

Curriculum Knowledge Map – Y11 Science



Year 11 Combined Science (trilogy)	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
The numbers below reference the AQA specification which can be accessed via this link (this is the programme of study followed in years 10 and 11) : https://filestore.aqa.org.uk/resources/science/specifications/AQA-8464-SP-2016.PDF						
Declarative <i>What should they know?</i>	Chemistry 5.6 The rate and extent of chemical change 5.6.1.1 Calculating rates of reactions 5.6.1.2 Factors which affect the rates of chemical reactions 5.6.1.3 Collision theory and activation energy 5.6.1.4 Catalysts 5.6.2.1 Reversible reactions 5.6.2.2 Energy changes and reversible reactions 5.6.2.3 Equilibrium 5.6.2.4 The effect of changing conditions on equilibrium (HT only) 5.6.2.5 The effect of changing concentration (HT only) 5.6.2.6 The effect of temperature changes on equilibrium (HT only) 5.6.2.7 The effect of pressure changes on equilibrium (HT only) Biology 4.5 Homeostasis and response 4.5.1. Homeostasis 4.5.2 The human nervous system 4.5.3 Hormonal coordination in humans 4.5.3.2 Control of blood glucose	Physics 6.5 Forces 6.5.1.1 Scalar and vector quantities 6.5.1.2 Contact and noncontact forces 6.5.1.3 Gravity 6.5.1.4 Resultant forces 6.5.2 Work done and energy transfer 6.5.3 Forces and elasticity Required practical activity 18: force and extension of a spring 6.5.4.1.1 Distance and displacement 6.5.4.1.2 Speed 6.5.4.1.3 Velocity 6.5.4.1.4 The distance– time relationship 6.5.4.1.5 Acceleration 6.5.4.2.1 Newton's First Law 6.5.4.2.2 Newton's Second Law Required practical activity 19: force and acceleration 6.5.4.2.3 Newton's Third Law 6.5.4.3.1 Stopping distance 6.5.4.3.2 Reaction time 6.5.4.3.3 Factors affecting braking distance 1 6.5.4.3.4 Factors affecting braking distance 2 6.5.5.1 Momentum is a property of moving objects (HT only) 6.5.5.2 Conservation of momentum (HT only)	Physics 6.6 Waves Waves 6.6.1.1 Transverse and longitudinal waves 6.6.1.2 Properties of waves Required practical activity 20: (observations of waves) 6.6.2.1 Types of electromagnetic waves 6.6.2.2 Properties of electromagnetic waves Required practical activity 21 (absorption and emission of IR) 6.6.2.3 Properties of electromagnetic waves 2 6.6.2.4 Uses and applications of electromagnetic waves Chemistry 5.8 Chemical analysis 5.8.1.1 Pure substances 5.8.1.2 Formulations 5.8.1.3 Chromatography Required practical activity 12: Chromatography. 5.8.2.1 Test for hydrogen 5.8.2.2 Test for oxygen 5.8.2.3 Test for carbon dioxide 5.8.2.4 Test for chlorine Biology 4.6 Inheritance, variation and evolution 4.6.1.1 Sexual and asexual reproduction 4.6.1.2 Meiosis 4.6.1.3 DNA / genome 4.6.1.4 Genetic inheritance 4.6.1.5 Inherited disorders 4.6.1.6 Sex determination 4.6.2.1 Variation 4.6.2.2 Evolution 4.6.2.3 Selective breeding 4.6.2.4 Genetic engineering 4.6.3.1 Evolution	Physics 6.7 Magnetism and electromagnetism 6.7.1.1 Poles of a magnet 6.7.1.2 Magnetic fields 6.7.2.1 Electromagnetism 6.7.2.2 Fleming's left-hand rule (HT only) 6.7.2.3 Electric motors (HT only) Chemistry 5.9 Chemistry of the atmosphere 5.9.1.1 The proportions of different gases in the atmosphere 5.9.1.2 The Earth's early atmosphere 5.9.1.3 How oxygen increased 5.9.1.4 How carbon dioxide decreased 5.9.2.1 Greenhouse gases 5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere 5.9.2.3 Global climate change 5.9.2.4 The carbon footprint and its reduction 5.9.3.1 Atmospheric pollutants from fuels 5.9.3.2 Properties and effects of atmospheric pollutants	Chemistry 5.10 Using resources 5.10.1.1 Using the Earth's resources and sustainable development 5.10.1.2 Potable water Required practical activity 13: water samples and analysis 5.10.1.3 Waste water treatment 5.10.1.4 Alternative methods of extracting metals (HT only) 5.10.2.1 Life cycle assessment 5.10.2.2 Ways of reducing the use of resources Biology 4.7 Ecology 4.7.1.1 Communities 4.7.1.2 Abiotic factors 4.7.1.3 Biotic factors 4.7.1.4 Adaptations 4.7.2.1 Levels of organisation Required practical activity 7 - sampling 4.7.2.2 How materials are cycled 4.7.3.1 Biodiversity 4.7.3.2 Waste management 4.7.3.3 Land use 4.7.3.4 Deforestation 4.7.3.5 Global warming 4.7.3.6 Maintaining biodiversity	GCSE exams and revision

