

AQA A Level Biology



Assessment Information:

All students will sit 3 external examinations at the end of year 13, which will cover content from both years of the A-Level. The exams are a mix of short and long written answers, calculations and multiple-choice questions. See the summary below for more information.

Students will also be required to complete 12 Required Practicals over the 2 years. Skills will be assessed during these practicals through observations and questioning during the practical, and by the content of the written work in the student's lab book after the practical. Students must show consistent competency in these skills to obtain the practical accreditation on their Biology A-Level.

Paper 1
What's assessed <ul style="list-style-type: none">Any content from topics 1–4, including relevant practical skills
Assessed <ul style="list-style-type: none">written exam: 2 hours91 marks35% of A-level
Questions <ul style="list-style-type: none">76 marks: a mixture of short and long answer questions15 marks: extended response questions
Paper 2
What's assessed <ul style="list-style-type: none">Any content from topics 5–8, including relevant practical skills
Assessed <ul style="list-style-type: none">written exam: 2 hours91 marks35% of A-level
Questions <ul style="list-style-type: none">76 marks: a mixture of short and long answer questions15 marks: comprehension question
Paper 3
What's assessed <ul style="list-style-type: none">Any content from topics 1–8, including relevant practical skills
Assessed <ul style="list-style-type: none">written exam: 2 hours78 marks30% of A-level
Questions <ul style="list-style-type: none">38 marks: structured questions, including practical techniques15 marks: critical analysis of given experimental data25 marks: one essay from a choice of two titles

Practical Skills Assessments:

Students must complete practicals demonstrating use of key apparatus and techniques. They are also required to show competency of the CPAC statements below throughout their practical work.

Competency	Practical mastery
1. Follows written procedures	a. Correctly follows written instructions to carry out experimental techniques or procedures.
2. Applies investigative approaches and methods when using instruments and equipment	a. Correctly uses appropriate instrumentation, apparatus and materials (including ICT) to carry out investigative activities, experimental techniques and procedures with minimal assistance or prompting. b. Carries out techniques or procedures methodically, in sequence and in combination, identifying practical issues and making adjustments when necessary. c. Identifies and controls significant quantitative variables where applicable, and plans approaches to take account of variables that cannot readily be controlled. d. Selects appropriate equipment and measurement strategies in order to ensure suitably accurate results.
3. Safely uses a range of practical equipment and materials	a. Identifies hazards and assesses risks associated with these hazards, making safety adjustments as necessary, when carrying out experimental techniques and procedures in the lab or field. b. Uses appropriate safety equipment and approaches to minimise risks with minimal prompting.
4. Makes and records observations	a. Makes accurate observations relevant to the experimental or investigative procedure. b. Obtains accurate, precise and sufficient data for experimental and investigative procedures and records this methodically using appropriate units and conventions.
5. Researches, references and reports	a. Uses appropriate software and/or tools to process data, carry out research and report findings. b. Cites sources of information demonstrating that research has taken place, supporting planning and conclusions.

Rationale

A Level Biology is taught according to the AQA scheme of work A. This means we follow a topic-by-topic approach and interleave sections where appropriate. The qualification is linear. Linear means that students will sit all the A-level exams at the end of their A-level course.

In the second year of the course, students will be expected to be able to draw on knowledge from both years of study and bring together their learning in a synoptic way. Practical skills are assessed throughout the year according to the CPAC guidance shared between exam boards.

AS level (year 12)

3.1 Biological molecules

3.2 Cells

3.3 Organisms exchange substances with their environment

3.4 Genetic information, variation, and relationships between organisms

A level (year 13)

3.5 Energy transfers in and between organisms (A-level only)

3.6 Organisms respond to changes in their internal and external environments (A-level only)

3.7 Genetics, populations, evolution, and ecosystems (A-level only)

3.8 The control of gene expression (A-level only)

Students are given the opportunity to practice exam questions throughout the course and answers are modelled by teachers. Lessons are designed to build on student's prior knowledge ensuring that they have a solid foundation before exploring A level content. Interleaving and retrieval opportunities are embedded throughout the year.

This learning plan allows students to take accountability for their own learning outside of the classroom to increase their chance of success in lessons and in the subject itself.

Below are some resources the students should equip themselves with before they begin the course:

Key Resources (textbooks/videos/websites)

Resource	Where to find it.	How to use it.
AQA Biology specification	https://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF	It is a good idea to work through the specification when revising – making sure you are familiar with every point of the upcoming topics. Highlighting sections, you are familiar with means you can use it as a ‘revision list’
A level textbook	The school should have loaned you this. But here is an amazon link (there also a kindle version available. https://www.amazon.co.uk/New-Level-Biology-2018-Complete/dp/1789080266/ref=sr_1_4?crid=3J6GALNF0ZK1Y&keywords=aqa+a+level+biology&qid=1693564568&sprefix=aqa+a+level+biology+%2Caps%2C3038&sr=8-4	Use this to pre-read on topics before lessons or to produce extra notes when revising. The book breaks down a lot of the information in a student friendly way.
Physics and Maths Tutor (exam questions and revision notes for all A-Level sciences)	https://www.physicsandmathstutor.com/	Has a lot of past exam papers with mark schemes and worksheets arranged by topics – practice weekly to familiarise yourself with exam technique.
Revisely AQA biology	https://www.revisely.com/alevel/biology/aqa	A great website where you can find notes for all the topics as well as video tutorials and exam questions. Use if you need to catch up with a lesson or need further explanation. First read the notes then watch the video tutorial to really embed the information.
YouTube – Primrose kitten playlist	https://www.youtube.com/watch?v=UMxYHES27Rc&list=PL7O6CcKg0HaEfeG3hzi1bxTVYikTBliAJ	These videos summarise entire topics into one video – Use it to catch up on a topic or revise before a test. Make sure to pause and understand the content (make some notes!) to get the best out of this resource.
YouTube – Miss Estruch	https://www.youtube.com/watch?v=DxGU-8GYm5g&list=PLOfYYgIrtVMjNF1xtpVSwo9TO8ucxWUV	These videos summarise entire topics into one video – Use it to catch up on a topic or revise before a test. Make sure to pause and understand the content (make some notes!) to get the best out of this resource.

Year 12

Two teachers will be teaching two different topics co-currently, the different colour shades represent the two different topics.

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 1	Cell structure	<p>Explain what is meant by a eukaryotic cell and the defining characteristics of a eukaryotic cell.</p> <p>Explain the roles of different components and organelles within eukaryotic cells.</p>	Cell structure – plant and animal cells.	<p>Check how many cell parts you can remember and their functions.</p> <p>Try this GCSE recall quiz: https://www.gcse.co.uk/cells-quiz/</p>	<p>Make a list of all the new organelles you have learnt about – make sure you remember their functions.</p> <p>Then have a go at the following quiz. https://www.proprofs.com/quiz-school/story.php?title=biology-ii-cell-structure-function-quiz</p>	<p>Describe differences between the smooth and rough endoplasmic reticulum.</p> <p>Give two examples of eukaryotic cells.</p> <p>Describe the structure of the nucleus.</p>
	Biological molecules	<p>Identify some biological polymers and the monomer from which they are made.</p> <p>Explain the concept of condensation and hydrolysis reactions</p>	<p>Monomers and polymers.</p> <p>Food molecules.</p>	<p>Give examples of: Monomers Polymers</p>	<p>Make a glossary of the key words from this week.</p>	<p>What catalyses hydrolysis in the body?</p> <p>Give examples of where a hydrolysis reaction may be useful.</p>
Week 2	Cell Structure	<p>Interpret pictures, diagrams, and electron micrographs to identify cell organelles.</p> <p>Identify examples of specialised eukaryotic cells.</p>	<p>Adaptions of small intestine.</p> <p>Specialised cells.</p> <p>Levels of organisation.</p>	<p>Watch this video: https://www.youtube.com/watch?v=vEzXQGJSXhU</p>	<p>Look at different electron micrographs of eukaryotic cells online – Labelled or unlabelled – look at the features of the different organelles and how they look in different pictures.</p>	<p>Describe the structure and function of the chloroplast.</p> <p>Why do some cells have more mitochondria than others?</p>

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	Biological molecules	<p>Identify common monosaccharides.</p> <p>Describe the monosaccharides from which lactose, maltose and sucrose are made.</p> <p>Explain what is meant by a glycosidic bond and how they form through condensation.</p>	Food and digestion.	<p>Read through the summary section:</p> <p>https://alevelbiology.co.uk/notes/monosaccharide-disaccharide-polysaccharide/</p>	<p>Complete this past exam question:</p> <p>BIOL1 Jan 2013 Q3a</p>	<p>If a glucose and a fructose (both with the formula C₆H₁₂O₆) joined together in a condensation reaction, what would be the disaccharide which formed and what would its molecular formula be?</p>
Week 3	Cell structure	<p>Describe the structural differences between prokaryotic and eukaryotic cells.</p> <p>Explain the role of plasmids, capsules, and flagella.</p> <p>Describe the structure of virus particles.</p>	The viral life cycles.	<p>Read through this:</p> <p>https://www.khanacademy.org/science/biology/biology-of-viruses/virus-biology/a/intro-to-viruses</p>	<p>Make a summary table highlighting the differences between prokaryotes and eukaryotes.</p> <p>Find some exam questions on prokaryotes.</p>	<p>Describe the structural differences between prokaryotic and eukaryotic cells.</p> <p>Describe the role of attachment proteins.</p>
	Biological molecules	<p>Represent the structure of α -glucose and β – glucose diagrammatically.</p> <p>Explain how glycosidic bonds between α and β– glucose result in different structures forming.</p>	<p>Formula for glucose.</p> <p>Uses of glucose.</p> <p>Cellulose and starch.</p>	<p>Research the differences between cellulose and starch.</p>	<p>Complete this quiz – you can do this with your notes in front of you:</p> <p>https://primrosekitten.org/courses/aqa-a-level-biology/lessons/carbohydrates/quizzes/%CE%B1-glucose-and-%CE%B2-glucose-and-their-polymers-glycogen-starch-and-cellulose/</p>	<p>Describe the differences between α - glucose and β –glucose.</p>

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Week 4	Cell structure	<p>Explain the concepts of magnification and resolution and how they differ.</p> <p>Compare and contrast optical and electron microscopes.</p> <p>Calculate the actual size of cells based on measured size and magnification.</p> <p>Describe the processes of cell fractionation and ultracentrifugation.</p>	<p>Calculating magnification.</p> <p>Magnification and resolution.</p>	Find out what a 'centrifuge' is used for in the lab.	<p>Write down the pros and cons of the different electron microscopes.</p> <p>Find some magnification exam questions to practice the calculations</p>	<p>Compare and contrast optical and electron microscopes.</p> <p>Describe how to isolate chloroplasts from a solution of palisade cells.</p>
	Biological molecules	<p>Describe the stages of the emulsion test.</p> <p>Describe the structure of triglycerides.</p> <p>Contrast the different properties of triglycerides and phospholipids.</p> <p>Describe the general structure of an amino acid.</p> <p>Describe the biuret test and how it can be interpreted.</p>	<p>Testing for lipids.</p> <p>Food tests.</p>	<p>Remind yourself of the lipid test by watching this YouTube short.</p> <p>https://www.youtube.com/shorts/HJyBMsQuKck</p>	<p>Add to your notes using a different coloured pen. Use this video.</p> <p>https://www.youtube.com/watch?v=RaM8o0Hw4nE</p>	Contrast the different properties of triglycerides and phospholipids.

