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| Topic/ Unit title | Organisation |
| Learning overview | In this section we will learn about the human digestive system which provides the body with nutrients, and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. Damage to any of these systems can be debilitating if not fatal. Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reuced their risks through improved diet and lifestyle. We will also learn how the plant’s transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for photosynthesis.  |
| **Assessment:**  | Assessment: Lesson 1: description of each chemical food test and safety precautions : self assessedLesson 2: Enzyme action sheet: self assessedLesson 3: Digestion summary, exam questions : self assessedLesson 4: identification of variables and table for results : self assessedLesson 5: graph for required practical : teacher marked. Lesson 6: conclusions from required practical : teacher markedLesson 7: explanations of adaptations of lungs : self assessedLesson 8: extended writing on blood vessels : self assessedLesson 9: sheet on heart with calculations : self assessedLesson 10: evaluation of heart disease treatmentsLesson 11: data analysis of on-communicable disease incidenceLesson 12: cancer exam questionsLesson 13: descriptions of leaf adaptationsLesson 14: transpiration worksheet, exam question plenaryLesson 15: key word quiz, command word development, kahoot**Lesson 16: End of Topic test** |
| **Prior Knowledge** | Summary of KS3 KPIs relevant to the topic: 8BD 1 describe and explain the components that make up a balanced diet, describing the consequences of an imbalanced diet8BD 2 evaluate how different lifestyles have different energy needs8BD 3 describe the symbiotic relationship between bacteria and the human digestive system8BD 4 describe how and explain why foods are broken down in the digestive system, in terms of enzymes |

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| **Lesson 1 -**  What’s in our food? | **Learning Outcomes*** Describe how to test for starch, sugars, proteins and fats
* Describe the positive and negative results of these tests
* Describe the safety precautions needed
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| **Prior Knowledge**Students have covered nutrients and food tests in unit 8BD |
| **Spec reference**Required practical activity 2 : use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include Benedicts test for sugars, iodine test for starch and Biuret reagent for protein. AT skills covered : AT2 (Safe use of appropriate heating devices and techniques including a bunsen and water bath/electric heater) |
| **Suggested activities**Do now : recap nutrients and what each one is needed for. You may wish to complete more of the table to help more. Demo the chemical tests and then allow students to conduct the chemical tests on a range of food. Encourage good language when doing the written work - specify the colour change from and to etc. Provide instructions for each one - could do in ‘stations’ with the same food groups at each or collect all equipment and chemicals and do them all at their desks. Could assign each pair 2-3 foods to do and pool results as a class. Provide table for results to save time. Discuss results and then students should write up the tests - naming the chemicals and describing the colour change. **Working scientifically skills -** making and recording observations, working safely**Literacy**.model response and WAGOLLS on ppt**Scaffolding-** scaffolded sheet in resources folder | **Success criteria**For each food test: 1. Name the chemicals used2. Describe the procedure3. Describe appropriate safety procedures4. Describe the colour change for a positive result**Formative assessment opportunities (AfL)**Do nowDiscussions and questions following practicalDescription of each test |
| **Resources :**Do now sheet, scaffolded sheet if appropriate, prints of instructions for each food test (could use ppt slides)**Practical resources:**Per pair : benedicts reagent, iodine, biuret reagent, ethanol, test tubes, 250ml beaker or water bath, spotting tile. Foods : e.g milk, potato, apple, bread, rice/pasta, cheese.  |
| **Misconceptions**Students often think of dairy as a food group - it is not a nutrient groupEncourage better language than ‘tie hair back’ or ‘be careful’ when doing the safety part - e.g allow equipment to cool, turn the Bunsen off if using ethanol. Clear and colourless are not the same thing - emphasise the difference. E.g vimto is clear but it isn’t colourless | **Homework**  |