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	4.5.3.3 Hormones in human reproduction 4.5.3.4 Contraception 4.5.3.5 Hormones and fertility 4.5.3.6 Feedback systems	Chemistry 5.7 Organic chemistry 5.7.1.1 Crude oil, hydrocarbons and alkanes 5.7.1.2 Fractional distillation and petrochemicals 5.7.1.3 Properties of hydrocarbons 5.7.1.4 Cracking and alkenes	4.6.3.2 Fossils 4.6.3.3 Extinction 4.6.3.4 Resistant bacteria 4.6.4 Classification of living organisms			
Procedural <i>What should they be able to do?</i>	MS 1a Recognise and use expressions in decimal form. MS 1c Use ratios, fractions and percentages. MS 1d Make estimates of the results of simple calculations. MS 4a Translate information between graphical and numeric form. MS 4b Drawing and interpreting appropriate graphs from data to determine rate of reaction. MS 4c Plot two variables from experimental or other data. MS 4d Determine the slope and intercept of a linear graph. MS 4e Draw and use the slope of a tangent to a curve as a measure of rate of change. AT skills covered by this practical activity: biology AT 1, 3 and 4. AT 5 An opportunity to investigate the catalytic effect of adding different metal salts to a reaction such as the decomposition of hydrogen peroxide WS 1.3 Evaluate information around the relationship between obesity and diabetes, and	MS 3b, c - recall and apply equations. Students should be able to apply equations given on the Physics equation sheet. (elastic potential energy = $0.5 \times \text{spring constant} \times \text{extension}^2$) Required practical activity 18: investigate the relationship between force and extension for a spring. MS 1, 3c Throughout this section (Forces and motion), students should be able to use ratios and proportional reasoning to convert units and to compute rates. MS 4a, b, c, d, f The acceleration of an object can be calculated a velocity–time graph. MS 3a Students should recognise and be able to use the symbol for proportionality, \propto Required practical activity 19: investigate the effect of varying the force on the acceleration of an object of constant mass, and the	AT 1 WS 2.3, 2.4, 2.6, 2.7, 3.1, 3.5 describe a method to measure the speed of sound waves in air AT 1, AT 4 WS 2.3, 2.4, 2.6, 2.7, 3.1, 3.5 describe a method to measure the speed of ripples on a water surface. Required practical activity 20: make observations to identify the suitability of apparatus to measure the frequency, wavelength and speed of waves in a ripple tank and waves in a solid and take appropriate measurements. MS 2e, WS 1.2 Students should be able to construct a genetic cross by Punnett square diagram and use it to make predictions using the theory of probability MS 2c, 4a, MS 1c, 3a Students should be able to complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees. Students should be able to use direct proportion and simple ratios to express the outcome of a genetic cross.	WS 1.2, 1.3, 1.6 Students should be able to: evaluate the quality of evidence in a report about global climate change given appropriate information describe uncertainties in the evidence base recognise the importance of peer review of results and of communicating results to a wide range of audiences. WS 1.3 Students should be able to: • describe actions to reduce emissions of carbon dioxide and methane • give reasons why actions may be limited. MS 2h Translate information between graphical and numeric form. Required practical activity 13: analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. AT skills covered by this practical activity: chemistry AT 2, 3 and 4.	Homeostasis and response Evaluate information around the relationship between obesity and diabetes, and make recommendations, taking into account social and ethical issues. Interpret and explain simple diagrams of negative feedback control. Show why issues around contraception cannot be answered by science alone. Model behaviour of chromosomes Use probability, proportion and ratios in relation to inheritance. Interpret information about genetic engineering techniques and to make informed judgements about issues concerning cloning and genetic engineering, including GM crops.	

