

Applied General Science

AQA (1777)



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family 6th

<https://www.aqa.org.uk/subjects/science/applied-general/science>

Assessment Information:

All students will sit 2 external examinations in year 12, and 1 in year 13. All students will submit 1 coursework portfolio in year 12, and 2 in year 13.

External exams are a mixture of long answer, short answer, calculations, and multiple-choice questions. They are all 1 hour and 30 minutes with a total mark of 60 per paper.

Coursework in year 12 is a series of essays and lab reports based on biology, chemistry, and physics practicals. Year 13 coursework is a mixture of essays and lab reports on a scientific investigation and medical physics.

	Unit title	Assessment type	Ofqual unit reference
Mandatory			
1	Key concepts in science	Written exam	J/507/6497
2	Applied experimental techniques	Portfolio	L/507/6498
3	Science in the modern world	Written exam with pre-release material	R/507/6499
4	The human body	Written exam	A/507/6500
5	Investigating science	Portfolio	F/507/6501
Optional			
6a	Microbiology	Portfolio	J/507/6502
6b	Medical physics	Portfolio	L/507/6503
6c	Organic chemistry	Portfolio	R/507/6504

Rationale

In year 12, Applied General Science is taught by 2 or 3 specialist science teachers as separate strands incorporating biology, chemistry, and physics. This content is externally assessed in Unit 1 Key concepts in science. In addition, there is one unit 3 (Science in the modern world) lesson per week until Christmas in preparation for an external exam based on pre-release material that is provided in November. After this the fourth lesson will be shared between the separate sciences as needed. Unit 2 is taught alongside unit 1 in the separate sciences.

In year 13 Applied General Science is taught by Assessment Objective. Unit 4 (The human body) is taught in separate strands by 2 specialist science teachers in preparation for external examination in January. These strands are not dependent on each other and can be taught in any order. After Christmas unit 5 and 6b are taught alongside each other until the portfolio submission date in May.

The Applied Science Certificate is awarded if units 1, 2 and 3 are completed

The Extended Certificate is awarded on successful completion of units 1, 2, 3, 4, 5 and 6

Each individual unit receives a UMS score between 0 and 100. These UMS scores are then added to give the total UMS and overall grade as shown below.

Qualification grade	Certificate (300 UMS available)	Extended Certificate (600 UMS available)	Grade boundary as percentage of total UMS
Distinction*	270–300	540–600	90 %
Distinction	240–269	480–539	80 %
Merit	180–239	360–479	60 %
Pass	120–179	240–359	40 %

A student may pass the qualification if he/she has the required total number of uniform marks and no more than one N (near miss) grade in the Certificate or two N grades in the Extended Certificate. An N (near-miss) will be awarded on all units when the student has a uniform mark of between 30 and 39.

Key Resources (textbooks/videos/websites)

Resources that will help the students with their independence, homework and revision. Copies of any resources can be placed in the LRC or on the shared drive for students to access.

Applied Science Padlet	https://padlet.com/HFCS/appsci
Exam board website	www.aqa.org.uk
Unit 1 Biology Textbook	On Share Drive/Class Charts
Unit 1 Chemistry Textbook	On Share Drive/Class Charts
Unit 1 Physics Textbook	On Share Drive/Class Charts
Unit 4 Textbook	On Share Drive/Class Charts
AQA Chemistry Textbook	Copy in LRC
AQA Physics Textbook	Copy in LRC
AQA Biology Textbook	Copy in LRC
A selection of GCSE and A level science textbooks and revision guides	In the LRC

Year 12 – Half term 1 (September – October)

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Week 1	Biology Ultrastructure of cells.	<p>ultrastructure of eukaryotic and prokaryotic cells on electron micrographs.</p> <p>identify the organelles of a cell on an electron micrograph.</p> <p>differences between eukaryotic and prokaryotic cell structure</p>	<p>GCSE Cells.</p> <p>Respiration and photosynthesis</p>	Rabbits' life processes sheet		Use the biology textbook on Class charts to add to your notes from the lesson this week.
	Chemistry Atomic Structure	<p>atomic structure in terms of protons, neutrons, electrons, relative mass and relative charge.</p> <p>the terms: atomic (proton) number (Z), mass number (A), isotope and isotopic abundance</p> <p>electron configurations for atoms and ions up to Z = 36 in terms of shells</p>	GCSE Nuclear model of the atom.	Electron Configuration Worksheet	www.chemguide.co.uk/atoms/properties/gcse.html	Produce individual booklets (used for revision), using correct scientific nomenclature.
	Unit 3	<p>To know topical scientific issues and the related scientific ideas.</p> <p>To practice interpretation of both textual and numerical scientific information from the media and Demonstrate clear understanding of the content.</p>	What is a journal article	Read 3 different articles from the pre-reading list and summarise them into 50 words, make sure to carefully interpret the data in the article.	<p>Topical articles on science and the environment from the BBC: www.bbc.co.uk/news/science_and_environment</p> <p>Institute of Science in Society www.i-sis.org.uk/index.php</p>	<p>Reading Chernobyl Resource Pack</p> <p>Articles on science related to humans and society from New Scientist magazine www.newscientist.com/subject/humans</p>

Week 2	Biology Functions of Organelles	To learn and be able to recall the functions of nuclei, SER, RER, mitochondria, vesicles, lysosomes, Golgi apparatus, chloroplasts, vacuoles, cell walls, ribosomes, flagella, nucleoid, plasmids, mesosomes, pili, slime capsules	Eukaryotic and prokaryotic cells. Names of organelles. Functions of some organelles from GCSE.	Cell comparison sheet		Use the biology textbook on share drive to add to your notes from the lesson this week.
	Chemistry Atomic Structure	the origin of coloured flame emission spectra and of colour in transition metal compounds in terms of electron transmissions	Electron shells and orbitals. Energy is needed to move electrons.	Watch video: https://www.youtube.com/watch?v=1BCc_RrrSSw In a perfect paragraph, summarise the video.	www.science-projects.com/fes/FlameEmissions.htm	
	Unit 3	To process data acquired from the media and determine the usefulness and appropriateness of these data. To present data in an appropriate form.			Topical science news from the Centers for Disease Control and Prevention: www.cdc.gov	
Week 3	Biology DNA and RNA	To recall facts about DNA from GCSE. To know the nucleic acid structure (DNA/RNA). To compare DNA and RNA.	Names and functions of some organelles. Bonding, shape and function of DNA from GCSE.			Watch the video below to add to your notes. https://www.youtube.com/watch?v=HRga77i64nY

	Chemistry Atomic Structure	Calculating relative atomic mass, relative molecular mass and relative formula mass in terms of ^{12}C	P, N and E Isotopes	Practice calculations https://www.youtube.com/watch?v=DgnqpqXrhzs	www.bbc.co.uk/schools/gcsebitesize/science/add_gateway_pre_2011/chemical/reactingmassesrev1.shtml	
	Unit 3	To learn how scientific knowledge is developed and used when communicating with different audiences. To learn the differences in approach and style used by the media when communicating with scientists and wider society To learn how scientists publish and share their work, including peer reviewing			A rough guide to spotting bad science http://compoundchem.com/wp-content/uploads/2014/04/Spotting-Bad-Science.pdf Ben Goldacre's 'Bad Science' blog, covering media misrepresentations of science, with a particular focus on medicine https://www.badscience.net/	
Week 4	Biology Microscopy	Use an optical microscope and prepare slides. To calculate magnification or object size using: magnification = observed size / actual size	Recall parts of microscope, how to make a basic cell slide. Organelles and functions			Use the microscope simulator to write a method for observing slides on a microscope. https://www.ncbionetwork.org/iet/microscope/

	Chemistry Periodic Table	The Periodic Table: <ul style="list-style-type: none"> • that it lists elements in increasing order of proton number • how electron configuration is linked to position in PT • how properties change across periods. 	Define atoms and elements. P, N and E Groups and periods Trends		www.dummies.com/how-to/content/the-periodic-table.html	
	Unit 3	To learn ways in which data, hypothesis, argument and theory are gained and used To learn how society and the media interact with science; that the media give scientists a platform for explaining their work, and provide the public with a way to understand the key scientific features.			Guardian newspaper article, 'Science not helped by the media' https://www.theguardian.com/education/2002/sep/04/highereducation.uk1 Sense About Science – a charitable trust that equips people to make sense of scientific and medical claims in public discussion www.senseaboutscience.org NHS Choices – 'How to Read Health News' On share drive	

