

Separate Science Key Stage 4 Curriculum Overview



Y10 Biology	ygy Week1 ₩				
Торіс	B4 Bioenergetics	B1 Cells	B2 Organisation	B3 Infection and response	
Topic Key Content Know that (Substantive Knowledge) Know how (Disciplinary knowledge)	B4 Bioenergetics We will explore how plants harness the Sun's energy in photosynthesis in order to make food. This process liberates oxygen which has built up over millions of years in the Earth's atmosphere. Both animals and plants use this oxygen to oxidise food in a process called aerobic respiration which transfers the energy that the organism needs to perform its functions. Conversely, anaerobic respiration does not require oxygen to transfer energy. During vigorous exercise the human body is unable to supply the cells with sufficient oxygen and it switches to anaerobic respiration. This process will supply energy but also causes the build-up of lactic acid in muscles which causes fatigue. Maths Skills 1a – Recognise and use expressions in decimal form	B1 Cells Cells are the basic unit of all forms of life. In this section we explore how structural differences between types of cells enable them to perform specific functions within the organism. These differences in cells are controlled by genes in the nucleus. For an organism to grow, cells must divide by mitosis producing two new identical cells. If cells are isolated at an early stage of growth before they have become too specialised, they can retain their ability to grow into a range of different types of cells. This phenomenon has led to the development of stem cell technology. This is a new branch of medicine that allows doctors to repair damaged organs by growing new tissue from stem cells. Maths Skills 1a Recognise and use expressions in decimal form	B2 Organisation We will learn about the human digestive system which provides the body with nutrients and the respiratory system that provides it with oxygen and removes carbon dioxide. In each case they provide dissolved materials that need to be moved quickly around the body in the blood by the circulatory system. Damage to any of these systems can be debilitating if not fatal. Although there has been huge progress in surgical techniques, especially with regard to coronary heart disease, many interventions would not be necessary if individuals reduced their risks through improved diet and lifestyle. We will also learn how the plant's transport system is dependent on environmental conditions to ensure that leaf cells are provided with the water and carbon dioxide that they need for	B3 Infection and response Pathogens are microorganisms such as viruses and bacteria that cause infectious diseases in animals and plants. They depend on their host to provide the conditions and nutrients that they need to grow and reproduce. They frequently produce toxins that damage tissues and make us feel ill. This section will explore how we can avoid diseases by reducing contact with them, as well as how the body uses barriers against pathogens. Once inside the body our immune system is triggered which is usually strong enough to destroy the pathogen and prevent disease. When at risk from unusual or dangerous diseases our body's natural system can be enhanced by the use of vaccination. Since the 1940s a range of antibiotics have been developed which have proved successful against a number of lethal diseases caused by bacteria. Unfortunately, many groups of bacteria have now become	
	1c- Use ratios, fractions and percentages	1b Recognise and use expressions in standard form	photosynthesis. Maths skills	resistant to these antibiotics. The race is now on to develop a new set	
	frequency tables and diagrams, bar charts and histograms 3a- Understand and use the symbols: =, <, <<, >>, >, ∝, ~	percentages 1d Make estimates of the results of simple calculations 2a Use an appropriate number of	in decimal form 1c - Students should be able to develop an understanding of size and scale in relation	antibiotics Working scientifically WS 1.3 Appreciate the power of monoclonal antibodies	
	3d – Solve simple algebraic	significant figures	to cells, tissues, organs and	and consider any ethical	

equations.	2h Make order of magnitude	systems.	issues.
4a – Translate information between	calculations	2a Use an appropriate number of	WS 1.4
graphical and numeric form	3a Understand and use the	significant figures	Evaluate the global use of
4c – Plot two variables from	symbols: =, <, <<, >>, >, ∝ , ~	2c - Construct and interpret	vaccination in the
experimental or other data	4a Translate information between	frequency tables and diagrams, bar	prevention of disease.
	graphical and numeric form	charts and histograms	WS 1.4 The everyday application of
Working Scientifically	4b Understand that y = mx + c	2d Understand the principles of	scientific knowledge to detect and
(HT only) WS 1.4	represents a linear relationship	sampling as applied to scientific	identify plant disease.
Use data to relate limiting factors	4c Plot two variables from	data (biology questions only)	WS 1.4 The understanding of
to the cost effectiveness of adding	experimental or other data	2g Use a scatter diagram to identify	ion deficiencies allows
heat, light or carbon dioxide to	4d Determine the slope and	a correlation between two	horticulturists to provide
greenhouses.	intercept of a linear graph	variables (biology and physics	optimum conditions for
		questions only)	plants.
		4a- Translate information between	WS 1.5
		graphical and numeric form	Evaluate the advantages
	5c Calculate areas of triangles and	4d - Determine the slope and	and disadvantages of
	rectangles, surface areas and	intercept of a linear graph	monoclonal antibodies.
Apparatus and Techniques	volumes of cubes	5c - Process data from	
AT 1, 3, 4	MS 1a, 1b, 1d, 2a, 2h	investigations involving	WS 1.6
Investigations into the effect of	Calculate the number of	stomata and transpiration	Understand that the results
exercise on the body.	bacteria in a population	rates to find arithmetic means,	of testing and trials are
	after a certain time if given	understand the principles of	published only after scrutiny by peer
AT1 - Use of appropriate apparatus	the mean division time.	sampling and calculate surface	review
to make and record a range of	MS 5c Calculate cross-sectional	areas and volumes.	
measurements accurately,	areas of colonies or clear areas	Working scientifically	
including length, area, mass, time,	around colonies	1.2 Students should be able to use	
temperature, volume of liquids and	using πr ² .	other models to explain enzyme	
gases, and Ph	Working Scientifically	action.	
AT3 - Use of appropriate apparatus	WS1.1 Understand how scientific	WS 1.3 Evaluate methods of	
and techniques for the observation	methods and theories develop over	treatment bearing in mind the	
and measurement of	time.	benefits and risks associated with	
biological changes and/or	WS 1.2 Recognise, draw and	the treatment.	
processes.	interpret images of cells	WS 1.4 Explain everyday and	
AT4 - Safe and ethical use of living	Use models and analogies to	technological applications of	
organisms (plants or animals) to	develop explanations of how cells	science; evaluate associated	
measure physiological functions	divide.	personal, social,	
and responses to the environment	Recognise, draw and interpret	economic and environmental	
	diagrams that model diffusion	implications; and make decisions	

F	Required practical activity 6:	WS 1.2 Recognise, draw and	based on the evaluation of	
i	investigate the effect of light	interpret diagrams that model	evidence and arguments	
i	intensity on the rate of	osmosis	WS 1.5 Evaluate risks related to use	
F	photosynthesis using an aquatic	WS 1.3 Evaluate the practical risks	of blood products.	
0	organism such as pondweed.	and benefits, as well as social and	Interpret data about risk	
ŀ	AT skills covered by this practical	ethical issues, of the use of stem	factors for specified	
ā	activity: AT 1, 2, 3, 4 and 5.	cells in medical research and	diseases.	
		treatments.	WS 3.5 Interpreting observations	
		WS 1.5 Use of isotonic drinks and	and other data	
		high energy drinks in sport.	(presented in verbal, diagrammatic,	
		WS 4.4 Use prefixes centi, milli,	graphical,	
		micro and nano	symbolic or numerical form),	
			including identifying	
		Apparatus and Techniques	patterns and trends, making	
		AT 7 Images of cells in videos, bio	inferences and drawing	
		viewers, photographs and	conclusions.	
		micrographs can be used as		
		comparison for students own	Apparatus and Techniques	
		drawings.	AT 7 Observing and drawing blood	
			cells seen under a microscope.	
		Required practical activity 1: use a	AT 7 Observation and drawing of a	
		light microscope to observe, draw	transverse section of leaf.	
		and label a selection of plant and	AT 3, 4, 5	
		animal cells. A magnification scale	Measure the rate of	
		must be included. AT skills covered	transpiration by the uptake	
		by this practical activity: biology AT	of water.	
		1 and 7.	AT 6, 7	
			Investigate the distribution	
		Required practical activity 2:	of stomata and guard cells.	
		investigate the effect of antiseptics		
		or antibiotics on bacterial growth	Required practical activity 4: use	
		using agar plates and measuring	qualitative reagents to test for a	
		zones of inhibition. AT skills	range of carbohydrates, lipids and	
		covered by this practical activity: AT	proteins.	
		1, 3, 4 and 8.	To include: Benedict's test for	
			sugars; iodine test for starch; and	
			Biuret reagent for protein.	

