHpeqOEIK9Ie1RAZK_TVR4e8QWj2lUgJ768a4EMdZaKwZlz |