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	make recommendations taking into account social and ethical issues	effect of varying the mass of an object on the acceleration produced by a constant force. AT skills covered by this practical activity: physics AT 1, 2 and 3. WS 1.2 Make models of alkane molecules using the molecular modelling kits				
Disciplinary Literacy <i>(Tier 3 Vocab)</i>	<ul style="list-style-type: none"> • Regulation • Homeostasis • Stimulus • Receptor • Effector • Response • Reflex • Neurone • Endocrine • Glands • Diabetes • Plasmid • Diabetes • Activation Energy • Reversible • Dynamic • Endothermic • Exothermic • Equilibrium • Mole • Concentration 	<ul style="list-style-type: none"> • Resultant force • Acceleration • Speed • Velocity • Momentum • Inertia • Alkane • Alkene • Polymer • Fractional distillation • Saturated • Hydrocarbon 	<ul style="list-style-type: none"> • Frequency • Wavelength • infra-red • ultraviolet • gamma • radio wave • microwave • x-ray • Classification • Evolution • Evidence for evolution • Fossils • Extinction • Chromatography • Formulation • Melting point • Boiling point 	<ul style="list-style-type: none"> • Induced magnetism • Electromagnetism • Flux • Flemings left hand rule • solenoid • magnetic field • greenhouse • effect global warming • composition 	<ul style="list-style-type: none"> • Sustainable • Biotic • Abiotic • Potable • Biodiversity • Adaptation • Deforestation • Trophic level 	

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<p>Assessment</p>	<p>Students will be assessed on:</p> <p>EOT with teacher assessment – describing the factors that affect the rate of a chemical reaction.</p> <p>EOT with teacher assessment – describing reversible reaction using Le-Chateliers principle.</p>	<p>Students will be assessed on:</p> <p>EOT with teacher assessment – Using a graph to explain the relationship between force and extension.</p> <p>EOT with teacher assessment – describing fractional distillation</p> <ul style="list-style-type: none"> • MOCK EXAMS 	<p>Students will be assessed on:</p> <p>EOT with teacher assessment – comparison of longitudinal and transverse waves.</p> <p>EOT with teacher assessment – comparing meiosis and mitosis</p>	<p>Students will be assessed on:</p> <p>EOT with teacher assessment – describing the direction of the force in a current carrying wire.</p> <p>EOT with teacher assessment – Writing a description about the changing atmosphere.</p> <ul style="list-style-type: none"> • MARCH MOCKS 		
<p>Home Learning</p>	<p>Exam questions relevant to the lessons currently taught.</p> <p>Educake quizzes tiered to foundation and higher 1 quiz 10 – 15 marks per syllabus subsection</p>	<p>Exam questions relevant to the lessons currently taught.</p> <p>Educake quizzes tiered to foundation and higher 1 quiz 10 – 15 marks per syllabus subsection</p>	<p>Exam questions relevant to the lessons currently taught.</p> <p>Educake quizzes tiered to foundation and higher 1 quiz 10 – 15 marks per syllabus subsection</p>	<p>Exam questions relevant to the lessons currently taught.</p> <p>Educake quizzes tiered to foundation and higher 1 quiz 10 – 15 marks per syllabus subsection</p>	<p>Exam questions relevant to the lessons currently taught.</p> <p>Educake quizzes tiered to foundation and higher</p> <ul style="list-style-type: none"> • 1 quiz 10 – 15 marks per syllabus subsection 	<p>Exam questions relevant to the lessons currently taught.</p> <p>Educake quizzes tiered to foundation and higher 1 quiz 10 – 15 marks per syllabus subsection</p>

