Meden School Curriculum Planning							
Subject	Biology (Triple)	**Year Group**	10	**Sequence No.**	2	**Topic**	B2: Organisation

Retrieval	Core Knowledge	Student Thinking
What do teachers need **retrieve** from students before they start teaching **new content**?	What **specific ambitious knowledge** do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to **development of our students thinking, encouraging them to see the inequalities around them** and 'do something about them!'
KS3 Learning **Year 7** Organisms & Body Systems topic Basic cells, tissues, organs, organ systems and organisms. **Year 8** Digestion topic The Villi structures in the small intestine is only one cell thick so there is a short diffusion pathway. There are also many blood capillaries so a concentration gradient is maintained. Basic food tests for starch, sugars, lipids and proteins. **Year 9** Cells topic The different organisation of cells, tissues, organs, organ systems and organisms. Cardiovascular system topic	**L1 – Cell 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 o**rgan systems,** which work together to form **organisms**. **L2 – Digestive System** The **digestive system** is an example of an **organ system** in which several **organs** work together to **digest** and **absorb** food. **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**. **L3 & L4 – Enzymes** **Enzymes catalyse** specific reactions in living **organisms** due to the shape of their **active site**. The 'lock and key theory' is a simplified model to explain **enzyme** action. The **substrate binds** to the **active site** of the **enzyme** and **products** are released after the **reaction**. Other models to explain **enzyme** action are the **induced fit model**, this explored that the **enzyme** and **substrate** are '**complementary**' shapes and that the **enzyme** moulds slightly to fit the shape of the **substrate** perfectly. If an **enzyme** is **denatured** its **active site** has changed shape and can no longer **bind** to the **substrate**. This happens at too high **temperatures** or **extreme pH levels**. **L5 – Enzymes of Digestions**	L9 - Evaluate methods of treatment bearing in mind the benefits and risks associated with the treatment. L10 – Lifestyle factors that can impact health and disease. Debate lower income areas obesity levels vs higher income areas obesity rates.

The structure of the heart, blood vessels, blood components and functions, coronary arteries.	**Digestive enzymes** convert food into small **soluble molecules** that can be **absorbed** into the **bloodstream**. • **Carbohydrases** break down c**arbohydrates** to **simple sugars**. **Amylase** is a **carbohydrase** which breaks down **starch**. • **Proteases** break down **proteins** to **amino acids.** • **Lipases** break down **lipids** (fats) to **glycerol** and **fatty acids.** The products of **digestion** are used to build new **carbohydrates, lipids and proteins.** Some **glucose** is used in **respiration.** **L6 – Required Practical: Enzymes** Students should use a continuous sampling technique to determine the time taken to completely digest a starch solution at a range of pH values. Iodine reagent is to be used to test for the presence of starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater. **L7 & L8 - Required Practical: Food Tests** To include Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein on a selection of food samples. Students to be able to identify what a positive and negative result for each of the reagents would look like. **L9 & L10 - Lungs** The **structure** of the **lungs** incudes the **Trachea, Diaphragm, Pleural membranes, Heart, Intercostal, muscles, Rib, Oesophagus, Bronchus, Bronchiole, Alveoli.** **Inhaling** is the scientific term for breathing in, your **diaphragm contracts,** your chest **expands**, and the **ribcage** moves up and out using your **intercoastal muscles**. **Exhaling** the scientific term for breathing out, your **diaphragm relaxes** your chest **contracts**, and your **ribcage** moves down and in. The **oxygen** travels through the following **structures: Mouth/nose, trachea, bronchus, bronchioles, alveoli, blood, diffuses** into body cells for **respiration.** The lungs contain millions of tiny air sacs called **alveoli** which have a **large surface area**. They are surrounded by a **network** of **blood capillaries**. This is where **gas exchange** happens. **Blood** passing next to the **alveolus** has returned from the body, so it has very little **oxygen,** but it has a lot of **carbon dioxide**.	