		Required practical activity 3	AT skills covered by this practical	
		investigate the effect of a range of	activity: AT 2 and 8	
		concentrations of salt or sugar		
		solutions on the mass of plant	Required practical activity 5:	
		tissue.	investigate the effect of pH on the	
		AT skills covered by this practical	rate of reaction of amylase enzyme.	
		activity: AT 1. 3 and 5.	Students should use a continuous	
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	sampling technique to determine	
			the time taken to completely	
			digest a starch solution at a range	
			of pH values. Iodine reagent is to	
			be used to test for starch every 30	
			seconds. Temperature must be	
			controlled by use of a water bath	
			or electric heater.	
			AT skills covered by this practical	
			activity: AT 1, 2, 5 and 8.	
Prior	Y7 Plant reproduction	Y7 Variation	Y7 Plant reproduction	Y8 Photosynthesis
knowledge	Y8 Photosynthesis	Y8 Cells	Y8 Photosynthesis	Y9 Digestion
	Y8 Respiration	Y9 Breathing Y8 Movement		
		Y9 Digestion	Y8 Cells	
			Y9 Breathing	
			Y9 Digestion	
GCSE	AO1: Demonstrate knowledge and			
objectives	understanding of:	understanding of:	understanding of:	understanding of:
	scientific ideas	scientific ideas	scientific ideas	scientific ideas
	 scientific techniques and 			
	procedures.	procedures.	procedures.	procedures.
	AO2: Apply knowledge and			
	understanding of:	understanding of:	understanding of:	understanding of:
	scientific ideas	scientific ideas	scientific ideas	scientific ideas
	scientific enquiry	 scientific enquiry 	 scientific enquiry 	scientific enquiry
	 techniques and procedures. 			
	AO3: Analyse information and	AO3: Analyse information and	AO3: Analyse information and	AO3: Analyse information and ideas
	ideas to	ideas to	ideas to	to
	interpret and evaluate	 interpret and evaluate 	 interpret and evaluate 	interpret and evaluate
	 make judgements and draw 			
	conclusions	conclusions	conclusions	conclusions

	develop and improve	develop and improve experimental	develop and improve experimental	develop and improve experimental
	experimental procedures	procedures	procedures	procedures
Assessment	Prior knowledge check	Prior knowledge check	Prior knowledge check	Prior knowledge check
tasks	Extended response questions on	Extended response questions on	Extended response questions on	Extended response questions on
	4.4.1 photosynthesis and 4.4.2	4.1.1 cell structure	4.2.1 Principles of organisation	4.3.1 Communicable diseases
	respiration	4.1.2 cell division	4.2.2 Animal tissues, organs and	4.3.2 Monoclonal antibodies (biology
	End of topic assessment	4.1.3 cell transport	organ systems	only) (HT only)
		End of topic assessment	4.2.3 Plant tissues, organs and	4.3.3 Plant disease (biology only)
			systems	End of topic assessment
			End of topic assessment	

Y11 Biology	Week 1 Week 39		
Торіс	B7 Ecology	B6 Inheritance and variation	B5 Homeostasis
Key Content	The Sun is a source of energy that passes	In this section we will discover how the number of	Cells in the body can only survive within
Know that	through ecosystems. Materials including	chromosomes are halved during meiosis and then	narrow physical and chemical limits. They
Knowledge)	carbon and water	combined with new genes from the sexual partner	require a constant temperature and pH as well
Know how	are continually recycled by the living world,	to produce unique offspring. Gene mutations occur	as a constant supply of dissolved food and
(Disciplinary	being released through respiration of animals,	continuously and on rare occasions can affect the	water. In order to do this the body requires
Kilowieuge)	plants and decomposing microorganisms and	functioning of the animal or plant. These mutations	control systems that constantly monitor and
	taken up by plants in photosynthesis.	may be damaging and lead to a number of genetic	adjust the composition of the blood and
	All species live in ecosystems composed of	disorders or death. Very rarely a new mutation can	tissues. These control systems include
	complex communities of animals and plants	be beneficial and consequently, lead to increased	receptors which sense changes and effectors
	dependent on each other and that are	fitness in the individual. Variation generated by	that bring about changes.
	adapted to particular conditions, both abiotic	mutations and sexual reproduction is the basis for	In this section we will explore the structure and
	and biotic. These ecosystems provide essential	natural selection; this is how species evolve.	function of the nervous system and how it can
	services that support human life and	An understanding of these processes has allowed	bring about fast responses. We will also
	continued development.	scientists to intervene through selective breeding	explore the hormonal system which usually
	In order to continue to benefit from these	to produce livestock with favoured characteristics.	brings about much slower changes. Hormonal
	services humans need to engage with the	Once new varieties of plants or animals have been	coordination is particularly important in
	environment in a sustainable way. In this	produced it is possible to clone individuals to	reproduction since it controls the menstrual
	section we will explore how humans are	produce larger numbers of identical individuals all	cycle. An understanding of the role of
	threatening blodiversity as well as the natural	carrying the favourable characteristic. Scientists	normones in reproduction has allowed
	systems that support it. We will also consider	nave now discovered now to take genes from one	scientists to develop not only contraceptive
	some actions we need to take to ensure our	species and introduce them in to the	drugs but also drugs which can increase
	Nothe skills	genome of another by a process called genetic	lertility.
	Mains skills	that	Wallis Skills
	Calculate the efficiency of	this technology can offer genetic modification still	and diagrams, bar charts and histograms
	hiomass transfer between	remains highly controversial	And diagrams, bar charts and mistograms
	trophic levels	Mathe skille	and numeric form
	2h Find arithmetic means	1 clise ratios fractions and nercentages	
	2c Construct and interpret frequency tables	2c 4a Extract and interpret	Working scientifically
	and diagrams, bar charts and histograms.	information from charts.	WS 1.3 Evaluate information around the
	2f Understand the terms mean, mode and	graphs and tables	relationship between obesity and diabetes. and
	median	2e Understand simple probability (biology	make recommendations taking into account
	4a Translate information between graphical	questions only)	social and ethical issues.
	and numeric form	3a Understand and use the symbols: =, <, <<. >>. >.	WS 1.3 Show why issues around contraception
		α,~	cannot be answered by science alone.

4c Plot two variables from experimental or		WS 1.4 Explain everyday and technological
other data	Working scientifically	applications of
MS 2c, 4a Extract and interpret	WS 1.1 Historical	science; evaluate associated personal, social,
information from charts,	developments of our understanding of the causes	economic and
graphs and tables	and prevention of malaria.	environmental implications; and make
	WS 1.2 Interpret a diagram of	decisions based on the evaluation of evidence
Working scientifically	DNA structure but will not	and arguments
WS 1.2 Interpret graphs used to model	be required to reproduce	(HT only) WS 1.1 Developments of microscopy
predator-prey cycles	it.	techniques have enabled IVF treatments to
WS 1.2 Interpret and explain the processes in	WS 1.2 Modelling insertions and deletions in	develop.
diagrams of	chromosomes	WS 1.3 Understand social and ethical issues
the carbon cycle, the water	to illustrate mutations.	associated with IVF treatments.
cycle.	WS 1.2 Modelling behaviour of	(HT only) WS 1.4 Evaluate from the perspective
WS 2.6 Recording first-hand	chromosomes during	of patients and doctors the methods of treating
observations of organisms.	meiosis	infertility.
WS 1.4 Explain how waste,	WS 1.3 Appreciate that embryo screening and gene	(HT only) WS 1.2, MS 2c Interpret and explain
deforestation and global	therapy may alleviate suffering but consider the	simple diagrams of negative feedback control.
warming have an impact on	ethical issues which arise.	(HT only) WS 1.5 Evaluate the benefits and
biodiversity.	WS 1.2 Use the theory of evolution by natural	risks of procedures
WS 1.4, 1.5 Understand the conflict between	selection in an explanation.	carried out on the brain and nervous system.
the need for cheap available compost to	WS 1.1, 1.3 Students should	WS 1.4 Students should be able to describe
increase food production	appreciate that the theory	how kidney dialysis works.
and the need to conserve	of evolution by natural	WS 1.5 Evaluate the advantages and
peat bogs and peatlands as	selection developed over	disadvantages of treating organ failure by
habitats for biodiversity and	time and from information	mechanical device or transplant.
to reduce carbon dioxide	gathered by many scientists.	WS 1.3, 1.4 Understand how the everyday use
emissions.	WS 1.1 The theory of speciation has developed	of hormones
WS 1.4 Evaluate the environmental	over time.	as weed killers has an effect on biodiversity
implications of	WS 1.1 Our current understanding of genetics has	
deforestation.	developed over time	Required practical activity 7: plan and carry out
WS 1.6 Understand that the scientific	WS 1.3, 1.4 Explain the benefits and risks of	an investigation into the effect of a factor on
consensus about global warming and climate	selective breeding given appropriate	human
change is based on systematic reviews of	information and consider	reaction time.
thousands of peer reviewed publications.	related ethical issues	AT skills covered by this practical activity: AT 1,
WS 1.3 Explain why evidence is	(HT only) WS 1.4	3 and 4
uncertain or incomplete in a	Interpret information about	Required practical activity 8: investigate the
complex context	genetic engineering	effect of light or gravity on the growth of newly
	techniques and to make	germinated seedlings.

