Programme of study for Year 12 A-LEVEL Physics

Autumn (1 st term)	Autumn (2 nd term)	Spring (1 st term)	Spring (2 nd Term)	Summer (1 st term)	Summer (2 nd term)
Topics:	Topics:	Topics:	Topics:	Topics:	Topic:
GCSE to A-Level	Waves	Mechanics:	Mechanics (continued):	Materials	End of Year 12 exams
progression	Optics	Forces in equilibrium	Newton's laws of		
Measurements and		On the move	motion	Electricity:	Further mechanics:
their errors.	Skills(students should		Force and Momentum	Electric current	Circular motion
	be able to do):	AO1: Demonstration of	Work, energy and	DC circuits	Thermal Physics
Particles and radiation:	AO1: Demonstration of	knowledge and	power		
Matter and radiation	knowledge and	understanding of vector		Skills(students should	Skills(students should
Quarks and leptons	understanding of the	and scalar quantities.	Skills(students should	be able to do):	be able to do):
Electromagnetic	terms amplitude,	AO2: Apply knowledge	be able to do):	AO1: Demonstration of	AO1: Demonstrate
radiation and quantum	frequency, period,	and understanding of	AO1: Demonstration of	knowledge and	knowledge and
phenomenon	wavelength, phase and	how vectors can be	knowledge and	understanding of the	understanding of
	phase difference.	combined.	understanding of	meaning of density.	circular motion as an
Skills(students should	AO2: Apply knowledge	AO2: Apply knowledge	Newton's laws of	AO2: Apply knowledge	accelerated motion.
be able to do):	and understanding of	and understanding of	motion.	and understanding of	AO2: Apply knowledge
Use of dimensional	the equation c= fL to	how vectors can be	AO2: Apply knowledge	density in calculations.	and understanding of
analysis to predict	calculate wavelengths	resolved.	and understanding of	AO1: Demonstration of	forces to identify and
relationships between	and frequencies.	AO1: Demonstration of	Newton's laws in	knowledge and	calculate centripetal
quantities eg the speed	AO1: Demonstration of	knowledge and	practical situations.	understanding of	forces.
of a wave, v, in water in	knowledge and	understanding of the	AO3: Analyse, interpret	Hooke's Law and elastic	
terms of depth, d, and g	understanding of	moment of a force and	and evaluate evidence	limit.	AO1: Demonstrate
Extend to estimates	longitudinal and	a couple.	from investigation of		knowledge and
outside physics.	transverse waves.	AO2: Apply knowledge	Newton's second law.	MS3.1: Translate	understanding of
AO1: Demonstration of	AO1: Demonstration of	and understanding of	AO2: AO1: Apply	information between	specific heat and
knowledge of simple	knowledge and	the moment equation	knowledge and	graphical, numerical and	specific latent heat.
models of the atom.	understanding	by using in calculations.	understanding of	algebraic form when	AO2: Apply knowledge
AO2: Demonstrate	electromagnetic waves	AO2: Apply knowledge	situations involving	investigating elastic	and understanding of
knowledge and	and their properties.	and understanding of	Newton's third law.	behaviour.	scientific ideas to solve
understanding isotopes	AO1: Demonstration of	the principle of		AO1: Demonstration of	problems involving
and analyse isotope	knowledge and	moments in	AO1: Demonstration of	knowledge and	transfer of thermal
data.	understanding of the	calculations.	knowledge and	understanding of tensile	energy.
AO1: Demonstration of	polarisation of	AO1: Demonstration of	understanding of	stress and tensile strain.	
knowledge of strong	transverse waves.	knowledge and	momentum.	AO1: Demonstration of	
nuclear force.		understanding		knowledge and	

AO2: Apply knowledge	AO2: Apply knowledge	displacement, speed,	AO2: Apply knowledge	understanding of plastic
and understanding of	and understanding of	velocity and	and understanding of	behaviour, fracture and
scientific ideas,	the polarisation to	acceleration.	the conservation of	brittle behaviour.
processes, techniques	explain applications.	AO2: Apply knowledge	momentum in the	AO2: Apply knowledge
and procedures when	AO3: Analyse, interpret	and understanding of	analysis of collisions.	and understanding of
handling quantitative	and evaluate scientific	displacement, speed,	AO1: Demonstration of	plastic behaviour,
data.	information, ideas to	velocity and	knowledge and	fracture and brittle
AO2: Apply knowledge	identify applications of	acceleration in	understanding of	behaviour when relating
and understanding of	polarisation.	calculations.	impulse.	them to force extension
alpha and beta decay to	AO1: Demonstration of	AO1: Demonstration of	AO2: Apply knowledge	graphs.
analyse and complete	knowledge and	knowledge and	and understanding	AO2: Apply knowledge
equations representing	understanding of	understanding of	impulse and relate this	and understanding in
the decay.	standing waves	motion graphs.	to the area under a	the interpretation of
AO1: Demonstration of	including the meaning	AO2: Apply knowledge	force time graph.	stress strain graphs.
knowledge of matter	of nodes and antinodes.	and understanding in	AO2: Apply knowledge	AO2: Apply knowledge
and antimatter.	AO2: Apply knowledge	the analysis of motion	and understanding of	and understanding in
AO2: Apply knowledge	and understanding in	graphs.	the relationship	the description of the
and understanding of	calculations of the	AO2: Apply knowledge	between impact force	energy changes in
the factors affecting the	frequencies of the first	and understanding of	and contact time.	masses attached to
energy of photons.	harmonic.	the equations for	AO1: Demonstration of	vibrating springs.
AO1: Demonstration of	AO2: Apply knowledge	uniform acceleration.	knowledge and	AO3: Analyse, interpret
knowledge of the	and understanding of	AO2: Apply knowledge	understanding elastic	and evaluate evidence
process of pair	waves to explain the	and understanding of	and inelastic collisions.	when considering
production.	formation of standing	motion graphs and the		energy conservation in
AO1: Demonstration of	waves.	equations of uniform	Skills(students should	the context of ethical
knowledge of the	AO1: Demonstration of	acceleration to	be able to do):	transport design.
process of annihilation.	knowledge and	determine g.	AO1: Demonstration of	AO1: Demonstration of
AO1: Demonstration of	understanding of	AO1: Demonstration of	knowledge and	knowledge and
knowledge of the	different examples of	knowledge and	understanding the	understanding of the
fundamental	stationary waves	understanding of	relationship between	Young modulus.
interactions.		projectile motion.	work done and energy	AO2: Apply knowledge
AO2: Apply knowledge	AO1: Demonstration of	AO2: Apply knowledge	transfer.	and understanding of
and understanding of	knowledge and	and understanding of	AO2: Apply knowledge	the Young modulus in
conservation laws in	understanding of path	the independence of	and understanding of	calculations.
particle interactions.	difference and	horizontal and vertical	work done using the	AO1: Demonstration of
AO2: Apply knowledge	coherence.	motion when	appropriate equation.	knowledge and
and understanding in		considering projectiles.		understanding of