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| **Lesson 2 – Digestive enzymes** | **Learning Outcomes*** Describe the structure and function of the digestive system
* Describe the action of enzymes in digestion using the ‘lock and key’ model
* Name the 3 main digestive enzymes, where they are produced and the substrate and products of their action
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| **Prior Knowledge**Students have studied the digestive system in year 7 and in year 8The previous unit ‘Cells’ looks at hierarchy of cells - tissues - organs etc. and has covered the organelles that will come up again in this unit.  |
| **Spec reference**This section assumes knowledge of the digestive system studied in Key Stage 3. The digestive system is an example of an organ system in which several organs work together to digest and absorb food. Students should be able to relate knowledge of enzymes to metabolism. Students should be ab to use the ‘lock and key’ theory as a simplified model to explain enzyme action. Students should be able to recall the sites of production and the action of amylase, proteases and lipases. Students should also be able to understand simple word equations but no chemical symbol equations are required. Digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream. Carbohydrases break down carbohydrates to simple sugars. Amylase is a carbohydrase which breaks down starch. Proteases break down proteins to amino acids. Lipases break down lipids (fats) into glycerol and fatty acids.  |
| **Suggested activities**Demo or practical - starch in visking tubing with amylase. Set it up at the start and leave it to run. Consider surrounding the visking tubing with glucose solution labelled ‘distilled water’ to ensure students get a positive result. Recap the need for digestion - to produce small, soluble molecules that can be absorbed and the idea that the digestive system is adapted for this job by being highly folded (large surface area), has a good blood supply and produces enzymes. Introduce the lock and key theory of enzyme action and why we need 3 different enzymes (specificity for substrate). Sheet ‘enzyme action’ - self assess. Model first answer and then students should use pictures and additional info (sheet or text)Collect results from practical/demo and students should now be able to explain what has happened. **Scaffolding-** scaffolding on sheet for how enzymes work - provide word bank or sentence starters to scaffold further**Interleaving Opportunity -** glucose and starch tests, diffusion.  | **Success criteria****Formative assessment opportunities (AfL)**Do nowEnzyme action sheetDiscussions and questions following practical |
| **Resources :**Enzyme action sheet, digestive enzymes per pair for info (or text book)**Practical resources:**Per pair : visking tubing, 25ml starch, funnel, elastic bands, amylase and pipette, 100ml beaker, big jug of glucose solution labelled ‘distilled water’, spotting tile, benedicts, iodine, test tube, water bath (suggest just one on teacher desk rather than individual ones)Styrofoam ‘enzymes’ - have 3 different ones to model the 3 different enzyme active site shapes. Keep for the next couple of lessons (maybe stick on board) as you will be able to use them to show the effect of temp on the active site shape easily with them) beakers labelled ‘protease’ ‘amylase’ and ‘lipase’ |
| **Misconceptions**That enzymes are living things - not always helped by drawings that make them look like pac-man | **Homework** Write up the practical  |