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Week 5	Cells arise from other cells.	<p>Explain what the cell cycle is,</p> <p>Describe the stages of the cell cycle.</p> <p>Recognise the stages of the cell cycle: interphase, prophase, metaphase, anaphase, and telophase (including cytokinesis).</p> <p>Explain the appearance of cells in each stage of mitosis.</p>	Mitosis stages.	List the stages of mitosis and learn what happens at each stage.	<p>Complete this quiz:</p> <p>https://primrosekitten.org/courses/aqa-a-level-biology/lessons/all-cells-arise-from-other-cells-2/quizzes/mitosis/</p>	<p>Describe the appearance of chromosomes at anaphase.</p> <p>Describe how to prepare a root tip squash of garlic root.</p>
	Biological molecules	<p>Explain how dipeptides and polypeptides form.</p> <p>Explain the hierarchical organisation of protein structure.</p> <p>Describe the types of bond involved in protein structure and the weakness of hydrogen bonds.</p>	Protein structure.	<p>Complete this quiz – write down your score and then try again after the lesson.</p> <p>https://www.footprints-science.co.uk/index.php?quiz=Proteins</p>	<p>Start making a mind map on the biological molecules' topic. Use this guide if you need to:</p> <p>https://mindmapsunleashed.com/how-to-create-a-mind-map-on-paper</p> <p>Complete the quiz again!</p> <p>https://www.footprints-science.co.uk/index.php?quiz=Proteins</p>	Describe the biuret test.

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Week 6	Cells arise from other cells.	<p>Explain the events involved in the formation of tumours and cancers and why this is damaging to the body.</p> <p>State that cancer treatments often work to inhibit stages of the cell cycle.</p>	Cancer – uncontrollable cell division.	<p>Read this to learn the link between mitosis and cancer.</p> <p>https://www.cancerresearchuk.org/about-cancer/what-is-cancer/how-cancer-starts/how-cells-and-tissues-grow</p>	<p>Complete some exam questions:</p> <p>Past exam paper material:</p> <p>BIOL1 Jan 2013 – Q5 BIOL2 Jan 2013 – Q8b BIOL2 June 2013 – Q4c BIOL2 June 2013 – Q4</p>	Describe how anti-mitotic drugs work.
	Biological molecules	Relate the structure of proteins to properties of proteins (this is required for proteins named throughout the specification).	Proteins: food and digestion.	Research different types of proteins in the human body.	<p>Complete this question:</p> <p>A-level Paper 1 (Set 1) – Q11.2</p> <p>Or watch this video.</p> <p>https://www.youtube.com/watch?v=8d2Edz46UF4</p>	Describe the structure of a protein.
Week 7	Cells arise from other cells.	<p>Explain what binary fission is and the organisms which carry out binary fission.</p> <p>Describe binary fission.</p>	Labelling bacterial cells.	<p>Watch this video:</p> <p>https://www.youtube.com/watch?v=RUsWvULs5nk</p>	Research Vibrio cholerae bacteria – how it replicates, the problems it causes and the different strains of the bacteria.	<p>Binary fission can happen every 20 minutes for some species, under ideal conditions. Suggest one example where this trait would be useful to humans.</p> <p>Describe the role of plasmids.</p>
	Biological molecules	<p>Interpret energy level diagrams and identify the activation energy.</p> <p>Explain the induced-fit model of enzyme action.</p>	<p>Enzymes.</p> <p>Enzyme graphs.</p>	<p>Revise enzymes (GCSE)</p> <p>https://www.bbc.co.uk/bitesize/guides/z88hjcj6/revision/1</p>	<p>Add to your revision notes in a different coloured pen. Use the following:</p> <p>https://www.thesciencehive.co.uk/enzymes-alevel</p>	Why is induced-fit a more refined model of enzyme catalysis than lock and key?

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Week 8	Cells arise from other cells.	Describe the sequence of events by which viruses replicate. Explain why viruses are so difficult to treat and develop medicines against.	Viral diseases – health and disease. The viral life cycles.	Read through these notes. https://www.bbc.co.uk/bitesize/guides/z83qfcw/revision/3	Add to your revision notes in a different coloured pen. Use the following: https://studymind.co.uk/notes/life-cycle-and-replication-of-viruses/	Explain why viruses are so difficult to treat and develop medicines against. Describe the differences between viruses and bacteria.
	Biological molecules	Apply knowledge of tertiary structure to explain enzyme specificity and the formation of enzyme-substrate complexes. Explain how temperature, pH, substrate concentration, enzyme concentration and the presence of inhibitors affect enzyme catalysis. Describe and explain trends within graphs, relating this back to the tertiary structure of active sites and the effect of these variables.	Factors affecting enzymes.	Look over your notes from last lesson.	Search for these exam questions BIOL1 June 2009 – Q3a and 3b BIOL1 Jan 2011 – Q2b BIOL1 June 2010 – Q5 BIOL1 Jan 2012 – Q7a–7c BIOL1 Jan 2011 – Q2b	Evaluate the statements: “Temperature denatures enzymes”. “Acidic and alkaline pHs denature enzymes”.

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Week 9	Transport across membranes.	Describe the arrangement of proteins, glycoproteins, glycolipids, phospholipids, and cholesterol in the fluid mosaic model of membrane.	Function of the cell membrane.	Research substances that can and cannot pass through the cell membrane.	Design a model/animation/picture of the fluid mosaic model of the cell membrane.	Describe the role of cholesterol in the cell membrane. State the roles of extrinsic proteins.
	Biological molecules	Calculate rate of reaction from graphs and raw data and explain the advantage of using initial rate. Interpret graphs of enzyme-controlled reactions and apply knowledge to explain them.	Enzyme graphs.	Look over your notes from last lesson.	Search for these exam questions BIOL1 June 2011 – Q3 BIOL1 Jan 2010 – Q3 BIO3X 2011 EMPA Practice some rate of reaction calculations: https://www.bing.com/videos/riverview/related-video?q=rate+of+reaction+enzymes+calculations&mid=A26AE70B77B4BD091E8AA26AE70B77B4BD091E8A	Define initial rate.
Week 10	Transport across membranes.	Define osmosis in terms of water potential. Explain the movement of water due to osmosis into or out of cells. Explain the effect of osmosis on plant and animal cells.	Osmosis definition. Effect on plant and animal cells.	Use this video to refresh your knowledge: https://www.youtube.com/watch?v=CJVXYmXkzM	Make notes on page 42-43 of your biology textbook. Use these to answer the questions.	State two factors that affect the rate of osmosis. Define osmosis.

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	Biological molecules	Describe the structure of DNA and identify structural components from diagrams.	GCSE DNA structure.	Quiz your GCSE knowledge: https://www.footprints-science.co.uk/index.php?quiz=Structure_of_DNA	Design a model showing all the components of a DNA molecule. Or do some further reading: https://www.thetech.org/ask-a-geneticist	Describe the structure of DNA. Explain why many scientists initially doubted that DNA was the genetic code.
	Transport across membranes.	Define what is meant by diffusion and facilitated diffusion. Identify which substances rely on facilitated diffusion and why they cannot enter/leave cells by diffusion.	Diffusion definition and factors affecting diffusion. Transport processes.	Remind yourself of the factors that affect diffusion rate. https://www.youtube.com/watch?v=lxHMJaXOzP4	Make a table comparing carrier proteins and channel proteins. You could also add pictures to your notes. Research aquaporins. https://www.ks.uiuc.edu/Research/aquaporins/	Why is diffusion a passive process? How do microvilli increase the rate of diffusion? How does the concentration gradient affect facilitated diffusion?
Week 11	Biological molecules	Explain the role of RNA in transferring genetic information and as a component of ribosome. Describe the structure of RNA and identify structural components of an RNA nucleotide from diagrams. Compare and contrast the similarities and differences between DNA and RNA.	Ribosomes. DNA structure.	Type RNA and DNA into google images and note the differences you see.	Make a table comparing DNA and RNA.	Compare and contrast the similarities and differences between DNA and RNA.

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Week 12	Transport across membranes.	Define what is meant by active transport. Explain the process of active transport.	Active transport definitions. Transport processes.	Research how is active transport different to diffusion.	Revise the structure of ATP and how it is used in active transport.	Describe how carrier proteins actively transport substances across the cell membranes.
	Biological molecules	Describe the process of DNA replication. Explain the significance of DNA replication.	DNA structure. The role of DNA.	Watch this video: https://www.youtube.com/watch?v=TNKWgcFPHqw	Use pictures or a poster to summarise the process of DNA replication. Rewatch the video if you need to.	Describe the process of DNA replication. State the role of RNA in DNA replication. Name the enzymes involved in DNA replication.
Week 13	Transport across membranes.	Compare and contrast active transport and facilitated diffusion. Interpret data to identify when a substance is being actively transported.	Transport processes.	Write down some examples of where active transport is important in the body.	Make a list of factors affecting active transport. Answer the following exam question: <i>BIOL1 June 2011 Q8b</i>	Compare and contrast active transport and facilitated diffusion.
	Biological molecules	Describe the structure of ATP. Explain the role of enzymes in hydrolysing and synthesising ATP. Explain the significance of ATP in numerous processes within organisms, as a supplier of energy or phosphate.	ATP and energy.	Find out what ATP and ADP stand for and the difference between them.	Answer the following exam question: <i>BIOL4 Jan 2012 – Q8a</i> <i>BIOL4 June 2011 – Q1b–1c</i>	Describe the structure of ATP. Explain why ATP is such an important molecule.

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 14	Transport across membranes.	Describe the adaptations of small intestine epithelial cells for absorption. Define what is meant by co-transport.	Adaptations of the small intestine epithelial cells.	Watch this video to be prepared for the lesson on co-transport. https://www.youtube.com/watch?v=Ptmlvtei8hw	Complete some exam questions: BIOL1 Jan 2013 – Q9a BIOL1 June 2010 – Q7a BIOL1 Jan 2010 – Q4	What common adaptations do cells of exchange surfaces have?
	Biological molecules	Describe the properties that are important in water. Explain the properties of water linked to the polar nature of the molecule.	Chemistry of water.	Watch this video: https://www.bing.com/videos/riverview/relatedvideo?q=properties+of+water&mid=67D28BF60A162F58863C67D28BF60A162F58863C	Make a revision card on the water properties.	Explain the significance of these properties of water to living organisms and processes.
Week 15	Transport across membranes.	Explain the process of co-transport in the context of absorption of glucose (and amino acids).	Transport through the small intestine.	Rewatch this video: https://www.youtube.com/watch?v=Ptmlvtei8hw	Read through your revision notes – make revision cards or condense your notes into a mind map. Make sure you can write the steps for co-transport from memory.	Describe what happens during co-transport of sodium and glucose.
	Biological molecules	Explain what is meant by the term inorganic ions and where they occur in the body. Explain the specific role of hydrogen ions, iron ions, sodium ions and phosphate ions. Relate the role of each of these ions to their properties.	Ions (chemistry)	Revise 'ions' Use this video: https://www.bing.com/videos/riverview/relatedvideo?q=ions+in+the+body&mid=A751AE3EA80C12B50B67A751AE3EA80C12B50B67	Read through your revision notes – make revision cards or condense your notes into a mind map.	Essay question: Inorganic ions include those of sodium, phosphorus and hydrogen. Describe how these and other inorganic ions are used in living organisms.