the importance of	AO2: Apply knowledge	AO3: Analyse, interpret	AO2: Apply knowledge	electric current,	
conservation laws when	and understanding of	and evaluate evidence	and understanding of	potential difference and	
constructing Feynman	path difference to	from motion in a fluid	the formulae for	resistance.	
diagrams.	determine whether	experiments.	gravitational potential	AO2: Apply knowledge	
AO1: Demonstration of	interference is	AO1: Demonstration of	energy and kinetic	and understanding of	
knowledge of the	constructive or	knowledge and	energy.	electric current,	
classification of	destructive.	understanding of the	AO1: Demonstration of	potential difference and	
hadrons, baryons and	AO1: Demonstration of	nature of frictional	knowledge and	resistance.	
mesons.	knowledge and	forces.	understanding of the	AO1: Demonstration of	
AO2: Apply knowledge	understanding of the	AO2: Apply knowledge	principle of	knowledge and	
and understanding of	difference in the fringe	and understanding of	conservation of energy.	understanding of	
how decay equations	pattern produced by	the effects of frictional		current-voltage	
can be analysed to	monochromatic and	forces on the motion of		characteristics of	
predict if they can	white light sources.	a projectile.		various components.	
occur.	AO1: Demonstration of			AO2: Apply knowledge	
AO1: Demonstration of	knowledge and			and understanding of	
knowledge of leptons.	understanding of			current-voltage	
AO1: Demonstration of	examples of			characteristics.	
knowledge of the	interference of sound			AO1: Demonstration of	
classification of strange	waves.			knowledge and	
particles.	AO3: Analyse scientific			understanding of	
AO2: Apply knowledge	information, ideas and			resistivity.	
and understanding of	evidence about the			AO2: Apply knowledge	
how strangeness does	nature of light.			and understanding of	
not have to be	AO1: Demonstration of			resistivity in	
conserved in the weak	knowledge and			calculations.	
interaction.	understanding of the			AO1: Demonstration of	
AO1: Demonstration of	main features of a single			knowledge and	
knowledge and	slit diffraction pattern.			understanding of effect	
understanding of quark	AO2: Apply knowledge			of temperature on the	
and antiquark	and understanding of			resistance of metal	
properties.	interference patterns to			conductors.	
AO2: Apply knowledge	explain the diffraction			AO1: Demonstration of	
and understanding of	pattern produced by a			knowledge and	
quark properties to	plane diffraction			understanding of effect	
deduce quark	grating.			of temperature on a	
structures.	1				1

AO1: Demonstration of	AO2: Apply knowledge		negative temperature	
knowledge and	and understanding of		coefficient thermistor.	
understanding of beta	path difference to		AO3: Analyse and	
plus and beta minus	derive the diffraction		interpret how	
decay.	grating equation.		thermistors are used in	
AO2: Apply knowledge	AO2: Apply knowledge		temperature sensors.	
and understanding of	and understanding of		AO1: Demonstration of	
conservation laws to	the diffraction grating		knowledge and	
analyse decay	equation in calculations.		understanding of	
equations.	AO3: Analyse scientific		superconductivity.	
AO1: Demonstration of	information to		AO3: Analyse and	
knowledge and	determine applications		interpret the	
understanding of beta.	of the diffraction		applications of	
AO2: Apply knowledge	grating.		superconductors.	
and understanding of	AO1: Demonstration of		AO1: Demonstration of	
the photoelectric effect	knowledge and		knowledge and	
both qualitatively and	understanding of		understanding of series	
quantitatively.	refractive index and its		and parallel electric	
AO3: Analyse, interpret	relationship to wave		circuits.	
and evaluate scientific	speed.		AO2: Apply knowledge	
ideas and evidence to	AO1: Demonstration of		and understanding in	
see why the wave	knowledge and		the analysis of electric	
model of light does not	understanding of Snell's		circuits.	
explain the	law.		AO1: Demonstration of	
photoelectric effect.	AO2: Apply knowledge		knowledge and	
AO1: Demonstration of	and understanding of		understanding of how	
knowledge and	Snell's law in		cells combine in series	
understanding of nature	calculations.		and in parallel.	
of line spectra.	AO1: Demonstration of		AO2: Apply knowledge	
AO1: Demonstration of	knowledge and		and understanding of	
knowledge and	understanding of total		the power equations	
understanding of the	internal reflection and		and apply these in the	
structure of the	critical angle.		analysis of electric	
fluorescent tube.	AO2: Apply knowledge		circuits	
AO2: Apply knowledge	and understanding in		AO1: Demonstration of	
and understanding of	calculations involving		knowledge and	
the electron volt to	the critical angle.		understanding of the	