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| **Lesson 3 -**  Digestion and absorption | **Learning Outcomes*** Describe the purpose and action of acid and bile in the digestive system
* Describe the process of absorption and how the intestines are well adapted for this
* Describe uses for the absorbed food particles
 |
| **Prior Knowledge**Digestive system studied in year 8 unit 8BD |
| **Spec reference**The products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration. Bile is made in the liver and stored in the gall bladder. It is alkaline to neutralize fat to form small droplets which increase the surface area. The alkaline conditions and large surface area increase the rate of fat breakdown by lipase.**This section assumes knowledge of the digestive system from KS3. The digestive system is an example of an organ system in which several organs work together to digest and absorb food.**  |
| **Suggested activities**Do now : structure and function of digestive system from KS3. Video clip or demo of digestion <https://www.bbc.com/bitesize/articles/zrm48mn> Students need to now add on the SITE of production of all these enzymes. During the demo, they should be completing the notes sheet - discuss with them what each bit represents and which secretions are being added at each stage. Try to encourage complete answers using the enzyme knowledge they just learned - ie in the mouth carbohydrase enzymes are added to digest starch into sugar. For demo - blend the ‘meal’ in the blender. Add some of the water from the ‘amylase’ beaker and discuss the need for chewing food (increase surface area) Then model the chewed food going into the stomach (Ziploc bag) Add some ‘protease’ and some ‘HCl’ here, seal and mix thoroughly, referring to muscular contraction and relaxation in stomach walls, discussing role of each. Has anything been absorbed here? No, stomach isn’t really permeable. Then, tip contents a little at a time into the tight leg. Add ‘bile’ and all 3 enzymes. Put the tights into the ‘bloodstream’ - pupils will see a cloud of substances diffuse inwards and this models diffusion. Tip into a larger pair for large intestine and wrap a towel around to show how water is absorbed here. Finally, cut a hole in the end of the tights and model getting rid of waste products.Focus on absorption and how the intestines are adapted for this and then look at uses for the absorbed nutrients. Encourage them to be specific - e.g glucose is used in respiration, amino acids are used for making new proteins etc. **They will revisit this in metabolism in Bioenergetics.** Exam questions (higher and foundation tier available in resources folder)**Literacy**. Model for mouth on ppt to show detail required. **Scaffolding-** Word bank given on sheet. List of criteria on ppt**Interleaving Opportunity -** adaptations of exchange surfaces, diffusion | **Success criteria**For each stage of digestion: 1. Describe any mechanical or chemical digestion2. Name the enzymes, their substrate and products3. Name any other secretions and their action**Formative assessment opportunities (AfL)**Do now Grid completed during/after demonstrationExam questions |
| **Resources :**digestion demo sheet, flowchart, exam questions (H or F tier)**Practical resources:**Demo : Blender, ‘meal’, tights, large beaker filled with water with a little red food colouring in, bowl, scissiors, gloves, large Ziploc bag.Demo - bottle with vegetable oil, fairy liquid |
| **Misconceptions**That only ‘good’ nutrients are absorbed and bad stuff is got rid of. If only. Students often think that acid in the stomach is for digesting food - it kills bacteria in food and provides the best conditions for proteases enzymes | **Homework** Flowchart or digestion summary (more scaffolded) to consolidate digestive processes and secretions |
| **Lesson 4 – investigating enzyme action (temp)** | **Learning Outcomes*** Describe ways to measure the rate of enzyme action
* Identify variables to change measure and control to test the effect of temperature on enzyme action
* Describe and explain the effect of temperature on the rate of enzyme action
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| **Prior Knowledge** |
| **Spec reference**Required practical 4 : investigate the effect of pH on the rate of reaction of amylase enzyme. 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 a s test for starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater. AT skills covered : AT1, 2 and 5. |
| **Suggested activities**Do now quiz. **This investigation is done as an introduction to the pH required practical. It could be demonstrated rather than done as a full practical but should provide a helpful build up to the required one, otherwise students are required to think about too many things at once (rate, the loss of colour and what that means, pH buffers, continuous sampling etc)**Recap on active site, substrate, specificity language from last lesson. Then demo starch with iodine (turns from orange to blue black) then add amylase - colour should disappear. Practise this first or it might be very unconvincing! Ask - what would happen if I changed the temperature. How could I compare the two? Should be able to come up with timing until colour disappears. Demo/class prac to look at one or two temps in a water bath and one boiled (can fake this with a similar solution to ensure it will not digest the starch) Use secondary data to get students to describe what has happened. What happens at very high temperatures? Show the slide with the enzyme being denatured. Encourage good language in explaining this - they must refer to the active site shape and no longer being able to bind the substrate to explain why the enzyme does not work. Show your Styrofoam enzyme shapes and use tongs to hold one in a Bunsen flame - it will rapidly deform. Point out the change to the active site - would the substrate fit in here now?**Maths skills -** could get higher students to convert the times into rates using 1/t before plotting**Working scientifically skills - identification of variables to change, measure and control, design of table for results, description of pattern****Literacy**.- WAGOLLS given**Scaffolding**- word bank provided**Interleaving Opportunity -**  | **Success criteria****Formative assessment opportunities (AfL)**Do nowIdentification of variables and table. Questions on sheet |
| **Resources :**A starch experiment sheet or similar, graph paper**Practical resources:**Water baths set at different temps, ice, per pair : thermometers, amylase, pipette, 10cm3 measuring cylinder, starch solution, iodine, boiling/test tubes, stopwatch |
| **Misconceptions**That enzymes are ‘killed’ at high temperatures - they need to understand that enzymes are not alive in the first place, that they are proteins and are simply denatured.  | **Homework**  |