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Week 16	Cells and the immune system	<p>Explain what is meant by an antigen and the types of molecules which can act as antigens.</p> <p>Explain why antigen recognition is important for the immune system.</p> <p>Describe the process of phagocytosis.</p> <p>Explain the role of lysozymes in the destruction of pathogens.</p>	<p>GCSE white blood cells and phagocytosis.</p> <p>AS lysozymes.</p>	Watch a video on GCSE phagocytosis.	<p>Complete the following.</p> <p>Specimen assessment material:</p> <p>A-level Paper 3 (set 1) – Q4.</p> <p>Examprom:</p> <p>BYA3 – June 2006 Q1a</p>	<p>Define what an antigen is.</p> <p>Explain why the surface molecules of some cells act as antigens.</p>
	DNA, genes and chromosomes	<p>Explain what is meant by the terms chromosome and gene.</p> <p>Compare and contrast DNA in eukaryotes with that in prokaryotes, mitochondria and chloroplasts.</p> <p>Explain what a gene could code for.</p>	.GCSE DNA, genes, chromosomes.	Find definitions for gene, genome, and mutation.	<p>Put the following in order of size from biggest to smallest:</p> <p>DNA Gene Chromosome Nucleus Cell</p>	A textbook stated that “The bacterial chromosome is found in the cytoplasm of the cell”. Evaluate this statement.
Week 17	Cells and the immune system	<p>Explain what is meant by the specific immune response.</p> <p>Explain the cell-mediated (cellular) immune response.</p> <p>Explain the roles played by helper T cells.</p>	GCSE lymphocytes.	<p>Read up on lymphocytes.</p> <p>https://www.revise.ly.com/alevel/biology/aqa/notes/cells/immunity</p>	<p>Learn about other white blood cells.</p> <p>White Blood Cells: What Are They, Normal Ranges, Role & Function (clevelandclinic.org)</p>	Why is the cell-mediated response able to destroy body cells that have turned cancerous?

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
	DNA, genes and chromosomes	<p>Explain how the DNA base sequence can code for the primary structure of a polypeptide.</p> <p>Explain the terms degenerate, universal and non-overlapping.</p> <p>Explain why much of eukaryotic DNA can be considered as non-coding.</p> <p>Explain what is meant by an intron and an exon.</p>	.GCSE DNA	Name the bases found in DNA.	<p>Watch this video to recap the lesson.</p> <p>https://www.youtube.com/watch?v=YtKoTOCJGt4o</p>	<ul style="list-style-type: none"> • What is meant by the terms: <ul style="list-style-type: none"> • degenerate? • non-overlapping? • universal? <p>A polypeptide is made of 24 amino acids. What is the minimum number of bases that the gene coding for it must have had?</p>
Week 18	Cells and the immune system	<p>Relating previous knowledge of protein structure, describe the structure of antibodies.</p> <p>Explain how antibodies lead to the destruction of pathogens.</p>	GCSE antibodies. AS protein structure.	<p>Watch this video: https://www.bing.com/videos/riverview/relatedvideo?q=antibodies&mid=5BAD648B4C960B6E4CA65BAD648B4C960B6E4CA</p>	<p>Past exam paper material:</p> <p>BIOL1 Jan 2012 – Q6</p> <p>HBIO1 – June 12 Q4a</p>	<p>Define what an antibody is.</p> <p>Explain the importance of the variable region of antibodies.</p> <p>Explain the structure of antibodies in terms</p>

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
	DNA, genes and chromosomes	<p>Explain what the terms genome and proteome mean.</p> <p>Describe the structure of mRNA and how it is related to its function.</p> <p>Explain the process of transcription in prokaryotes.</p> <p>Explain the process of transcription and splicing in eukaryotes, linking this to knowledge of introns.</p> <p>Interpret data from experimental work investigating the role of nucleic acids</p>	GCSE Genome AS RNA.	Research 'the human genome'	<p>Find out the benefits of the human genome study.</p> <p>Or search for these exam questions:</p> <p>BIOL2 June 12 Q5b</p> <p>BIOL2 June 2011 – Q3a</p> <p>BIOL2 Jan 2010 – Q3</p>	Define the term splicing.
Week 19	Cells and the immune system	<p>Explain the humoral (antibody-mediated) immune response.</p> <p>Explain what is meant by a monoclonal antibody.</p> <p>Explain the roles of plasma cells in producing a primary response and memory cells in producing a secondary response.</p>	GCSE antibodies.	Read through notes on last lesson.	<p>Research uses of monoclonal antibodies.</p> <p>Past exam paper material:</p> <p>HBIO1 – June 2012 Q4b</p>	<p>Would the humoral response be used during a viral infection? Explain your answer.</p> <p>Why does the secondary immune response mean that pathogens are destroyed before they are able to make you ill?</p>

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
	DNA, genes and chromosomes	<p>Explain the process of translation.</p> <p>Explain the specific roles of ribosomes, ATP and tRNA in translation.</p> <p>Describe the structure of tRNA and how it is related to its function.</p> <p>Relate the base sequence of nucleic acids to the amino acid sequence of polypeptides, when provided with suitable data about the genetic code.</p>	<p>GCSEL Ribosomes and protein synthesis.</p> <p>AS: link to RNA.</p>	Find out the difference between mRNA, rRNA and tRNA.	<p>Complete these exam questions:</p> <p>Past exam paper material:</p> <p>BIOL5 June 2010 – Q2</p> <p>BIOL5 June 2011 – Q1.</p>	<p>Describe the structure of tRNA and how it is related to its function.</p> <p>What are the advantages of mRNA being used to carry the genetic code to the ribosomes, rather than DNA?</p>
Week 20	Cells and the immune system	<p>Explain that antigen variability can lead to some diseases being caught more than once.</p> <p>Explain how mutations can cause antigen variability and how this can cause new strains of pathogen</p>	GCSE: mutations.	Read through notes on last lesson.	Research bird flu: newscientist.com/topic/bird-flu	<ul style="list-style-type: none"> • Why is it so difficult to develop a vaccine against the common cold or HIV? • • Why have many animal flu viruses e.g., bird flu, made the news so often in recent years?

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
	DNA, genes and chromosomes	<p>Explain what a gene mutation is and how it arises.</p> <p>Explain what is meant by a deletion and substitution mutation and the potential consequences of each.</p> <p>Interpret base sequences to identify gene mutations and their impact.</p> <p>Describe what a mutagenic agent.</p>	GCSE: mutations	<p>Learn about mutations and cancer:</p> <p>https://www.youtube.com/watch?v=R4rxlRsNcs8</p>	<p>Research mutagenic agents.</p> <p>Answer these questions:</p> <p>BIOL2 Jan 2013 – Q6a–6</p> <p>BIOL2 June 2013 – Q7b–7c</p> <p>BIOL2 Jan 2012 – Q4</p> <p>BIOL2 June 2011 – Q3b</p> <p>BIOL2 June 2010 – Q3</p>	<p>Which type of gene mutation is likely to be the most damaging and why?</p> <p>A student wrote that UV light increased the likelihood of mutations in the protein that the cell made. Why is this not correct?</p>
Week 21	Cells and the immune system	<p>Compare and contrast active and passive immunity and apply knowledge to given examples.</p> <p>Describe how antigens can be used to produce a vaccine.</p> <p>Explain what is meant by herd immunity.</p> <p>Discuss ethical issues associated with the use of vaccines.</p>	GCSE: Vaccines Herd immunity.	<p>Revise GCSE vaccines:</p> <p>https://www.bbc.co.uk/bitesize/guides/z8fkmsg/revision/16</p>	<p>Read this news article on vaccines:</p> <p>Vaccines: What we know about long-term safety now - BBC News</p>	How does herd immunity protect the unvaccinated?

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
	DNA, genes and chromosomes	<p>Explain the different outcome of mitosis and meiosis.</p> <p>Recognise where meiosis occurs when given information about an unfamiliar life cycle.</p> <p>Explain how random fertilisation of haploid gametes further increases genetic variation within a species.</p> <p>Explain what a non-disjunction event is and how it occurs.</p> <p>Compare and contrast gene and chromosomal mutations.</p>	GCSE Meiosis , Mitosis Fertilisation.	<p>Revise the mitosis and meiosis squash experiment:</p> <p>https://practicalbiology.org/cells-to-systems/cell-division</p>	Produce a table showing the differences between meiosis and mitosis.	<p>Why is non-disjunction important?</p> <p>How does meiosis result in variation?</p>

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 22	Cells and the immune system	<p>Describe the structure of a HIV particle.</p> <p>Explain how the structure of a HIV particle enables it to infect and replicate within a helper T cell.</p> <p>Explain the distinction between being HIV positive and developing AIDS.</p> <p>Explain how HIV causes the symptoms of AIDS.</p> <p>Explain why antibiotics are ineffective against viruses (link to cell structure).</p>	GCSE/cells topic at AS HIV structure Cell structure	Revise your notes on HIV from the cells topic!	<p>Search for the following past exam paper material:</p> <p>BIOL1 Jan 2013 – Q8</p> <p>HBIO1 – June 2014 Q6</p> <p>HBIO1 – Jun 2009 Q8</p>	Why are so few anti-viral drugs licensed for human use compared with the number against other types of pathogen?
	DNA, genes and chromosomes	<p>Explain what is meant by genetic diversity and allele frequency.</p> <p>Explain the principles of natural selection and how selection and adaptation are major factors in evolution and contributing to species diversity.</p> <p>Apply knowledge to unfamiliar information to explain how selection produces changes within a population of a species.</p>	GCSE alleles Diversity Natural selection.	<p>Recall natural selection:</p> <p>https://www.youtube.com/watch?v=F3mJ6FRn4xk&t=420s</p>	<p>Make some extra notes on the topic or watch the video tutorial:</p> <p>A-Level AQA Biology Notes - Genetic Information & Variation - Genetic Diversity & Adaptations - Revisely</p>	How would selective breeding of animals and plants by humans affect genetic diversity?

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 23	Cells and the immune system	<p>Explain how the specificity of monoclonal antibodies can be used in medical diagnosis and targeting of medication at cell types.</p> <p>Explain the use of monoclonal antibodies in the ELISA technique.</p> <p>Discuss ethical issues associated with the use of monoclonal antibodies.</p>	GCSE: Antibodies	<p>Watch this ted talk:</p> <p>https://www.youtube.com/watch?v=aOfWTscU8YM</p>	Internet research into applications of monoclonal antibodies e.g., ADEPT, ELISA, magic bullets	What property of monoclonal antibodies makes them so useful in diagnostic testing?
	DNA, genes and chromosomes	<p>Explain what is meant by directional and stabilising selection.</p> <p>Identify types of selection from distribution curves.</p> <p>Interpret data relating to the effect of selection in producing change within populations.</p> <p>Apply knowledge of types of selection to explain antibiotic resistance and human birth weights.</p>	GCSE Natural selection	Read through your notes from last lesson.	<p>Search for these exam questions:</p> <p>BIOL2 June 2012 Q2</p> <p>BIOL2 Jan 2011 – Q6</p> <p>BIOL2 June 2009 – Q3 (except 3b)</p> <p>BIOL2 Jan 2012 – Q5 (except 5c)</p>	Fossils indicate that crocodiles and sharks have remained relatively unchanged for millions of years. Does this indicate that they are no longer subject to natural selection?