Week 5	Biology Fluid Mosaic Model	<p>Know the structure of cell membranes as a phospholipid bilayer with proteins interspersed.</p> <p>To know the function of intrinsic proteins, including their role in facilitated diffusion and active transport</p> <p>To know the function of extrinsic proteins.</p>	<p>Structure of proteins</p> <p>Transport of substances across membranes.</p>			<p>Watch the following video to make notes on cell membranes.</p> <p>https://www.youtube.com/watch?v=ipa1vmQ7H4</p> <p>https://www.khanacademy.org/science/ap-biology/cell-structure-and-function/membrane-permeability/a/fluid-mosaic-model-cell-membranes-article</p>
	Chemistry Periodic Table	<ul style="list-style-type: none"> • how, across a period (row) properties of elements change from metallic to non-metallic • the properties (including radii, ionisation energy and electronegativity) of: <ul style="list-style-type: none"> • the s-block elements • the d-block metals (including the transition metals and their coloured compounds in solution) • Group VII, the halogens • Group 0, the noble gases 	<p>Define atoms and elements.</p> <p>P, N and E</p> <p>Groups and periods</p> <p>Trends</p>	<p>Plot graphs which show trends in properties</p>	<p>www.rsc.org/learn-chemistry/resource/res00000409/the-reactivity-of-the-group-2-metals?cmpid=CMP0000479</p> <p>www.s-cool.co.uk/gcse/chemistry/metals-the-reactivity-series/revise-it/properties-of-metals-and-non-metals</p>	<p>Use the Unit 1 Chemistry revision guide uploaded on Class Charts to revise the Periodic Table topic</p>

	Unit 3	<p>To learn the benefits and drawbacks of topical scientific advances and how these are represented in the media, eg GM crops, fracking.</p> <p>To learn the environmental and commercial considerations associated with these advances, and any health and safety implications</p>			<p>Ethics, morality and biotechnology http://resources.schoolscience.co.uk/BB/SRC/ethics/ethics_a_nimal_biotech.pdf</p> <p>Greenpeace website www.greenpeace.org.uk</p> <p>Friends of the Earth website www.foe.co.uk</p>	
Week 6	Biology Transport of Substances	<p>To know the difference between diffusion, facilitated diffusion, active transport and osmosis.</p> <p>To carry out a practical investigating diffusion in agar cubes.</p>	<p>Structures in cell membrane.</p> <p>Functions of structures in cell membrane.</p>			http://www.a-levelnotes.co.uk/biology-aga-as-notes-cells-transport-across-cell-membranes.html
	Chemistry Amount of substance	<p>Moles the mole as the amount of a substance that always contains the same number of entities (e.g. atoms, molecules, ions, electrons)</p> <p>the relationship between mass of substance and amount in moles</p>	<p>Calculations from GCSE</p> <p>Atoms</p>	Calculations to practice using $n = \frac{\text{mass}}{M_r}$	www.bbc.co.uk/bitesize/higher/chemistry/calculations_1/mole/revision/1/	

	Unit 3	<p>To learn the social, ethical and moral matters which might be raised by scientific advances, eg animal research, drug trials, transplants</p> <p>To learn how the media treat these social, ethical and moral issues</p> <p>To learn the importance of national and/or local political pressure groups in influencing scientific advancements.</p>			<p>Resources from the Biotechnology and Biological Sciences Research Council (BBSRC) www.bbsrc.ac.uk/engagement/schools</p> <p>Stem cells – science and ethics www.bbsrc.ac.uk/engagement/schools/keystage5/stem-cells</p> <p>Genewatch, a not-for-profit group that monitors developments in genetic technologies from a public interest, human rights, environmental protection and animal welfare perspective www.genewatch.org</p>	
Week 7	Biology Consolidation and Application	To link ideas from the topic and practice exam style questions.	Linking big ideas across cells and transport.	NA	NA	NA

	Chemistry Amount of substance	Concentrations of Solutions concentrations of solutions in terms of mol dm ⁻³ and g dm ⁻³	Calculations from GCSE	Calculations to practice using $C = n/v$	Practice rearranging the two moles formulae and make sure you know the correct units to use https://filestore.aqa.org.uk/sample-papers-and-mark-schemes/2019/june/AQA-17751-INS-JUN19.PDF	https://www.chemguide.co.uk/14to16/calculations/solutions.html#top
	Unit 3	the varied roles that scientists can perform in an organisation, the scientifically-related skills, techniques and experience needed to undertake specific roles and responsibilities within an organisation the roles and responsibilities associated with science personnel within an organisation the benefits of scientific roles to society the relations between science personnel in an organisation.			https://nationalcareers.service.gov.uk/job-categories/science-and-research	

Year 12 – Half term 2 (November to December)

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Week 1	Biology The heart	key structures of the heart including bicuspid valve, tricuspid valve, mitral valves, sinoatrial node (SAN), atrioventricular node (AVN), Purkinje fibres, bundle of His				https://www.youtube.com/watch?v=y1DsaAzYamQ
	Chemistry Amount of substance	<ul style="list-style-type: none"> molecular formulas empirical formulas 	GCSE maths - ratios			Use an A level Chemistry textbook from the LRC to read about this topic
	Unit 3	Use information about topical scientific issues obtained from a variety of media sources		Produce glossary of all technical and unfamiliar terminology in sources A to D	https://nij.ojp.gov/topics/articles/next-generation-crime-tools-and-challenges-3d-printing	Reading Forensics sources, A to D
Week 2	Biology The heart	<ul style="list-style-type: none"> myogenic stimulation of the heart the role of the SAN, AVN, Purkinje fibres and bundle of His in cardiac stimulation the role of carbon dioxide chemoreceptors and baroreceptors in controlling heart rate artificial pacemakers as treatment for arrhythmia (abnormal heart rate), and how they work to re-establish normal heart rate the advantages and disadvantages of different types of artificial pacemakers 		Exam questions practice	https://studymind.co.uk/notes/controlling-heart-rate/	

	Chemistry Amount of substance	<ul style="list-style-type: none"> the relationship between volume of gas at RTP and STP and amount in moles 			https://docbrown.info/page04/4_73calcs09mvg.htm	https://docbrown.info/page04/4_73calcs09mvg.htm
	Unit 3	Understand the public perception of science and the influence that the media have		Carry out your own research on any parts of the four sources that you do not fully understand		Reading and annotating Forensics sources, A to D
Week 3	Biology Homeostasis	<ul style="list-style-type: none"> how homeostasis involves physiological control systems that maintain the internal environment within restricted limits, i.e. <ul style="list-style-type: none"> body temperature range is 35.8°C–37.5°C blood glucose range is 82–110 mg/dL blood pH range is 7.35–7.45 negative feedback as a homeostatic mechanism e.g. controlling water retention using anti-diuretic hormone (ADH, also known as vasopressin) produced by the pituitary gland 	GCSE Biology control topic		https://www.youtube.com/watch?v=XMSJ-3qRVJM	
	Chemistry Amount of substance	<ul style="list-style-type: none"> Writing balanced equations for typical reactions including: <ul style="list-style-type: none"> acid-base neutralisation thermal decomposition acid/metal acid/carbonate precipitation combustion reactions 	Balancing chemical equations from GCSE		Exam Qs	Recap balancing chemical equations from GCSE – use any GCSE revision guide or textbooks online/inLRC

	Unit 3	Understand the ethical, moral, commercial, environmental, political and social issues involved in scientific advances, and how these are represented in the media.			https://blog.drupa.com/de/forensic-3d-printing/	Summarise each of the four sources into 50 words, make sure to carefully interpret the data in the article.
Week 4	Biology Homeostasis	<ul style="list-style-type: none"> the roles of the pancreas and liver in regulating blood glucose concentration the body's normal system for regulating blood glucose concentration: <ul style="list-style-type: none"> action of insulin in activating enzymes to convert glucose to glycogen action of glucagon in activating enzymes to convert glycogen to glucose action of adrenaline in activating enzymes to convert glycogen to glucose 	GCSE Biology Animal coordination, control and homeostasis		https://www.nhs.uk/conditions/diabetes/	
	Chemistry Amount of substance	<ul style="list-style-type: none"> calculating reacting masses based on correct stoichiometries 	Reacting masses – GCSE chemistry			Read up on reacting masses – GCSE chemistry textbook
	Unit 3	Understand the roles and responsibilities that science personnel carry out in the science industry		Produce a table listing all the scientific jobs mentioned in the 4 sources. Include information on roles and responsibilities	https://nationalcareers.service.gov.uk/job-categories/science-and-research	