	WS 1.4, 1.5 Evaluate given information about	informed judgements about	Record results as both length measurements
	methods that can be used to tackle problems	issues concerning cloning	and as careful, labelled biological drawings to
	caused by human impacts on the	and genetic engineering,	show the effects.
	environment.	including GM crops.	AT skills covered by this practical activity: AT 1,
	Explain and evaluate the	WS 1.3, 1.4 Explain the potential benefits and risks	3, 4 and 7
	conflicting pressures on	of	
	maintaining biodiversity	cloning in agriculture	
	given appropriate information	and in medicine and that	
	WS 1.4 Interpret population and food	some people have ethical	
	production statistics	objections.	
	to evaluate food security	WS 1.3 Data is now available to support the theory	
	WS 1.3 Understand that some	of	
	people have ethical objections to some	Evolution	
	modern intensive farming methods.	WS 1.3 Appreciate why the fossil record is	
	WS 1.4 Evaluate the advantages and	incomplete.	
	disadvantages	WS 1.1 Understand how scientific methods and	
	of modern farming techniques.	theories develop over time.	
	WS 1.4 Understand how	WS 1.2 Interpret evolutionary trees.	
	application of different		
	fishing techniques promotes recovery of fish		
	stocks		
	Required practical activity 9: measure the		
	population size of a common species in a		
	habitat. Use sampling techniques to		
	investigate the effect of a factor on the		
	distribution of this species.		
	Al skills covered by this practical activity: Al 1,		
	3, 4, 6 and 8.		
	Required practical activity 10: investigate the		
	effect of temperature on the rate of decay of		
	fresh milk by measuring nH change		
	AT skills covered by this practical activity: AT 1		
	3 4 and 5		
Prior knowledge	Y7 interdependence	Y7 Variation	Y7 Plant reproduction
-	Y7 Variation	Y7 Human reproduction	Y7 Interdependence
	Y8 Respiration	Y8 Photosynthesis	Y7 Human reproduction
		,	1

	Y9 Evolution	Y9 Inheritance	Y8 Respiration
	Y9 Climate	Y9 Evolution	Y8 Photosynthesis
			Y8 Light
GCSE	AO1: Demonstrate knowledge and	AO1: Demonstrate knowledge and understanding	AO1: Demonstrate knowledge and
assessment	understanding of:	of:	understanding of:
objectives	scientific ideas	scientific ideas	scientific ideas
	• scientific techniques and procedures.	 scientific techniques and procedures. 	• scientific techniques and procedures.
	AO2: Apply knowledge and understanding of:	AO2: Apply knowledge and understanding of:	AO2: Apply knowledge and understanding of:
	scientific ideas	scientific ideas	scientific ideas
	scientific enquiry	scientific enquiry	scientific enquiry
	• techniques and procedures.	techniques and procedures.	• techniques and procedures.
	AO3: Analyse information and ideas to	AO3: Analyse information and ideas to	AO3: Analyse information and ideas to
	 interpret and evaluate 	interpret and evaluate	interpret and evaluate
	 make judgements and draw conclusion 	make judgements and draw conclusions	make judgements and draw conclusions
	develop and improve experimental procedures	develop and improve experimental procedures	develop and improve experimental procedures
Assessment	Prior knowledge check	Prior knowledge check	Prior knowledge check
tasks	Extended response questions on	Extended response questions on	Extended response questions on
	4.7.1 Adaptations, interdependence and	4.6.1 Reproduction	4.5.1 Homeostasis
	competition	4.6.2 Variation and evolution	4.5.2 The human nervous system
	4.7.2 Organisation of an ecosystem	4.6.3 The development of understanding of	4.5.3 Hormonal coordination in humans
	4.7.3 Biodiversity and the effect of human	genetics and evolution	4.5.4 Plant hormones (biology only)
	interaction on ecosystems	4.6.4 Classification of living organisms	End of topic assessment
	4.7.4 Trophic levels in an ecosystem (biology	End of topic assessment	
	only)		
	End of topic assessment		

Y10 Chemistry	Week 1				Week 39
Торіс	C1 Atomic structure and the periodic table	C2 Bonding and structure	C3 Quantitative chemistry	C4 Chemical changes	C5 Energy changes
Key Content	The periodic table provides	Chemists use theories of	Chemists use quantitative	Understanding of chemical	Energy changes are an
Know that	chemists with a structured	structure and bonding to	analysis to determine the	changes began when	important part of chemical
(Substantive Knowledge)	organisation of the known	explain the physical and	formulae of compounds and	people began	reactions. The interaction of
Know how	chemical elements from	chemical properties of	the equations for reactions.	experimenting with	particles often involves
(Disciplinary	which they can make sense	materials. Analysis of	Given this information,	chemical reactions in a	transfers of energy due to
knowledge)	of their physical and	structures shows that atoms	analysts can then use	systematic way and	the breaking and formation
	chemical properties. The	can be arranged in a variety	quantitative methods to	organizing their results	of bonds. Reactions in which
	historical	of ways, some of which are	determine the purity of	logically. Knowing about	energy is released to the
	development of the periodic	molecular while others are	chemical samples and to	these different	surroundings are exothermic
	table and models of atomic	giant structures. Theories of	monitor the yield from	chemical changes meant	reactions, while those that
	structure provide good	bonding explain how atoms	chemical reactions.	that scientists could begin	take in thermal energy are
	examples of how scientific	are held together in these	Chemical reactions can be	to predict exactly what new	endothermic. These
	ideas and explanations	structures. Scientists use this	classified in various ways.	substances would be	interactions between
	develop over time as new	knowledge of structure and	Identifying different types of	formed and use this	particles can produce
	evidence emerges. The	bonding to engineer new	chemical reaction allows	knowledge to develop a	heating or cooling effects
	arrangement of elements in	materials with desirable	chemists to make sense of	wide range of different	that are used in a range of
	the modern periodic table	properties. The properties of	how different chemicals	materials and processes. It	everyday applications. Some
	can be explained in terms of	these materials may offer	react together, to establish	also helped biochemists to	interactions between ions in
	atomic structure which	new applications in a range	patterns and to make	understand the complex	an electrolyte result in the
	provides evidence for the	of different technologies.	predictions about the	reactions that take place in	production of electricity.
	model of a nuclear atom	Maths Skills	behaviour of other	living organisms.	Cells and batteries use these
	with electrons in energy	1a Recognise and use	chemicals. Chemical	The extraction of important	chemical reactions to
	levels.	expressions in decimal form	equations	resources from the earth	provide
	Maths skills	1b Recognise and use	provide a means of	makes use of the way that	electricity. Electricity can
	1b Recognise and use	expressions in standard	representing chemical	some elements and	also be used to decompose
	expressions in standard form	form.	reactions and are a key way	compounds react with each	ionic substances and is a
	1d Recognise expressions in	1c Use ratios, fractions and	for chemists to communicate	other and how easily they	useful means of producing
	standard form	percentages	chemical ideas.	can be 'pulled apart'.	elements that are too
	5b Visualise and represent	1d Make estimates of the	Maths Skills	Maths skills	expensive to extract any
	2D and 3D forms including	results of simple	MS 1a - Recognise and use	MS 2h Make order of	other way.
	two dimensional	calculations.	expressions in decimal	magnitude calculations.	Maths skills
	representations of 3D	2h Make order of magnitude	form.		MS 1a Recognise and use
	objects	calculations.	MS 1b -Recognise and use	Working scientifically	expressions in decimal

