Meden School Curriculum Planning							
Subject	Biology	**Year Group**	8	**Sequence No.**	5	**Topic**	Digestive System

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 Y7 (Organisms & Body Systems): Cells are the basic building block of life, many cells together form a tissue which carries out a particular function. Many different tissues form an organ which carries out a particular function. Many organs make up an organ system and many organ systems make up an organism which is a complex living thing. Organs group together to do a job in a system. The digestive system is made up of several organs including the stomach, liver, intestine and pancreas that break food down into small molecules that are absorbed into the bloodstream. **KS3 Y7 (Healthy Bodies & First Aid):** Diet affects physical and mental health. A diet that contains adequate amounts of all the necessary nutrients required for healthy growth and activity is a	**L1:** The reasons as to why we eat: **fuel/energy, growth, repair, hunger, boredom, see advertising** (usually for unhealthy food). Understand that **daily dietary requirements** of **children** and **adults differ:** 34g vs. 50g of protein, 1300mg vs. 1000mg of calcium, 200g vs, 130g of carbohydrates, 2000kcal vs. 2300 kcal and 25% vs. 5% fat. **Obesity** levels have been increasing worldwide for the past two decades and is labelled as a global pandemic. The **UK** is one of the most **overweight** countries in the world, with **1 in 4 adults being obese**. The number of **obese children** in the UK has risen and continues to do so. Obesity is not an issue solely for **poorer** people or for **girls** or **boys.** L2: Label and identify the parts of the digestive system: **salivary glands, oesophagus, stomach, liver, pancreas, gall bladder, small intestines, large intestines, rectum,** and **anus.** William Beaumont discovered that hydrochloric acid and muscle movement in the stomach were to blame for digestion. He studies this through a fistula (a tunnel between two hollow parts of the body) in Alexis St. Martin in the US in 1822. L3: The function of the parts of the digestive system. **Salivary glands:** produces saliva which makes food easier to swallow. **Oesophagus:** transports food from mouth to stomach. **Stomach:** acid kills bacteria on food. **Liver:** makes bile to break down fat. **Gall bladder:** stores bile produced by the liver. **Pancreas:** makes enzymes to help break down food. **Small intestine:** absorbs nutrients from food into the blood. **Large intestine:** absorbs water from food. **Rectum:** stores faeces (poo). **Anus:** releases faeces (poo). **Physical digestion** is making food **smaller,** and the mouth, stomach and small intestines is involved. **Chemical digestion** is using **enzymes** to break down food molecules, the mouth and small intestines are involved. **Stomach acid kills bacteria** on food (or drink) and is **NOT** directly involved in digestion. **Bile** is produced by the liver, stored in the gall bladder, and released into the small intestine. Bile is **alkaline** and **neutralises** stomach acid so enzymes in the small intestines can work at their optimum. Bile **emulsifies** fat (breaks fat droplets down into smaller ones) to give them a **bigger surface area** so **lipase** can work faster.	**L1:** Why may people be obese? Think about the cost of food, a packet of biscuits compared to a bag of apples. Are children of obese parents more likely to be obese and why? What could school, communities and the government do to tackle obesity? How does being obese affect someone's mental health? **L4:** How can people in the school community with Celiac Disease be supported? How may Celiac Disease affect a person mentally? **L5:** How can people in the school community with Lactose intolerance be supported? How may Lactose intolerance affect a person mentally? L9: Should companies be fined for food fraud or sent to prison? L10 Careers across the food industry

balanced diet. It is also one that contains all the ingredients needed for our body to healthily continue its day-to-day functions in the most efficient way. The 7 nutrients are: Carbohydrates, protein, fat, fibre, vitamins, minerals and water.	**L4:** The **small intestines absorb nutrients** from food, it has the same surface area as a tennis court. This is because it has many **villi (**finger-like projections). Each villus (singular) is only **one cell thick** so there is a **short diffusion pathway.