Week 5	Biology Homeostasis	<p>the causes of Types I and II diabetes and their control</p> <p>the control of Types I and II diabetes and their control</p> <p>how health professionals and patients with diabetes use physiological measurements to inform diagnosis and treatment of diabetes, including the use of:</p> <p>fasting glucose levels</p> <p>urine dipsticks</p> <p>urine dipsticks</p> <p>blood glucose 'pinprick' tests</p>			https://www.nhs.uk/conditions/diabetes/	Use textbooks from LRC to make notes and research type 2 diabetes
	Chemistry Amount of substance	<p>plotting and interpreting pH curves</p> <ul style="list-style-type: none"> • equivalence point of an acid-base titration • how the choice of indicator for an acid-base titration depends on the types (strengths) of acid and base used and the resulting pH titration curve 		Exam Qs	https://raci.org.au/comm/Uploaded%20files/Website%20files/School/Titration/A%20Guide%20to%20Titration%20(Updated%20Feb%202020).pdf	
	Unit 3	Preparation for January Unit 3 exam			https://www.elgalabwater.com/blog/forensic-analysis-fingermarks-new-banknotes-using-maldi-ms	
Week 6	Chemistry Amount of substance	<ul style="list-style-type: none"> • calculating unknown concentrations and volumes from results involving volumetric analysis (limited to acid-base titrations) 	<p>Chemistry calculations from GCSE</p> <p>Using standard form for small numbers</p>			Revision guide – online or in LRC

Year 12 Half term 3 (January to February)

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Week 1	Biology Homeostasis	<ul style="list-style-type: none"> the roles of the hypothalamus, pituitary and ADH in osmoregulation the different parts of the nephron and their roles including: Bowman's capsule as an ultrafiltration unit convoluted tubules in selective reabsorption of glucose, sodium ions and water the roles of the adrenal cortex, convoluted tubules and aldosterone in the reabsorption of sodium ions 				http://www.a-levelnotes.co.uk/biology-aqa-a2-notes-organisms-respond-to-changes-in-their-internal-and-external-environments-control-of-blood-water-potential.html
	Chemistry Bonding	<ul style="list-style-type: none"> formulas for common cations formulas for common anions (sulfate, carbonate, nitrate, hydroxide) deducing formulas for ionic compounds 		Volumetric calculations		https://www.bbc.co.uk/bitesize/guides/z9fwrwx/revision/5
Week 2	Biology Homeostasis	<ul style="list-style-type: none"> the consequences of sodium chloride (salt) deficiency in the short term and the long term effects on health the circumstances in which certain people may be at risk of losing too much salt why excess salt in the diet might create health problems the consequences of excess/deficiency of ions and hormones on health 			https://www.nhs.uk/live-well/eat-well/food-types/salt-nutrition/	Use the course textbook from the LRC to make notes

	Chemistry Bonding	<ul style="list-style-type: none"> ionic bonding and ionic crystal lattices in terms of strong electrostatic forces of attraction 	GCSE ionic bonding		https://www.youtube.com/watch?v=PNKsbnH1vw8	https://www.bbc.co.uk/bitesize/guides/ztc6w6f/revision/3
Week 3	Biology Breathing and respiration	<ul style="list-style-type: none"> the distinction between breathing and cellular respiration: breathing as a physical, external process cellular respiration as a chemical, internal process methods of monitoring the respiratory system (breathing rate and volumes) 		Exam questions on Homeostasis	https://www.youtube.com/watch?v=k9BWCnnXOG8	
	Chemistry Bonding	<ul style="list-style-type: none"> a covalent bond as a shared pair of electrons multiple bonds, neutral molecules, non-conductors and weak intermolecular forces of attraction 	GCSE bonding topic	Exam Qs ionic bonding		Read up on types of chemical bonding including covalent
Week 4	Biology Breathing and respiration	<ul style="list-style-type: none"> how during cellular respiration, adenosine triphosphate (ATP) is produced by phosphorylation, in which a phosphate group is added to a molecule of adenosine diphosphate (ADP) how ATP is used to release energy for cell activity the stages in respiration of glucose that result in the production of ATP, and the site of each process: glycolysis (in the cell cytoplasm) Krebs cycle (in mitochondria) electron transfer chain (in mitochondria) 				https://www.thesciencehive.co.uk/respiration-a-level
	Chemistry Bonding	<ul style="list-style-type: none"> metallic bonding 	GCSE Bonding		Watch the video https://www.youtube.com/watch?v=b1y2Q6YX1bQ	Watch the video and make notes https://www.youtube.com/watch?v=b1y2Q6YX1bQ

Week 5	Biology Respiration	<ul style="list-style-type: none"> the detailed process of glycolysis the detailed process of the Krebs cycle the detailed process of the electron transfer chain the amount of ATP that can be produced from aerobic and anaerobic pathways 			https://www.thesciencehive.co.uk/respiration-a-level	
	Chemistry Bonding	<ul style="list-style-type: none"> structures of: <ul style="list-style-type: none"> ionic crystal lattices typified by sodium chloride, magnesium oxide metallic lattices typified by magnesium covalent structures typified by iodine, methane, carbon dioxide giant covalent structures (macromolecular), e.g. diamond, graphite, graphene, fullerene drawing diagrams to represent: <ul style="list-style-type: none"> a named ionic lattice a generalised metallic lattice an alloy giant covalent structures including silicon, graphite, graphene 		Drawing a selection of substances to show bonding typed	https://www.bbc.co.uk/bitesize/guides/zwxp8mn/revision/4 Practice drawing the different types of chemical bond – use tabs 4 to 7 from this link	https://www.bbc.co.uk/bitesize/guides/zwxp8mn/revision/4 Practice drawing the different types of chemical bond – use tabs 4 to 7 from this link
Week 6	Biology Respiration	<ul style="list-style-type: none"> what is meant by basal metabolic rate (BMR) and how it can be determined in a laboratory by direct or indirect methods the differences in BMR for males and females, and for different age groups of both genders, using secondary data 			https://www.calculator.net/bmr-calculator.html	
	Chemistry Bonding	<ul style="list-style-type: none"> predicting types of bonding for compounds given their typical properties and vice versa typical properties based on the type of bonding, particles present and forces between particles 		Bonding exam questions		https://www.bbc.co.uk/bitesize/guides/zwxp8mn/revision/4

Week 7	Biology Photosynthesis	<ul style="list-style-type: none"> • photosynthesis as a process of organic carbon capture, to include: • essential raw materials and their sources • two stages in photosynthesis: light-dependent (water hydrolysed into oxygen and hydrogen) and light-independent (hydrogen combines with carbon dioxide to produce carbohydrate) • initial conversion to carbohydrates and subsequent conversions to lipids and proteins 	GCSE Biology – Plant structures and functions	Practice questions on Respiration	Use GCSE textbook or revision guide to read up on photosynthesis	
	Biology Photosynthesis	<ul style="list-style-type: none"> • green plants (producers) as the initiators of food chains • efficiency of food chains, to include: constraints - solar, temperature, water nutrient and space availability for plants 	GCSE Biology – Plant structures and functions		https://www.bbc.co.uk/bitesize/guides/z2mk/39j6/revision/6	
	Biology Photosynthesis	<ul style="list-style-type: none"> • energy transfer out of the food chain through respiration, excretion and movement • gross primary production (GPP) • net primary production (NPP) • biomass / energy pyramids to demonstrate productivity advantages / disadvantages of following a meat-free / reduced meat diet 	GCSE Biology – Plant structures and functions		https://www.bbc.co.uk/bitesize/guides/z2mk/39j6/revision/6	

Year 12 Half term 4 (March to April)

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Week 1	Chemistry Enthalpy changes	<ul style="list-style-type: none"> energy profiles for exothermic and endothermic reactions activation energy using an energy profile types of enthalpy changes from equations (limited to combustion, neutralisation, formation and mean bond enthalpies) units for molar enthalpy change (kJ mol^{-1}) enthalpy changes as the heat energy change (at constant pressure) 	Energy profiles diagrams Energy changes in chemical reactions	https://www.youtube.com/watch?v=-mFtKp_o8D0	Read up on exothermic and endothermic reactions in a GCSE textbook or revision guide	https://www.chemguide.co.uk/physical/energetics/definitions.html
	Chemistry Enthalpy changes	<ul style="list-style-type: none"> enthalpy of formation, enthalpy of combustion and enthalpy of reaction as represented by $\Delta_f H$, $\Delta_c H$ and $\Delta_r H$ the term 'mean bond enthalpy' calculating enthalpy changes based on Hess's Law cycles calculating enthalpy changes based on mean bond enthalpies and why these values are only approximate 	Bond energies – GCSE Chemistry		Bond energies - use LRC textbooks	https://www.bbc.co.uk/bitesize/guides/z8p72hv/revision/4
	Chemistry Enthalpy changes	<ul style="list-style-type: none"> determining practically the molar enthalpy of combustion of a liquid fuel (e.g. ethanol) determining practically the molar enthalpy of neutralisation for a simple acid-base reaction 	KS3 Burning food practical	Enthalpy change exam questions	https://www.chemguide.co.uk/14to16/calculations/thermopractical.html Make notes and make sure to watch the video of the practical	