	4a Translate information	expressions in standard	WS 1.2 Use a variety of	form.
Working scientifically	between graphical and	form.	models such as	
1.1 Understand how	numeric form	MS 1c-Use ratios, fractions	representational, spatial,	Apparatus and Techniques
scientific methods and	MS 5b - Visualise and	and percentages.	descriptive,	AT 5 An opportunity to
theories develop over time	represent 2D and 3D forms	MS 2a-Use an appropriate	computational and	measure
1.2 Use a variety of models	including two dimensional	number of significant figures.	mathematical to solve	temperature changes when
such as representational,	representations of 3D	MS 3a- Understand and use	problems, make	substances react or dissolve
spatial, descriptive,	objects.	the symbols: =, <, <<, >>, >,	predictions and to develop	in water.
computational and	MS 5c Calculate areas of	<i>∝,</i> ~	scientific explanations and	
mathematical to solve	triangles and rectangles,	MS 3b-Change the subject of	understanding of familiar	AT6
problems, make predictions	surface areas and volumes of	an equation	and unfamiliar facts.	Safe and careful use of
and to develop scientific	cubes.	MS 3c Substitute numerical		Liquids.
explanations and		values into algebraic	Apparatus and Techniques	
understanding of	Working scientifically	equations using appropriate	AT 6 Mixing of reagents to	Required practical 4:
familiar and unfamiliar facts	1.2 Recognise substances as	units for physical quantities.	explore chemical changes	investigate the variables that
1.6 Recognise the	small molecules, polymers		and/or products.	affect temperature changes
importance of peer	or giant structures from	Working Scientifically		in reacting solutions such as,
review of results and of	diagrams showing their	WS 1.2 1.2 Use a variety of	AT 3 This is an opportunity	eg acid plus metals, acid plus
communicating results	bonding.	models such as	to	carbonates, neutralisations,
to a range of audiences.	Recognise substances as	representational, spatial,	investigate pH changes	displacement of
Students should be able to	metallic giant structures	descriptive, computational	when a strong acid	metals.
represent the electronic	from diagrams showing	and mathematical to solve	neutralises a strong alkali.	AT skills covered by this
structures of the first twenty	their bonding.	problems, make predictions		practical activity: 1, 3, 5 and
elements of the periodic	1.4 Explain everyday and	and to develop scientific	Required practical 1:	6
table in both forms	technological applications of	explanations and	preparation of a pure, dry	
Explain how testing a	science; evaluate associated	understanding of familiar	sample of a soluble salt	
prediction can support or	personal, social, economic	and unfamiliar facts	from an insoluble oxide or	
refute a new scientific idea.	and environmental	3.4 Representing	carbonate using a Bunsen	
2.2 Plan experiments or	implications; and make	distributions of results	burner to heat dilute acid	
devise procedures	decisions based on the	and make estimations of	and a water bath or electric	
to make observations,	evaluation of evidence and	uncertainty.	heater to evaporate the	
produce or characterise	arguments.	4.1 Use scientific vocabulary,	solution.	
a substance, test	1.3 Appreciate the power	terminology and definitions	AT skills covered by this	
hypotheses, check data or	and limitations of science	4.2 Recognise the	practical activity: 2, 3, 4	
explore phenomena	and consider any ethical	importance of scientific	and 6	
2.3 Apply a knowledge of a	issues which may arise.	quantities and understand		
range of techniques,	1.5 Evaluate risks both in	how they are determined	Required practical 2:	
instruments, apparatus, and	practical science and the		(chemistry only)	

	materials to select those appropriate to the experiment. 4.3 Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate 4.4 Use SI units and the prefix nano. Apparatus and techniques AT 4 Safe use of a range of equipment to separate chemical mixtures. AT 6 Offers an opportunity within displacement reactions of halogens.	wider societal context, including perception of risk in relation to data and consequences. 4.1 Use scientific vocabulary, terminology and definitions. 4.2 Recognise the importance of scientific quantities and understand how they are determined 4.3 Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate 4.4 Use prefixes and powers of ten for orders of magnitude (eg tera, giga, mega, kilo, centi, milli, micro and nano). 4.5 Interconvert units.	 4. 3 Use SI units (eg kg, g, mg; km, m, mm; kJ, J) and IUPAC chemical nomenclature unless inappropriate 4.5 Interconvert units. 4.6 Use an appropriate number of significant figures in calculation Apparatus and Techniques AT 1, 2,6 Opportunities within investigation of mass changes using various apparatus. AT 1, 3, 8 Opportunities within titrations including to determine concentrations of strong acids and alkalis. 	determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration. (HT only) determination of the concentration of one of the solutions in mol/dm3 and g/dm3 from the reacting volumes and the known concentration of the other solution. AT skills covered by this practical activity: 1 and 8. Required practical 3: investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis. AT skills covered by this practical activity: 3, 7 and 8.	
Prior knowledge	Y7 Separating mixtures Y8 Elements Y8 Periodic table Y9 Types of reaction	Y7 Particle model Y7 Metals and non-metals Y8 Earth structure Y8 Elements	Y9 Types of reaction	Y7 Acids and alkalis Y7 Metals and non-metals Y9 Types of reaction	Y9 Types of reaction Y9 Chemical energy
GCSE assessment objectives	AO1: Demonstrate knowledge and understanding of: • scientific ideas	AO1: Demonstrateknowledge andunderstanding of:scientific ideas	AO1: Demonstrateknowledge andunderstanding of:scientific ideas	AO1: Demonstrateknowledge andunderstanding of:scientific ideas	AO1: Demonstrateknowledge andunderstanding of:scientific ideas

	• scientific techniques and	• scientific techniques and	• scientific techniques and	• scientific techniques	• scientific techniques and
	procedures.	procedures.	procedures.	and procedures.	procedures.
	AO2: Apply knowledge and				
	understanding of:				
	 scientific ideas 				
	 scientific enquiry 				
	 techniques and 				
	procedures.	procedures.	procedures.	procedures.	procedures.
	AO3: Analyse information				
	and ideas to				
	 interpret and evaluate 				
	 make judgements and 				
	draw conclusions				
	 develop and improve 				
	experimental procedures	experimental procedures	experimental procedures	experimental	experimental
				procedures	procedures
Assessment	Prior knowledge check				
tasks	Extended response questions	Extended response questions	Extended response questions	Extended response	Extended response
	on	on	on 4.3.1 Chemical	questions on 4.4.1	questions on
	4.1.1 A simple model of the	4.2.1 Chemical bonds, ionic,	measurements, conservation	Reactivity of metals	4.5.1 Exothermic and
	atom, symbols, relative	covalent and metallic	of mass and the quantitative	4.4.2 Reactions of acids	endothermic reactions
	atomic mass, electronic	4.2.2 How bonding and	interpretation of chemical	4.4.3 Electrolysis	4.5.2 Chemical cells and fuel
	charge and isotopes.	structure are related to the	equations.	End of topic assessment	cells (chemistry only)
	4.1.2 The periodic table.	properties of	4.3.2 Use of amount of		End of topic assessment
	End of topic assessment	Substances	substance in relation to		
		4.2.3 Structure and bonding	masses of pure substances		
		of carbon	4.3.3 Yield and atom		
		4.2.4 Bulk and surface	economy of chemical		
		properties of matter	reactions (chemistry only)		
		including nanoparticles	4.3.4 Using concentrations of		
		(chemistry only)	solutions in mol/dm3		
		End of topic assessment	(chemistry only) (HT only)		
			4.3.5 Use of amount of		
			substance in relation to		
			volumes of gases (chemistry		
			oniy) (HT oniy)		
			End of topic assessment		