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| **Lesson 5 -**  **The effect of pH on enzymes (Required practical)** | **Learning Outcomes*** Identify variables to change, measure and control to test a hypothesis
* Collect and record data accurately
* Process and display the results appropriately
* Describe and explain the effect of pH on enzyme activity
 |
| **Prior Knowledge** |
| **Spec reference**Required practical 4 : investigate the effect of pH on the rate of reaction of amylase enzyme. 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 as a test for starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater. AT skills covered : AT1, 2 and 5. |
| **Suggested activities**Do now quizDiscuss how the method from last lesson could be changed to test the new hypothesis on pH. Introduce continuous sampling. Allow students to carry out the practical, record results and then show how to calculate rate. Students should then plot the graph and write the conclusionDiscuss ways of improving the investigation - both for time and for finding optimum pH. **Maths skills -** rate calculations, graph plotting**Working scientifically skills -** identification of variables to change, measure and control, recording data, plotting graph, drawing conclusions and explaining them using scientific knowledge and understanding.**Literacy**. Conclusion, method reading**Scaffolding-** provide graph scale examples or predrawn axes | **Success criteria**For graph:1. Linear scales (each square must be worth the same)2. Both axes labelled fully including units3. Plotting correct4. Line that best fits the points. This may be a curve!**Formative assessment opportunities (AfL)**Do nowGraph plotting |
| **Resources :**Student sheet in folder if needed**Practical resources:**Per pair : amylase already mixed into pH buffers to save time, starch solution, measuring cylinder, spotting tile, iodine, stopwatch,  |
| **Misconceptions**Students need to refer to the change in the active site and the substrate no longer being able to fit or bind in there, not just say ‘the enzyme doesn’t work’ | **Homework**  |

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| **Lesson 6 – Required prac lesson 2** | **Learning Outcomes*** Describe and explain the effect of pH on amylase activity
* Suggest improvements to the method
* Apply knowledge and understanding to secondary investigations
 |
| **Prior Knowledge** |
| **Spec reference**Required practical 4 : investigate the effect of pH on the rate of reaction of amylase enzyme. 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 a s test for starch every 30 seconds. Temperature must be controlled by use of a water bath or electric heater. AT skills covered : AT1, 2 and 5. |
| **Suggested activities**Do nowRecap required practical, demoing equipment and method again if necessary. Point out the two ways to display the results and the importance of reading graph axes carefully when writing conclusions. Allow discussion for conclusions and improvements, then students should write their own conclusions using data to back up and suggest improvements. Self assessExam questions - choose some that look at other enzyme investigations such as protease or lipase and other ways to monitor rate - e.g the change in pH over time. There are a few in the resources folder. **Maths skills - interpretation of secondary data, higher students could calculate rates from gradients of graphs****Working scientifically skills - interpretation of secondary data, drawing conclusions, suggesting improvements****Literacy**. WAGOLL on ppt**Scaffolding-** Sentence starters for describing patterns, word bank for conclusions (denature, shape, substrate, bind, active site)**Interleaving Opportunity -** digestive system | **Success criteria****Formative assessment opportunities (AfL)**Do nowConclusions and evaluationsExam questions |
| **Resources :**Exam questions on other enzyme investigations and/or ‘enzymes and pH sheet’**Practical resources:**Demo of equipment from last lesson if needed.  |
| **Misconceptions**Students need to refer to the change in the active site and the substrate no longer being able to fit or bind in there, not just say ‘the enzyme doesn’t work’ | **Homework** Exam questions or ‘enzymes and pH sheet’ |