Week 2	Physics Energy and efficiency	<p>the meaning of 'efficiency', why it is important and why a device can never be 100% efficient</p> <p>methods of improving the efficiency of a system or device</p> <p>the formula for calculating efficiency</p> <p>ways in which efficiency can be increased in mechanical and thermal systems</p>	GCSE Energy stores and transfers	Efficiency calculations	https://www.bbc.co.uk/bitesize/guides/zhhcwmn/revision/1	Recap gravitational potential energy and efficiency from GCSE and add to your lesson notes
	Physics Energy and efficiency	<p>the meaning of 'efficiency', why it is important and why a device can never be 100% efficient</p> <p>methods of improving the efficiency of a system or device</p> <p>the formula for calculating efficiency</p> <p>ways in which efficiency can be increased in mechanical and thermal systems</p>	<p>Calculating efficiency</p> <p>Calculating gravitational potential energy</p>	Exam question on investigating efficiency	https://www.youtube.com/watch?v=v_lhFwiTBal	<p>Look at the past papers available on www.aqa.org.uk</p> <p>Practice exam questions on energy and efficiency</p> <p>Self-assess using the mark scheme</p>
	Physics Energy and efficiency	Recall and describe examples of situations where thermal transfer needs to be maximised and situations where it needs to be minimised	Energy transfer processes – conduction, convection and radiation	Past paper exam questions	https://www.bbc.co.uk/bitesize/guides/zttrd2p/revision/1	Quick Quiz https://www.bbc.co.uk/bitesize/guides/zttrd2p/test

Week 3	Physics Energy and efficiency	Recall and describe examples of situations where thermal transfer needs to be maximised and situations where it needs to be minimised	Experiment design and variables from GCSE	Complete graph and follow up questions from insulation investigation	https://www.bbc.co.uk/bitesize/guides/z2gjt4/revision/3	
	Physics Energy and efficiency	The meaning of U values The formula: $U = \frac{Q}{At\Delta T}$	Interpreting graphs Conduction, convection and radiation	U value practice calculations		https://www.cyberphysics.co.uk/topics/heat/uvalue.htm
	Physics Energy and efficiency	The generation of useful energy from: <ul style="list-style-type: none"> • fossil fuels • nuclear fuels • renewable fuels such as: • solar power • wind power • wave power • tidal power • traditional hydroelectric power • geothermal sources • biomass The advantages and disadvantages of these sources and their suitability for use in a range of contexts	U value calculations	Produce summary table/poster to show the advantages, disadvantages and suitability of these sources	http://www.bbc.co.uk/education/guides/zbsdmp3/revision/1 http://www.bbc.co.uk/education/guides/znn9q6f/revision/1	
Week 4	Physics Energy and efficiency	The generation of useful energy from: <ul style="list-style-type: none"> • fossil fuels • nuclear fuels • renewable fuels such as: • solar power • wind power • wave power • tidal power • traditional hydroelectric power • geothermal sources • biomass The advantages and disadvantages of these sources and their suitability for use in a range of contexts	Recall some advantages and disadvantages of a variety of energy sources	Complete write up of class investigation – solar cells or wind turbines		https://www.education.com/science-fair/article/photovoltaic-cell-efficiency/

	Physics Electricity	What can you remember from GCSE Electricity topic?	Circuit symbols and recognising equipment		https://www.bbc.co.uk/bitesize/guides/z8ykmsg/revision/1	
	Physics Electricity	The behaviour of electric current, voltage and resistance in series and parallel circuits	Building series and parallel circuits	GCSE Electricity exam questions	https://www.bbc.co.uk/bitesize/guides/z8ykmsg/revision/1	
Week 5	Physics Electricity	The formula $I = Q/t$	Symbols and units used for electricity measurements		https://www.bbc.co.uk/bitesize/guides/z8ykmsg/revision/2	
	Physics Electricity	Calculating current, voltage, power and resistance in a range of electrical circuits The formula $I = V/R$	GCSE Electricity calculations			https://www.bbc.co.uk/bitesize/guides/z8ykmsg/revision/3
	Physics Electricity	Calculating the total resistance of a circuit which contains resistors in series, resistors in parallel and a combination The formulas: $R_{total} = R1 + R2 + R3$ $1/R_{total} = 1/R1 + 1/R2 + 1/R3$	GCSE Electricity calculations		Use the Unit 1 Physics revision guide uploaded on Class Charts to learn about resistors in series and parallel	
Week 6	Physics Electricity	Calculating the heating effect of a current rate of heat loss = $I^2 R$ Calculating power using $P = IV$	Power as rate of energy transfer	Past paper exam questions	https://www.bbc.co.uk/bitesize/guides/z8ykmsg/revision/8	Look at the past papers available on www.aqa.org.uk Practice exam questions on Electricity Self-assess using the mark schemes
	Physics Electricity	graphs of V against I to find resistance	Line graph skills		https://www.youtube.com/watch?v=MU16uK13AmM	

	Physics Electricity	<ul style="list-style-type: none"> graphs of voltage against current for a range of components including standard resistors, thermistors and lamps 		https://www.calderlearningtrust.com/high-school/assets/Revision-Materials/Science/GCSE/4.-Practice-Exam-Questions/Y11-Physics-Exam-Questions/Investigative-Skills-Questions-F.pdf		
Week 7	Physics Electricity	<ul style="list-style-type: none"> free electrons and the electrical behaviour of conductors and semiconductors the effect of temperature on the resistance of conductors and semiconductors the behaviour of thermistors and light-dependent resistors (LDRs) 			https://www.bbc.co.uk/bitesize/guides/zppnn39/revision/1	Course textbook in LRC or use the revision guides on Class charts
	Physics Dynamics	<ul style="list-style-type: none"> application of Newton's First Law of Motion to both stationary and moving objects inertia 	GCSE motion and forces topic	GCSE exam questions		https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/newtons-laws-of-motion/
	Physics Dynamics	<ul style="list-style-type: none"> Newton's Second Law of Motion the formula $F = ma$ weight = mg as an example of Newton's Second Law of Motion 	Rearranging equations		https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/newtons-laws-of-motion/	

Year 12 Half term 5 (May to June)

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Week 1	Physics Dynamics	<ul style="list-style-type: none"> representing motion through the use of graphs of displacement against time and velocity against time 	GCSE motion and forces topic	Draw graphs and use to calculate speed, displacement etc.		https://www.bbc.co.uk/bitesize/guides/zgbggk7/revision/4
	Physics Dynamics	<ul style="list-style-type: none"> calculating the gravitational potential energy of an object the formula $GPE = mgh$ 	GCSE Energy topics		https://www.bbc.co.uk/bitesize/guides/zssk7ty/revision/2	
	Physics Dynamics	<ul style="list-style-type: none"> Newton's Third Law of Motion including its relationship to the Law of Conservation of Momentum the meaning of 'momentum' applying the Law of Conservation of Momentum to a range of situations, including collisions 			https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/newtons-laws-of-motion/	
Week 2	Physics Dynamics	<ul style="list-style-type: none"> the meaning of 'momentum' the formulas $p = mv$ $F = \Delta p / t$ 	Rearranging equations	Exam questions from past papers		LRC textbooks
	Physics Dynamics	<ul style="list-style-type: none"> calculating the kinetic energy of a moving object the formula $K.E. = \frac{1}{2} mv^2$ 				

	Physics Dynamics	<ul style="list-style-type: none"> • the motion of objects • the formulas • (average) $v = s/t$ • $v = u + at$ • $v^2 = u^2 + 2as$ • $s = ut + \frac{1}{2} at^2$ 	Rearranging equations Unit changes		https://isaacphysics.org/concepts/cp_eq_of_motion?stage=all	A level Physics textbook or revision guide
Week 3	Physics Dynamics	<ul style="list-style-type: none"> • calculate the power of a mechanical system • the formula $P = E/t$ 	GCSE Energy topics	Consolidation questions on the dynamics topic		https://quizizz.com/admin/quiz/5beeca3c299816001ad502ab/power-equation
Weeks 4 - 6	Unit 1 Revision Biology Chemistry Physics	The rest of this term will be spent revising Unit 1 in preparation for the external exam which will be taken in June				