Y11 Chemistry	Week 1 Week 39					
Торіс	C6 Rates of reaction	C7 Organic Chemistry	C8 Chemical analysis	C9 Chemistry of the atmosphere	C10 using resources	
Key Content	Chemical reactions can occur	The chemistry of carbon	Analysts have developed a	The Earth's atmosphere is	Industries use the Earth's	
Know that	at vastly different rates.	compounds is so important	range of qualitative tests to	dynamic and forever	natural resources to	
(Substantive	Whilst the reactivity of	that it forms a separate	detect specific chemicals.	changing. The causes of	manufacture useful products.	
Know how	chemicals is a	branch of chemistry A	The tests are based on	these changes are	In order to operate	
(Disciplinary	significant factor in how fast	great variety of carbon	reactions that produce a	sometimes man-made and	sustainably, chemists seek to	
knowledge)	chemical reactions proceed.	compounds is possible	gas with distinctive	sometimes part of many	minimise the use of limited	
	there are many variables	because carbon atoms can	properties or a colour	natural cycles Scientists	resources use of energy	
	that can be manipulated in	form chains and rings	change or an insoluble	use very complex software	waste and environmental	
	order to speed them up or	linked by C-C bonds. This	solid that appears as a	to predict weather and	impact in the manufacture of	
	slow them down. Chemical	hranch of chemistry gets its	precipitate	climate change as there are	these products. Chemists also	
	reactions may also be	name from the fact that	Instrumental methods	many variables that can	aim to develop ways of	
	reactions may also be	the main sources of organic	provide fact, consitive and	influence this The	disposing of products at the	
	affect of different variables	compounds are living or	provide last, sensitive and	ninderice tins. The	and of their useful life in ways	
	enect of uniferent variables	compounds are living, of	accurate means of	problems caused by	that answer that materials and	
	needs to be established in	once-living materials from	analysing chemicals, and	Increased levels of all	that ensure that materials and	
	b such a maximized the wield of	plants and animals. These	are particularly useful	poliutants require scientists	Stored energy are utilised.	
	now to maximise the yield of	sources include fossil fuels	when the amount of	and engineers to develop	Pollution, disposal of waste	
	desired product.	which are a major source	chemical being analysed is	solutions that help to	products and changing land	
	Understanding energy	of feedstock for the	small. Forensic scientists	reduce the impact of	use has a significant effect on	
	changes that accompany	petrochemical industry.	and	human activity.	the environment, and	
	chemical reactions is	Chemists are able to take	drug control scientists rely	Working scientifically	environmental chemists study	
	important for this process. In	organic molecules and	on such instrumental	1.1 Understand how	how human activity has	
	industry, chemists and	modify them in many ways	methods in their work.	scientific methods and	affected the Earth's natural	
	chemical engineers	to make new and useful	Maths skills	theories develop over time	cycles, and how damaging	
	determine the effect of	materials such as polymers,	MS 1a Recognise and use	1.2 Use a variety of models	effects can be minimised.	
	different variables on	pharmaceuticals, perfumes	expressions in decimal	such as representational,	Maths skills	
	reaction rate and yield of	and flavourings, dyes and	form.	spatial, descriptive,	MS 1a Recognise and use	
	product. Whilst there may be	detergents.	MS 1c Use ratios, fractions	computational, and	expressions in decimal	
	compromises to be made,	Maths skills	and	mathematical to solve	form.	
	they carry out optimisation	MS 5b Visualise and	percentages.	problems, make	MS 1c Use ratios, fractions	
	processes to ensure that	represent 2D and 3D forms	MS 1d Make estimates of	predictions and to develop	and	
	enough product is produced	including two dimensional	the	scientific explanations and	percentages	
	within a sufficient time, and	representations	results of simple	understanding of familiar	MS 1d Make estimates of the	
	in an energy-efficient way.	of 3D objects.	calculations.	and unfamiliar facts	results of simple calculations	

Maths skills	Working scientifically	MS4a Translate information	1.3 Appreciate the power	MS 2a Use an appropriate
MS 1a Recognise and use	WS 1.2 Make models of	between graphical and	and limitations of science	number of significant figures.
expressions in decimal	alkane	numeric form.	and consider any ethical	2c Construct and interpret
form.	molecules using the		issues which may arise.	frequency tables and
MS 1c Use ratios, fractions	molecular modelling kits.	Working scientifically	1.5 Evaluate risks both in	diagrams, bar charts and
and	WS 1.2, 4.1 Investigate the	WS 1.4Explain everyday	practical science and the	histograms
percentages.	properties of different	and technological	wider societal context,	MS 2h Translate information
MS 1d Make estimates of the	hydrocarbons.	applications of science;	including	between graphical and
results of simple	WS 1.2 Recognise	evaluate associated	perception of risk in	numeric form.
calculations.	substances that are alkenes	personal, social, economic	relation to data and	4a Translate information
MS 4a Translate information	from their names or from	and environmental	consequences.	between graphical and
between graphical and	given formulae in these	implications; and make	1.6 Recognise the	numeric form
numeric form.	forms.	decisions based on the	importance of peer review	
MS 4b Drawing and	WS 1.2 Use models to	evaluation of evidence and	of results and of	Working scientifically
interpreting appropriate	represent addition	arguments	communicating results	WS 3.2
graphs from data to	polymerisation.	WS 2.2 Plan experiments or	to a range of audiences.	WS 1.3, 4, 5 LCAs should be
determine rate of reaction.	WS 1.2 Use models to	devise procedures to make	3.5 Interpreting	done as a comparison of the
MS 4c Plot two variables	represent condensation	observations, produce or	observations and other	impact on the environment of
from	polymerisation.	characterise a substance,	data (presented in verbal,	the stages in the life of a
experimental or other data.		test hypotheses, check data	diagrammatic,	product, and only quantified
MS 4d Determine the slope	Apparatus and techniques	or	graphical, symbolic or	where data is readily
and intercept of a linear	AT 2, 5, 6	explore phenomena.	numerical form), including	available for energy, water,
graph.	Opportunities when	WS 2.3 Apply a knowledge	identifying patterns and	resources and wastes.
MS 4e Draw and use the	investigating reactions of	of a range of techniques,	trends, making inferences	Interpret LCAs of materials
slope of a tangent to a curve	alcohols.	instruments, apparatus,	and drawing conclusions.	or products given
as a		and	3.6 Presenting reasoned	appropriate information
measure of rate of change.	AT 2, 5, 6	materials to select those	explanations	WS 2.2, 7, 3.5 Investigate the
MS 5C Calculate areas of	Opportunities within	appropriate to the	including relating data to	conditions for rusting.
triangles and rectangles,	investigation of the	experiment.	hypotheses.	WS 1.4, 3.5, 3.8
surface areas and volumes of	reactions of carboxylic	WS 3.1 Presenting	4.1 Use scientific	Compare the properties of
cubes.	acids.	observations and other	vocabulary, terminology	thermosetting and
Working scientifically		data using appropriate	and definitions.	thermosoftening polymers
WS 1.2 Use a variety of		methods.	WS 1.2 An opportunity to	WS 3.5
models such as		WS3.6	show that aquatic plants	WS 3.8
representational, spatial,		WS 4.1 Use scientific	produce oxygen in daylight.	
descriptive, computational		vocabulary, terminology		Apparatus and techniques
and mathematical to solve		and definitions.		AT 4 Prepare an ammonium
				salt.

problems, make predictions	Apparatus and techniques	
and to develop scientific	AT 8 An opportunity to	Required practical 8: analysis
explanations and	investigate flame colours.	and purification of water
understanding of familiar	AT 8 An opportunity to	samples from different
and unfamiliar facts	make	sources, including
	precipitates of metal	pH, dissolved solids and
Apparatus and techniques	hydroxides.	distillation.
AT 5 An opportunity to	AT 8 An opportunity to	AT skills covered by this
investigate the catalytic	observe flame spectra	practical activity: 2, 3 and 4
effect of adding different	using a handheld	
metal salts to a reaction	spectroscope.	
such as the decomposition		
of hydrogen peroxide.	Required practical 6:	
	investigate how paper	
Required practical 5:	chromatography can be	
investigate how changes in	used to separate and tell	
concentration affect the	the	
rates of reactions by a	difference between	
method involving measuring	coloured substances.	
the volume of a gas	Students should calculate	
produced and a method	Rf values.	
involving a change in	AT skills covered by this	
colour or turbidity. This	practical activity: 1 and 4.	
should be an investigation		
involving developing a	Required practical 7: use of	
hypothesis.	chemical tests to identify	
AT skills covered by this	the ions in unknown single	
practical activity: 1, 3, 5 and	ionic	
6.	compounds covering the	
	ions from sections Flame	
	tests (page 73) to Sulfates	
	(page 74) in the Spec.	
	AT skills covered by this	
	practical activity: 1 and 8	