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| **Lesson 7 - the lungs** | **Learning Outcomes*** Label the major structures in the lungs
* Describe gaseous exchange
* Describe and explain how the lungs are adapted for efficient gaseous exchange.
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| **Prior Knowledge**Students have studied the breathing system in year 7 and in year 9 so this should not be unfamiliar to them  |
| **Spec reference**Students should know the structure and functioning of the human heart and lungs, including how the lungs are adapted for gaseous exchange. Knowledge of the lungs is restricted to the trachea, bronchi, alveoli and the capillary network surrounding the alveoli.  |
| **Suggested activities**Do nowRecap on why we breathe and emphasise breathing is different than respiration. Lung dissection demo if possible, video embedded if not. There is a student sheet in resources folder to inform dissection - what to point out, inflating the lungs and floating a piece of lung tissue to show how spongy and air filled it is. Students shuld then label a diagram of the major structures of the lungs. Distribute a picture of the alveoli (resources folder) and discuss what is happening as blood flows through the lungs. They can stick in and consolidate by writing this. **Maths skills – n/a****Working scientifically skills -** **Literacy**. Oracy in using provided key words and discussing before writing. **Scaffolding-** word banks given, sentence starters given for adaptations task**Interleaving Opportunity –** adaptations of internal surfaces, diffusion | **Success criteria****Formative assessment opportunities (AfL)**Do nowDiagram labelling after dissectionDiscussion and feedback on gas exchange task Explanations of adaptations  |
| **Resources :**Lungs diagram to label, alveoli picture**Practical resources:**Pair of lungs , dissecting board, scalpel, scissors, trough of water, bell jar lung model if available |
| **Misconceptions**Students often confuse respiration and breathing to be the same thing. They also think of respiration only happening in the lungs.  | **Homework**  |

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| **Lesson 8 -**  The blood and blood vessels | **Learning Outcomes*** Describe the components of the blood and their function
* Describe the structure and function of arteries and veins
* Explain how blood components and blood vessels are adapted for their function
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| **Prior Knowledge** |
| **Spec reference**Blood is a tissue consisting of plasma, in which the red blood cells, white blood cells and platelets are suspended. Students should now the functions of each of these blood components. Students should be able to recognize different types of blood cells in a photograph or diagram, and explain how they are adapted to their function. The body contains three different types of blood vessel: arteries, veins, capillaries. Students should be able to explain how the structure of these vessels relates to their functions. |
| **Suggested activities**Do now Introduce the blood as the mechanism for carrying all the substances previously studied. Students should use the information sheet to make a table to show features and adaptations. Move on to blood vessels and look at physical features of arteries, veins and capillaries. Sheet ‘blood vessels’ makes students try to connect the physical features with the reasons for them and then write a paragraph for each. More scaffolded table available in resources folder. **Working scientifically skills – n/a****Literacy**.Extended writing on blood vessels **Scaffolding-** word banks, scaffolds in resource folder**Interleaving Opportunity –** cells, magnification question and microscopes in do now | **Success criteria**Describe physical characteristics Explain how these characteristics relate the function **Formative assessment opportunities (AfL)**Do now quiz |
| **Resources :**Blood fact sheet or scaffolded table, blood vessels sheet or more scaffolded version if needed, quiz homework sheet**Practical resources:**Could look at prepared blood slides under the microscope but this is often unconvincing |
| **Misconceptions** | **Homework** Students can use the sheet ‘quizhomework’ to write questions for which the answers are the words given. Write the quiz up onto a new page and mix up the order - they can swap quizzes later in the unit.  |