Year 12 Half term 6 (June to July)

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Weeks 1 – 6	Unit 2 Coursework Applied experimental techniques.	To complete Unit 2, students will carry out 6 practical based investigations (2 biology, 2 chemistry and 2 physics) and will write these up as lab reports. The work will be submitted by a fixed deadline and marked internally by their teachers.				
		<p>PO1 Demonstrate applied experimental techniques in biology.</p> <p><u>1. Rate of respiration:</u> when conducting this experiment, the knowledge from Unit 1 on breathing and cellular respiration will be consolidated. Learners will also be able to extend their knowledge of homeostasis when studying physiological measurements and oxygen transportation in Unit 4.</p> <p><u>2. Light-dependent reaction in photosynthesis:</u> knowledge of photosynthesis and food chain productivity from Unit 1 is important for learners to understand when carrying out this experiment.</p> <p><u>Pre reading and independent learning</u></p> <p>https://filestore.aqa.org.uk/resources/science/specifications/AQA-1775-SP-2016.PDF Read pages 44 to 64 of the specification to find out about this unit and how it is assessed.</p> <p><u>Rate of respiration</u> Tips for measuring blood pressure. http://bloodpressureuk.org/BloodPressureandyou/HomeMonitoring/Howtomeasure Values for peak expiratory flow rate http://peakflow.com/top_nav/normal_values/index.html Method for measuring lung capacity http://glasgowsciencecentre.org/teacher-resources/lung-capacity.html</p> <p><u>Photosynthesis</u> Resources from the ‘Science and Plants for Schools’ website http://saps.org.uk/attachments/article/130/SAPSTheeffectoflightcolourandintensityontherateofphotosynthesis.doc Photosynthesis experiments from the Nuffield Foundation http://nuffieldfoundation.org/practical-biology/photosynthesis</p>				

PO2 Demonstrate applied experimental techniques in chemistry.

1. Volumetric analysis: when conducting these experiments, the knowledge from Unit 1 on atomic structures and amount of substance can enhance learning.

2. Colorimetric analysis: when conducting these experiments, the knowledge from Unit 1 on atomic structures and amount of substance can enhance learning.

Pre reading and independent learning.

<https://filestore.aqa.org.uk/resources/science/specifications/AQA-1775-SP-2016.PDF>

Read pages 44 to 64 of the specification to find out about this unit and how it is assessed.

Volumetric analysis

Detailed method for volumetric analysis

<http://wiredchemist.com/chemistry/instructional/laboratory-tutorials/volumetric-analysis>

BBC Bitesize GCSE recap

<https://www.bbc.co.uk/bitesize/guides/ztkdd2p/revision/4>

Colorimetric analysis

'Chemistry – A Practical Guide – Support Materials' from Education Scotland

http://educationscotland.gov.uk/Images/ChemistryPracticalGuide_tcm4-723689.doc

RSC Standard solutions

<https://edu.rsc.org/resources/standard-solution/2257.article>

PO3 Demonstrate applied experimental techniques in physics.

1. Resistivity: Unit 1 key concepts - Electricity will be part of the underpinning knowledge and understanding needed for this investigation

2. Specific heat capacity: Students will draw on knowledge from GCSE and from the Energy topic in Unit 1 of this course. They will also use investigative skills that have been developed in the previous experiments carried out for unit 2.

Learners will build on their knowledge and understanding of electricity and circuits from Unit 1 when measuring the resistivity of conductors and semiconductors in an applied context. They will also build on their knowledge and understanding of useful energy and efficiency from Unit 1 when measuring the specific heat capacity of materials in solid or liquid phase in an applied context.

Pre reading and independent learning.

<https://filestore.aqa.org.uk/resources/science/specifications/AQA-1775-SP-2016.PDF>

Read pages 44 to 64 of the specification to find out about this unit and how it is assessed.

Resistivity

YouTube videos on measuring the resistivity of the material in a wire.

<http://youtube.com/watch?v=Lf3eGar8Kss>

<http://youtube.com/watch?v=Tt-7nfAJ5U>

Measuring electrical resistivity (The Institute of Physics, 'Teaching Advanced Physics')

http://tap.iop.org/electricity/resistance/112/file_45987.doc

Specific heat capacity

Measuring specific heat capacity (The Institute of Physics, 'Teaching Advanced Physics')

http://tap.iop.org/energy/thermal/607/file_47505.doc

Measurement of specific heat capacities (from 'School Physics')

http://schoolphysics.co.uk/age16-19/Thermal%20physics/Heat%20energy/text/Specific_heat_capacity_measurement/index.html

PO4 Understand safe procedure and risk assessment when undertaking scientific practical work

Safe procedure and risk assessment: the skill of carrying out risk assessments is developed further in Unit 5 with a requirement to produce a risk assessment for the chosen science investigation.

Pre reading and independent learning.

Student safety sheets - <http://science.cleapss.org.uk/Resource-Info/Student-Safety-Sheets-ALL.aspx>

Applied General Science

AQA (1777)



holy family 6th

<https://www.aqa.org.uk/subjects/science/applied-general/science>

Assessment Information:

All students will sit 2 external examinations in year 12, and 1 in year 13. All students will submit 1 coursework portfolio in year 12, and 2 in year 13.

External exams are a mixture of long answer, short answer, calculations, and multiple-choice questions. They are all 1 hour and 30 minutes with a total mark of 60 per paper.

Coursework in year 12 is a series of essays and lab reports based on biology, chemistry, and physics practicals. Year 13 coursework is a mixture of essays and lab reports on a scientific investigation and medical physics.

	Unit title	Assessment type	Ofqual unit reference
Mandatory			
1	Key concepts in science	Written exam	J/507/6497
2	Applied experimental techniques	Portfolio	L/507/6498
3	Science in the modern world	Written exam with pre-release material	R/507/6499
4	The human body	Written exam	A/507/6500
5	Investigating science	Portfolio	F/507/6501
Optional			
6a	Microbiology	Portfolio	J/507/6502
6b	Medical physics	Portfolio	L/507/6503
6c	Organic chemistry	Portfolio	R/507/6504

Rationale

In year 12, Applied General Science is taught by 2 or 3 specialist science teachers as separate strands incorporating biology, chemistry, and physics. This content is externally assessed in Unit 1 Key concepts in science in June. In addition, there is one unit 3 (Science in the modern world) lesson per week until Christmas in preparation for an external exam based on pre-release material that is taken in January. After this the fourth lesson will be shared between the separate sciences as needed. Unit 2 is taught alongside unit 1 in the separate sciences.

In year 13 Applied General Science is taught by Assessment Objective. Unit 4 (The human body) is taught in separate strands by 2 specialist science teachers in preparation for external examination in January. These strands are not dependent on each other and can be taught in any order. After Christmas unit 5 and 6b are taught alongside each other until the portfolio submission date in May.

The Applied Science Certificate is awarded if units 1, 2 and 3 are completed

The extended Certificate is awarded on successful completion of units 1, 2, 3, 4, 5 and 6

Each individual unit receives a UMS score between 0 and 100. These UMS scores are then added to give the total UMS and overall grade as shown below.

Qualification grade	Certificate (300 UMS available)	Extended Certificate (600 UMS available)	Grade boundary as percentage of total UMS
Distinction*	270–300	540–600	90 %
Distinction	240–269	480–539	80 %
Merit	180–239	360–479	60 %
Pass	120–179	240–359	40 %

A student may pass the qualification if he/she has the required total number of uniform marks and no more than one N (near miss) grade in the Certificate or two N grades in the Extended Certificate. An N (near-miss) will be awarded on all units when the student has a uniform mark of between 30 and 39.

Key Resources (textbooks/videos/websites)

Resources that will help the students with their independence, homework, and revision. Copies of any resources can be placed in the LRC and on Class Charts for students to access.

