Biology Autumn Term Year 12		***Curriculum Checkpoints: What do students know and what can they do?***				***YT Clips***	Further guidance
Summative Comment		**Developing**	**Securing**	**Mastering**	**Excelling**		
Biological Molecules Part 2- Proteins	**Substantive Knowledge**	To be able to identify and label the general structure of an amino acid. To state the different levels of protein structure. To identify the many uses of proteins within organisms. To describe the action of enzymes using the Induced Fit Model. To be able to describe how different factors affect the rate of enzyme-controlled reactions	To be able to describe the formation of dipeptides and polypeptides and describe fully the different levels of protein structure. To simply explain the Induced Fit model using key vocabulary, and link use of enzymes to lowered activation energy. To describe how different factors (such as temperature and pH) affect the rate of enzyme activity with reference to active sites and enzyme-substrate complexes.	To be able to explain the effects of different factors on rates of enzyme-controlled reactions, including the effects of competitive and non-competitive inhibitors. To appreciate that enzymes catalyse a wide range of intracellular and extracellular reactions that determine structures and functions from cellular to whole-organism level. To be able to explain how different proteins are structurally adapted to their function, to link the structure of a protein to the bonding within it	To make synoptic links within and between topics in the Y12 curriculum E.g. relate the structures to properties of proteins named throughout the specification. To explain how scientists developed the Induced-Fit model from the Lock and Key model and evaluate these. Apply understanding of effects of factors on rates of reactions to novel scenarios including uses of enzymes in industry.	https://www.youtube.com/watch?v=tsvTdILMEXw	https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/biological-molecules/
Biological Molecules Part 2 - Proteins	**Disciplinary Knowledge**	To be able to describe the difference between quantitative and qualitative tests. To identify the control variables in experiments into enzyme-action. To use correct equipment for different practical techniques and calculate rate using 1/time or 1000/time using correct units.	To be able to calculate rate of reactions using data and graphs and correct units. To calculate uncertainty for different experiments. To decide appropriate graphical presentations of data from experiments (tables and graphs). To independently collect data investigating the effect of a named variable on the rate of an enzyme-controlled reaction.	To be able to describe when to use each statistical test and also standard deviation. To research and produce risk assessments for experiments in class for particular experiments. To confidently calculate initial rate of reaction using a tangent.	To independently adapt a method for an experiment and improve techniques as required. Calculate the pH of a solution using the formula calculate its pH, using the formula: $pH = -\log_{10}[H^+]$	https://www.youtube.com/watch?v=haweShrOEU	https://www.savemyexams.co.uk/a-level/biology/aqa/17/revision-notes/1-biological-molecules/1-3-biological-molecules-proteins/1-3-3-protein-structure--function/

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Topic 2 - Cells Part 2	**Substantive Knowledge**	To be able to state components of cell surface membrane and the water potential of pure water. Describe simply methods of transport across cell membranes. To describe the different types of white blood cells and their sub cellular structures. To be able to identify how the body is able to distinguish between self and non-self cells. Describe the definitions for antigen, antibody and antibiotic, mAb, antiseptic, antifungal and antigen presenting cell. To distinguish between HIV infection and AIDs (immunocompromised) Identify why antibiotics are not an effective treatment for non-bacterial infections. Describe difference active and passive, primary and secondary, specific and non-specific immunity.	To be able to describe the structure of a cell surface membrane and the functions of their various componenets within the Fluid Mosaaic model. Describe and distinguish between osmosis, diffusion, active transport in context of different cells and tissues. Describe the part villi play in absorption and the role played by active transport, co-transport in the absorption of digestion end products. Describe the structure and function of an antibodies and mAbs and who they are made. Describe how vaccines are used to achieve herd immunity by acting as a primary exposure to an antigen thus allowing antibody production to occur much faster upon secondary exposure.	To explain the Fluid-Mosaic model of membranes and explain how different factors affect membrane-permeability. To be able to distinguish between simple diffusion and facilitated diffusion in relation to membrane structure. To explain thoroughly how T and B lymphocytes work to facilitate an immune response (cellular and humoral). Apply understanding of cell structur to explain the outcome of animal and plant cells being placed in hypertonic vs hypotonic solutions. To be able to identify and explain which type of movement is occuring when given data in graph. To eExplain how mAbs are used and how the ELISA tests work using mAbs to identify prescnce of antigen for a drug, cancer, pathogen, hormone in a patient sample.	To be able to apply understanding of processes of transport across cell membranes like co-transport to other areas of the specification. To be able to apply concept of water potential to processes in organisms. To link phagocytosis with cell-mediated and humoral immune response. To suggest how autoimmune disorders could occur using your understanding of B and T lymphocytes. To suggest how concenvtional cancer tratements be improved by making use of mAbsand apply mAbs to novel techniques e.g. how pregnancy or lateral flow tests work using understanding of mAbs	https://www.youtube.com/watch?v=C88QynEYPXo	https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/cells/