** There are also many **blood capillaries,** so a **concentration gradient** is maintained. Nutrients from digested food is carried in **blood plasma** through capillaries into body cells. Know that **Celiac Disease** is a condition when your immune system attacks your own tissue when you eat gluten. This damages your small intestine, so you are unable to absorb nutrients. **Gluten** is a dietary protein found in wheat, rye and barley. Gluten is found in many foods such as **bread, pasta,** and **cake**. It can cause a range of symptoms such as bloating, abdominal pain (belly ache) and diarrhoea. There is no cure for Celiac Disease, but following a **gluten-controlled diet** can limit the symptoms. Children who have this disease may have a **slower growth rate** and even **delayed puberty.** It is not known what causes Celiac Disease, but it is a combination of **genetic factors** and the **environment** which causes the immune system to trigger in this way. **L5: Catalysts speed up chemical reactions**, they are **not used up or changed** in the process. **Enzymes** are **biological catalysts**; they are **highly folded proteins.** Enzymes will either **break a molecule or form a molecule**, but it will not change or be used up in the process. Enzymes are present in **every cell** in the human body, without them **reactions would happen too slowly,** and we would **die**. Label **the enzyme, active site, substrate,** and **product.** An enzyme's active site is a **unique shape,** it only fits **one substrate,** so an enzyme will only catalyse (speed up) **one reaction**. The substrate fits into the enzyme's active site like a **key fit into a lock:** only one key will fit one lock. **Lactose intolerance** is caused by people not producing enough **lactase.** Because lactase ends in '-**ase'** it means it is an enzyme. **Lactose** is a **sugar found in milk**, so the enzyme lactase digests the lactose in milk into two products which are easily absorbed by the villi and eventually diffuse into body cells. Without enough lactase, the lactose stays in the digestive system and is fermented by bacteria which causes symptoms such as farting, bloating and diarrhoea. Lactose is found in many dairy products such as **milk, cream** and **cheese**. It depends on how much lactose is consumed (eaten) and how much lactase is present as to how severe the symptoms are. There is **no cure** for this condition, but the symptoms can be controlled by cutting down on lactose containing products. Lactose intolerance is most prevalent in people of **African, Asian** and **South American** descent. L6: GPA (Journey of a cheese sandwich). L7: Know the 7 food nutrients and what they do: **carbohydrates (energy), proteins (growth and repair), fats (make cell membranes) minerals (in small amounts make the body work properly) vitamins (in small amounts make chemicals in the body), fibre (keep bowels working properly)** and **water (chemical reactions and transport).** Discuss a diet plan and how the macronutrients (carbohydrates, fats and proteins) are controlled. L8: Know the test for **sugar**: add (blue) **Benedict's** solution, heat in a water bath and if colour goes **red there's a lot of sugar, orange mid-amount of sugar, yellow some sugar** and stays blue no sugar. The test for **starch**, if **iodine** goes from **browny-orange to blue-black then starch is present**, stays browny-orange then no starch present. The test for **protein**, **biuret** solution turns from **blue to pink/purple** if protein is present, stays blue if	

	there is no protein. The test for **fat**, add **Sudan III,** after missing **two layers** will appear if fat is present, the **top layer being bright red**, if there is not fat no separate red layer will form. L9: The **Food Standards Agency** (FSA) is responsible for food hygiene and food safety in **England, Wales** and **Northern Ireland**. Scientists can use a range of tests to find out more information about food. In 2007 the FSA recorded a number of people becoming ill with a rare form of **food poisoning**, caused by the **bacteria *Salmonella motevideo***. It was later linked to **Cadbury's** chocolate products. **Calorie content** is calculated when the food has completely burnt away in a calorie bomb chamber. All foods have the **calorie content displayed** on them. In 2013, horse meat was identified in beef burgers from a number of UK supermarkets such as Tesco and Iceland. A DNA test called an **ELISA** was used to find this. **Antigens** are structures present on the outside of cells. They are different on different animals. An ELISA uses **antibodies** which **bind** to **specific antigens.