Applied Science Padlet	https://padlet.com/HFCS/appsci	Resources to support new learning
Exam board website	www.aqa.org.uk/subjects/science/applied-general/science	Access the specification and past papers here. There are also examiners reports on the exams and coursework.
Unit 1 Biology revision booklet	Class Charts	Unit 1 is externally examined at the end of year 12
Unit 1 Chemistry revision booklet	Class Charts	Unit 1 is externally examined at the end of year 12
Unit 1 Physics revision booklet	Class Charts	Unit 1 is externally examined at the end of year 12
Unit 4 Revision book	Class Charts	Unit 4 is externally examined in the January of year 13
Course Textbook (published by Hodder Education)	Copy in LRC https://www.hoddereducation.co.uk/subjects/science/products/16-18/my-revision-notes-aqa-applied-science	https://www.hoddereducation.co.uk/product-landing-pages/revision/my-revision-notes/my-revision-notes-aqa-applied-science This website has good quizzes to try
A selection of GCSE and A level science textbooks and revision guides	In the LRC	Good reference sources for students aiming for distinction level

Year 13 Term 1

	Topic Area(s)	AO	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Weeks 1 - 3	Unit 2 Chemistry coursework		<p>PO2 Demonstrate applied experimental techniques in chemistry.</p> <p><u>1. Volumetric analysis:</u> when conducting these experiments, the knowledge from Unit 1 on atomic structures and amount of substance can enhance learning.</p> <p><u>2. Colorimetric analysis:</u> when conducting these experiments, the knowledge from Unit 1 on atomic structures and amount of substance can enhance learning.</p> <p><u>Pre reading and independent learning.</u></p> <p>https://filestore.aqa.org.uk/resources/science/specifications/AQA-1775-SP-2016.PDF Read pages 44 to 64 of the specification to find out about this unit and how it is assessed.</p> <p><u>Volumetric analysis</u> Detailed method for volumetric analysis http://wiredchemist.com/chemistry/instructional/laboratory-tutorials/volumetric-analysis BBC Bitesize GCSE recap https://www.bbc.co.uk/bitesize/guides/ztkdd2p/revision/4</p> <p><u>Colorimetric analysis</u> 'Chemistry – A Practical Guide – Support Materials' from Education Scotland http://educationscotland.gov.uk/Images/ChemistryPracticalGuide_tcm4-723689.doc RSC Standard solutions https://edu.rsc.org/resources/standard-solution/2257.article</p>				

Weeks 1-3	<p>Unit 2</p> <p>Physics coursework</p>	<p>PO3 Demonstrate applied experimental techniques in physics.</p> <p><u>1. Resistivity:</u> Unit 1 key concepts - Electricity will be part of the underpinning knowledge and understanding needed for this investigation</p> <p><u>2. Specific heat capacity:</u> Students will draw on knowledge from GCSE and from the Energy topic in Unit 1 of this course. They will also use investigative skills that have been developed in the previous experiments carried out for unit 2.</p> <p>Learners will build on their knowledge and understanding of electricity and circuits from Unit 1 when measuring the resistivity of conductors and semiconductors in an applied context. They will also build on their knowledge and understanding of useful energy and efficiency from Unit 1 when measuring the specific heat capacity of materials in solid or liquid phase in an applied context.</p> <p><u>Pre reading and independent learning.</u></p> <p>https://filestore.aqa.org.uk/resources/science/specifications/AQA-1775-SP-2016.PDF Read pages 44 to 64 of the specification to find out about this unit and how it is assessed.</p> <p><u>Resistivity</u> YouTube videos on measuring the resistivity of the material in a wire. http://youtube.com/watch?v=Lf3eGar8Kss http://youtube.com/watch?v=Tt-7nfAJ5U Measuring electrical resistivity (The Institute of Physics, 'Teaching Advanced Physics') http://tap.iop.org/electricity/resistance/112/file_45987.doc</p> <p><u>Specific heat capacity</u> Measuring specific heat capacity (The Institute of Physics, 'Teaching Advanced Physics') http://tap.iop.org/energy/thermal/607/file_47505.doc Measurement of specific heat capacities (from 'School Physics') http://schoolphysics.co.uk/age16-19/Thermal%20physics/Heat%20energy/text/Specific_heat_capacity_measurement/index.html</p>
Weeks 1-3	<p>Unit 2</p> <p>Risk Assessment and Safety</p>	<p>PO4 Understand safe procedure and risk assessment when undertaking scientific practical work</p> <p>Safe procedure and risk assessment: the skill of carrying out risk assessments is developed further in Unit 5 with a requirement to produce a risk assessment for the chosen science investigation.</p> <p><u>Pre reading and independent learning.</u></p> <p>Student safety sheets - http://science.cleapss.org.uk/Resource-Info/Student-Safety-Sheets-ALL.aspx</p>

	Topic Area(s)	AO	Learning Objectives	Flashback RP	Out of lesson assignments	Pre reading	Independent learning
Week 4	Unit 4 Digestive system	AO1	<p>Key components of the digestive system, including the liver, gall bladder and pancreas</p> <p>Roles of each organ in the digestive system and how they play a part in mechanical and/or chemical digestion</p> <p>Role of condensation and hydrolysis reactions in the bond-making and bond-breaking of carbohydrates, proteins and lipids in chemical digestion and assimilation</p> <p>Roles of hydrochloric acid, bile and mucus in the digestive system and how each of these affects enzyme-controlled digestion</p>	<p>Ks3 Digestion – names and functions</p> <p>Labelling and annotating diagrams</p> <p>Chemical bonding and structures of molecules</p>	Group projects on each part of the digestive system for presentations	<p>www.abpischools.org.uk/topic/dietanddigestion/1/1</p>	<p>Complete the quiz questions and make notes</p> <p>www.abpischools.org.uk/topic/dietanddigestion/1/1</p>
Week 5	Unit 4 Digestive system	AO1	<p>The role of carbohydrases, proteases, and lipases.</p> <p>Role of the small intestine in absorption of the small soluble products of digestion, including how the structure of the small intestine ensures efficient absorption.</p> <p>The process of co-transport used to absorb glucose and amino acids.</p> <p>Effect of gastrin on digestion</p>	<p>GCSE enzymes - factors affecting activity</p> <p>Hormones GCSE</p>	Past paper questions on enzymes and absorption	<p>https://practicalbiology.org/bio-molecules/factors-affecting-enzyme-activity/investigating-effect-of-temperature-on-the-activity-of-lipase</p>	<p>Watch the video and make notes</p> <p>https://www.youtube.com/watch?v=a0yGDipKWIo</p>

Week 6	Unit 4 Digestive system	AO1	<p>Uses of macronutrients and micronutrients in the body, including: Carbohydrates, proteins, lipids, sodium, calcium, iron, vitamin C and vitamin D</p> <p>The symptoms of deficiency of these macronutrients and micronutrients.</p> <p>Diseases/disorders that can develop from deficiency of these macronutrients and micronutrients and their symptoms.</p> <p>Foods that can help to maintain healthy levels of macronutrients and micronutrients</p>	<p>KS3 & GCSE deficiency diseases.</p>	<p>Individual research on nutrients and deficiencies</p>		<p>https://www.bbc.co.uk/bitesize/guides/zyp6sg8/revision/2</p>
Week 7	Unit 4 The skeletal system	AO2	<p>Structure of the skeleton:</p> <ul style="list-style-type: none"> • axial and appendicular • cartilage • bone <p>Function of the skeleton:</p> <ul style="list-style-type: none"> • support • protection • movement • marrow/blood cell production • resorption and ossification <p>Structure and functions of synovial joints:</p> <ul style="list-style-type: none"> • adaptations for movement • types of synovial joint and range of movement – gliding, hinge, ball and socket, pivot 	<p>Structure and function of skeleton.</p> <p>Food groups linked to growth and repair, and bones.</p> <p>KS3 Muscles and skeleton Cells, tissues and organs</p> <p>KS3 +4 joints and skeleton</p>	<p>Past paper exam questions on structure and function of skeletal system</p>	<p>https://www.s-cool.co.uk/a-level/biology/movement-and-support-animals</p>	<p>Read relevant sections from the Biology A level textbooks in the LRC</p>

Week 8	Unit 4 Muscle action	AO2	<p>The features of a myofibril, including:</p> <ul style="list-style-type: none"> • myosin filaments (thick filaments) • actin filaments (thin filaments), Z line, A band, H band, I band <p>The sliding filament theory for muscle contraction.</p> <ul style="list-style-type: none"> • myosin heads attaching to actin, forming a cross bridge • myosin head changing shape to slide the actin further along the myosin • cross bridges forming and breaking at a rate of up to 100 times per second • how this mechanism shortens the sarcomere • cross bridges (actinomyosin formation) in the presence of calcium ions • how adenosine triphosphate (ATP) releases the energy needed by this mechanism 	<p>Cellular respiration Year 12 Applied science</p> <p>Structure of ATP and ADP.</p>	<p>Model making for sequencing of sliding filament theory</p>	<p>Make sure you can access the revision guide for Unit 4 available on Class Charts – read up on this topic before your lesson</p>	<p>https://www.teachpe.com/anatomy-physiology/sliding-filament-theory</p>
Week 9	Unit 4 Muscle action	AO2	<p>The role of calcium:</p> <ul style="list-style-type: none"> • tropomyosin prevents myosin heads from attaching to actin by blocking the binding sites • nerve impulses (action potentials) cause calcium ions to be released • calcium ions bind with troponin • causing tropomyosin to change shape and unblock the binding sites • when action potentials stop arriving, calcium ions are actively transported out of the sarcoplasm and the muscle relaxes 	<p>Features of myofibril sliding filament theory</p>	<p>Revision for mini test</p>	<p>https://www.livestrong.com/article/464511-the-importance-of-calcium-in-muscle-contraction/</p>	