Prior knowledge	Y9 Types of reaction	Y8 Elements	Y7 Separating mixtures	Y9 Types of reaction	Y8 Earth structure
		Y9 Types of reaction		Y9 Climate	Y9 Climate
					Y9 Earth's resources
GCSE assessment	AO1: Demonstrate	AO1: Demonstrate	AO1: Demonstrate	AO1: Demonstrate	AO1: Demonstrate knowledge
objectives	knowledge and	knowledge and	knowledge and	knowledge and	and understanding of:
	understanding of:	understanding of:	understanding of:	understanding of:	 scientific ideas
	 scientific ideas 	 scientific ideas 	 scientific ideas 	 scientific ideas 	 scientific techniques and
	 scientific techniques and 	scientific techniques	 scientific techniques 	scientific techniques	procedures.
	procedures.	and procedures.	and procedures.	and procedures.	AO2: Apply knowledge and
	AO2: Apply knowledge and	AO2: Apply knowledge and	AO2: Apply knowledge and	AO2: Apply knowledge and	understanding of:
	understanding of:	understanding of:	understanding of:	understanding of:	 scientific ideas
	 scientific ideas 	 scientific ideas 	 scientific ideas 	 scientific ideas 	 scientific enquiry
	 scientific enquiry 	 scientific enquiry 	 scientific enquiry 	 scientific enquiry 	 techniques and
	 techniques and 	 techniques and 	 techniques and 	 techniques and 	procedures.
	procedures.	procedures.	procedures.	procedures.	AO3: Analyse information and
	AO3: Analyse information	AO3: Analyse information	AO3: Analyse information	AO3: Analyse information	ideas to
	and ideas to	and ideas to	and ideas to	and ideas to	 interpret and evaluate
	 interpret and evaluate 	 interpret and evaluate 	 interpret and evaluate 	 interpret and evaluate 	 make judgements and
	 make judgements and 	 make judgements and 	 make judgements and 	 make judgements and 	draw conclusions
	draw conclusions	draw conclusions	draw conclusions	draw conclusions	 develop and improve
	 develop and improve 	develop and improve	develop and improve	develop and improve	experimental procedures
	experimental procedures	experimental	experimental	experimental	
		procedures	procedures	procedures	
Assessment tasks	Prior knowledge check	Prior knowledge check	Prior knowledge check	Prior knowledge check	Prior knowledge check
	Extended response questions	Extended response	Extended response	Extended response	Extended response questions
	on	questions on 4.7.1 Carbon	questions on 4.8.1 Purity,	questions on 4.9.1 The	on
	4.6.1 Rate of reaction	compounds as fuels and	formulations and	composition and evolution	4.10.1 Using the Earth's
	4.6.2 Reversible reactions	feedstock	chromatography	of the Earth's atmosphere	resources and obtaining
	and dynamic equilibrium	4.7.2 Reactions of alkenes	4.8.2 Identification of	4.9.2 Carbon dioxide and	potable water
	End of topic assessment		Common gases	methane as greenhouse	4.10.2 Life cycle assessment
		4.7.2 Synthetic and	4.8.3 Identification of ions	gases.	4 10 2 Using materials
		4.7.5 Synthetic and	spectroscopic means	atmospheric pollutants and	(chemistry only)
		nolymers (chemistry only)	(chemistry only)	their sources	A 10 A The Haber process and
		End of tonic assessment	End of tonic assessment	End of tonic assessment	the use of NPK fertilisers
					(chemistry
					only
					End of topic assessment

Y10 Physics	Week 1					
Торіс	P1 Energy	P2 Electricity	P3 Particle model	P4 Atomic structure	P5 Forces	
Key Content	The concept of energy	Electric charge is a	The particle model is widely	Ionising radiation is	Engineers analyse forces	
(Substantive	emerged in the 19th century.	fundamental property of	used to predict the	hazardous but can be very	when designing a great	
Knowledge)	The idea was used to explain	matter everywhere.	behaviour of solids, liquids	useful. Although	variety of machines and	
Know how	the work output of steam	Understanding the difference	and gases and this has many	radioactivity was	instruments, from road	
(Disciplinary	engines and then generalised	in the microstructure of	applications in everyday life.	discovered over a century	bridges and fairground rides	
Knowledgej	to understand other heat	conductors, semiconductors	It helps us to explain a wide	ago, it took many nuclear	to atomic force microscopes.	
	engines. It also became a key	and insulators makes it	range of observations and	physicists several decades	Anything mechanical can be	
	tool for understanding	possible to design	engineers use these	to understand the structure	analysed in	
	chemical reactions and	components and build	principles when designing	of atoms, nuclear forces	this way. Recent	
	biological systems.	electric circuits. Many	vessels to withstand high	and stability. Early	developments in artificial	
	Limits to the use of fossil fuels	circuits are powered with	pressures and temperatures,	researchers suffered from	limbs use the analysis of	
	and global warming are critical	mains electricity, but	such as submarines and	their exposure to ionising	forces to make movement	
	problems for this century.	portable electrical devices	spacecraft. It also explains	radiation. Rules for	possible.	
	Physicists and engineers are	must use batteries of some	why it is difficult to make a	radiological protection	Maths skills	
	working hard to identify ways	kind.	good cup of tea high up a	were first introduced in the	1a Recognise and use	
	to reduce our energy usage.	Electrical power fills the	mountain!	1930s and subsequently	expressions in decimal form	
	Maths Skills	modern world with artificial	Maths skills	improved. Today	1c Use ratios, fractions and	
	1a Recognise and use	light and sound, information	1a Recognise and use	radioactive materials are	percentages	
	expressions in decimal form	and entertainment, remote	expressions in decimal form	widely used in medicine,	1d Make estimates of the	
	1c Use ratios, fractions and	sensing and control. The	1bRecognise and use	industry, agriculture and	results of simple calculations	
	percentages	fundamentals of	expressions in standard form	electrical power generation	2f Understand the terms	
	2c Construct and interpret	electromagnetism were	1c Use ratios, fractions and	Maths skills	mean, mode and median	
	frequency tables and	worked out by scientists of	percentages	1b Recognise and use	3a Students should	
	diagrams, bar charts and	the 19th century. However,	3b Change the subject of an	expressions in standard	recognise	
	histograms	power stations, like all	equation	form	and be able to use the	
	3b Change the subject of an	machines, have a limited	3c Substitute numerical	1c Use ratios, fractions and	symbol for proportionality,	
	equation	lifetime. If we all	values into algebraic	percentages	X	
	3c Substitute numerical values	continue to demand more	equations using appropriate	3c Substitute numerical	3b Change the subject of an	
	into algebraic equations using	electricity this means	units for physical	values into algebraic	equation	
	appropriate units for physical	building new power stations	quantities (chemistry and	equations using	3c Substitute numerical	
	quantities (chemistry and	in every generation – but	physics questions only)	appropriate units for	values into algebraic	
	physics questions only)	what mix of power stations	3d Solve simple algebraic	physical	equations using appropriate	
	4a Translate information	can promise a sustainable	equations (biology and	quantities (chemistry and	units for physical	
	between graphical and	future?	physics questions only)	physics questions only)	quantities (chemistry and	
	numeric form	Maths skills			physics questions only)	

	1c Use ratios, fractions and	4a Translate information	(HT only) 3d Solve simple	4a Translate information
Working scientifically	percentages	between graphical and	algebraic equations	between graphical and
1.2 Use a variety of models	3b Change the subject of an	numeric form	(biology and physics	numeric form
such as representational,	equation		questions only)	4b Understand that y = mx +
spatial, descriptive,	3c Substitute numerical	Working scientifically	Working scientifically	c represents a linear
computational and	values into algebraic	1.2 Use a variety of models	1.1 Understand how	relationship
mathematical to solve	equations using appropriate	such as representational,	scientific methods and	4c Plot two variables from
problems, make predictions	units for physical	spatial, descriptive,	theories develop over time.	experimental or other data
and to develop scientific	quantities (chemistry and	computational and	1.2 Use a variety of models	4d Determine the slope and
explanations and	physics questions only)	mathematical to solve	such as representational,	intercept of a linear graph
understanding of	Students should be able to	problems, make predictions	spatial, descriptive,	4f Understand the physical
familiar and unfamiliar facts.	recall and apply equations.	and to develop scientific	computational and	significance of area between
1.3 Appreciate the power and	3d Solve simple algebraic	explanations and	mathematical to solve	a curve and the x-axis and
limitations of science and	equations (biology and	understanding of familiar	problems, make	measure it by counting
consider any ethical issues	physics questions only)	and unfamiliar facts.	predictions and to develop	squares as appropriate
which may arise	4c Plot two variables from		scientific explanations and	(physics questions only)
1.4 Explain everyday and	experimental or other data	Apparatus and techniques	understanding of familiar	5a Use angular measures in
technological applications of	4d Determine the slope and	AT 5	and unfamiliar facts.	degrees (physics questions
science; evaluate associated	intercept of a linear graph	Perform an experiment to	1.4 Explain everyday and	only)
personal, social, economic and	4e Draw and use the slope of	measure the latent heat of	technological applications	5b Visualise and represent
environmental implications;	a tangent to a curve as a	fusion of water	of science; evaluate	2D and 3D forms including
and make decisions based on	measure of rate of change		associated	two dimensional
the evaluation of evidence and	(chemistry	Required practical activity 5:	personal, social, economic	representations of 3D
arguments	and physics questions only)	use appropriate apparatus to	and environmental	objects (chemistry and
3.5 Interpreting observations		make and record the	implications; and make	physics questions only)
and other data (presented in	Working scientifically	measurements needed to	decisions based on the	
verbal, diagrammatic,	1.2 Use a variety of models	determine the densities of	evaluation of evidence and	Working scientifically
graphical, symbolic or	such as representational,	regular and irregular solid	arguments	WS 1.2 2 Use a variety of
numerical form), including	spatial, descriptive,	objects and liquids. Volume	1.5 Evaluate risks both in	models such as
identifying patterns and	computational and	should be determined from	practical science and the	representational, spatial,
trends, making inferences and	mathematical to solve	the dimensions of regularly	wider societal context,	descriptive, computational
drawing conclusions.	problems, make predictions	shaped objects, and by a	including	and mathematical to solve
4.3 Use SI units (eg kg, g, mg;	and to develop scientific	displacement technique for	perception of risk in	problems, make predictions
km, m, mm; kJ, J) and IUPAC	explanations and	irregularly shaped objects.	relation to data and	and to develop scientific
chemical nomenclature	understanding of familiar	Dimensions to be measured	consequences	explanations and
unless inappropriate.	and unfamiliar facts.	using appropriate apparatus	1.6 Recognise the	understanding of familiar
		such as a ruler, micrometer	importance of peer review	and unfamiliar facts
		or Vernier callipers.		