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| **Lesson 9 - the heart**  | **Learning Outcomes*** Label the major structures in the heart
* Describe the path blood takes through the heart and around the body
* Calculate blood flow using appropriate equations
* Describe how heart rate is controlled
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| **Prior Knowledge** |
| **Spec reference**Students should know the structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange. 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 rest of the body. Knowledge of the blood vessels associated with the heart is limited to the aorta, vena cava, pulmonary artery pulmonary vein and coronary arteries. Knowledge of the names of the heart valves is not required. The natural resting heart rat 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.  |
| **Suggested activities**Do now quizShow and talk through major structures, pointing out the two blood vessels coming into the heart are veins and two leaving are both arteries. ‘Pulmonary’ relates to the lungs and therefore the ‘pulmonary vein’ brings blood FROM the lung to the heart. Point out the use of valves - again to ensure blood flow is one way only. Demo the dissection or, if possible, let students dissect a heart. Students do not need gloves even though they are shown in the video - although consult CLEAPSS for most up to date advice on this. Students should then label a diagram and add arrows to show blood flow through the heart. Describe the action of the pacemaker and have students mark the pacemaker on their heart diagram. Then model the calculations and then students should practice. **Maths skills -** calculations of cardiac output and percentage increase**Working scientifically skills -** Safe use of dissecting equipment**Interleaving Opportunity -**  | **Success criteria****Formative assessment opportunities (AfL)**Do now Heart labelsCalculations  |
| **Resources :**Heart diagram, **Practical resources:**Per pair : dissecting board, scalpel, scissors, hearts, model heart for anyone that does not want to dissect |
| **Misconceptions**Make sure students understand the opposite side labelling of the heart - it is as though you’re looking at it in someone’s chest.  | **Homework**  |

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| **Lesson 10 - heart disease** | **Learning Outcomes*** Describe some of the causes of heart disease
* Explain how coronary heart disease can lead to a heart attack
* Evaluate treatments for heart disease
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| **Prior Knowledge** |
| **Spec reference**Students should be able to evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplant. 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. Student should understand the consequences of faulty valves. Faulty heart valves can be replaced using biological or mechanical valves. In the case of heat failure, a donor heart, or heart and lungs can be transplanted. Artificial hearts are occasionally used to keep patients alive whist waiting for a heart transplant, or to allow the heart to rest as an aid to recovery.  |
| **Suggested activities**Do now quizShow the slides/video on what coronary heart disease is and look at treatments. Complete heart disease worksheet - provide access to information if needed. Go over what ‘evaluate’ means and read through model answer. Allow students to talk through/complete the statins/aspirin one in pairs, then**Working scientifically skills - use of secondary information** **Literacy** - development of evaluation writing skills, WAGOLL provided**Scaffolding- evaluation is scaffolded on sheet to encourage clear layout of answers** | **Success criteria**AdvantagesDisadvantagesJustified conclusionIf data or information is provided, it must be manipulated in the answer, not just copied**Formative assessment opportunities (AfL)**Do nowWorksheet on CHDEvaluation  |
| **Resources :**Coronary heart disease worksheet, model evaluation answer, scaffolded evaluation for paired work, statins/aspirin information**Practical resources:** |
| **Misconceptions**Students think that a heart attack is when the heart simply ‘gives up’ because it is working too hard. They need to understand it is a lack of oxygen to parts of the heart, meaning those cells cannot respire and can become damaged. They need to understand that the coronary arteries are not the ones studied during the heart structure lesson, but the ones that give the heart muscle its oxygen and glucose.  | **Homework** Exam questions - higher and foundation tier available  |

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| **Lesson 11 - lifestyle and other diseases** | **Learning Outcomes*** Describe some risk factors for diseases
* Explain the impacts of lifestyle choices and disease at local, national and global levels
* Describe how one disease can trigger another
* Analyse and interpret secondary data on disease incidence rates
 |
| **Prior Knowledge** |
| **Spec reference**Students should be able to describe the relationship between health and disease and the interactions between different types of disease. Health is the state of physical 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. Different types of disease may interact. 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 lea to depression and other mental illness. Students should be able to translate disease incidence information between graphical and numerical forms, construct and interpret frequency tables and diagrams, bar charts and histograms and use a scatter diagram to identify a correlation between two variables. Students should understand the principle of sampling as applied to scientific data, including epidemiological data. Students should be able to discuss the human and financial cost of these non-communicable diseases to an individual, a local community, a nation or globally and explain the effect of lifestyle factors, including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels. Risk factors are linked to an increased rate of a disease. They can be aspects of a person’s lifestyle or substances in the person’s body or environment. A causal mechanism has been proven for some risk factors, but not 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 ionizing radiation, as risk factors in cancer. Many disease are caused by the interaction of a number of factors.  |
| **Suggested activities**Do now - quiz on ppt or exam questionDiscuss the meaning of the terms ‘health’, disease and ‘non-communicable’. Students should be able to give examples of diseases linked with each factor shown on ppt. Discuss the costs of these diseases - locally, nationally, globally. Then look at some data and analyse. There are some examples in the resources folder, you may wish to use alternatives. Try to include different types of graph. **Maths skills -** analysis of secondary data**Working scientifically skills -** data analysis and explaining using knowledge and understanding | **Success criteria****Formative assessment opportunities (AfL)**Do now exam questionGrid for causal linksData analysis questions |
| **Resources :**Exam question do now, data analysis questions (some in resource folder)**Practical resources:**n/a |
| **Misconceptions** | **Homework**  |