Week 10	Unit 4 Muscle action - Fast twitch and slow twitch fibres.	AO2	<p>Fast-twitch (white) and slow-twitch (red) fibres:</p> <ul style="list-style-type: none"> • how slow-twitch fibres do not produce ATP very quickly so are not very powerful • how fast-twitch fibres generate ATP very quickly and are used for short bursts of explosive action • the adaptations of slow-twitch fibres, to include: ability to function over long periods, ability to respire aerobically, ability to store glycogen as a metabolic fuel store, ability to respire fat stores in the body, myoglobin, good blood supply, high density of mitochondria, • the adaptations of fast-twitch fibres, to include: ability to function for short periods of time, ability to respire anaerobically, storage of creatine phosphate for anaerobic respiration, fatiguing quickly due to anaerobic respiration of lactate 	Features of myofibril Sliding filament theory		http://www.bbc.co.uk/science/humanbody/body/actfiles/fastandslowtwitch/soleus.shtml http://breakingmuscle.com/fitness/understanding-energy-systems-atp-pc-glycolytic-and-oxidative-oh-my https://www.idealift.com/personal-training/the-three-metabolic-energy-systems/ https://www.nutritionist-resource.org.uk/articles/sports-nutrition.html	<p>Make your own notes</p> <p>http://www.bbc.co.uk/science/humanbody/body/actfiles/fastandslowtwitch/soleus.shtml</p>
	Unit 4 Creatine and ATP. Exercise and athletic diets.	AO2	<ul style="list-style-type: none"> • how the breakdown of creatine phosphate transfers energy makes ATP • how creatine phosphate is regenerated during aerobic respiration • the effect of exercise on the proportion of fast-twitch and slow-twitch muscle fibres • possible adaptations of diet for athletes in training, including the use of creatine supplements. 	<p>Respiration.</p> <p>Diet and functions of macro and micronutrients.</p>	Application style exam questions		

Week 11	Unit 4 Oxygen transport	AO3	<p>How oxygen does not dissolve well so most oxygen is carried by haemoglobin (Hb) in the red blood cells.</p> <p>The structure of haemoglobin.</p> <p>How the degree of oxygenation depends on the partial pressure of oxygen $p(O_2)$.</p> <p>Use an oxygen dissociation curve to explain how oxygen is carried by haemoglobin.</p> <p>How the presence of carbon dioxide assists in the dissociation of oxygen and shifts the curve to the right (the Bohr effect).</p> <p>How training at high altitudes affects oxygen transportation.</p>	Recall facts on enzymes, absorption and dietary disorders	Homework questions on dissociation curves	<p>Make sure you can access the revision guide for Unit 4 available on Class Charts – read up on this topic before your lesson</p>	<p>https://s-cool.co.uk/a-level/biology/transport/revise-it/blood</p> <p>https://www.youtube.com/watch?v=D1icju2Tbh4</p>
	Unit 4 Oxygen saturation	AO3	<p>How to use a pulse oximeter to measure oxygen saturation as a non-invasive method.</p> <p>The normal range for oxygen saturation levels as (95-99%).</p> <p>Using SaO_2 % to represent oxygen saturation.</p> <p>The effect of diseases such as emphysema or cystic fibrosis on oxygen saturation levels.</p>	Links to unit 2 biology – physiological measurements	Past paper exam questions – focus on data analysis style questions	<p>https://www.nonin.com/resource/why-use-a-pulse-oximeter/</p>	<p>https://www.nonin.com/resource/why-use-a-pulse-oximeter/</p>
	Unit 4 Blood pressure	AO3	<p>How to use a sphygmomanometer to measure blood pressure.</p> <p>The effect of high/low blood pressure on health.</p>	Links to unit 2 biology – physiological measurements	Revision for mini test	<p>https://www.practicalclinicalskills.com/sphygmomanometer</p>	<p>Access the online Unit 4 textbook for notes and further questions to practice</p>

Week 12	Unit 4 The nervous system.	AO4	<p>The organisation of the nervous system into the central nervous system (CNS) and the peripheral nervous system (PNS).</p> <p>The somatic and automatic nervous systems and the difference in their roles.</p> <p>The structure and roles of the sympathetic and para sympathetic nervous systems.</p> <p>The roles of the four lobes of the cerebral cortex:</p>	<p>Recall facts on oxygen transport and saturation</p> <p>Organisation of the nervous system GCSE Coordination topic</p>		<p>https://www.diffen.com/difference/Parasympathetic_nervous_system_vs_Sympathetic_nervous_system</p>	<p>https://www.topendsports.com/testing/tests/reaction-stick.htm</p> <p>http://faculty.washington.edu/chudler/experi.html</p>	
	Unit 4 The lobes of the cerebral cortex.	AO4	<ul style="list-style-type: none"> • frontal lobe-associated with reasoning, planning, movement, emotions and problem solving • parietal lobe- associated with movement, orientation, recognition • occipital lobe – associated with visual processing • temporal lobe- associated with perception and recognition of auditory stimuli, memory and speech. 		Research brain damage and disorders	<p>http://waiting.com/brainfunctthree.html</p>	<p>https://www.abpschools.org.uk/topic/nervoussystem/1/1</p>	
	Unit 4 The cerebellum and brain stem.	AO4	<p>The role of the cerebellum in controlling skeletal muscle for fine movement, coordination, posture and balance.</p> <p>The role of the brain stem in maintaining breathing and heart rate.</p>					
	Unit 4 The brain and brain damage.	AO4	<p>How brain damage may result in symptoms that indicate the area of the brain that has been affected.</p>	Structure and function of the brain	Online Quiz https://www.abpschools.org.uk/topic/nervoussystem/10/1	<p>https://www.stem.org.uk/resources/elibrary/resource/32339/inside-brain</p>	<p>https://www.abpschools.org.uk/topic/nervoussystem/6</p>	

Week 13	Unit 4 Nerve Impulses	AO5	<p>The sensory and motor nerves, including dendrites, cell body, myelin sheath and nodes of Ranvier</p> <p>The movement of ions into and out of the neurone causing an action potential:</p> <ol style="list-style-type: none"> 1. resting potential 2. the role of the sodium–potassium pump in maintaining resting potential 3. action potential <p>How nerve impulses travel rapidly along a nerve fibre</p> <p>How the structure of myelinated nerve fibres enables them to conduct impulses more quickly.</p>	<p>GCSE Nerves and Coordination</p> <p>Nerve structures and functions</p> <p>GCSE Nerves and Coordination</p>	<p>http://webspace.ship.edu/cgboer/theneuron.html</p> <p>Use the information from this website to make a table of neurone cell structures and functions</p> <p>Past paper exam questions</p>	<p>https://www.stem.org.uk/system/files/elibrary-resources/2019/12/Big%20Picture%20animation%20Action%20potential%20in%20the%20brain.mp4</p>	<p>https://www.abpiscools.org.uk/topic/nervousystem/1/1</p> <p>https://www.bbc.co.uk/bitesize/guides/zywj2p/revision/4</p>
Week 14	Unit 4 Nerve Impulses	AO5	<p>The components of a synapse</p> <p>The sequence of events from when the action potential arrives at the presynaptic membrane, including the role of Ca²⁺ ions and Ca²⁺ channels, synaptic vesicles, neurotransmitter, receptors</p> <p>The role of enzymes in recycling the neurotransmitter</p> <p>The symptoms of disorders arising from problems with neurotransmitters and synaptic transmission, such as:</p> <ol style="list-style-type: none"> 1. Alzheimer’s, linked to acetylcholine 2. Parkinson’s, linked to a lack of dopamine 3. depression, linked to a lack of serotonin <p>The effects on synaptic transmission of drugs used to treat these disorders.</p>	<p>Sequence of an Action potential</p> <p>Synaptic transmission</p>	<p>Making a model to show synaptic transmission</p> <p>Past paper exam questions</p>	<p>https://www.parkinsons.org.uk/information-and-support/what-parkinsons</p> <p>https://what0-18.nhs.uk/health-for-young-people/mental-health-and-wellbeing/depression</p> <p>https://www.alzheimers.org.uk/about-dementia/types-dementia/alzheimers-disease</p>	<p>https://www.bbc.co.uk/bitesize/guides/zywj2p/revision/4</p>

Week 15

Revision for Unit 4 January exam

90-minute paper

60 Marks

Thursday January 11th pm

AO1 Understand the digestive system and diet.