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perform calculations to	AO1: Demonstration of			conservation of energy	
convert energies in	knowledge and			in electric circuits.	
joules to electron volts.	understanding of optic			AO1: Demonstration of	
AO1: Demonstration of	fibres and the			knowledge and	
knowledge and	importance of cladding.			understanding of the	
understanding of	AO1: Demonstration of			potential divider.	
discrete energy levels	knowledge and			AO2: Apply knowledge	
and how these lead to	understanding of			and understanding of	
line spectra.	material and modal			using potential dividers	
AO2: Apply knowledge	dispersion.			in sensing circuits	
and understanding of				AO1: Demonstration of	
discrete energy levels				knowledge and	
and the energies				understanding of emf	
associated with them to				and internal resistance.	
calculate frequencies				AO2: Apply knowledge	
and wavelengths of				and understanding of	
emitted photons.				emf and internal	
AO1: Demonstration of				resistance in circuit	
knowledge and				calculations.	
understanding of					
electron diffraction.					
AO1: Demonstration of					
knowledge and					
understanding of the					
dual nature of light.					
AO2: Apply of					
knowledge and					
understanding of the de					
Broglie equation to					
calculate the de Broglie					
wavelength.					
Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes	Key Learning Outcomes
(students should know):	(students should know):	(students should know):	(students should know):	(students should know):	(students should know):
				•Define density and do	Understand and explain
•Students know that base	•Define the terms	•Students can distinguish	•Recall the three laws of	calculations using the	why circular motion is an
units are needed in a	Trequency, period,	between scalar and vector	motion and apply them in	density equation.	accelerated motion and
system of measurement.	of a wave	velocity/speed mass	appropriate situations.		Recall and use equations
	of a wave.	velocity/speed, mass,			Recall and use equations

•Students demonstrate	 Explain what is meant by 	force/weight,	 Construct and use free- 	 State Hooke's law and 	ω = v / r = 2π f, a = v2/r =
that they can convert	phase and phase	acceleration,	body diagrams.	explain what is meant by	$\omega 2r$, F = mv2/r= m $\omega 2r$, to
between different units of	difference.	displacement/distance.	 Use the equation linking 	the elastic limit.	solve circular motion
the same quantity, eg J	•Use the equation $c = f\lambda$ in	 Students can add two 	force and acceleration in	•Apply the force extension	problems.
and eV, J and kW h.	calculations.	vectors by constructing an	calculations.	equation and recognise	Use radian as a measure
 Students explain the 	 Distinguish between 	appropriate scale drawing.	 Recognise that the 	that the constant, k, is	of angle and convert
difference between	longitudinal and	•Calculate the sum of two	equation can only be used	known as the stiffness or	between radians and
precision and accuracy.	transverse waves.	vectors.	in situations where the	the spring constant.	degrees.
 Students explain the 	 Recognise that 	•Resolve a vector into two	mass is constant.	 Demonstrate that they 	Identify and calculate
difference between	electromagnetic waves	perpendicular		recognise the meanings of	centripetal forces in
repeatability and	are transverse and all	components.	•Define momentum and	tensile stress and tensile	contexts such as a mass
reproducibility.	examples of	•Recognise the conditions	recall the unit for	strain.	whirled on a string and a
 Students can estimate 	electromagnetic waves	for two or three coplanar	momentum.	 Explain what breaking 	car rounding a bend.
uncertainties in	travel at the same speed	forces acting at a point to	 Discuss the conservation 	stress means.	
measurements	in a vacuum.	be in equilibrium.	of linear momentum and	•Calculate elastic strain	Recall the definition of
 Students are able to 	•Describe the polarisation	 Apply the conditions for 	apply it in calculations	energy.	specific heat capacity and
calculate percentage	of transverse waves.	equilibrium in the context	involving collisions in one	 Recognise that the 	specific latent.
uncertainties from	•Describe applications of	of an object at rest or	dimension.	energy stored is equal to	Understand and apply the
absolute uncertainties.	polarisers.	moving at constant	 Relate force to rate of 	the area under a force –	equation Q = $mc\Delta\theta$ to
 Students are able to 	•Explain what is meant by	velocity.	change of momentum.	extension graph.	solve thermal energy
combine absolute and	a stationary wave.	 Define and calculate the 	•Define impulse.	•Explain what is meant by	transfer problems
percentage uncertainties.	•Define the terms node	moment of a force.	 Deduce the effect on 	plastic behaviour, fracture	including in continuous
 Students can use error 	and antinode.	 Describe a couple and 	impact forces of contact	and brittle behaviour.	flow.
bars on graphs to estimate	•Calculate the frequency	calculate the moment of a	times.	 Analyse stress – strain 	Understand and apply the
uncertainties in gradients	of the first harmonic	couple.	 Distinguish between 	curves.	equation Q = ml to solve
and intercepts.	produced by a stationary	 State the principle of 	elastic and inelastic	 Apply energy 	thermal energy transfer
Students are able to make	wave on a string.	moments.	collisions.	conservation to examples	problems where there is a
order of magnitude	 Describe the formation 	Apply and use the	 Apply momentum 	involving elastic strain	change of state.
estimates.	of a stationary wave by	principle to analyse the	conservation to	energy and energy to	
	two waves of the same	forces acting on a body in	explosions.	deform.	
•Describe a model of the	frequency travelling in	equilibrium.		 Analyse the energy 	
atom including protons,	opposite directions.	•Explain what is meant by	 Recognise that when 	changes taking place in an	
neutrons and electrons.	 Use graphs to 	the centre of mass.	work is done energy is	oscillating spring.	
 Identify the charge and 	demonstrate the	•Define displacement,	transferred.	 Appreciate the 	
mass of the proton,	formation of standing	speed, velocity and	•Calculate the work done	importance of energy	
neutron and electron in SI	waves.	acceleration.	including situations where	conservation in transport	
and relative units.	 Describe the formation 	 Distinguish between 	the force is not acting in	design.	
•Define specific charge	of standing waves	velocity and speed.	the direction of	•Define the Young	
and calculate the specific	produced by microwaves	 Calculate velocities and 	displacement.	modulus and use it in	
charges of the proton and	and sound waves.	accelerations.		calculations.	