** When the antibodies bind a **coloured product** is formed so a positive and negative result can be seen quickly and easily. **Melamine** is a compound used to make **kitchen utensils** as it is heat and fire resistant. However, it is **high in protein**. Despite not being approved for use in food a number of **Chinese companies** used it to **water down milk** which allowed it to **pass protein tests**. An adverse effect of this is **kidney problems**. By the end of 2008, **300,000 people** in China had become ill. Chemists at Universities in the US and China developed a test to **identify melamine in milk**. The culprits behind the 'food fraud' were eventually caught and two even received the death penalty. **Protein** content of food is displayed on the back, similar to the yoghurt label to the left. The **Dumas Combustion method** is used to determine protein content of food. The sample is **combusted (burned)** at **high temperature** in an **oxygen atmosphere** so that **nitrogen compounds** are converted into **nitrogen molecules (N_2).** The amount of nitrogen gas is then measured. The **percentage of nitrogen** is converted into **protein content** by using **Conversion Tables.** **L10:** Each year this sector contributes **£28.2B** to the UK economy and employs around **400,000** people. Know the job description, salary and job requirements to be a food microbiologist, food hygiene officer, food processing operative and a dietician. **Food microbiologist:** research the **microorganisms** present in food and are tasked, primarily, with preventing food-bourne disease. They also study **food spoilage, poisoning** and **preservation.** They are also key in ensuring manufacturers adhere to Government legislation on the Health and Safety of food production. Food microbiologists usually work in laboratories in either hospitals or Universities. **£40,000 a year. Five GCSEs (6-9)** including **Maths, English** and **Science. Two A-Levels** including **Biology** and **preferably Chemistry.** An **Honours degree** in a subject such as microbiology, food technology or biomedical sciences is a must. After the degree the **NHS Scientist Training Program** must be completed. **Food hygiene officer:** Food Hygiene inspect businesses in terms of **food safety.** They will also follow up complaints and local outbreaks of food poisoning which includes **collecting samples for the laboratory, writing reports** and **giving evidence in court**. They also offer advice and enforce **Environmental Health Law.** Typically working in an office, but also travelling to local businesses. **£25,000** to start and with experience **£60,000. Four or five GCSEs (4-9)** including **Maths** and **English.** An **Environmental Health Practitioner Degree Apprenticeship** is available after GCSE. Or after **A-Level** complete an accredited degree in **Environmental Health. Two A-Levels** are required for this route in **Science** or **Technology. Food processing operative:** creates **large batches of food products** and generally works at a **food**	

	manufacturing facility where they have to follow a recipe. As part of their work, they **collect test results, record timings, temperatures** and **ingredients used.** They observe gauges to ensure conditions are within specific limits and make adjustments as and when needed. There is a lot of **physical activity** involved including handling, lifting and carrying. Products also may be manipulated by rolling, pulling or cutting. **£12,500** to start, but can go up to **£20,000. 2 or more GCSEs, grade 9-3,** to access the **Level 2 Award in Packaging Technology**. Alternatively, there is a **Food and Drink Processor Operative Intermediate Apprenticeship.** A **GCSE in Maths and English grade 4-9** is needed for this. You could **apply directly for jobs**, but would need experience on a **Food Line** to aid your prospects. **Dietician:** advise people to make i**nformed decisions and practical choices about their food and nutrition.** They **assess, diagnose and treat dietary and nutritional problems**. They are very skilled at translating the latest scientific information into practical guidance for the general public. People they work with may have an **allergy, want to lose weight, want to improve their sport performance or put on weight after an illness.** Overall, their aim is to **promote good health and prevent disease** in individuals and communities. They are usually employed by the **NHS.** Start on **£26,000** and can rise to **£45,000. Five GCSEs, grade (9-5)** including **English** and **Maths. Two or three A-Levels including Chemistry** and **Maths** or **Biology**. Or **BTECs which include Science subjects**. An accredited **Degree in Dietetics**, followed by **6-12 months of supervised work** and then a **registration test** known as a **CDR.** A **Degree Apprenticeship** is an **alternative to University**, **but Level 3 Qualifications** are required. **L11:** EoTT **L12:** GPA.	