AO2 Understand the musculoskeletal system and movement.

AO3: Understand how oxygen is transported in the blood and how physiological measurements can be applied.

AO4: Understand the structure and function of the nervous system and brain.

AO5: Understand nerve impulses.

Unit 4 Revision guide uploaded on Class Charts

Past papers and mark schemes on www.aqa.org.uk

Other resources listed at the start of this document.

Year 13 Term 2

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
	Week 1 introduces the 2 portfolio units that students will undertake between now and the end of April. The portfolios are internally marked and then submitted to AQA for external moderation.					
Week 1	Unit 5: Investigating science	<p>Prepare for a scientific investigation. Carry out the investigation and record results. Analyse results, draw conclusions and evaluate the investigation. Present the findings of the investigation to a suitable audience.</p> <p>Investigate how electrochemical cells work and the factors that can change the voltage output Make a number of different electrochemical cells by pairing up various metal/metal ion half cells and then investigate how the voltage changes depending on the salt concentration, the size and shape of the electrode and the temperature of the salt solution.</p> <p>Helping learners to choose, design and plan their own investigation http://nuffieldfoundation.org/applied-science/scientific-investigations-getting-started Evaluating a scientific report http://nuffieldfoundation.org/applied-science/scientific-investigations-reporting Student safety sheets http://science.cleapss.org.uk/Resource-Info/Student-Safety-Sheets-ALL.aspx</p>				
	Unit 6b: Medical physics	<p>Understand imaging methods. Understand radiotherapy techniques and the use of radioactive tracers. Demonstrate the ability to work with radioisotopes in the laboratory. Understand the medical uses of optical fibres and lasers</p> <p>Produce a portfolio of evidence of the research you have carried out</p> <p>Resources from the National Stem Centre http://nationalstemcentre.org.uk/elibrary/collection/565/teaching-medical-physics</p>				

	Topic Area(s)	Learning Objectives	Flashback RP Opportunities	Out of Lesson Assignments	Pre-Learning Reading	Independent Learning
Week 2	Unit 5: Investigating science	Identify reduction and oxidation processes Define a redox reaction in terms of electron transfer Determine oxidation states	Electrolysis GCSE Chemistry	Practice Qs working out oxidation states		https://qualifications.pearson.com/content/dam/pdf/A%20Level/Chemistry/2015/teaching-and-learning-materials/A_level_Chemistry_Core_Practical_10_-_Electrochemical_Cells.pdf
	Unit 6b: Medical physics	Understand imaging methods.	EM radiation: x-rays and gamma radiation– GCSE Physics	Research 2 imaging techniques		https://medlineplus.gov/diagnosticimaging.html
Week 3	Unit 5: Investigating science	Write and apply the conventional representation of cells. Apply the IUPAC convention for writing half equations for electrode reactions.	Oxidation states		https://www.york.ac.uk/org/seg/salters/ChemistryArchive/ResourceSheets/electrochemicalcells.PDF	Use A level chemistry textbook from the LRC to read up and make notes.
	Unit 6b: Medical physics	Understand imaging methods.	Difference between diagnosis and therapy	Research and write up – suitable and unsuitable imaging techniques	https://www.alliancemedical.co.uk/for-patients/types-of-scan/modalities	
Week 4	Unit 5: Investigating science	Apply the IUPAC convention for writing half equations for electrode reactions. Predict the direction of simple REDOX reactions using E^\ominus values	Redox equations GCSE Chemistry			https://www.youtube.com/watch?v=qtqq3fuSKJw Make your own notes

	Unit 6b: Medical physics	Understand radiotherapy techniques and the use of radioactive tracers.		Describe, with the aid of diagrams, two radiotherapy techniques		https://www.macmillan.org.uk/cancer-information-and-support/treatment/types-of-treatment/radiotherapy/side-effects-of-radiotherapy
Week 5	Unit 5: Investigating science	How to use Harvard referencing How to evaluate sources		Practice QS on half equations	Watch the video clip https://library.rgu.ac.uk/rguharvard	https://www.open.ac.uk/library/referencing-and-plagiarism/quick-guide-to-harvard-referencing-cite-them-right
	Unit 6b: Medical physics	Understand radiotherapy techniques and the use of radioactive tracers.	Isotopes – GCSE Chemistry	Identify the properties of one radioisotope used for a radiotherapy technique.	https://www.world-nuclear.org/information-library/non-power-nuclear-applications/radioisotopes-research/radioisotopes-in-medicine.aspx	
Week 6	Unit 5: Investigating science	How to keep a lab book	Format for writing up experiments			https://bitesizebio.com/11068/10-tips-for-organizing-your-lab-book/
	Unit 6b: Medical physics	Understand radiotherapy techniques and the use of radioactive tracers.		How radioisotopes can be used as tracers.		https://www.sciencelearn.org.nz/resources/1801-using-isotopes-as-tracers http://www.radiochemistry.org/nuclearmedicine/radioisotopes/01_isotopes.shtml

Week 7	Unit 5: Investigating science	Making a plan for the electrochemical cells investigation	How science works key terminology, e.g. hypothesis validity reliability accuracy precision		https://pmt.physicsandmathstutor.com/download/Chemistry/A-level/Notes/Edexcel-IAL/Unit-6/CP%2012%20-%20Investigating%20Electrochemical%20Cells.pdf	
	Unit 6b: Medical physics	Understand radiotherapy techniques and the use of radioactive tracers.		Dangers of radioactivity and the precautions taken to protect medical staff and patients	Watch the video clip as an introduction to this section https://www.youtube.com/watch?v=Z4GV13xB00U	

Week 8	Unit 5: Investigating science	Each lesson students follow their own plan to carry out the electrochemical cells investigation They must manage their time and resources effectively All work must be recorded in lab book for submission at end of April Use marking grid to self-assess your work as you progress				
	Unit 6b: Medical physics	Demonstrate the ability to work with radioisotopes in the laboratory	Line graph skills		https://www.bbc.co.uk/bitesize/clips/z8qqxnb	

Week 9	Unit 5: Investigating science	Each lesson students follow their own plan to carry out the electrochemical cells investigation They must manage their time and resources effectively All work must be recorded in lab book for submission at end of April Use marking grid to self-assess your work as you progress				
	Unit 6b: Medical physics	Demonstrate the ability to work with radioisotopes in the laboratory		Lab report of half-life investigation		https://docbrown.info/page03/3_54radio04.htm
Week 10	Unit 5: Investigating science	Each lesson students follow their own plan to carry out the electrochemical cells investigation They must manage their time and resources effectively All work must be recorded in lab book for submission at end of April Use marking grid to self-assess your work as you progress				
	Unit 6b: Medical physics	Understand the medical uses of optical fibres and lasers		Structure of optical fibres and medical applications	https://www.explainthetext.com/fiberoptics.html	http://www.genesis.net.au/~ajs/projects/medical_physics/endoscopes/
Week 11	Unit 5: Investigating science	Each lesson students follow their own plan to carry out the electrochemical cells investigation They must manage their time and resources effectively All work must be recorded in lab book for submission at end of April Use marking grid to self-assess your work as you progress				
	Unit 6b: Medical physics	Understand the medical uses of optical fibres and lasers	GCSE Waves topic - refraction	Lab report: Measuring refractive index	Watch the video of this experiment https://www.youtube.com/watch?v=ADN9Rph96NE	
Week 12	Unit 5: Investigating science	Each lesson students follow their own plan to carry out the electrochemical cells investigation They must manage their time and resources effectively All work must be recorded in lab book for submission at end of April Use marking grid to self-assess your work as you progress				

	Unit 6b: Medical physics	Understand the medical uses of optical fibres and lasers			https://www.healthline.com/health/laser-therapy	
Week 13	Unit 5: Investigating science	<p>Each lesson students follow their own plan to carry out the electrochemical cells investigation</p> <p>They must manage their time and resources effectively</p> <p>All work must be recorded in lab book for submission at end of April</p> <p>Use marking grid to self-assess your work as you progress</p>				
	Unit 6b: Medical physics	Understand the medical uses of optical fibres and lasers		Research laser light and medical treatments		https://www.aslms.org/or-the-public/treatments-using-lasers-and-energy-based-devices/photobiomodulation