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 24	Exchange and transport	<p>Explain how the size of an organism affects its surface area to volume ratio and why this is important.</p> <p>Describe and explain the relationship between surface area to volume ratio and metabolic rate.</p> <p>Calculate surface area to volume ratios when supplied with cell/organism dimensions.</p>	GCSE surface area calculations.	<p>Revise surface area in organisms:</p> <p>https://www.bbc.co.uk/bitesize/guide/s/zwyfxf/revision/2</p>	<p>Complete some questions.</p> <p>Past exam paper material:</p> <p>BIOL2 June 2012 Q1a</p> <p>BIO3X 2013 EMPA</p>	How is surface area increased in the small intestine?
	DNA, genes and chromosomes	<p>Explain what a species is.</p> <p>Appreciate the difficulties in defining the term species.</p> <p>Explain the role of courtship and why it is necessary.</p> <p>Interpret information and data relating to courtship displays.</p> <p>Explain the hierarchical taxonomic ranks used in the classification of species.</p> <p>Interpret phylogenetic trees</p>	GCSE species Classification.	<p>Define what a species is and find some example of species from the different kingdoms.</p>	<p>Search these exam questions.</p> <p>BIOL2 June 2009 – Q7</p> <p>BIOL2 June 2012 – Q6b</p> <p>BIOL2 June 2013 – Q9</p> <p>BIOL2 Jan 2010 – Q10 (except 10f)</p> <p>BIOL2 Specimen paper Q8</p>	<p>What is the difficulty in applying this definition to species such as bacteria?</p> <p>If a mutation were to affect the ability of a group of individuals to perform elements of a courtship display correctly, suggest what this would mean for them and why it might be significant in terms of speciation?</p>

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week25	Exchange and transport	<p>Describe the internal structure of a leaf.</p> <p>Explain how the structure is an adaptation allowing efficient gas exchange.</p> <p>Explain what a xerophytic plant is.</p> <p>Explain the adaptations that xerophytic plants have.</p>	<p>GCSE leaf structure.</p> <p>Transpiration.</p>	<p>GCSE revision</p> <p>https://www.bing.com/videos/riverview/relatedvideo?q=transpiration&mid=4B85CE67C4FF769B14AC4B85CE67C4FF769B14AC</p>	<p>Research some xerophytic plants and try to identify some adaptations.</p>	<p>Give an example of a xerophytic plant and how it is adapted.</p> <p>How may the stomata adapted to reduce water loss?</p> <p>Define transpiration.</p>
	DNA, genes and chromosomes	<p>Explain how the results of genetic sequencing and immunological analysis can help us to update our understanding of evolutionary relationships.</p> <p>Interpret results from genetic and immunological analysis, to draw valid conclusions as to evolutionary relationships between organisms.</p>	<p>GCSE</p> <p>Genes</p> <p>Evolution</p>	<p>Learn how the immune system has evolved:</p> <p>https://www.youtube.com/watch?v=r7ee1qaUKi0</p>	<p>Search for the assessment material:</p> <p>Past exam paper material:</p> <p>BIOL2 Jan 2012 – Q6</p> <p>BIOL2 June 2011 – Q7</p>	<p>Explain why determining the similarity of DNA sequences for common genes is a valid way of determining evolutionary relationships.</p>

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 26	Exchange and transport	<p>Describe the structure of insect tracheal systems.</p> <p>Describe the structure of fish gills.</p> <p>Explain how fish gills are adapted to maximise gas exchange.</p>	GCSE dissections of heart.	<p>Learn how to draw a scientific drawing:</p> <p>Microscope Drawings - Biology A-level - YouTube</p>	<p>Watch a fish gill dissection. https://www.youtube.com/watch?v=IfjIY2ffkl</p> <p>Or look for a locust dissection.</p>	Explain the adaptations present in fish gills and insect tracheal systems.
	DNA, genes and chromosomes	<p>Explain what is meant by biodiversity, species richness and index of diversity.</p> <p>Calculate the index of diversity.</p> <p>Interpret information and draw conclusions from the index of diversity for different habitats.</p> <p>Explain how farming techniques impact on biodiversity.</p>	GCSE biodiversity and conservation.	Find out what biodiversity is and why it is important.	<p>Specimen assessment material:</p> <p>A-level Paper 1 (set 1) – Q3.</p> <p>AS Paper 2 (set 1) – Q6.</p> <p>AS Paper 2 (set 1) – Q7.</p>	<p>Define what we mean by the terms: biodiversity; species richness; and index of diversity.</p> <p>Why is the index of diversity a more useful measure than counting the number of species in an area?</p> <p>Explain some of the ways in which farming causes a reduction in biodiversity.</p>

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 27	Exchange and transport	<p>Describe the structure of the human gas exchange system.</p> <p>Explain the role of ventilation in terms of maintaining diffusion gradients.</p> <p>Explain the mechanism of breathing in terms of the action of the diaphragm muscle ,external and internal intercostal muscles and the pressure changes they cause.</p>	<p>GCSE:</p> <p>Lung structure</p> <p>Adaptations</p> <p>Diffusion</p>	Find an unlabelled diagram of the lungs and see if you can still add the labels from GCSE.	<p>Past exam paper material: BIOL1 Jan 2013 – Q1</p> <p>BIOL1 Jan 2012 – Q2</p> <p>BIOL1 June 2010 – Q2</p> <p>BIOL4 June 2012 – Q6</p>	<p>Compare and contrast the human gas exchange system with that of an insect or a fish.</p> <p>The trachea and bronchi have C-shaped rings of cartilage, but the bronchioles do not. Suggest the advantages of this.</p>
	DNA, genes and chromosomes	<p>Explain how the results of DNA hybridisation and biochemical analysis can be used to show relationships between different organisms.</p> <p>Interpret data from DNA hybridisation or biochemical analysis.</p> <p>Explain how gene technology has changed the way in which relationships between organisms are worked out.</p>	GCSE DNA genes	Research gene technologies.	<p>Revise DNA hybridisation</p> <p>https://www.youtube.com/watch?v=3LtoKy-XiCo</p>	Explain how gene technology has changed the way in which relationships between organisms are worked out

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 28	Exchange and transport	<p>Explain the process of gas exchange, related to blood circulation and ventilation.</p> <p>Describe the features of the squamous epithelium and explain how the squamous epithelium is adapted to maximising gas exchange.</p>	GCSE gas exchange.	Find a picture of a squamous epithelial cell – draw this and then find out where these cells are found.	<p>Past exam paper material:</p> <p>BIOL1 June 2013– Q3</p> <p>BIOL1 June 2012 – Q3</p> <p>BIOL1 June 2009 – Q6</p> <p>BIOL1 June 2010 – Q7b</p> <p>BIOL1 Jan 2010 – Q2</p>	Describe the features of the squamous epithelium.
	DNA, genes and chromosomes	<p>Explain how random samples can be obtained.</p> <p>Explain what standard deviation is and how it is calculated.</p> <p>Represent raw and processed data clearly using tables and graphs.</p>	GCSE Sampling	<p>Pre-prepare for standard deviation.</p> <p>https://www.youtube.com/watch?v=MRqtXL2WX2M</p>	<p>Past exam paper material:</p> <p>BIOL2 Jan 2013 – Q4</p> <p>BIOL2 Jan 2012 – Q7</p> <p>BIOL4 June 2010 – Q7a</p>	Design a quantitative investigation into variation e.g., the effect of light intensity on leaf size. This should include:

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 29	Exchange and transport	<p>Interpret information relating to the effects of lung disease on gas exchange and/or ventilation.</p> <p>Analyse and interpret data associated with specific risk factors and the incidence of lung disease.</p> <p>Recognise correlations and causal relationships.</p>	GCSE Lungs and smoking.	What are the health risks of smoking? - NHS (www.nhs.uk)	<p>Write definitions for FEV1 FVC Tidal volume</p> <p>Or Research further on one of the diseases you have learnt about this week.</p>	<p>What is a risk factor?</p> <p>Describe the symptoms of emphysema.</p> <p>What is asbestos?</p>
	DNA, genes, and chromosomes	<p>Interpret data in terms of means and the overlap of standard deviation bars.</p> <p>Apply knowledge of, to draw and explain conclusions.</p> <p>Evaluate the quality of results and reliability of conclusions.</p>	AS Sampling, standard deviation.	Look over notes from last lesson.	<p>Check out this practical on variation. https://practicalbiology.org/environment/factors-affecting-plant-growth</p>	<p>Complete the exam question. BIO3T ISA Q11</p>

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 30	Digestion and absorption	<p>Explain the general roles of organs within the digestive system and where key events in digestion happen.</p> <p>Explain the role of different enzymes in the digestive process and relate the specificity of enzymes back to protein structure.</p> <p>Explain how endopeptidases and exopeptidases increase protein digestion.</p> <p>Explain the role of bile.</p>	GCSE digestion	<p>Research bile</p> <p>Find out where it is made/stored and its role in the human body.</p>	<p>Write out a model answer for the following:</p> <p>Describe the role of enzymes in protein digestion.</p>	Why do vitamins and minerals do not require digestion?
	Revision					
Week 31	Digestion and absorption	<p>Recall the adaptations of intestinal epithelial cells to exchange.</p> <p>Explain the absorption of amino acids and glucose against a concentration gradient by co-transport.</p> <p>Explain the role of micelles in the absorption of lipids.</p>	<p>GCSE : small intestine</p> <p>AS co transport.</p>	Revisit co-transport.	<p>Exam questions to search:</p> <p>Past exam paper material:</p> <p>BIOL1 June 2009 – Q7b</p> <p>BIOL1 June 2011 – Q8b</p> <p>BIOL1 June 2009 – Q7b</p>	Explain the mechanisms by which each of the products of digestion is absorbed.
	Revision					

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 32	Mass transport	<p>Describe the structure of the circulatory system.</p> <p>Link the structure of the circulatory system to its role.</p> <p>Relate this knowledge to explain oxygen.</p> <p>Describe the structure of haemoglobin and the Bohr effect.</p>	<p>GCSE/AS haemoglobin</p> <p>GCSE circulatory system.</p>	Revisit haemoglobin and the Bohr effect.	<p>Past exam paper material:</p> <p>BIOL2 – June 2009 Q1a–1b</p>	Why do humans need a double circulatory system?
	Revision					
Week 33	Mass transport					
	Revision					

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 34	Mass transport	<p>Describe and label the structure of the heart.</p> <p>Explain the role of the atrio-ventricular and semilunar valves and coronary artery.</p> <p>Explain the cardiac cycle and the opening and closing of AV and semilunar valves.</p> <p>Analyse and interpret data relating to pressure and volume changes during the cardiac cycle.</p> <p>Compare and contrast the structure and function of different blood vessels.</p> <p>Explain what tissue fluid is and how it is formed.</p>	GCSE The heart Blood vessels	<p>Revise GCSE topics on the heart: What do valves do?</p> <p>What does the heart look like?</p>	<p>Revise the cardiac cycle: https://www.youtube.com/watch?v=KmNHqgrFqG8</p>	Describe the journey of a red blood cell around one circuit of the body, naming the main blood vessels and the chambers of the heart.
	Revision					

	Topic Area(s)	Learning Objectives	GCSE links	Pre-lesson task	Revision task	Extra questions
Week 35	Mass transport	<p>Explain the role of the xylem in plants.</p> <p>Explain the cohesion-tension theory of water transport.</p> <p>Explain the factors which affect transpiration.</p> <p>Explain the role of the phloem in plants.</p> <p>Explain the mass flow hypothesis as a mechanism for translocation.</p> <p>Interpret evidence from tracer and ringing experiments and evaluate the evidence for and against the mass flow hypothesis.</p>	GCSE Xylem and phloem	<p>Learn how water moves up a plant.</p> <p>https://www.youtube.com/watch?v=GAdCykR7MR</p>	<p>Use your book to make more notes on the mass flow hypothesis.</p> <p>Then answer the following questions:</p> <p>BIOL2 Jan 2013 – Q5</p> <p>BIOL2 June 2013 – Q8a</p> <p>A-level Paper 1 (set 1) – Q9.</p> <p>AS Paper 2 (set 1) – Q9.</p>	<p>Explain how ringing and tracer experiments prove the mass flow hypothesis through the phloem.</p> <p>What causes translocation by mass flow?</p>

AQA A Level Biology



Assessment Information:

All students will sit 3 external examinations at the end of year 13, which will cover content from both years of the A-Level. The exams are a mix of short and long written answers, calculations and multiple-choice questions. See the summary below for more information.