4.4 Use prefixes and powers of	1.4 Explain everyday and	AT skills covered by this	of results and of	WS 1.5 Evaluate risks both in
ten for orders of magnitude	technological applications of	practical activity: AT 1.	communicating results	practical science and the
(eg tera, giga, mega, kilo,	science; evaluate associated		to a range of audiences.	wider societal context,
centi, milli, micro and nano).	personal, social, economic		4.1 Use scientific	including
4.5 Interconvert units.	and environmental		vocabulary, terminology	perception of risk in relation
4.6 Use an appropriate	implications; and make		and definitions.	to data and consequences
number of	decisions based on the		4.4 Students should be able	WS 2.2 Plan experiments or
significant figures in	evaluation of evidence and		to	devise procedures to make
calculation.	arguments		recognise expressions	observations, produce or
	1.5 Evaluate risks both in		given in standard form.	characterise a substance,
Apparatus and Techniques	practical science and the			test hypotheses, check data
AT 1 Investigate the transfer of	wider societal context,			or
energy from a gravitational	including			explore phenomena.
potential energy store to a	perception of risk in relation			WS 3.3 Carrying out and
kinetic energy store	to data and consequences.			represent mathematical and
	4.5 Interconvert units.			statistical analysis.
AT 1, 5 Investigate thermal	Apparatus and Techniques			WS 3.5 Interpreting
conductivity using rods of	AT 6 Investigate the			observations and other
different materials.	relationship between the			data (presented in verbal,
	resistance of a thermistor			diagrammatic, graphical,
Required practical activity 1:	and temperature.			symbolic or numerical form),
investigation to determine the	Investigate the relationship			including identifying
specific heat capacity of one	between the resistance of			patterns and trends, making
or more materials. The	an LDR and light intensity			inferences and drawing
investigation will involve				conclusions.
linking the decrease of one	AT 7			WS 3.7 Being objective,
energy store (or work done) to	Use of appropriate			evaluating data in terms of
the increase in temperature	apparatus, techniques and			accuracy, precision,
and subsequent increase in	magnification, including			repeatability and
thermal energy stored.	microscopes, to			reproducibility and
AT skills covered by this	make observations of			identifying potential sources
practical activity: AT 1 and 5.	biological specimens and			of random and systematic
	produce labelled scientific			error.
Required practical activity 2	drawings (links to A-level AT			WS4.3 Use SI units (eg kg, g,
(physics only): investigate the	d and e).			mg; km, m, mm; kJ, J) and
effectiveness of different				IUPAC chemical
materials as thermal insulators	Required practical activity 3:			nomenclature
and the factors that may affect	Use circuit diagrams to set			unless inappropriate.

the thermal insulation	up and check appropriate		WS4.4 Use prefixes and
properties of a material.	circuits to investigate the		powers of ten for orders of
AT skills covered by this	factors affecting the		magnitude (eg tera, giga,
practical activity: AT 1 and 5.	resistance of electrical		mega, kilo, centi, milli, micro
	circuits. This should include:		and nano).
	 the length of a wire at 		WS 4.5 Interconvert units.
	constant temperature		WS4.6 Use an appropriate
	• combinations of resistors in		number of significant figures
	series and parallel.		in calculation.
	AT skills covered by this		
	practical activity: AT 1, 6 and		
	7.		Apparatus and techniques
			AT 1 Measure the effect of
	Required practical activity 4:		distractions on reaction
	use circuit diagrams to		time.
	construct appropriate		AT 1, 2, 3 Investigate
	circuits to investigate the I–V		collisions
	characteristics of a variety of		between laboratory trollies
	circuit elements, including a		using light gates, data
	filament lamp, a diode and a		loggers or ticker timers to
	resistor at constant		measure and record data
	temperature.		
	AT skills covered by this		Required practical activity 6:
	practical activity: AT 6 and 7		investigate the relationship
			between force and
			extension for a spring.
			AT skills covered by this
			practical activity: AT 1 and 2.
			Required practical activity 7:
			investigate the effect of
			varying the force on the
			acceleration of an object of
			constant mass, and the
			effect of varying the mass of
			an object on the
			acceleration

Prior knowledge	Y7 Energy costs Y7 Energy transfer	Y8 Potential difference and voltage Y8 Current Y9 Electromagnets	Y7 Elements Y7 particle model	Y8 Elements Y8 Periodic table	produced by a constant force. AT skills covered by this practical activity: AT 1, 2 and 3 Y7 Speed Y7 Gravity Y8 Work Y9 Contact forces Y9 Pressure
GCSE assessment objectives	 AO1: Demonstrate knowledge and understanding of: scientific ideas scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas scientific enquiry techniques and procedures. AO3: Analyse information and ideas to interpret and evaluate make judgements and draw conclusions develop and improve experimental procedures 	 AO1: Demonstrate knowledge and understanding of: scientific ideas scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas scientific enquiry techniques and procedures. AO3: Analyse information and ideas to interpret and evaluate make judgements and draw conclusions develop and improve experimental procedures 	 AO1: Demonstrate knowledge and understanding of: scientific ideas scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas scientific enquiry techniques and procedures. AO3: Analyse information and ideas to interpret and evaluate make judgements and draw conclusions develop and improve experimental procedures 	 AO1: Demonstrate knowledge and understanding of: scientific ideas scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas scientific enquiry techniques and procedures. AO3: Analyse information and ideas to interpret and evaluate make judgements and draw conclusions develop and improve experimental procedures 	 AO1: Demonstrate knowledge and understanding of: scientific ideas scientific techniques and procedures. AO2: Apply knowledge and understanding of: scientific ideas scientific enquiry techniques and procedures. AO3: Analyse information and ideas to interpret and evaluate make judgements and draw conclusions develop and improve experimental procedures.
Assessment tasks	Prior knowledge check Extended response questions on 4.1.1 Energy changes in a system, and the ways energy is stored before and after such changes.	Prior knowledge check Extended response questions on 4.2.1 Current, potential difference and resistance 4.2.2 Series and parallel circuits	Prior knowledge check Extended response questions on 4.3.1 Changes of state and the particle model 4.3.2 Internal energy and energy transfers	Prior knowledge check Extended response questions on 4.4.1 Atoms and isotopes 4.4.2 Atoms and nuclear radiation 4.4.3 Hazards and uses of	Prior knowledge check Extended response questions on 4.5.1 Forces and their interactions 4.5.2 Work done and energy transfer

4.1.2 Conservation and	4.3.3 Particle model and	of background radiation	4.5.4 Moments, levers and
dissipation of energy	pressure	(physics only)	gears (physics only)
4.1.3 National and global	End of topic assessment	4.4.4 Nuclear fission and	4.5.5 Pressure and pressure
energy resources		fusion (physics only)	differences in fluids (physics
End of topic assessment		End of topic assessment	only)
			4.5.6 Forces and motion
			4.5.7 Momentum (HT only)
			End of topic assessment