	Oxygen diffuses out of the **alveolus** and into the **red blood cells**. **Carbon dioxide diffuses** out of the **blood plasma** and into the **alveolus** to be **exhaled**. **<u>L11 & L12 – The Heart</u>** The **heart** is an **organ** that pumps **blood** around the body in a **double circulatory system**. The r**ight ventricle** pumps **blood** to the **lungs** where **gas exchange** takes place. The **left ventricle** pumps **blood** around the rest of the body. The **blood vessels** associated with the **heart** are limited to the **aorta, vena cava, pulmonary artery, pulmonary vein** and **coronary arteries.** 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. **<u>L13 – Blood Vessels</u>** The body contains three different types of **blood vessel**: • **Arteries** - have **thick elastic** walls so they can withstand **high pressures**, they have **smaller lumens** in the centre. They are made from **elastic muscle** fibres to allow them to stretch and return to normal. • **Veins** - have thinner walls and a **bigger lumen**; they carry the **blood** at **lower pressures** back to the **heart**. They have **valves** in them to stop the **backflow of deoxygenated blood**. • **Capillaries** - are the smallest **blood vessels** and are usually **one cell thick**. They make up a huge network around the body, they go close to all **cells** in the body and are made of **permeable walls** to allow them to **exchange substances** in the body. **<u>L14 – Components of Blood</u>** Blood is a tissue consisting: **Plasma** – is a yellow straw like **fluid** which allows the blood to be transported around the body, it also carries the **waste products, nutrients, hormones, proteins, antibodies and antigens.** **Red blood cells** – contain a **pigment** called **haemoglobin** which **binds** to the **oxygen** to become **oxyhaemoglobin**, they have **no nucleus** and a **biconcave** shape to give them a **bigger volume** and **surface area** to carry the oxygen. **White blood cells** – fight off **pathogens** that enter our body. They **engulf** the **pathogen** and **digest** it,	

	produce antibodies and antitoxins. **Platelets** – are tiny **fragments of cells** in our blood that involved in **blood clotting** and **scab forming**. **L15 – Coronary heart disease (CHD)** In **coronary heart disease** layers of fatty material build up inside the **coronary arteries**, narrowing them. This reduces the **flow of blood** through the **coronary arteries**, resulting in a lack of **oxygen** for the **heart muscle. 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. In some people **heart valves** may become faulty, preventing the valve from opening fully, or the heart valve might develop a leak. The consequences of **faulty valves** can be irregular heartbeats, mixing of **oxygenated** and **deoxygenated blood**. **L16 – Treating Coronary Heart Disease** Faulty **heart valves** can be replaced using **biological** or **mechanical valves**. In the case of **heart failure** a donor heart, or heart and lungs can be transplanted. 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. **L17 – Health and disease** **Health** is the state of **physica**l and **mental** well-being. **Diseases**, both **communicable** and **non-communicable**, are major causes of ill health. Other factors including diet, stress and life situations may have a profound effect on both **physical** and **mental health.** Defects in the **immune system** mean that an individual is more likely to suffer from **infectious diseases**. **Viruses** living in cells can be the trigger for **cancers**. **Immune** reactions initially caused by a **pathogen** can trigger **allergies** such as **skin rashes** and **asthma**. Severe physical ill health can lead to **depression** and other mental illness. **L18 – Risk Factors** **Risk factors** are linked to an increased rate of a **disease.** They can be:	

	• aspects of a person's lifestyle • substances in the person's body or environment. • A causal mechanism has been proven for some risk factors, but not in others. • The effects of diet, smoking and exercise on cardiovascular disease. • Obesity as a risk factor for Type 2 diabetes. • The effect of alcohol on the liver and brain function. • The effect of smoking on lung disease and lung cancer. • The effects of smoking and alcohol on unborn babies. • Carcinogens, including ionising radiation, as risk factors in cancer. Many **diseases** are caused by the interaction of a number of factors. **L19 – Cancer** **Cancer** is the result of changes (**Mutations**) in **cells** that lead to **uncontrolled growth** and **division**. **Benign tumours** are growths of **abnormal cells** which are contained in one area, usually within a **membrane**. They do not **invade** other parts of the body. **Malignant tumour** cells are **cancers**. They **invade** neighbouring **tissues** and spread to different parts of the **body** in the **blood** where they form secondary **tumours.** Scientists have identified lifestyle **risk factors** for various types of **cancer**. There are also **genetic** risk factors for some **cancers.** **L20 – Plant Organisation** The structures of plant **tissues** are related to their functions. Plant **tissues** include: • **epidermal tissues** • **palisade mesophyll** • **spongy mesophyll** • **xylem and phloem**	

	• **meristem tissue** found at the growing tips of **shoots** and **roots.** The **leaf** is a **plant organ**. Knowledge limited to e**pidermis, palisade and spongy mesophyll, xylem and phloem,** and **guard cells** surrounding **stomata.** **<u>L21 – Plant Transport</u>** The **roots, stem** and **leaves** form a **plant organ system** for **transport** of substances around the plant. **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 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. **<u>L22 – Factors Affecting Transpiration & Stomata</u>** The role of **stomata** and **guard cells** are to control **gas exchange** and **water loss**. The process of **transpiration** happens from the **stomata**. The different things that can affect rate of **transpiration** from a plant include: wind, temperature and humidity **<u>L23: Revision</u>** **<u>L24: EoTT</u>** **<u>L25: GPA</u>**	