Students will also be required to complete 12 Required Practicals over the 2 years. Skills will be assessed during these practicals through observations and questioning during the practical, and by the content of the written work in the student's lab book after the practical. Students must show consistent competency in these skills to obtain the practical accreditation on their Biology A-Level.

Paper 1
What's assessed <ul style="list-style-type: none">Any content from topics 1–4, including relevant practical skills
Assessed <ul style="list-style-type: none">written exam: 2 hours91 marks35% of A-level
Questions
Paper 2
What's assessed <ul style="list-style-type: none">Any content from topics 5–8, including relevant practical skills
Assessed <ul style="list-style-type: none">written exam: 2 hours91 marks35% of A-level
Questions <ul style="list-style-type: none">76 marks: a mixture of short and long answer questions15 marks: comprehension question
Paper 3
What's assessed <ul style="list-style-type: none">Any content from topics 1–8, including relevant practical skills
Assessed <ul style="list-style-type: none">written exam: 2 hours78 marks30% of A-level
Questions <ul style="list-style-type: none">38 marks: structured questions, including practical techniques15 marks: critical analysis of given experimental data25 marks: one essay from a choice of two titles

Practical Skills Assessments:

Students must complete practicals demonstrating use of key apparatus and techniques. They are also required to show competency of the CPAC statements below throughout their practical work.

Competency	Practical mastery
1. Follows written procedures	a. Correctly follows written instructions to carry out experimental techniques or procedures.
2. Applies investigative approaches and methods when using instruments and equipment	a. Correctly uses appropriate instrumentation, apparatus and materials (including ICT) to carry out investigative activities, experimental techniques and procedures with minimal assistance or prompting. b. Carries out techniques or procedures methodically, in sequence and in combination, identifying practical issues and making adjustments when necessary. c. Identifies and controls significant quantitative variables where applicable, and plans approaches to take account of variables that cannot readily be controlled. d. Selects appropriate equipment and measurement strategies in order to ensure suitably accurate results.
3. Safely uses a range of practical equipment and materials	a. Identifies hazards and assesses risks associated with these hazards, making safety adjustments as necessary, when carrying out experimental techniques and procedures in the lab or field. b. Uses appropriate safety equipment and approaches to minimise risks with minimal prompting.
4. Makes and records observations	a. Makes accurate observations relevant to the experimental or investigative procedure. b. Obtains accurate, precise and sufficient data for experimental and investigative procedures and records this methodically using appropriate units and conventions.
5. Researches, references and reports	a. Uses appropriate software and/or tools to process data, carry out research and report findings. b. Cites sources of information demonstrating that research has taken place, supporting planning and conclusions.

Rationale

A Level Biology is taught according to the AQA scheme of work A. This means we follow a topic-by-topic approach and interleave sections where appropriate. The qualification is linear. Linear means that students will sit all the A-level exams at the end of their A-level course.

In the second year of the course, students will be expected to be able to draw on knowledge from both years of study and bring together their learning in a synoptic way. Practical skills are assessed throughout the year according to the CPAC guidance shared between exam boards.

AS level (year 12)

3.1 Biological molecules

3.2 Cells

3.3 Organisms exchange substances with their environment

3.4 Genetic information, variation, and relationships between organisms

A level (year 13)

3.5 Energy transfers in and between organisms (A-level only)

3.6 Organisms respond to changes in their internal and external environments (A-level only)

3.7 Genetics, populations, evolution, and ecosystems (A-level only)

3.8 The control of gene expression (A-level only)

Students are given the opportunity to practice exam questions throughout the course and answers are modelled by teachers. Lessons are designed to build on student's prior knowledge ensuring that they have a solid foundation before exploring A level content. Interleaving and retrieval opportunities are embedded throughout the year.

This learning plan allows students to take accountability for their own learning outside of the classroom to increase their chance of success in lessons and in the subject itself.

Below are some resources the students should equip themselves with before they begin the course:

Key Resources (textbooks/videos/websites)

Resource	Where to find it.	How to use it.
AQA Biology specification	https://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF	It is a good idea to work through the specification when revising – making sure you are familiar with every point of the upcoming topics. Highlighting sections, you are familiar with means you can use it as a ‘revision list’
A level textbook	The school should have loaned you this. But here is an amazon link (there also a kindle version available). https://www.amazon.co.uk/New-Level-Biology-2018-Complete/dp/1789080266/ref=sr_1_4?crid=3J6GALNF0ZK1Y&keywords=aqa+a+level+biology&qid=1693564568&prefix=aqa+a+level+biology+%2Caps%2C3038&sr=8-4	Use this to pre-read on topics before lessons or to produce extra notes when revising. The book breaks down a lot of the information in a student friendly way.
Physics and Maths Tutor (exam questions and revision notes for all A-Level sciences)	https://www.physicsandmathstutor.com/	Has a lot of past exam papers with mark schemes and worksheets arranged by topics – practice weekly to familiarise yourself with exam technique.
Revisely AQA biology	https://www.revisely.com/alevel/biology/aqa	A great website where you can find notes for all the topics as well as video tutorials and exam questions. Use if you need to catch up with a lesson or need further explanation. First read the notes then watch the video tutorial to really embed the information.
YouTube – Primrose kitten playlist	https://www.youtube.com/watch?v=UMxYHES27Rc&list=PL7O6CcKg0HaEfeG3hzl1bxTVYikTBliAJ	These videos summarise entire topics into one video – Use it to catch up on a topic or revise before a test. Make sure to pause and understand the content (make some notes!) to get the best out of this resource.
YouTube – Miss Estruch	https://www.youtube.com/watch?v=DxGU-8GYm5g&list=PLOfYYglrtVMjNF1xtpVSwo9TOn8ucxWUV	These videos summarise entire topics into one video – Use it to catch up on a topic or revise before a test. Make sure to pause and understand the content (make some notes!) to get the best out of this resource.

Year 13

Two teachers will be teaching two different topics co-currently, the different colour shades represent the two different topics.

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 1	Retrieval	Recall key concepts from year 12.	Recall on AS topics.	Read through your notes from last year or watch a YouTube video summarising the content.	Produce a mind map on the genetic key terms. Revise co-transport.	Describe some adaptations of the small intestine.
	Retrieval	Recall key concepts from year 12.	Recall on AS topics.	Read through your notes from last year or watch a YouTube video summarising the content.	Revise DNA replication. Watch a video on the mass flow hypothesis.	Describe the role of RNA in DNA replication.
Week 2	Retrieval	Recall key concepts from year 12.	Recall on AS topics.	Read through your notes from last year or watch a YouTube video summarising the content.	Revise Xerophytic plants and their adaptations. Revisit your notes on the fluid mosaic model.	How does the structure of the membrane make it partially permeable?
	Photosynthesis	Describe the structure of chloroplasts. Explain the role of light in photolysis and photoionization. Explain chemiosmosis and the role of ATP synthase in producing ATP.	GCSE photosynthesis AS ATP/chloroplasts	Revise chloroplast structure: https://www.youtube.com/watch?v=S04c8e-O8ks	Define the terms photolysis and photoionization at the end of your notes. Make sure you are familiar with the enzymes involved in photosynthesis. Watch this video if you need more help. https://www.youtube.com/watch?v=yyR9anIP6hs	What roles does light play in this process? How is ATP produced? How is reduced NADP produced?

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 3	Inheritance	<p>Explain the meaning of the key terms:</p> <ul style="list-style-type: none"> • gene • allele • genotype • phenotype • homozygous • heterozygous. 	GCSE genetics definitions.	<p>Recall these definitions.</p> <p>https://www.youtube.com/watch?v=xA3-piUUQWg</p>	<p>Practice using the following flash cards:</p> <p>https://quizlet.com/1876981/genetics-terms-flash-cards/</p>	What is wrong with this statement: “he had two blue eyed genes which meant he had blue eyes”?
	Photosynthesis	<p>Explain where the light-independent reaction occurs.</p> <p>Describe the Calvin cycle.</p> <p>Explain the roles of reduced NADP and ATP.</p>	AS ATP production and uses.	<p>Look over the light dependent reaction again.</p>	<p>Watch this video on the light independent reaction – make sure you can summarise both reactions:</p> <p>https://www.youtube.com/watch?v=G8bRxIIKAoE</p>	How is the chloroplast adapted to maximising the rate of photosynthesis in the stroma?
Week 4	Inheritance	<p>Define what is meant by dominant and recessive alleles and describe how to represent these.</p> <p>Draw genetic diagrams to predict offspring genotypes and phenotypes.</p>	GCSE punnet squares.	<p>Complete the punnet square for XX female and XY male.</p>	<p>Search for these exam questions:</p> <p>BIOL4 June 2013 – Q3a–b</p> <p>HBIO4 June 2013 – Q4</p> <p>HBIO4 June 2010 – Q6</p>	Two heterozygous parents who can roll their tongue have 3 children. All 3 offspring can roll their tongue. They then fall pregnant with a 4th child. Does this mean that this one will be unable to roll their tongue?
	Photosynthesis	<p>Explain what is meant by limiting factors.</p> <p>Interpret graphs showing the rate of photosynthesis and explain graphs in terms of which factors are rate limiting.</p> <p>Explain how farmers seek to maximise crop growth.</p>	GCSE limiting factors of photosynthesis.	<p>Revisit photosynthesis practical on pondweed:</p> <p>https://www.youtube.com/watch?v=id0aO_OdFwA</p>	<p>Past exam paper material:</p> <p>BIOL4 Jan 2011 – Q5</p> <p>BIOL4 June 2014 – Q3c</p> <p>BIO6X 2013 EMPA</p>	Describe the effect that carbon dioxide has on photosynthesis.

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 5	Inheritance	<p>Set a null hypothesis.</p> <p>Explain what the chi-squared test is used for and use it to compare observed values against those predicted from genetic crosses.</p> <p>Interpret chi-squared tests in terms of probability and chance.</p>	GCSE Punnet squares.	Find a definition for null hypothesis.	<p>Here is a simplified version of null hypothesis: https://www.youtube.com/watch?v=0bRp4o6ltTO</p> <p>BYA5 Jan 2003 – Q8a–8b</p>	<p>Why should you use chi-squared for inheritance investigations?</p> <p>What is the null hypothesis for this?</p>
	Respiration	<p>Explain the significance of the oxidation reactions involved in glycolysis, the link reaction and the Krebs cycle.</p> <p>Explain the roles of coenzymes and reduced NAD in respiration.</p> <p>Describe the process of electron transfer associated with oxidative phosphorylation.</p> <p>Explain chemiosmosis and the role of ATP synthase in producing ATP.</p>	GCSE Respirations. AS level ATP	Recall the respiration equation.	<p>Search for these exam questions:</p> <p>BIOL4 Jan 2012 – Q8b</p> <p>BIOL4 June 2013 – Q4</p> <p>BIOL4 June 2010 – Q6</p> <p>BIOL5 Jun 2014 – Q9</p>	Describe what happens in the electron transport chain.