the electron and of nuclei	 Explain the meaning of 	 Calculate both 	•Calculate the rate of	 Describe a method to 	
and ions.	path difference and	instantaneous and	doing work.	determine the Young	
 Identify the unit of 	coherence.	average velocities.	 Analyse situations in 	modulus.	
specific charge.	 Describe the Young's 	 Draw graphs to represent 	which the force acting is		
 Define proton number 	double slit experiment	motion.	variable.	 Recognise that current is 	
and nucleon number and	and calculate fringe	 Recognise the 	 Recall that the work 	the rate of flow of charge.	
recognise nuclear	spacing using data from	significance of the areas of	done or energy	 Recognise that potential 	
notation.	the experiment.	velocity – time and	transferred is equal to the	difference is the work	
 Explain the meaning of 	 Distinguish between the 	acceleration – time	area under a force	done per unit charge.	
isotopes.	fringe patterns produced	graphs.	displacement graph.	 Recognise the equation 	
 Analyse isotopic data. 	by monochromatic and	 Recognise the 	 Calculate efficiency as a 	defining resistance and	
 Describe the strong 	white light.	significance of the	ratio and as a percentage.	can apply it in calculations.	
nuclear force and its role	 Analyse different 	gradients of displacement	•Recall the principle of the	 Interpret current – 	
in keeping the nucleus	examples of the double	 time and velocity – time 	conservation of energy.	voltage graphs and	
stable.	slit experiment using both	graphs.	 Calculate kinetic and 	distinguish between the	
 Recognise that the 	electromagnetic and	 Recall the equations of 	gravitational potential	characteristics for an	
strong nuclear force has a	sound waves.	uniform acceleration and	energy.	ohmic conductor, a	
short range attraction and	 Explain how knowledge 	can apply them in	 Describe energy changes 	semiconductor diode and	
a very short range	and understanding of the	calculations. Involving	involving kinetic,	a filament lamp.	
repulsion.	nature of electromagnetic	motion in straight lines.	gravitational potential	 Recognise that Ohm's 	
 Associate distance below 	radiation has changed	 Analyse experiments to 	energy and work done	law is a special case for a	
0.5 fm with repulsion and	over time.	determine the	against friction.	component with constant	
between 0.5 and 3.0 fm	 Describe the diffraction 	acceleration due to gravity		resistance.	
with attraction.	patterns produced using a	using a graphical method		 Define resistivity and use 	
 Describe alpha decay and 	single slit with	 Explain how the motion 		the resistivity equation in	
beta decay.	monochromatic light and	of a projectile can be		calculations.	
 Illustrate alpha beta 	contrast this with the	analysed by treating its		 Describe an experiment 	
decay using equations.	pattern produced by white	horizontal and vertical		to determine the	
 Deduce why the neutrino 	light.	motion independently.		resistivity of a wire.	
is necessary in beta decay.	 Discuss the effect on the 	 Analyse the motion of a 		 Describe the effect of 	
 Recall that every particle 	width of the central	projectile by considering		temperature on the	
has a corresponding	maximum when the slit	the effect of gravity on		resistance of metal	
antiparticle.	width is varied.	horizontal and vertical		conductors.	
 Contrast the properties 	 Describe the use of the 	motion.		 Describe the effect of 	
of particles and	plane diffraction grating.	 Describe friction 		temperature on a negative	
antiparticles.	 Use the grating equation 	quantitatively.		temperature coefficient	l
 Give examples of particle 	in calculations.	 Explain the nature of lift 		thermistor.	l
antiparticle pairs.	 Describe uses of the 	and drag forces.		 Describe application of 	l
 Describe the photon 	diffraction grating such as			thermistors including	l
model of electromagnetic	the analysis of spectra.			temperature sensors.	1

radiation.	•Define refractive index in	•Describe the effects of	•Explain what is meant by	
•Calculate the energy of	terms wave speed in	air resistance on the	a superconductor.	
photons from wavelength	different media.	trajectory of a projectile.	•Describe how	
and frequency.	•Recall that the refractive	•Explain why falling	superconductors can be	
•Describe the processes of	index of air is	objects can reach a	used to produce strong	
annihilation and pair	approximately 1.	terminal speed.	magnetic fields and to	
production.	•Use Snell's law to	• Discuss the factors that	reduce energy losses in	
•Name the four	calculate angles when	affect the maximum speed	the transmission of	
fundamental interactions.	light crosses a boundary	of a vehicle.	electric power.	
•Describe the	between two media,		•Calculate the total	
fundamental interactions	•Describe total internal		resistance for	
in terms of exchange	reflection and distinguish		combinations of series and	
particles.	this from partial		parallel resistors.	
•Identify the virtual	reflection.		• •Analyse series and	
photon as the exchange	•Calculate critical angles		parallel circuits.	
particle in the	using refractive indices.		•Analyse circuits involving	
electromagnetic	•Describe the step index		combinations of cells in	
interaction.	optic fibre.		series and identical cells in	
•Distinguish between	•Understand the		parallel.	
beta- and beta+ decay	principles and		•Calculate the energy and	
identifying them both as	consequences of pulse		power in electric circuits.	
examples of the weak	broadening and		•Explain how energy and	
interaction.	absorption.		charge are conserved in	
•Analyse electron capture			electric circuits.	
and electron positron			•Demonstrate that they	
collisions as examples of			understand how a	
the weak interaction and			potential divider can	
identify the appropriate			provide a constant or	
exchange particle (W+ or			variable potential	
W-) in each case.			difference from a power	
•Draw simple diagrams to			supply.	
represent interactions.			 Describe how variable 	
 Associate hadrons with 			resistors, light dependent	
the strong interaction.			resistors and thermistors	
 Classify hadrons into 			can be used in potential	
baryons and mesons.			divider circuits.	
•Differentiate between			 Define emf with 	
baryons and mesons in			reference to cells.	
terms of baryon number			 Understand and perform 	
and are able to			calculations for circuits in	

demonstrate baryon		which the internal	
number conservation in		resistance of the supply is	
interactions.		not negligible.	
•Explain that the proton is		 Explain what is meant by 	
the only stable hadron		terminal pd.	
and that all other baryons			
eventually decay into			
protons.			
 Identify the pion as the 			
exchange particle of the			
strong nuclear force.			
 Recognise and describe 			
kaon decay.			
 Identify leptons and how 			
they can interact through			
the weak interaction.			
 Identify the lepton 			
numbers of electrons,			
muons and neutrinos and			
demonstrate lepton			
number conservation in			
examples of the weak			
interaction.			
•Describe the decay of			
muons into electrons.			
 Identify strange particles 			
and describe their			
production and decay.			
•Demonstrate the			
conservation of			
strangeness in strong			
interactions.			
•Explain that strangeness			
does not have to be			
conserved in the weak			
interaction.			
 Recognise charge, 			
baryon number and			