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| **Lesson 12 - cancer** | **Learning Outcomes*** Describe how cancer forms in the body
* Describe the risk factors associated with cancer development
* Explain the difference between ‘benign’ and ‘malignant’ tumours
* analyse data on cancer risk factors and incidence
 |
| **Prior Knowledge** |
| **Spec reference**Students should be able to describe cancer as the result of changes 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. Students should be able to understand the principles of sampling as applied to scientific data in terms of risk factors. Students should be able to translate information between graphical and numerical forms and extract and interpret information from charts, graphs and tables in terms of risk factors. Students should be able to use a scatter diagram to identify a correlation between two variables in terms of risk factors.  |
| **Suggested activities**Do now exam question**Sensitivity will be needed in this lesson. There may well be students that have family members that have/had cancer.**Look at risk factors first as these have generally been covered in previous lessons. Introduce tumours and establish that they are the body’s own cells just continuing to divide. Video clip embedded in ppt. Look at the difference between benign and malignant tumours - students need to be able to describe these. Worksheet ‘cancer development’ - answers on page 3 of sheets. Data interpretation**Maths skills –** data analysis on graph exam questions**Working scientifically skills –** analysing secondary data**Literacy**.new terms - benign, malignant, carcinogenic etc**Scaffolding-** word banks**Interleaving Opportunity -** mitosis, cell cycle**.** | **Success criteria****Formative assessment opportunities (AfL)**Exam question do nowCancer worksheetExam questions |
| **Resources :**Exam question do now, Cancer development worksheet,**Practical resources:** |
| **Misconceptions**Most students do not realise that cancer is the overgrowth of the body’s own cells | **Homework** Exploring non-communicable disease sheet is good consolidation |

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| **Lesson 13 - plants tissues and transport** | **Learning Outcomes*** Describe the job of the different types of plant tissue and how they are adapted for function
* Describe the structure of a leaf and how it is adapted for gas exchange
* Explain the function and location of stomata
 |
| **Prior Knowledge**Students have looked at specialise cells in the cells unit and should be familiar with some of the adaptations of xylem, phloem and root hair cells. They should have also met meristem during the stem cells section of the cells unitStudents looked at leaf structure and stomata in the KS3 unit ‘photosynthesis’ |
| **Spec reference**Student should be able to explain how 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 epidermis, palisade and spongy mesophyll, xylem and phloem and guard cells surrounding stomata. Students should be able to explain how the structure of root hair cells, xylem and phloem are adapted to their functions. The roots, stems and leaves form a plant organ system for transport of substances around the plant. Students should be able to describe the processes of transpiration and translocation, including the structure and function of the stomata. Root hair cells are adapted for the efficient uptake of water by osmosis and mineral ions by active transport. 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. The role of stomata and guard cells are to control gas exchange and water loss. Phloem tissue transports dissolved sugars from the leaves to the rest of the plant for immediate use of 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 call to the next through pores in the end walls. Detailed structure of phloem tissue or the mechanism of transport is not required.  |
| **Suggested activities**Do now on root hair cellsEstablish the organization of plants to be just like animals - cell, tissues, organs etc. Go through the tissue types in plants. Look at leaf structure and discuss how plants get the materials they need, emphasizing this is done by diffusion. Practical to look at stomata - provide students with leaves that have been sat with stems in water and some that have dried out for a few hours - they should see a difference in the stomata. They should also look at the top side to see there are no stomata there. Distribute leaf section diagrams to label and annotate. WAGOLLS on ppt. Model how to calculate stomata coverage and practice a couple on whiteboards. **Maths skills -** calculating number of stomata (whiteboard task at end)**Working scientifically skills -** use of microscope, observations**Literacy** - WAGOLL provided**Scaffolding-** calculation is scaffolded**Interleaving Opportunity –** Do now revisits cell structures and adaptations, diffusion, osmosis and active transport.remind how to use microscope using good language - start on lowest magnification, use the focusto get a clear image | **Success criteria****Formative assessment opportunities (AfL)**Do nowLabelling of diagram Description of adaptations of leaf |
| **Resources :**Leaf section diagrams**Practical resources:**Per pair : microscope, slides, sellotape, nail varnish, leaves that have been stood in water, leaves that have been left to dry |
| **Misconceptions**That water is absorbed by leaves (eg when it rains)Students need to realise that water vapour can leave through the stomata, not ‘water’ | **Homework** Root hair adaptations sheet (they’ve covered this in cells so this is a revision activity) |