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 6	Inheritance	<p>Define what is meant by codominant alleles and describe how to represent these.</p> <p>Draw genetic diagrams of codominant monohybrid crosses to predict offspring genotypes and phenotypes.</p> <p>Use the chi-squared test to compare observed values against those predicted from genetic crosses.</p>	GCSE: Alleles	<p>What does co-dominant mean?</p> <p>Research the definition.</p>	<p>Watch the video to summarise your learning:</p> <p>https://www.youtube.com/watch?v=sWbQadFCso</p>	Describe what is meant by co-dominance.
	Respiration	<p>Describe the process of anaerobic respiration in animals and some microorganisms.</p> <p>Explain the advantage of producing ethanol or lactate using reduced NAD.</p> <p>Compare and contrast aerobic and anaerobic respiration.</p>	GCSE Respiration: Aerobic and anaerobic respiration.	<p>Produce a table comparing aerobic and anaerobic respiration.</p>	<p>Get ready for the upcoming required practical: Make sure to make notes.</p> <p>https://www.youtube.com/watch?v=JLzBYTQkTI</p>	Write an essay on the processes involved in aerobic respiration.
Week 7	Inheritance	<p>Describe how to represent alleles in crosses involving multiple alleles.</p> <p>Draw genetic diagrams to predict offspring genotypes and phenotypes.</p> <p>Use the chi-squared test to compare observed values against those predicted from genetic crosses.</p>	<p>GCSE Alleles Punnet squares. Meiosis.</p> <p>AS meiosis</p>	<p>Revisit your notes on meiosis.</p>	<p>Complete the exam question:</p> <p>BIOL4 June 2014 – Q4c</p>	Describe the process of meiosis.

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
	Respiration	<p>Explain how plants utilise the sugars from photosynthesis.</p> <p>Explain what is meant by biomass and how it can be measured.</p> <p>Explain the process of calorimetry.</p>	GCSE Biomass	<p>Watch this video on calorimetry:</p> <p>https://www.youtube.com/watch?v=TomgHXgMx6Y</p> <p>Find the meaning of biomass.</p>	<p>Exam practice.</p> <p>Past exam paper material:</p> <p>BIOL4 June 2014 – Q7ci</p>	Explain how you could ensure that biomass was completely dry before weighing.
Week 8	Inheritance	<p>Explain what is meant by sex-linked genes and describe how to represent these.</p> <p>Draw genetic diagrams of sex-linked crosses.</p> <p>Use the chi-squared test to compare observed values against those predicted from genetic crosses.</p>	GCSE punnet squares, genetic diagrams.	Revisit the chi squared test.	<p>Complete the exam questions:</p> <p>BIOL4 Jan 2012 – Q5</p> <p>BIOL4 Jan 2013 – Q3</p> <p>BIOL4 June 2013 – Q3bii</p> <p>BIOL4 June 2014 – Q4a-4b</p> <p>BYA5 June</p>	Explain what is meant by sex-linked genes
	Energy in ecosystems	<p>Explain the concepts of gross primary production and net primary production.</p> <p>Explain the reduction in energy/biomass along a food chain.</p> <p>Explain the concept of net production in consumers, linked to how energy losses occur along food chains.</p>	GCSE Food chains	Research the best type of diet for the environment.	<p>Complete the following:</p> <p>BIOL4 Jan 2013 – Q8b</p> <p>BIOL4 June 2010 – Q4</p> <p>BIOL4 June 2011 – Q2</p> <p>BIOL4 Jan 2010 – Q8b</p>	<p>Why do humans tend to rear herbivores as their source of meat?</p> <p>How is energy lost along a food chain?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 9	Inheritance	<p>Draw genetic diagrams of dihybrid crosses to predict offspring genotypes and phenotypes.</p> <p>Use the chi-squared test to compare observed values against those predicted from genetic crosses.</p>	GCSE Punnet squares.	Find out what you can about dihybrid crosses.	<p>Use the video to consolidate your knowledge: https://www.youtube.com/watch?v=qIGXTJLrLf8</p> <p>Try these exam questions:</p> <p>BYA5 Jan 2005 – Q7</p> <p>BYA5 Jan 2009 – Q6</p> <p>BYB4 June 2006 – Q6</p>	Define the term genotype and phenotype.
	Energy in ecosystems	<p>Explain the ways in which farmers are reducing respiratory losses within a human food chain.</p> <p>Interpret and calculate data on efficiency when provided with appropriate information.</p> <p>Evaluate the ethics of some of these farming practices.</p>	GCSE Respiration	<p>Use this video to revise all the lessons in topic 5 you have already done.</p> <p>https://www.youtube.com/watch?v=cZHb5cKFIqs</p>	<p>Continue to use this video – it may help to make a mind map.</p> <p>https://www.youtube.com/watch?v=cZHb5cKFIqs</p>	<p>How could farmers improve efficiency?</p> <p>Evaluate the advantages and disadvantages of using these methods.</p>
Week 10	Inheritance	<p>Apply knowledge to calculate the predicted frequencies of genotypes and phenotype of offspring, using fully labelled diagrams, when supplied with appropriate information.</p> <p>Use the chi-squared test to compare observed values against those predicted from genetic crosses.</p>	GCSE punnet squares.	Revisit the last few lessons.	<p>Try these questions:</p> <p>Specimen assessment material:</p> <p>A-level Paper 2 (set 1) – Q3.</p>	

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
	Energy in ecosystems	Describe the stages of the phosphorus cycle, and the ions at each stage. Explain the role of saprobionts and mycorrhizae in the phosphorus cycle.	GCSE Nutrient cycles.	Research Why is phosphorus important?	Draw a diagram of the phosphorus cycle – practice doing this from memory. Produce a glossary of key terms.	Explain the significance of phosphorus to living things. What role do saprobionts and mycorrhizae play?
Week 11	Inheritance	Revision and exam practice.			Practice inheritance and punnet square using the exam booklet your teacher gives you.	
	Energy in ecosystems	Describe the stages of the nitrogen cycle, and the ions/ molecules at each stage. Explain the processes of saprobiotic nutrition, ammonification, nitrification, nitrogen fixation and denitrification within the nitrogen cycle.	GCSE The nitrogen cycle.	Watch this video: https://www.youtube.com/watch?v=UrP1E-yM7Cs	Use pictures or a poster to summarise the nitrogen cycle. Complete the exam questions: BIOL4 June 2011 – Q8a BIOL4 June 2014 – Q2	Explain the significance of nitrogen to living things. Write an equation for the conversions which occur during ammonification; nitrogen fixation; denitrification; nitrification.
Week 12	Populations	Define what is meant by the term ‘population’. Explain what is meant when we refer to allele frequencies and a gene pool. Explain why some genotypes cannot be determined by looking at phenotypes.	GCSE recall Alleles Variation Phenotypes	Find out what is meant by a gene pool.	Try these questions: BYA5 Jan 2005 – Q8a BYA5 June 2003 – Q4a	Is the dominant allele more common in a population than the recessive allele? Explain your answer. Is it possible to work out the genotypes of everyone in a population for a particular feature? Explain your answer.
	Energy in ecosystems	Explain why farmers utilise natural and artificial fertilisers. Explain how eutrophication is caused, and what the impact is on the ecosystem in which it happens.	GCSE Fertilisers Eutrophication	Research what do fertilisers contain.	Describe what happens during eutrophication – use a diagram to depict this.	Suggest steps that could be taken to reduce eutrophication from farmland.

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 13	Populations	<p>Explain what the Hardy-Weinberg principle predicts.</p> <p>Describe and explain the mathematical equations used to express allele and genotype frequencies.</p> <p>Apply knowledge of the Hardy-Weinberg equation to exam questions.</p>	Chi-squared test.	Makes some notes on mendelian genetics.	<p>Use this if you struggled with the maths:</p> <p>https://www.youtube.com/watch?v=oG7ob-MtO8</p>	<p>What assumptions does the Hardy-Weinberg principle make?</p> <p>Do these principles apply in practice?</p> <p>Why must both equations be equal to 1?</p>
	Energy in ecosystems.	Revision			<p>Produce a mind map of the topic or answer some exam questions.</p> <p>https://www.revisely.com/alevel/biology/aqa</p>	
Week 14	Populations	<p>Explain why individuals within a population of a species may show a wide range of variation in phenotype.</p> <p>Explain what is meant by selection and how it is linked to inheritance of alleles by the next generation and adaptation.</p> <p>Explain the concept of differential reproductive success.</p>	<p>GCSE Genotype, alleles, phenotype.</p> <p>AS natural selection.</p>	Revisit natural selection.	<p>Try these exam questions:</p> <p>HBIO4 Jan 2013 – Q3</p> <p>HBIO4 June 2011 – Q4 and Q10e</p>	Explain why siblings are so varied, even though they have the same parents.
	Energy in ecosystems.	Revision			Read through your revision notes – make revision cards or condense your notes into a mind map.	

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 15	Populations	<ul style="list-style-type: none"> Recall what is meant by allele frequency. Explain what is meant by stabilising, directional, and disruptive selection in the context of the effect that each has on phenotypes and allele frequencies. 	GCSE Alleles AS Directional selection.	Recall what is meant by allele frequency	Try these exam questions. BIOL4 June 2011 – Q6bii. BIOL4 Jan 2010 – Q1d. BIOL4 June 2014 – Q5.	What kind of selection is shown in the example of <i>Biston Betula Ria</i> ? Justify your answer.
	Energy in ecosystems	Revision			Read through your revision notes – make revision cards or condense your notes into a mind map.	
Week 16	Populations	<p>Explain what is meant by allopatric and sympatric speciation.</p> <p>Explain how natural selection and isolation may result in change in the allele and phenotype frequency and lead to the formation of a new species by allopatric speciation and sympatric speciation.</p> <p>Explain possible mechanisms for sympatric speciation.</p>	GCSE Species and natural selection.	<p>List the different types of speciation mentioned in this video.</p> <p>https://www.youtube.com/watch?v=fAajKkjjLCQ</p>	<p>Make a table summarising the different types of speciation.</p> <p>Attempt this exam question: BIOL4 June 2013 – Q6</p>	<p>Explain what happens to cause speciation.</p> <p>How do the mechanisms of reproductive separation differ in allopatric and sympatric speciation?</p>