Topic 2 - Cells Part 2	Disciplinary Knowledge	To be able to confidently calculate percentage change, and giving answers to specified decimal places/ sfg/ standard form. Use substantive knowledge to form a hypothesis on the effects of a named variable on dependent variable. To be able to determine the water potential of a plant sample using a graph of % change in mass. To display data in suitable tables and graphs.	To produce a dilution series of a solute to then produce a calibration curve with which to identify the water potential of plant tissue. To follow a method carefully to investigate the effect of a named variable on the permeability of cell-surface membranes. To describe some ethical issues with the use of vaccines and mAbs. To use substantive knowledge to explain	To be able to explain the importance of serial dilutions and follow a method independently to create a series of dilutions. Use calculations to work out concentrations of dilutions. Link understanding to explain the outcomes of different independent variables (temp/ alcohol/ pH changes) on lipid permeability using colorimetry to confirm hypothesis. Explain different ethical issues surrounding the use of mAbs and vaccines.	To be able to explain how our understanding of models has changes of time in Biology eg. how technology advancing has enabled us to develop Fluid-Mosaic model. To discuss the various ethical considerations with regards to mAbs and vaccines, and be able to form own conclusions. To indepedendently suggest and justify method improvements for investigations.	https://www.youtube.com/watch?v=5c7AmsM4Bdo, https://www.youtube.com/watch?v=BuwszRIk-_w, https://www.youtube.com/watch?v=M4LugywewAU https://www.youtube.com/watch?v=Hc3Mg0Yc7kI	https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/practical-skills/
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Topic 2 - Cells Part 1	Substantive Knowledge	To be able to dentify and label membrane bound vs no- membrane bound structures found in eukaryotes vs prokaryotes in diagrams or electromicrographs. To identify viruses as acellular structures that require a host cell to replicate new viral particles. To describe the importance of semi conservative DNA replication. To be able to identify the steps that take place in the cell cycle and mitosis, and how undertsanding of cell cycle can be used for cancer treatments	To be able to describe the function of structures found in eukaryotes vs prokaryotes and viruses. Describe the processes of cell fractionation and ultracentifugation as methods to isolate subcellular structures for further study. To describe the limitations of light vs TEM vs SEM microscopes and the advantages of differentiation and cell specislisation. Describe the process of mitosis and cell cycle, and how this links to progression or cancer. To describe how viral replication occurs for RNA viruses eg HIV, using reverse transcritpase	To explain how ultracentifugation works and why electron mcroscopes have a higher resolution than light microscopes. Compare and constrat different microscopy techniques and suggest which is most appropriate to study cells vs subcellular stuctures. Explain the steps that take place in the cell cycle and the importance of mitosis regarding chromosomes To explain how the evidence from experiments conducted by Meselson and Stahl supports the semi conservative DNA replicaiton model. Using the cell cycle to suggest how cancer treatments (chemotherapy vs radiotherapy) are used to treat cancer. Explain using specific vocabulary how HIV replicates inside cells.	To be able to use the endosymbiotic theory to explain why eukaryotes contain 70s ribosomes and prokaryotic DNA. To apply the evidence from Meselson and Stahl experiments to explain why DNA is not replicated by the conservative or dispersive method. To be able to apply understanding of cell structures and replication to various novel contexts.	https://www.youtube.com/watch?time_continue=1&v=EvH-stL0BQs&embeds_referring_euri=https%3A%2F%2Fwww.google.com%2Fsearch%3Fq%3Daqa%2Balevel%2Bbiology%2Bresponse%2Bvideo%26rlz%3D1C1JJTC_en-GBGB1032GB1032%26ei%3DxGIZK26N5C0gAbkzZiQAg%26ved%3D0a&source_ve_path=MjM4NTE&feature=emb_title	https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/cells/
Topic 2 - Cells Part 1	Disciplinary Knowledge	To be able to convert between the following units km/m/ mm/ um/ nm and confident with working to dp/ sfg/ standard form. Able to rearrangeformula to make image/ actual/ magnification the subject. Identify the use of Stains when working with cells. Identify why thin samples must be used when working with light microscopes. Able to determines outcomes of starch test (iodine) to Identify starch grains in plant cells. Identify the rules of a good biological drawing	To set-up and use an optical microscope to identify the stages of mitosis in these stained squashes and calculation of a mitotic index. Describe risks associated with the experiment and why a thin sample and dye must be used. Interpret the different stages of the cell cycle using graphs that illustrates mass of DNA or mass of cell over time. Calculation of a mitotic index and draw and label biological drawings. Students could plot the data from their investigations in an appropriate format.	To explain how to calibrate an eyepiece graticule in order to measure image size. Calculate actual sizes of sample speciemns from drawings and micrographs To be able to sugget improvements for biologicla drawings. Write your own method for creating a tissue sample for viewing using a light microscope. To make conclusions about different mitotic indices. To explain how to gain a more representative and accurate mitotic index from room tip squashes.	To be able to link understanding of scientific discoveries to the history of microscopes. To understand models in science will change over time due to new discoveries.	https://www.youtube.com/watch?v=5c7AmsM4Bdo https://www.youtube.com/watch?v=BuwszRIk-_w https://www.youtube.com/watch?v=M4LugywewAU https://www.youtube.com/watch?v=Hc3Mg0Yc7kI	https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/practical-skills/