Y11 Physics	Week 1			Week 39
Tonic	P5 Forces (continuation from V10 SU2)	P6 Wayes	P7 Magneticm and Electromagnetism	
юріс		FU Waves		ro space
Key Content	Engineers analyse forces when	Wave behaviour is common in both	Electromagnetic effects are used in	Questions about where we are, and
Know that	designing a great variety of machines	natural and man-made systems.	a wide variety of devices. Engineers	where we came from, have been
Knowledge)	and instruments, from road bridges	Waves carry energy from one place	make use of the fact that a magnet	asked for thousands of ears. In the
Know how	and fairground rides to atomic force	to another and can also carry	moving in a coil can produce	past century, astronomers and
(Disciplinary	microscopes. Anything mechanical	information. Designing comfortable	electric current and also that when	astrophysicists have made
knowledge)	can be analysed in	and safe structures such as bridges,	current flows around a magnet it	remarkable progress in
	this way. Recent developments in	houses and music performance	can produce movement. It means	understanding the scale and
	artificial limbs use the analysis of	halls requires an understanding of	that systems that involve control or	structure of the universe, its
	forces to make movement possible.	mechanical waves. Modern	communications can take full	evolution and ours. New questions
	Maths skills	technologies such as imaging and	advantage of this.	have emerged recently. 'Dark
	1a Recognise and use expressions in	communication systems show how	Maths skills	matter', which bends light and
	decimal form	we can make the most of	1c Use ratios, fractions and	holds galaxies together but does
	1c Use ratios, fractions and	electromagnetic waves.	percentages	not emit
	percentages	Maths skills	3b Change the subject of an	electromagnetic radiation, is
	1d Make estimates of the results of	MS 1c Use ratios, fractions and	equation	everywhere – what is it? And what
	simple calculations	percentages	3c Substitute numerical values into	is causing the universe to expand
	2f Understand the terms mean,	3b Change the subject of an	algebraic equations using	ever faster?
	mode and median	equation	appropriate units for physical	Working scientifically
	3a Students should recognise	3c Substitute numerical values into	quantities (chemistry and physics	1.1 Understand how scientific
	and be able to use the	algebraic equations using	questions only)	methods and theories develop over
	symbol for proportionality, \propto	appropriate units for physical		time.
	3b Change the subject of an	quantities (chemistry and physics	Working Scientifically	1.2 Use a variety of models such as
	equation	questions only)	WS1.4 Explain everyday and	representational, spatial,
	3c Substitute numerical values into	5a Use angular measures in	technological applications of	descriptive, computational and
	algebraic equations using	degrees	science; evaluate associated	mathematical to solve
	appropriate units for physical	5c Calculate areas of triangles and	personal, social, economic and	problems, make predictions and to
	quantities (chemistry and physics	rectangles, surface areas and	environmental implications; and	develop scientific explanations and
	questions only)	volumes of cubes	make decisions based on the	understanding of familiar and
	4a Translate information between		evaluation of evidence and	unfamiliar facts
	graphical and numeric form		arguments.	1.3 Appreciate the power and
	4b Understand that y = mx + c		WS 2.2 Plan experiments or devise	limitations of science and consider
	represents a linear relationship		procedures to make observations,	any ethical issues which may arise.
			produce or characterise a	

4c Plot two variables from	Working scientifically	substance, test hypotheses, check	
experimental or other data	WS1.1 Understand how scientific	data or	
4d Determine the slope and	methods and theories develop over	explore phenomena	
intercept of a linear graph	time.		
4f Understand the physical	WS 1.2 Use a variety of models		
significance of area between a curve	such as representational, spatial,		
and the x-axis and measure it by	descriptive, computational and		
counting squares as appropriate	mathematical to solve		
(physics questions only)	problems, make predictions and to		
5a Use angular measures in degrees	develop scientific explanations and		
(physics questions only)	understanding of familiar and		
5b Visualise and represent 2D and	unfamiliar facts		
3D forms including two dimensional	WS 1.4 Explain everyday and		
representations of 3D objects	technological applications of		
(chemistry and physics questions	science; evaluate associated		
only)	personal, social, economic and		
	environmental implications; and		
Working scientifically	make decisions based on the		
WS 1.2 2 Use a variety of models	evaluation of evidence and		
such as representational, spatial,	arguments.		
descriptive, computational and	WS 1.5 Evaluate risks both in		
mathematical to solve	practical science and the wider		
problems, make predictions and to	societal context, including		
develop scientific explanations and	perception of risk in relation to		
understanding of familiar and	data and consequences		
unfamiliar facts			
WS 1.5 Evaluate risks both in	WS 2.2 Plan experiments or devise		
practical science and the wider	procedures to make observations,		
societal context, including	produce or characterise a		
perception of risk in relation to data	substance, test hypotheses, check		
and consequences	data or		
WS 2.2 Plan experiments or devise	explore phenomena		
procedures to make observations,	WS 2.3 Apply a knowledge of a		
produce or characterise a substance,	range of techniques, instruments,		
test hypotheses, check data or	apparatus, and		
explore phenomena.	materials to select those		
WS 3.3 Carrying out and represent	appropriate to the experiment.		
mathematical and statistical analysis.			

WS 3.5 Interpreting observations and	2.4 Carry out experiments	
other	appropriately having due regard for	
data (presented in verbal,	the correct manipulation of	
diagrammatic, graphical, symbolic or	apparatus, the accuracy of	
numerical form),	measurements	
including identifying patterns and	and health and safety	
trends, making inferences and	considerations.	
drawing conclusions.	2.6 Make and record observations	
WS 3.7 Being objective, evaluating	and measurements using a range of	
data in terms of accuracy, precision,	apparatus and methods.	
repeatability and reproducibility and	2.7 Evaluate methods and suggest	
identifying potential sources of	possible improvements and further	
random and systematic error.	investigations.	
WS4.3 Use SI units (eg kg, g, mg; km,	3.1 Presenting observations and	
m, mm; kJ, J) and IUPAC chemical	other data using appropriate	
nomenclature	methods	
unless inappropriate.	3.5 Interpreting observations and	
WS4.4 Use prefixes and powers of	other data (presented in verbal,	
ten for orders of magnitude (eg tera,	diagrammatic, graphical, symbolic	
giga, mega, kilo, centi, milli, micro	or numerical form),	
and nano).	including identifying patterns and	
WS 4.5 Interconvert units.	trends, making inferences and	
WS4.6 Use an appropriate number of	drawing conclusions.	
significant figures in calculation.		
	Apparatus and techniques	
	AT 1 Use of appropriate apparatus	
Apparatus and techniques	to make and record a range of	
AT 1 Measure the effect of	measurements accurately,	
distractions on reaction	including length, area, mass, time,	
time.	volume and temperature. Use of	
AT 1, 2, 3 Investigate collisions	such	
between laboratory trollies	measurements to determine	
using light gates, data	densities of solid and liquid objects	
loggers or ticker timers to	(links to A-level AT a	
measure and record data	and b).	
	AT 4 Making observations of waves	
	in fluids and solids to identify the	
	suitability of apparatus to measure	

	Required practical activity 6:	speed/frequency/wavelength.		
	investigate the relationship between	Making observations of the effects		
	force and extension for a spring.	of the interaction of		
	AT skills covered by this practical	electromagnetic waves with matter		
	activity: AT 1 and 2.	(links to A-level AT i and j).		
		AT 4, 8 Investigate the		
	Required practical activity 7:	magnification produced by a range		
	investigate the effect of varving the	of convex lenses.		
	force on the acceleration of an			
	object of constant mass, and the	Required practical activity 8: make		
	effect of varying the mass of an	observations to identify the		
	object on the acceleration	suitability of apparatus to		
	produced by a constant force	measure the frequency		
	AT skills covered by this practical	wavelength and speed of waves in		
	activity: AT 1 2 and 3	a rinnle tank and waves in a solid		
	activity. AT 1, 2 and 5	and		
		take appropriate measurements		
		AT skills covered by this practical		
		activity: AT A		
		Required practical activity 9		
		(physics only): investigate the		
		reflection of light by different types		
		of curface and the refraction of		
		light hy different substances		
		AT skills severed by this practical		
		AT Skills covered by this practical		
		activity: Al 4 and 8.		
		Required practical activity 10:		
		investigate how the amount of		
		infrared radiation absorbed or		
		radiated by a surface depends on		
		the nature of that surface		
		AT abills accounted by this was sticed.		
		AT SKIIIS COVERED BY THIS PRACTICAL		
Prior knowledge	V7 Crossel	ACTIVITY: AT 1 and 4.	VO Determined differences and the	
FIIOI KIIOWleage	Y/ Speed	Y& Sound	Y8 Potential difference and voltage	Y& Universe
	Y/ Gravity	Y& Light	Y8 Current	
	Y8 Work	Y8 Heating and cooling	Y9 Magnetism	

	Y9 Contact forces	Y9 Wave effects	Y9 Electromagnets	
	Y9 Pressure	Y9 Wave properties		
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Assessment tasks	Prior knowledge check Extended response questions on 4.5.1 Forces and their interactions 4.5.2 Work done and energy transfer 4.5.3 Forces and elasticity 4.5.4 Moments, levers and gears (physics only) 4.5.5 Pressure and pressure differences in fluids (physics only) 4.5.6 Forces and motion 4.5.7 Momentum (HT only) End of topic assessment	Prior knowledge check Extended response questions on 4.6.1 Waves in air, fluids and solids 4.6.2 Electromagnetic waves 4.6.3 Black body radiation (physics only) End of topic assessment	Prior knowledge check Extended response questions on 4.7.1 Permanent and induced magnetism, magnetic forces and fields 4.7.2 The motor effect 4.7.3 Induced potential, transformers and the National Grid (physics only) (HT only) End of topic assessment	Prior knowledge check Extended response questions on 4.8.1 Solar system; stability of orbital motions; satellites (physics only) 4.8.2 Red-shift (physics only) End of topic assessment