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	Stimuli, responses and nervous system.	<p>Explain what is meant by phototropism/ gravitropism/positive and negative tropisms.</p> <p>Describe where IAA is produced and its effects.</p> <p>Explain how IAA causes positive phototropism in shoots and roots.</p>	GCSE Plants and their functions.	Find out what auxins are.	<p>Learn more on plant tropisms and hormones.</p> <p>https://www.youtube.com/watch?v=RqCqUEu9nY4</p>	<p>Explain phototropism in stems.</p> <p>Explain gravitropism in roots.</p>
Week 17	Populations	<p>Explain the process of genetic drift and its impact on allele frequencies.</p> <p>Explain how genetic drift differs from natural selection.</p> <p>Explain why genetic drift is important only in small populations</p>	GCSE genetics	Find out what genetic drift is.	<p>Watch this video to understand the topic – make extra notes if you need to.</p> <p>https://www.youtube.com/watch?v=OEQ4Q_srefA</p>	<p>How is genetic drift fundamentally different to natural selection?</p> <p>Why does genetic drift only have noticeable effects in small populations?</p>
	Stimuli, responses and nervous system.	<p>Explain what is meant by taxes and kinesis and how they differ.</p> <p>Explain how taxes and kinesis aid survival.</p>	GCSE Responses of animals.	Search up choice chambers and how they work.	<p>Practical preparation: CHOICE CHAMBER Required Practical: A-level Biology practical with maggots or woodlice studying taxes - YouTube</p>	<p>Explain how a taxis and a kinesis differ. How might each manifest itself in the movement of the animal?</p>
Week 18	Populations	<p>Define the terms community, biotic, abiotic, ecosystem and niche.</p> <p>Explain what is meant by the carrying capacity of a population.</p> <p>Explain why no two species have the same niche.</p>	GCSE abiotic and biotic factors.	Make a list of abiotic and biotic factors in grassland.	<p>Complete these exam questions:</p> <p>BIOL4 Jan 2012 – Q1a and Q1c</p> <p>BIOL4 Jan 2012 – Q4</p> <p>BIOL4 – June 2012 – Q3</p>	<p>Why do no two species have the same niche?</p> <p>What happens when niches overlap?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
	Stimuli, responses and nervous system.	<p>Explain the role of reflexes.</p> <p>Explain the role of sensory, intermediate and motor neurones in a reflex arc.</p> <p>Explain the sequence of events which brings about a reflex action.</p>	GCSE Reflex arc Neurones	<p>Recall GCSE reflex arc – try this quiz:</p> <p>GCSE Biology – Reflex arcs – Primrose Kitten</p>	Write out a step-by-step process of the reflex action that takes place when you touch a sharp object.	Why are reflex actions much quicker than voluntary responses?
Week 19	Populations	<p>Describe and explain the techniques of sampling at random using quadrats, and systematic sampling using transects.</p> <p>Describe the different measures of abundance that can be measured.</p> <p>Explain how sampling at random can be done to avoid bias.</p>	GCSE sampling techniques/quadrats.	<p>Revise sampling techniques:</p> <p>https://www.youtube.com/watch?v=HLX76gdXgTA</p>	Produce a mind map of all the different ways a population can be sampled.	When is it more appropriate to use a transect?
	Stimuli, responses and nervous system.	<p>Explain the features of sensory reception which are common to all receptors.</p> <p>Describe the structure of a Pacinian corpuscle and how it works.</p>	GCSE Receptors Responses	Find out where receptors are found in the body and what the different receptors detect.	Now try this quiz: Receptors – Pacinian corpuscle – Primrose Kitten	Explain how a Pacinian corpuscle produces a generator potential in response to a specific stimulus.

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Week 20	Populations	<p>Explain the technique of mark-release-recapture and when it would be appropriate to use this technique.</p> <p>Explain why careful consideration must be given to the method used to mark animals.</p> <p>Explain the assumptions which must be made during mark-release-recapture.</p>	GCSE Sampling.	Write down what you think the mark-release-recapture means.	<p>Try this mini practical at home:</p> <p>https://www.youtube.com/watch?v=b0eMQQvltY</p>	Why might it be inappropriate to put a brightly coloured mark on an animal?
	Stimuli, responses and nervous system.	<p>Identify the pigments in rod and cone cells.</p> <p>Explain how rod and cone cells' visual acuity, sensitivity to light and sensitivity to colour are accounted for by the presence of rhodopsin/iodopsin and connections to the optic nerve.</p>	GCSE The eye, Receptors.	<p>Review the structure of the eye:</p> <p>https://www.youtube.com/watch?v=GS66ojslteU</p>	<p>Watch an eye dissection video:</p> <p>https://www.youtube.com/results?search_query=the+eye+dissection</p>	<p>Why are rods able to respond to low light intensity?</p> <p>Why do we see in greater detail when the image is focussed on the fovea?</p>

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Week 21	Populations	<p>Required practical 12 Propose a null hypothesis to test.</p> <p>Design an experiment to investigate the effect of a named factor on the distribution of a given species, considering the need for data to be reliable.</p> <p>Suggest what you will do for variables which cannot be controlled.</p> <p>Represent raw and processed data clearly using tables and graphs.</p> <p>Select and use an appropriate statistical test and interpret the P value that results in terms of probability and chance.</p>	GCSE: Sampling.	Revise sampling techniques.	Spend some time planning your experiment and fixing your lab book.	Describe what is meant by a null hypothesis.
	Stimuli, responses and nervous system.	<p>Describe/locate structures, which are responsible for events during the cardiac cycle.</p> <p>Explain the events which take place during the cardiac cycle to produce and transmit a wave of electrical activity to make the heartbeat.</p> <p>Explain the roles of the SAN, AVN and bundle of His.</p>	GCSE The heart AS The cardiac cycle	Look over your notes on the cardiac cycle.	<p>Print out an unlabelled diagram of the heart and label in the SAN, AVN, bundle of His and purkinje fibres.</p> <p>Produce a flow diagram of the generation of a heartbeat.</p>	<ul style="list-style-type: none"> What is meant by the term 'myogenic'?

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Week 22	Populations	<p>Explain what succession is.</p> <p>Explain how succession causes changes to ecosystems over time.</p> <p>Explain the impact of environmental changes on biodiversity.</p> <p>Apply knowledge to unfamiliar contexts</p>	GCSE Biodiversity	What does the word succession mean to you?	<p>Try searching these at home.</p> <p>BIOL4 June 2012 – Q1</p> <p>BIOL4 June 2013 – Q2</p> <p>BIOL4 Jan 2011 – Q8a</p> <p>BIOL4 Jan 2010 – Q6</p>	Why does succession begin with a pioneer species?
	Stimuli, response and nervous system	<p>Describe the location of, and the role played by, chemoreceptors and baroreceptors.</p> <p>Explain what is meant by the sympathetic and parasympathetic nervous system.</p> <p>Explain the role of the autonomic nervous system in controlling heart rate.</p> <p>Explain the role of the medulla oblongata.</p>	GCSE Nervous system.	Research the role of the parasympathetic and sympathetic nervous system.	<p>Search for these exam questions.</p> <p>BIOL5 June 2012 – Q4</p> <p>HBIO4 June 2013 – Q2</p>	<p>What is the difference between the sympathetic and parasympathetic nervous system?</p> <p>What could act as a stimulus to change the heart rate?</p> <p>Where are chemoreceptors and pressure receptors located?</p> <p>How does the medulla oblongata increase/reduce heart rate?</p>

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Week 23	Populations	<p>Use knowledge and understanding to present scientific arguments and ideas relating to the conservation of species and habitats.</p> <p>Evaluate evidence and data concerning issues relating to the conservation of species and habitats and consider conflicting evidence.</p> <p>Know that management of succession can involve preventing succession occurring to maintain a desired community.</p>	GCSE Conservation and biodiversity.	Read over your notes from last lesson.	<p>Try these exam questions:</p> <p>BYB6 Jan 2005 – Q2</p> <p>BYB6 Jan – 2004 Q7c.</p>	<p>What is conservation?</p> <p>Why does conservation often involve managing succession?</p>
	Stimulus, response and nervous system	<p>Describe and explain the structure of a myelinated motor neurone. (Saltatory conduction)</p> <p>Explain what is meant by a resting and an action potential.</p> <p>Explain the events in establishing a resting/acting potential.</p> <p>Explain how action potentials pass along unmyelinated neurones.</p> <p>Describe what nodes of Ranvier are.</p>	GCSE Neurone structure.	<p>Revise the structure of neurones.</p> <p>https://www.bbc.co.uk/bitesize/guides/zpkhcj6/revision/1</p>	<p>Watch this video to help understand the topic better.</p> <p>https://www.youtube.com/watch?v=BFXK7Dc-AJY</p>	<p>How is a resting potential established?</p> <p>How is the membrane potential reversed during an action potential?</p> <p>What is the all or nothing principle?</p>