strangeness as properties			
of quarks and antiquarks.			
 Analyse the quark 			
structure of protons,			
neutrons, antiprotons,			
antineutrons, pions and			
kaons.			
Identify the change in			
quark character in β^{-} and			
β⁺ decay.			
Apply the conservation			
laws for charge, baryon			
number, lepton number			
and strangeness for			
particle interactions.			
Recall that momentum			
and energy are conserved			
in interactions.			
•Describe the			
photoelectric effect.			
 Recognise that the 			
threshold frequency			
cannot be explained by			
the wave model of light			
and can deduce an			
explanation of threshold			
frequency in terms of the			
photon model.			
•Explain the terms work			
function and stopping			
potential.			
•Analyse the photoelectric			
effect using the			
photoelectric equation			
and calculate the			
maximum kinetic energy			
of emitted electrons.			
•Deduce that the emitted			
electrons have a range of			
kinetic energies up to the			

maximum value calculated			
using the photoelectric			
equation.			
•Describe the processes of			
excitation and ionisation			
•Explain how excitation			
and ionisation apply in the			
fluorescent tube.			
•Define the electron volt			
•Convert energies from eV			
to J and vice versa.			
 Demonstrate how line 			
spectra implies discrete			
energy levels in atoms.			
•Calculate the frequencies			
of emitted photons using			
the energies associated			
with different discrete			
energy levels.			
 Identify that electron 			
diffraction provides			
evidence of particles			
having wave properties.			
•Analyse the photoelectric			
effect and deduce that it			
demonstrates the			
particulate nature of			
electromagnetic waves.			
•Calculate the wavelength			
of a particle using the de			
Broglie equation.			
•Explain how and why the			
amount of diffraction			
changes when the			
momentum of a particle is			
changed.			

End of Autumn 1 st term	End of Autumn 2 nd term	End of Spring term assessme	ent:	End of year assessment to	Summer term assessment:
assessment:	assessment:	MECHANICS module graded	test	cover:	ELECTRICITY module
PARTICLES AND	WAVES AND OPTICS			Measurements and their	graded test
RADIATION module	module graded test			errors.	
graded test				Matter and radiation	
				Quarks and leptons	
				Electromagnetic radiation	
				and quantum	
				phenomenon	
				Newton's laws of motion	
				Forces in equilibrium	
				On the move	
				Force and Momentum	
				Waves	
				Work, energy and power	
				Optics	
				Materials	
Building understanding:	Building understanding:	Building understanding:	Building understanding:	Building understanding:	Building understanding:
Rationale / breakdown	Rationale / breakdown	Rationale / breakdown	Rationale / breakdown	Rationale / breakdown	Rationale / breakdown
for your sequence of	for your sequence of	for your sequence of	for your sequence of	for your sequence of	for your sequence of
for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:
for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:	for your sequence of lessons:
for your sequence of lessons: AQA A-level Physics is a	for your sequence of lessons: GCSE studies of wave	for your sequence of lessons: Vectors and their	for your sequence of lessons: Both GCSE and A-level	for your sequence of lessons: Both GCSE and A-level	for your sequence of lessons: Circular motion prior
for your sequence of lessons: AQA A-level Physics is a natural progression from	for your sequence of lessons: GCSE studies of wave phenomena are extended	for your sequence of lessons: Vectors and their treatment were	for your sequence of lessons: Both GCSE and A-level assume knowledge of F =	for your sequence of lessons: Both GCSE and A-level include an understanding	for your sequence of lessons: Circular motion prior knowledge: Vectors and
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of	for your sequence of lessons: Vectors and their treatment were introduced by	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion.
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the	for your sequence of lessons: Vectors and their treatment were introduced by development of the	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion.
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties,	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion.
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces,	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level).	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum.	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension:	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction,	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: F=ke (GCSE) and F=kΔL (A-	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle physics, broaden the GCSE	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction, diffraction, superposition	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of materials considered in	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including graphical representation	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: F=ke (GCSE) and F=kΔL (A- level) including elastic,	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these forces depend on mass,
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle physics, broaden the GCSE experience and include a	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction, diffraction, superposition and interference.	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of materials considered in terms of their bulk	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including graphical representation for uniform straight line	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: F=ke (GCSE) and F=kΔL (A- level) including elastic, strain and potential	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these forces depend on mass, speed and radius.
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle physics, broaden the GCSE experience and include a greater use of	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction, diffraction, superposition and interference.	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of materials considered in terms of their bulk properties and tensile	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including graphical representation for uniform straight line motion to determine	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: $F=ke$ (GCSE) and $F=k\Delta L$ (A- level) including elastic, strain and potential energy stored are also	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these forces depend on mass, speed and radius. The equation F = mv2r and
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle physics, broaden the GCSE experience and include a greater use of mathematics so that the	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction, diffraction, superposition and interference.	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of materials considered in terms of their bulk properties and tensile strength. As with earlier	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including graphical representation for uniform straight line motion to determine acceleration and distance	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: F=ke (GCSE) and F=kΔL (A- level) including elastic, strain and potential energy stored are also included.	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these forces depend on mass, speed and radius. The equation F = mv2r and the link v = ωr are only
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle physics, broaden the GCSE experience and include a greater use of mathematics so that the qualitative understanding	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction, diffraction, superposition and interference.	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of materials considered in terms of their bulk properties and tensile strength. As with earlier topics, this section and	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including graphical representation for uniform straight line motion to determine acceleration and distance travelled.	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: F=ke (GCSE) and F=kΔL (A- level) including elastic, strain and potential energy stored are also included. At A-level the concept of	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these forces depend on mass, speed and radius. The equation F = mv2r and the link v = ωr are only required at A-level.
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle physics, broaden the GCSE experience and include a greater use of mathematics so that the qualitative understanding becomes quantitative.	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction, diffraction, superposition and interference.	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of materials considered in terms of their bulk properties and tensile strength. As with earlier topics, this section and also the following section	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including graphical representation for uniform straight line motion to determine acceleration and distance travelled. At A-level, all suvat	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: $F=ke$ (GCSE) and $F=k\Delta L$ (A- level) including elastic, strain and potential energy stored are also included. At A-level the concept of elastic limit, plastic	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these forces depend on mass, speed and radius. The equation F = mv2r and the link v = ωr are only required at A-level.
for your sequence of lessons: AQA A-level Physics is a natural progression from the GCSE course and there are many familiar topics that are taken a stage further. Some topics, such as mechanics, are studied in greater detail while others, such as particle physics, broaden the GCSE experience and include a greater use of mathematics so that the qualitative understanding becomes quantitative.	for your sequence of lessons: GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling and stationary waves. Topics treated include refraction, diffraction, superposition and interference.	for your sequence of lessons: Vectors and their treatment were introduced by development of the student's knowledge and understanding of forces, energy and momentum. The mechanics section continues with a study of materials considered in terms of their bulk properties and tensile strength. As with earlier topics, this section and also the following section on Electricity provides a	for your sequence of lessons: Both GCSE and A-level assume knowledge of F = ma, but at A-level all three of Newton's laws are required. GCSE content is restricted to motion in a straight line and definitions of velocity and acceleration, including graphical representation for uniform straight line motion to determine acceleration and distance travelled. At A-level, all suvat equations and	for your sequence of lessons: Both GCSE and A-level include an understanding of Hooke's law and expressions in terms of a spring constant, k (or stiffness at A-level). Mathematical expressions of force and extension: $F=ke$ (GCSE) and $F=k\Delta L$ (A- level) including elastic, strain and potential energy stored are also included. At A-level the concept of elastic limit, plastic behaviour, breaking	for your sequence of lessons: Circular motion prior knowledge: Vectors and Scalars. Linear motion. Newton's laws of motion. Both GCSE and A-level require knowledge of centripetal forces, their origins and how these forces depend on mass, speed and radius. The equation F = mv2r and the link v = ωr are only required at A-level. Thermal energy transfer