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Year 11 Separate Science BIOLOGY	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>The numbers below reference the AQA specification which can be accessed via this link (this is the programme of study followed in year 11) : https://filestore.aqa.org.uk/resources/biology/specifications/AQA-8461-SP-2016.PDF</p>						
<p>Declarative <i>What should they know?</i></p>	<p>Bio 4.5 Homeostasis and response 4.5.1. Homeostasis 4.5.2 The human nervous system 4.5.3 Hormonal coordination in humans 4.5.3.2 Control of blood glucose 4.5.3.3 Hormones in human reproduction 4.5.3.4 Contraception 4.5.3.5 Hormones and fertility 4.5.3.6 Feedback systems</p> <p><u>Biology</u> <u>4.5.2.2 The brain</u> <u>4.5.2.3 The eye</u> <u>4.5.2.4 Control of body temperature</u> <u>4.5.3.3 Maintaining water and nitrogen balance in the body</u> <u>4.5.4 Plant hormones</u></p>	<p>Bio 4.6 Inheritance, variation and evolution 4.6.1.1 Sexual and asexual reproduction 4.6.1.2 Meiosis 4.6.1.3 DNA and the genome 4.6.1.4 Genetic inheritance 4.6.1.5 Inherited disorders 4.6.1.6 Sex determination 4.6.2.1 Variation</p> <p><u>Biology</u> <u>4.6.1.3 Advantages and disadvantages of sexual and asexual reproduction</u> <u>4.6.1.5 DNA structure</u> <u>4.6.2.5 Cloning</u> <u>4.6.3.1 Theory of evolution</u> <u>4.6.3.2 Speciation</u> <u>4.6.3.3 The understanding of genetics</u></p>	<p>Bio 4.6 Inheritance, variation and evolution 4.6.2.2 Evolution 4.6.2.3 Selective breeding 4.6.2.4 Genetic engineering 4.6.3.1 Evidence for evolution 4.6.3.2 Fossils 4.6.3.3 Extinction 4.6.3.4 Resistant bacteria 4.6.4 Classification of living organisms</p>	<p>Bio 4.7 Ecology 4.7.1.1 Communities 4.7.1.2 Abiotic factors 4.7.1.3 Biotic factors 4.7.1.4 Adaptations 4.7.2.1 Levels of organisation Required practical activity 7 - sampling</p>	<p>4.7.2.2 How materials are cycled 4.7.3.1 Biodiversity 4.7.3.2 Waste management 4.7.3.3 Land use 4.7.3.4 Deforestation 4.7.3.5 Global warming 4.7.3.6 Maintaining biodiversity</p> <p><u>Biology</u> <u>4.7.2.3 Decomposition</u> <u>4.7.2.4 Impact of environmental change</u> <u>4.7.4 Trophic levels in an ecosystem</u> <u>4.7.5 Food production</u></p>	<p>GCSE exams and revision</p>

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Year 11 Separate Science CHEMISTRY	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
The numbers below reference the AQA specification which can be accessed via this link (this is the programme of study followed in year 11) : https://filestore.aqa.org.uk/resources/chemistry/specifications/AQA-8462-SP-2016.PDF						
Declarative <i>What should they know?</i>	Chem 5.6 The rate and extent of chemical change 5.6.1.1 Calculating rates of reactions 5.6.1.2 Factors which affect the rates of chemical reactions Required practical activity 11: rate of reaction 5.6.1.3 Collision theory and activation energy 5.6.1.4 Catalysts 5.6.2.1 Reversible reactions 5.6.2.2 Energy changes and reversible reactions 5.6.2.3 Equilibrium 5.6.2.4 The effect of changing conditions on equilibrium (HT only) 5.6.2.5 The effect of changing concentration (HT only) 5.6.2.6 The effect of temperature changes on equilibrium (HT only) 5.6.2.7 The effect of pressure changes on equilibrium (HT only)	Chem 5.7 Organic chemistry 5.7.1.1 Crude oil, hydrocarbons and alkanes 5.7.1.2 Fractional distillation and petrochemicals 5.7.1.3 Properties of hydrocarbons 5.7.1.4 Cracking and alkenes <u><i>Chemistry</i></u> <u><i>4.7.2 Reactions of alkenes and alcohols</i></u> <u><i>4.7.3 Synthetic and naturally occurring polymers</i></u> Chemistry 5.8 Chemical analysis 5.8.1.1 Pure substances 5.8.1.2 Formulations 5.8.1.3 Chromatography Required practical activity 12: Chromatography. 