

**Science: GCSE Organisation**

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| 1. Digestive system | | |
|  | Organ | Function |
| 1 | Oesophagus | Muscle contractions push food into the stomach |
| 2 | Stomach | Hydrochloric acid and pepsin chemically digest food, stomach muscles churn the food. |
| 3 | Liver | Produced bile that is added into the first part of the small intestines called the ileum |
| 4 | Pancreas | Produces enzymes that are released into the small intestines to complete digestion. |
| 5 | Small Intestines | Chemical digestion continues and small soluble molecules are absorbed into the blood |
| 6 | Large intestines | Water is removed from the waste faeces and absorbed back into the blood |
| 1  3  2  4  6  5 | | |

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| 1. Key words | |
| Optimum | The best conditions for the reaction to take place fastest |
| Active site | The specific point in the structure of the enzyme where the reaction occurs |
| Denature | When the active site changes shape permanently so the enzyme no longer binds to the substrate |
| Emulsify | When fat droplets are broken down in to small ones to help mix them with the enzyme and increase the surface area for digestion |
| Bile | Alkali released from the liver in the duodenum to neutralise neutralise stomach acid and emulsify fats |

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| 1. Enzymes | | |
| Enzymes are **biological catalysts** that speed up the digestion of large insoluble molecules to small soluble ones that can be absorbed into the blood. | | |
| Enzyme | Released from | Function |
| Amylase | Salivary Glands, pancreas and small Intestines | Breaks down starch into glucose |
| Protease (Pepsin) | Stomach (pepsin), pancreas and small intestines | Breaks down proteins into amino acids |
| Lipase | Pancreas and small intestines | Breaks down fats into fatty acids and glycerol |

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| 1. Factors affecting the rate of an enzyme reaction | | |
| **Temperature** | **pH** | **Concentration** |
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| 1. Key Words | | | |
| 1 | Diaphragm | Flat muscle underneath the lungs that contracts and relaxes to cause breathing | |
| 2 | Trachea | Tube containing rings of cartilage that allows air to move in and out of the lungs | |
| 3 | Thorax | Air tight chest cavity containing the respiratory system and the heart. | |
| 4 | Alveoli | Small blind ending sacs where gases are exchanged between the air and the blood | |
| 3  4  1  2 | | | |
| **Inhaling** | | | **Exhaling** |
| Diaphragm contracts | | | Diaphragm relaxes |
| Volume in the thorax increases | | | Volume in the thorax decreases |
| Pressure in the thorax decreases | | | Pressure in the thorax increases |
| Air is pulled into the lungs | | | Air is pushed out of the lungs |

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| Challenge Questions | |
| 1 | Why does boiled amylase not work when cooled down to room temperature? |
| 2 | How and why does asthma affect breathing? |
| 3 | How are the lungs adapted for gas exchange? |
| 4 | Why is both diffusion and active transport needed to absorb digested nutrients into the blood? |

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| 1. Circulatory system | | |
|  | Key Word |  |
| 1 | Vena cava | Vein that brings deoxygenated blood back to the heart from the body |
| 2 | Right atrium | Pumps blood in to the ventricle and where the pacemaker cells are located |
| 3 | Right ventricle | Pimps blood out of the heat to the lungs |
| 4 | Pulmonary artery | Takes deoxygenated blood to the lungs |
| 5 | Pulmonary vein | Brings oxygenated blood back to the heart from the lungs |
| 6 | Left atrium | Pumps blood to the left atrium |
| 7 | Left ventricle | Pumps blood out of the heart to the body. Has a large muscle wall to pump blood at a high pressure |
| 8 | Aorta | Artery that carries blood away from the heart to the body |
| 9 | Valves | These prevent the backflow of blood through the circulatory system |
| The blood flows through the heart in the order of 1 to 8  4  2  3  7  9  6  5  8  1 | | |
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| 1. Non communicable diseases | |
| Non-communicable disease | Condition that is caused by lifestyle and is not spread by a pathogen |
| Risk Factor | Environmental or lifestyle factor that can increase the likelihood of developing a non-communicable disease |
| Coronary Heart Disease | Condition where fat (cholesterol) builds up in the coronary arteries, reducing blood flow to the heart muscles |
| Diabetes | Condition where the pancreas cannot make enough or does not make any insulin to control blood sugar levels |
| Deficiency disease | Condition caused by a lack of a specific nutrient, mineral or vitamin, e.g. anaemia or scurvy. |

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| 1. Treating Coronary Heart Disease | | | |
| Treatment | How it works | Advantages | Disadvantages |
| Statins | Breaks down cholesterol in the body | Reduces risk of heart attack by up to 35%, reduces likelihood of developing CHD | Side effects include headaches, memory loss and liver damage |
| Aspirin or Warfarin | Thins the blood and prevents blood clots | Aspirin can be bought cheaply at supermarkets | Increased risk of strokes if a blood vessel bursts and it cannot clot |
| Stent | Metal mesh that widens the blood vessel to increase blood flow | Increases blood flow to the heart reducing the chance of heart attacks | Temporary solution as cholesterol can build up over the stent |
| Heart bypass | Blood vessels from the leg are grafted over a narrow or blocked blood vessel | Several blockages could be treated at once. | Risk of infections from surgery |

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| 1. Blood composition and Blood Vessels | | |
|  | Blood Vessel | Structural Adaptations |
| 1 | Artery | Small lumen and thick muscular walls to withstand and maintain a high blood pressure |
| 2 | Vein | Large lumen to increase the volume of blood in the blood vessel. Valves to prevent the back flow of blood |
| 3 | Capillary | Thin calls that are only 1 cell thick to decrease the diffusion pathway and speed up exchange of substances |
| 1  2  3 | | |
| Component | | Function |
| Plasma | | Carries dissolved substances around the body including CO2, urea, glucose, minerals, hormones and amino acids |
| Red blood cell | | Carry oxygen from the lungs to the body cells |
| White blood cells | | Internal defence against infection |
| Platelets | | Causes the blood to clot around a wound |

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| 1. Cancer | |
| Benign tumour | Grows slowly inside a membrane and can be removed easily, does not invade other parts of the body |
| Malignant tumour | Grows rapidly and out of control. Cells can break off and travel in the blood to other parts of body to spread the cancer. |

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| Challenge Questions | |
| 1 | What are the risk factors for cancer? |
| 2 | Why do arteries need to maintain a high blood pressure? |
| 3 | What lifestyle changes could be made to reduce the risk of developing a non-communicable disease and why is it hard to make everyone follow this? |
| 4 | Evaluate the treatments for CHD for an 80 year old and for a 55 year old. |