The Particle Physics topics	students who prefer to	and the use of Δ for	behaviour are included	prior knowledge: States of
introduces students both	begin by consolidating	changes in V=∆s∆t is	with the use of stress and	matter. Heat transfer
to fundamental properties	work.	introduced, including non-	strain graphs. The area	mechanisms (conduction,
of matter, and to		uniform acceleration. The	under a force-extension	convection and radiation).
electromagnetic radiation	Both GCSE and A-level	acceleration due to gravity	graph is equated to	Basic kinetic theory. There
and quantum phenomena.	specifications require the	(g) and its measurement is	energy stored as E=1/2F∆L	is use of Q = mc∆T in both
	definition of a moment	an A-level requirement.	and also the	the GCSE and A-level
Simple 'Bohr model' of an	and the principle of	Projectile motion is	transformation of energy	specifications. Definition
atom in terms of protons,	moments, including the	analysed mathematically	in a mass and spring	of c and measurement as
neutrons, electrons, and	idea of	taking account of air	system between KE and	well as ideas about cooling
the relative masses of	equilibrium/stability.	resistance.	PE. Use of stress and	by evaporation also
these particles is common	A-level introduces the		strain curves to determine	appear in both.
to both GCSE and A-level.	concept of parallel		the Young modulus and its	A-level also deals with
The idea of neutrality	opposite forces forming a	Both GCSE and A-level	measurement is at A-level	quantitative appreciation
(number of electrons =	couple.	define momentum and	only.	of latent heat and Q = mL
number of protons) and		conservation of		for fusion and
ions and isotopes. 'Atomic	The outcome of resultant	momentum, including the	The electricity topics build	evaporation.
number' is used at GCSE	forces through vector	concept of a 'closed	on and develop earlier	
and 'proton number, Z' is	addition and the concept	system', for collisions and	study of these phenomena	
used at A-level. 'Mass	of equilibrium (resultant	explosions.	from GCSE. It provides	
number' is referred to in	force=zero) is common to	At A-level, linear	opportunities for the	
GCSE and 'nucleon	both GCSE and A-level for	momentum in one	development of practical	
number' in A-level.	parallel forces, including	dimension is specified and	skills at an early stage in	
For A-level only, evidence	acceleration in the	involves the	the course and lays the	
for the nucleus	direction of the resultant	understanding that force	groundwork for later	
(Rutherford) and specific	force.	results from a momentum	study of the many	
charge of nuclei, ions and	At A-level, the calculation	change per second. The	electrical applications that	
protons/electrons and the	of the resultant of two	idea of impulse ('force ×	are important to society.	
concept of a nuclide with	forces at 90 ° and	time') including an		
symbolic representation.	resolution of forces are	appreciation of impact	Both GCSE and A-level	
XAZ including masses and	treated mathematically.	forces and contact times is	include circuit symbols;	
the amu.		introduced and for	the terms, I, Q, V; and the	
		constant and variable	definitions of current,	
Through a study of the		forces, the area under a	voltage (PD), and work	
particle physics topics		force-time graph is used	done in a circuit. The	
students become aware of		for momentum change.	concept of resistance (
the way new ideas		There is also consideration	R=VI), and I-V	
develop and evolve in		at A-level for both elastic	characteristics for ohmic	
physics. They will		(conservation of KE) and	and non ohmic	
appreciate the importance			components, and	