5.8.2.1 Test for hydrogen 5.8.2.2 Test for oxygen 5.8.2.3 Test for CO ₂ 5.8.2.4 Test for chlorine <u><i>Chemistry</i></u> <u><i>4.8.3 Identification of ions by chemical and spectroscopic means</i></u>	5.9 Chemistry of the atmosphere 5.9.1.1 The proportions of different gases in the atmosphere 5.9.1.2 The Earth's early atmosphere 5.9.1.3 How oxygen increased	5.9.1.4 How carbon dioxide decreased 5.9.2.1 Greenhouse gases 5.9.2.2 Human activities which contribute to an increase in greenhouse gases in the atmosphere 5.9.2.3 Global climate change 5.9.2.4 The carbon footprint and its reduction 5.9.3.1 Atmospheric pollutants from fuels 5.9.3.2 Properties and effects of atmospheric pollutants	Chem 5.10 Using resources 5.10.1.1 Using the Earth's resources and sustainable development 5.10.1.2 Potable water Required practical activity 13: water samples and analysis 5.10.1.3 Waste water treatment 5.10.1.4 Alternative methods of extracting metals (HT only) 5.10.2.1 Life cycle assessment 5.10.2.2 Ways of reducing the use of resources <u><i>Chemistry</i></u> <u><i>4.10.3 Using materials</i></u> <u><i>4.10.4 The Haber process and the use of NPK fertilisers</i></u>	GCSE exams and revision

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Year 11 Separate Science PHYSICS	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
The numbers below reference the AQA specification which can be accessed via this link (this is the programme of study followed in year 11) : https://filestore.aqa.org.uk/resources/physics/specifications/AQA-8463-SP-2016.PDF						
Declarative <i>What should they know?</i>	Phys 6.5 Forces 6.5.1.1 Scalar and vector quantities 6.5.1.2 Contact and noncontact forces 6.5.1.3 Gravity 6.5.1.4 Resultant forces 6.5.2 Work done and energy transfer 6.5.3 Forces and elasticity Required practical activity 18: force and extension of a spring 6.5.4.1.1 Distance and displacement 6.5.4.1.2 Speed 6.5.4.1.3 Velocity 6.5.4.1.4 The distance– time relationship 6.5.4.1.5 Acceleration	6.5.4.2.1 Newton's First Law 6.5.4.2.2 Newton's Second Law Required practical activity 19: force and acceleration 6.5.4.2.3 Newton's Third Law 6.5.4.3.1 Stopping distance 6.5.4.3.2 Reaction time 6.5.4.3.3 Factors affecting braking distance 1 6.5.4.3.4 Factors affecting braking distance 2 6.5.5.1 Momentum is a property of moving objects (HT only) 6.5.5.2 Conservation of momentum (HT only) <u>Physics</u> <u>4.5.4 Moments, levers and gears</u> <u>4.5.5 Pressure and pressure differences in fluids</u>	Phys 6.6 Waves Waves 6.6.1.1 Transverse and longitudinal waves 6.6.1.2 Properties of waves Required practical activity 20: (observations of waves) 6.6.2.1 Types of electromagnetic waves 6.6.2.2 Properties of electromagnetic waves Required practical activity 21 (absorption and emission of IR) 6.6.2.3 Properties of electromagnetic waves 2 6.6.2.4 Uses and applications of electromagnetic waves <u>Physics</u> <u>4.6.1.3 Reflection of waves</u> <u>4.6.1.4 Sound waves</u> 4.6.1.5 <u>Waves for detection and exploration</u> 4.6.2.5 <u>Lenses</u> 4.6.2.6 <u>Visible light</u> 4.6.3 <u>Black body radiation</u>	Phys 6.7 Magnetism and electromagnetism 6.7.1.1 Poles of a magnet 6.7.1.2 Magnetic fields 6.7.2.1 Electromagnetism 6.7.2.2 Fleming's left-hand rule (HT only) 6.7.2.3 Electric motors (HT only) <u>Physics 4.7</u> <u>4.7.2.4 Loudspeakers Induced potential, transformers and the National Grid</u>	<u>Space physics (Physics Only)</u> 4.8.1 <u>Solar system; stability of orbital motions; satellites</u> 4.8.2 <u>Red-shift</u>	GCSE exams and revision