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Week 24	Gene expression	<p>Describe what happens in substitution, addition, deletion, inversion, duplication, and translocation mutations.</p> <p>Explain how mutations can arise spontaneously, and the effect that mutagenic agents have on the rate of mutation.</p> <p>Relate the nature of a gene mutation to its effect on the encoded polypeptide.</p>	AS mutagenic agents.	Review your notes on mutations.	<p>Make a mind map or revision cards on the different types of mutation.</p> <p>Or</p> <p>Try the following:</p> <p>BIOL5 June 2012 – Q1a-1c</p> <p>BIOL5 June 2014 – Q1</p> <p>HBIO4 Jan 2013 – Q10b</p> <p>HBIO4 June 2011 – Q10c</p>	<p>What is meant by a frame shift mutation?</p> <p>Explain why some types of mutation might not result in a change to the structure of the polypeptide that is produced.</p>
	Stimuli, responses and nervous system	<p>Explain the importance of the refractory period.</p> <p>Explain the factors which affect the speed of nerve impulse conduction.</p> <p>Calculate an appropriate statistical test and interpret values in terms of probability and chance.</p>	GCSE Neurones	Look over notes from last lesson.	<p>Exam practice</p> <p>A-level Paper 2 (set 1) – Q4.1 and 4.4.</p> <p>BIOL5 June 2013 – Q10a</p> <p>BIOL5 June 2010 – Q3</p>	<p>What are nodes of Ranvier?</p> <p>Why is conduction along myelinated neurones quicker than along unmyelinated ones?</p>
Week 25	Gene expression	<p>Define what a stem cell is.</p> <p>Explain the characteristics of totipotent, pluripotent, multipotent and unipotent stem cells, and the sources of each type.</p> <p>Explain how induced pluripotent cells can be produced and why they are of interest.</p> <p>Evaluate the use of stem cells in treating human disorders.</p>	GCSE stem cells	<p>Revise stem cells</p> <p>https://www.bbc.co.uk/bitesize/guides/z2kmk2p/revision/3</p>	<p>Now watch this video to summarise the types of stem cells – add to your notes in a different coloured pen.</p> <p>https://www.youtube.com/watch?v=Yb92uVjFB_0</p>	<p>How do plants and mammals differ in relation to differentiation?</p> <p>Why is only a small proportion of a cell's DNA translated when it specialises?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
	Stimulus, responses and nervous system	<p>Explain the functions of synapses and detail its structure.</p> <p>Explain the sequence of events involved in transmission of an action potential from one neurone to another.</p> <p>Explain why synaptic transmission is unidirectional.</p> <p>Explain temporal, spatial summation, and inhibition by inhibitory synapses.</p>	GCSE Synapses and neurones	Recall synapses https://www.bbc.co.uk/bitesize/guides/zpkhcj6/revision/1	<p>Produce summary notes on this week's lessons. Use these notes to help you.</p> <p>A-Level AQA Biology Notes - Responses to Changes in Environment - Nervous System - Revisely</p> <p>Research how drugs can affect transmission through synapses.</p>	Explain how the synapse structure and events involved in synaptic transmission allow for unidirectionality, spatial and temporal summation and inhibition by inhibitory synapses.
Week 26	Gene expression	<p>Explain what a transcription factor is and describe their role in gene expression.</p> <p>Describe the mechanism by which oestrogen can initiate transcription.</p> <p>Explain what epigenetics is, and what happens to the DNA or histone to modify gene expression.</p> <p>Explain how epigenetic control can cause disease, and how it could be used to treat disease.</p>	AS transcription.	Revise transcription and translation. https://www.youtube.com/watch?v=ubdoUqmNF98	Find out more about epigenetic control: https://www.nature.com/articles/nrg.2016.59	<p>Why is oestrogen able to directly enter the cell?</p> <p>What is a transcriptional factor?</p> <p>How does oestrogen stimulate/activate transcription factors?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
	Stimuli, responses and nervous system	<p>Explain what a neuromuscular junction is.</p> <p>Explain transmission across a neuromuscular junction by release of acetylcholine and compare this to synaptic transmission.</p> <p>Explain how muscle fibres stimulated to contract by one motor neurone act as a motor unit.</p>	<p>GCSE neurones. Synapses.</p>	<p>Watch this 2-minute video to get a good insight into NM junctions.</p> <p>https://www.youtube.com/watch?v=E6SuVmeqs2o</p>	<p>Past exam paper material:</p> <p>HBIO4 Jan 2011 – Q5</p> <p>HBIO4 Jan 2010 – Q7a and 7c</p> <p>BIOL5 June 2013 – Q7c</p>	<p>What effect does acetylcholine have on the postsynaptic membrane?</p> <p>In what ways is the transmission across a neuromuscular junction like transmission across a (excitatory) cholinergic synapse?</p>
Week 27	Gene expression.	<p>Explain how gene expression can be inhibited by RNA interference of translation. (siRNA).</p> <p>Describe the characteristics of benign and malignant tumours.</p> <p>Explain the role of oncogenes/tumour suppressor genes, abnormal methylation and increased oestrogen concentrations in the development of cancer.</p>	<p>GCSE Benign and malignant tumours.</p> <p>AS level: RNA</p>	<p>Research oncogenes.</p>	<p>Here is more on the link between oestrogen and cancer:</p> <p>https://www.cancerresearchuk.org/about-cancer/coping/physically/sex-hormone-symptoms/sex-hormones</p>	<p>What effect does DNA methylation have on gene expression? Why?</p> <p>Why is RNA interference specific to mRNA from a particular gene?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
	Stimuli, responses and nervous system.	<p>Explain the role of skeletal muscle, linked to the role of tendons and joints.</p> <p>Explain what is meant by a myofibril and sarcomere and how actin and myosin are arranged within a myofibril.</p> <p>Label diagrams of a sarcomere.</p> <p>Explain the importance of the release of calcium/actin/myosin ions in myofibril contraction. (Sliding filament theory).</p>	GCSE Muscles, ATP antagonistic.	<p>Write down roles of</p> <ul style="list-style-type: none"> • Tendons • Joints • Ligaments. 	<p>Complete one of these questions</p> <p>HBIO4 June 2012 – Q3a.</p> <p>HBIO4 Jan 2013 – Q9a–9b</p> <p>HBIO4 Jun 2012 – Q3b</p> <p>HBIO4 Jan 2011 – Q10a–10b</p> <p>HBIO4 June 2010 – Q4a–4b</p>	<p>What is a myofibril?</p> <p>In which bands/zone would you find:</p> <p>a) Myosin?</p> <p>b) Actin?</p> <p>Explain the presence of large amounts of mitochondria and endoplasmic reticulum in the sarcoplasm.</p>
Week 28	Gene technologies	<p>Explain the principles of gel electrophoresis in separating DNA fragments.</p> <p>Explain what is meant by recombinant DNA technology.</p> <p>Explain what is meant by a restriction endonuclease and how they work to leave sticky ends.</p>	AS Recombinant chromosomes.	<p>Watch this video:</p> <p>https://www.youtube.com/watch?v=ZDZUAleWX78</p>	<p>Now try this exam question.</p> <p>BIOL5 June 2013 – Q8c</p> <p>Or watch this video on gel electrophoresis:</p> <p>https://www.youtube.com/watch?v=eXE2bEd04RI</p>	<p>What is cDNA?</p> <p>Why would it be inappropriate to produce cDNA of the human insulin gene by trying to find mRNA in a small intestine epithelial cell?</p> <p>What is meant by the term palindromic recognition sequence?</p>
	Stimuli, responses and the nervous system.	<p>Explain the role of phosphocreatine in muscle fibres.</p> <p>Explain differences in the properties of slow and fast skeletal muscle fibres.</p>	GCSE Muscles and movement, mitochondria, energy, exercise.	<p>Learn about muscle twitch fibres:</p> <p>Fast and Slow Twitch Muscle Fiber Types (verywellfit.com)</p>	<p>Practice using these exam questions.</p> <p>BIOL5 June 2013 – Q2b</p> <p>BIOL5 June 2010 – Q7</p> <p>HBIO4 Jan 2013 – Q9c</p>	<p>Why is phosphocreatine used by athletes?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 29	Gene technologies	<p>Describe the process of PCR in amplifying DNA fragments.</p> <p>Explain the role of primers and Taq polymerase in PCR.</p> <p>Explain the processes of strand separation, primer annealing, and strand synthesis.</p> <p>Evaluate the pros and cons of using PCR to clone DNA fragments over in vivo methods</p>	<p>GCSE DNA</p> <p>AS DNA replication.</p>	Recall the enzymes involved in DNA replication.	<p>Watch this animation on PCR technology:</p> <p>PCR (Polymerase Chain Reaction) - YouTube</p>	
	Homeostasis.	<p>Define what homeostasis is and why it is important.</p> <p>Explain what is meant by negative and positive feedback.</p> <p>Explain the general stages involved in negative feedback, and why these are used in homeostatic mechanisms.</p>	GCSE Homeostasis.	Write down a list of body conditions that must be controlled by homeostasis.	<p>Practice these exam questions.</p> <p>BYA6 June 2005 – Q2</p> <p>BYB6 June 2005 – Q5</p> <p>BYA6 Jan 2005 – Q3</p> <p>Or complete this quiz:</p> <p>Quiz: Homeostasis A Level Biology</p>	<p>Explain how blood pH might fall and how the body would rectify this.</p> <p>Explain the consequence to enzymes of</p> <ol style="list-style-type: none"> a fall in body temperature a rise in body temperature.

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 30	Gene technologies	<p>Explain what gene cloning is and why it is important in a range of applications.</p> <p>Explain the importance of the addition of promoter and terminator regions.</p> <p>Explain the importance of the use of restriction enzymes and sticky ends.</p> <p>Explain the use of marker genes and replica plating.</p>	<p>GCSE Cloning</p> <p>Genetic modification.</p>	<p>Review modern methods of cloning:</p> <p>https://www.youtube.com/watch?v=FjBgLIE7514</p>	<p>Complete these exam questions:</p> <p>HBIO4 Jan 2013 – Q10c</p> <p>HBIO4 Jan 2011 – Q9b</p>	<p>What is the purpose of adding DNA primers?</p> <p>Why is Taq polymerase used in the PCR?</p> <p>How many fragments would you have after 20 cycles of PCR?</p>
	Homeostasis	<p>Explain how hormones bring about changes in blood glucose concentration.</p> <p>Explain the role of the pancreas, specifically the α and β cells of the Islets of Langerhans.</p> <p>Define the terms: glycogenesis, glycogenolysis and gluconeogenesis.</p> <p>Explain the stages involved in negative feedback response to changes in blood glucose concentration.</p>	<p>GCSE homeostasis.</p>	<p>Read through the textbook page page 158. Write a list of all the long words on diabetes. Use these as a glossary later.</p>	<p>Complete your glossary either in lesson or after the lesson.</p>	<p>What roles do the α cells of the Islets of Langerhans play in regulating blood glucose concentration?</p> <p>What roles do the β cells of the Islets of Langerhans play in regulating blood glucose concentration?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 31	Gene technologies	<p>Evaluate the ethical, financial and social issues associated with the use and ownership of recombinant DNA technology in agriculture, in industry and in medicine.</p> <p>Balance the humanitarian aspects of recombinant DNA technology with the opposition from environmentalists and anti-globalisation activists.</p>	AS level Gene technologies.	Begin researching issues associated with recombinant DNA technology.	Produce an essay on the issues associated with a gene technology you have learnt about in this topic.	<p>What are the potential benefits to mankind of transgenic/GM organisms?</p> <p>What are the valid objections that some people must using recombinant DNA technology?</p>
	Homeostasis	<p>Explain what triggers the release of adrenaline and how this affects blood glucose concentration.</p> <p>Explain the second messenger model related to adrenaline and glucagon action.</p> <p>Describe the role of adenylate cyclase, cyclic AMP and protein kinase in the second message model.</p> <p>Explain the causes and treatments of type I and II diabetes.</p>	GCSE diabetes.	Look over your notes from last lesson.	<p>Complete the exam question:</p> <p>BIOL5 June 2012 – Q6a</p> <p>HBIO4 Jan 2010 – Q3b</p> <p>HBIO4 June 2013 – Q8</p> <p>BIO6T – Q13 ISA Section B</p>	<p>When is adrenaline released?</p> <p>Suggest how the binding of glucagon and adrenaline to liver cell surface receptors can activate enzymes inside the cells of the liver.</p> <p>Explain the causes of types I and II diabetes.</p> <p>Why do diabetics have to manage their carbohydrate intake?</p> <p>Why can glucose concentration in urine be used as a means of diagnosing diabetes?</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 32	Gene technologies	<p>Explain the principles of gene therapy.</p> <p>Explain the use of liposomes and viruses in delivering genes into cells.</p> <p>Explain the difference between somatic and germ line therapy, and why germ line therapy is prohibited.</p> <p>Evaluate the effectiveness and risks of gene therapy.</p>	<p>GCSE and AS Viruses.</p> <p>AS genetics.</p>	<p>Find out what a liposome is.</p> <p>Write a few sentences to begin your notes.</p>	<p>Research further on gene therapy:</p> <p>https://www.genome.gov/genetics-glossary/Gene-Therapy</p>	<p>Why are viruses used in some forms of gene therapy?</p> <p>Why does gene therapy become less effective with successive treatments?</p>
	Homeostasis	<p>Describe the structure of a nephron.</p> <p>Explain how each part of the nephron is involved in controlling blood water potential.</p> <p>(Ultrafiltration ,selective reabsorption)</p> <p>Explain the importance of maintaining a sodium ion gradient in the medulla, and how this is achieved.</p> <p>Explain the role of the hypothalamus and posterior pituitary gland in osmoregulation and the hormones involved.</p>	<p>GCSE Controlling water concentration, osmosis.</p>	<p>Watch this ted talk:</p> <p>https://www.youtube.com/watch?v=FN3MFhYPWWo</p>	<p>Complete this revision quiz:</p> <p>Homeostasis quiz questions - Footprints-Science GCSE science animations and quizzes</p>	<p>Describe the function of the glomerulus.</p>

	Topic Area(s)	Learning Objectives	Recall opportunities	Pre-lesson task	Revision task	Extra questions
Week 33	Gene technologies	<p>Explain how DNA probes and hybridisation are used to locate specific alleles.</p> <p>Explain the benefits and issues of screening for genetic diseases.</p> <p>Evaluate information relating to screening individuals for genetically determined conditions and drug responses.</p>	<p>GCSE Genetic diseases.</p> <p>AS Genetics.</p>	Find out about downs syndrome – the causes, symptoms and treatments.	<p>Complete these exam questions:</p> <p>BIOL5 June 2014 – Q8</p> <p>HBIO4 Jan 2013 – Q10e</p> <p>HBIO4 Jan 2011 – Q10</p>	<p>Why are some people concerned about having screening for a wide range of genetic diseases and predispositions?</p> <p>What can genetic counsellors provide advice on, and what can they not advise on?</p>
	Revision				Complete exam questions, produce a mind map or condense your notes.	
Week 34	Gene technologies	<p>Describe how a genetic fingerprint is produced.</p> <p>Explain what variable number tandem repeats are.</p> <p>Explain the applications of genetic fingerprinting.</p> <p>Interpret genetic fingerprint patterns and draw conclusions.</p>	AS Genetics	<p>How to dust a fingerprint.</p> <p>How to dust and lift a fingerprint - YouTube</p>	<p>A little more on the topic.</p> <p>How does DNA fingerprinting work? - YouTube</p>	<p>Why might PCR be used with DNA fingerprinting?</p> <p>Why are forensics officers so careful to avoid contaminating a crime scene?</p>