of international collaboration in the development of new experiments and theories in this area of fundamental research. Fundamental research.					
collaboration in the calculations. common to both. development of new experiments and theories introduced as a control in this area of introduced as a control introduced as a control fundamental research. forces): mg and resistive mechanism, as are cells in in this area of forces): mg and resistive conservation of charge in why there is a terminal and energy in a DC circuit and energy in a DC circuit aspeed whow drag considered only at A-level, as is resistivity and speed and how drag considered only at A-level, as is resistivity and under graphs for objects falling under gravity with drag GCSE and A-level have under gravity with drag oreservation of GCSE the equation is only at A-level, the potential conservation of power and energy. At under gravity with drag conservation of power and energy. At under gravity with drag conservation of power and energy. At under gravity with drag conservation of power and energy. At under gravity with drag conservation of power and energy. At only at A-level, the power equation is also defi	of international		inelastic collisions, with	series/parallel circuits is	
development of new experiments and theories in this area of fundamental research. Fundamental research. A t-level, the potential experiments and theories in this area of forces. B add forces. B add forces. B add forces in the equation for resistance depends on speed (velocity), that fluid and the equation for resistors in parallel. B add forces and baseline and the equation for resistors in parallel are speed and how drag of why there is a terminal and the equation for resistors in parallel are speed and how drag of why there is a terminal and the equation for resistors in parallel are speed and how drag of why there is a terminal and the equation for resistors in parallel are speed and how drag of why there is a terminal and the equation for resistors in parallel are speed and how drag of orces present is also included. Lift forces are considered only at A-level. B oth GCSE and A-level have GCSE and A-level have GCSE and A-level have GCSE the equation is restricted to P-IV, and knowledge of kW, kWh. A t-level the power equation is also defined as P=2R and P= V2/R. P=2R and	collaboration in the		calculations.	common to both.	
experiments and theories divider/potentiometer is in this area of equilibrium (balanced fundamental research. forces: mg and resistive mechanism, as are cells in forces: mg and resistive mechanism, as are cells in series and parallel. level require a knowledge conservation of charge and energy in a DC circuit and energy in a DC circuit and energy in a DC circuit and the equation for resistance depends resistors in parallel are considered only at A-level, forces can be useful. as is resistivity and considered only at A-level, graphs for objects falling under gravity with energy in a DC circuit as is resistivity and under gravity with energy in a DC circuit as is resistivity and considered only at A-level, graphs for objects falling under gravity with energy in a DC circuit as is resistivity and considered only at A-level, interpretation of u-t superconductors. graphs for objects falling considered only at A-level, considered only at A-level, interpretation of u-t superconductors. graphs for CSE and A-level have conservation of restricted to P=IV, and knowledge of kW, kWh. At A-level. knowledg	development of new			At A-level, the potential	
in this area of fundamental research. Fundamental research. Funda	experiments and theories		This builds on the idea of	divider/potentiometer is	
fundamental research. forces: mg and resistive forces: mg and resistive and energy in a DC circuit and the equation for resistors in parallel are considered only at A-level, as is resistivity and under graphs for objects falling under graphs for objects falling forces are considered forces are considered forces are considered included. GCSE and A-level as is resistivity and superconductors. GCSE and A-level define momentum nomentum, including the concept of a 'closed system', for collisions and equation is also defined as GCSE and P= V2/R. P=12R and P= V2/R. P=12R and P= V2/R.	in this area of		equilibrium (balanced	introduced as a control	
forces). Both GCSE and A- level require a knowledge of why there is a terminal speed (velocity), that fluid resistance depends on speed and how drag forces can be useful. interpretation of u-t graphs for objects falling under gravity with drag forces present is also included. only at A-level, ast resistrict do the specific dotting is power and energy. At GCSE the equation is restistore dotting is owner query and energy. At define montum and conservation of specific dotting is owner query is also defined as power and energy. At define dotting is power and energy. At dequation is is also defined as power	fundamental research.		forces: mg and resistive	mechanism, as are cells in	
level require a knowledgeConservation of charge and energy in a DC circuit and energy in a DC circuit as is resticitive and included.Interpretation of under conservation of momentum, including the concept of a 'Closed system', for collisions and explosions.Conservation of momentum in one dimension of momentum in one dimension is specified and involves theInterpretation of momentum in one dimension is specified and involves thePelzR and P= V2/R.			forces). Both GCSE and A-	series and parallel.	
of why there is a terminal speed(velocity), that fluid resistance depends or speed and how drag forces can be useful. as is resistivity and superconductors.and the equation for and the equation for considered only at A-level, as is resistivity and superconductors.under gravity with drag forces resent is also included.GCSE and A-level have commer and energy. At GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level the powerboth GCSE and A-level define momentum, including the concept of a 'closed system', for collisions and explosions.GCSE and A-level adefine momentum in one dimension is specified and involves the			level require a knowledge	Conservation of charge	
speed(velocity), that fluid resistance depends on speed and how drag forces can be useful.and the equation for resistors in parallel are resistors in parallel are as is resistivity and superconductors.Interpretation of u - t graphs for objects falling under gravity with drag forces present is also included.GCSE and A-level have common equations for power and energy. At GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level have common equations for power and energy. At edsite a bit of conservation of momentum, including the concept of a 'Cosed system', for collisions and explosions.GCSE the equation for restricted to P=IV, and knowledge of kW, kWh. At A-level have restricted to P=IV and knowledge of kW. kWh.At A-level, linear momentum in one dimension is specified and involves the involves the invo			of why there is a terminal	and energy in a DC circuit	
Image: Speed and how drag speed and how drag forces can be useful. Interpretation of u-t graphs for objects falling under gravity with drag forces present is also only at A-level, and an energy. At GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level the power equation of momentum, including the conservation of momentum in one dimension is specified and involves the involves the 			speed(velocity), that fluid	and the equation for	
speed and how drag forces can be useful.considered only at A-level, as is resistivity and superconductors.graphs for objects falling under gravity with drag forces present is also included.GCSE and A-level have common equations for power and energy. At GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level.Both GCSE and A-level define momentum, including the conscrvation of momentum, in collisions and explosions.GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level, linear momentum in one dimension is specified and involves the			resistance depends on	resistors in parallel are	
Image: Section of the secting of the secting of the secting of th			speed and how drag	considered only at A-level,	
Interpretation of u-t graphs for objects falling under gravity with drag forces present is also included.GCSE and A-level have GCSE and energy. AtLift forces are considered only at A-level.GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level the powerBoth GCSE and A-level define momentum and conservation of momentum, including the concept of a 'closed system', for collisions and explosions.P=12R and P= V2/R.At A-level, linear momentum in one dimension is specified and involves theSpecified and involves the			forces can be useful.	as is resistivity and	
graphs for objects falling under gravity with drag forces present is also GCSE and A-level have common equations for included. power and energy. At Diff forces are considered only at A-level. GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level the power Both GCSE and A-level define momentum and conservation of momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the P=12R and P= V2/R.			Interpretation of u-t	superconductors.	
under gravity with drag forces present is also included.GCSE and A-level have common equations for power and energy. At GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level the power equation is also defined as P=12R and P= V2/R.Both GCSE and A-level define momentum, including the concept of a 'closed system', for collisions and explosions.GCSE and A-level Restricted to P=IV, and knowledge of kW, kWh. At A-level the power equation is also defined as P=12R and P= V2/R.			graphs for objects falling		
forces present is also included.common equations for power and energy. At GCSE the equation is restricted to P=IV, and knowledge of kW, kWh. At A-level the power equation is also defined as P=I2R and P= V2/R.Both GCSE and A-level define momentum and conservation of momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves theP=I2R and P= V2/R.			under gravity with drag	GCSE and A-level have	
included. Lift forces are considered only at A-level. Both GCSE and A-level define momentum and conservation of momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			forces present is also	common equations for	
Lift forces are considered only at A-level. Both GCSE and A-level define momentum and conservation of momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			included.	power and energy. At	
Image: Second			Lift forces are considered	GCSE the equation is	
knowledge of kW, kWh. At A-level the power equation is also defined as P=12R and P= V2/R. P=12R and P= V2/R. P=12R and P= V2/R. P=12R and P= V2/R.			only at A-level.	restricted to P=IV, and	
At A-level the power equation is also defined as define momentum and conservation of momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			,	knowledge of kW, kWh.	
Both GCSE and A-level equation is also defined as P=12R and P= V2/R. P=12R and P=12R and P= V2/R. P=12R and P=12R				At A-level the power	
define momentum and conservation of momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			Both GCSE and A-level	equation is also defined as	
conservation of momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			define momentum and	P=12R and $P=V2/R$.	
momentum, including the concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			conservation of		
concept of a 'closed system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			momentum, including the		
system', for collisions and explosions. At A-level, linear momentum in one dimension is specified and involves the			concept of a 'closed		
explosions. At A-level, linear momentum in one dimension is specified and involves the			system', for collisions and		
At A-level, linear momentum in one dimension is specified and involves the			explosions.		
momentum in one dimension is specified and involves the			At A-level, linear		
dimension is specified and involves the			momentum in one		
involves the			dimension is specified and		
			involves the		
I understanding that force			understanding that force		
results from a momentum			results from a momentum		
change per second. The			change per second. The		
idea of impulse ('force ×			idea of impulse ('force ×		
time') including an			time') including an		
appreciation of impact			appreciation of impact		
forces and contact times is			forces and contact times is		