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| **Lesson 14 - Transpiration and translocation** | **Learning Outcomes*** Describe the movement of water and dissolved sugars around the plant
* Describe factors that can affect the rate at which water moves
* Explain how changes in temperature, humidity, air movement and light intensity affect rates of water movement
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| **Prior Knowledge**Students have studied root hair cell adaptations and osmosis in the ‘cells’ unit |
| **Spec reference**The role of the stomata and guard cells are to control gas exchange and water loss. Students should be able to explain the effect of changing temperature, humidity, air movement and light intensity on the rate of transpirationStudents should be able to understand and use simple compound measures such as the rate of transpiration |
| **Suggested activities**Do now exam question in resource folderRecap root hair cell (covered in cells unit) as the method by which plants get water in. Then move onto translocation and transpiration. Demo or show picture of a potometer and establish how it could be used to measure the rate of transpiration. **Maths skills -** secondary data in exam questions**Working scientifically skills -** describing and explaining using scientific knowledge and understanding**Literacy** - model answer for first factor to show standard, WAGOLL for rest on ppt**Scaffolding-** Worksheet is scaffolded, word bank on ppt – could provide sentence starters or sentences to put into order**Interleaving Opportunity -** osmosis, active transport | **Success criteria****Formative assessment opportunities (AfL)**Do now exam questionTranspiration worksheet Exam question |
| **Resources :**Exam question do now, transpiration and translocation worksheet, exam question for plenary (H or F tier)**Practical resources:**Potometer demonstration, could demo some leaves being set up with Vaseline on top side, one with Vaseline on bottom side, one without and leave for a week or so to see the difference in water loss |
| **Misconceptions**That water enters a plant through the leavesWatch out for students saying the phloem carries ‘food’ - they need to say dissolved sugarsThat experimental controls are the same as control variables.  | **Homework**  |

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| **Lesson 15 - revision** | **Learning Outcomes** |
| **Prior Knowledge** |
| **Spec reference** |
| **Suggested activities**Key word quiz, development of command words - evaluate, describe and explain have all been covered in this unit. Correct the poor language sheet and self assess. Revision quiz to be given for homework. Kahoots: <https://create.kahoot.it/kahoots/my-kahoots/folder/204befd9-840f-4d02-b036-41a8145b6e8c> (cells, plant tissues, plant transport)<https://create.kahoot.it/details/aqa-9-1-enzymes-and-digestion/f3656934-ec2d-4ce7-a927-48b91940b4f1> (enzymes, food tests and digestion)**Maths skills -** **Working scientifically skills -** **Literacy**.**Scaffolding-** **Interleaving Opportunity -**  | **Success criteria****Formative assessment opportunities (AfL)** |
| **Resources :**Using good language sheet, **Practical resources:** |
| **Misconceptions** | **Homework**  |

Lesson 16 - Assessment

Lesson 17 - Corrections and follow up