	introduced and for	
	constant and variable	
	forces. the area under a	
	force-time graph is used	
	for momentum change.	
	There is also consideration	
	at A-level for both elastic	
	(conservation of KE) and	
	inelastic collisions, with	
	calculations.	
	Both GCSE and A-level	
	specifications require	
	knowledge of the terms	
	work energy and nower	
	(including the Joule and	
	(including the jourc and kW) as well as the	
	conservation of energy	
	including the equation for	
	work done Both	
	specifications involve a	
	definition of power in	
	terms of energy/work	
	transformed per second	
	and the equations for PE	
	and KE	
	A-level also considers	
	work done against	
	resistive forces. For 'non	
	narallel force and	
	displacement' A-level	
	considers when work is	
	done or not done by a	
	force $(W = E_s \cos A)$ and	
	nower in respect of force	
	and velocity (P=AWAt= Ev	
) and that the area under	
	a force-displacement	
	graph is work done for	
	graph is work uone ior	

			both constant and variable		
			forces.		
			In optics, most		
			specification content is		
			common so that an		
			appreciation of total		
			internal reflection, optical		
			fibres and lasers is		
			assumed.		
			At A-level the critical angle		
			is related to refractive		
			index by $Sin\theta c = ratio of$		
			two refractive indices. A-		
			level deals in slightly more		
			detail for optical fibres		
			with a step index.		
Home – Learning:	Home – Learning:	Home – Learning:	Home – Learning:	Home – Learning:	Home – Learning:
Past exam questions	Past exam questions	Past exam questions	Past exam questions	Past exam questions	Past exam questions
Reading / literacy:	Reading / literacy:	Reading / literacy:	Reading / literacy:	Reading / literacy:	Reading / literacy:
Use of ionising	Research and compile a	Read about how standing	Extended writing on the	Research some of the uses	Discussing the use of
radiation, including	presentation about the	waves are used in musical	applications of	of superconductors.	circular motion in
detectors.	electromagnetic	instruments.	interference in waves and		fairground rides and sport.
	spectrum.		optics.		
Numeracy:	Numeracy:	Numeracy:	Numeracy:	Numeracy:	Numeracy:
Substitute numerical	MS2.3: Substitute	MS1.2: Find arithmetic	MS2.2, 2.3: Substitute	MS0.3: Use of ratios in	MS4.7: Understand the
values into algebraic	numerical values into	means from data from	numerical values into a	density calculations.	relationship between
equations to calculate	equation for frequency	the determination of g.	conservation of	MS4.3: Calculate	degrees and radians and
specific charge.	of first harmonic.	MS3.9: Apply the	momentum equation	volumes of regular	translate from one to
Solve algebraic	MS4.5: Use sin in the	concepts underlying	and change the subject	solids.	the other in circular
equations involving	modelling of a	calculus by solving	of the equation.	MS3.1: Translate	motion problems.
masses and charges of	transverse wave.	equations involving	MS0.3: Use ratios,	information between	MS 1.5 / PS 2.3 / AT a, b,
nuclei and ions.	MS2.2: Change the	rates of change in the	fractions and	graphical, numerical and	d, f
Substitute numerical	subject of the fringe	experiment to	percentages in	algebraic form when	Investigate the factors
values into algebraic	separation equation to	determine g.	efficiency calculations.	investigating elastic	that affect the change in
equations to calculate	determine the	MS2.2, 2.3: Use		behaviour.	temperature of a
energies of photons	wavelength of light.	algebraic equations for		AO1: Demonstration of	substance using an
using frequency and		moments, couples and		knowledge and	electrical method or the
wavelength.					method of mixtures.

Solve algebraic equations to calculate energy of photons from frequency and	MS4.5: Use of sine in diffraction grating equation.	the principle of moments.		understanding of tensile stress and tensile strain. MS3.8: Understand the significance of the area	Students should be able to identify random and systematic errors in the experiment and suggest	
wavelength.				between the curve and the x-axis on a force extension graph.	ways to remove them.	
Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC): Attend lectures at London Universities and Institutions to enrich learning about a wide variety of Science, technology and engineering topics of which Physics						
makes a major contribution.						