Year 11 into 12 – Physics Summer work

July 2023

GCSE to A-Level Key ideas

Introduction:

A-Level Physics is extremely well valued by both employers and universities. It is, however, a challenging course. We want you to be ready to face these challenges and to do so you must have a good understanding of some key ideas that you studied at GCSE.
The purpose of this booklet is to inform you of the required skills for the A-Level Physics course and inform you of resources available to you to help you prepare.

How to prepare:

During the first couple of weeks of the course you will take a diagnostic test to assess your suitability for this course.

Use the checklist to RAG rate your current understanding of GCSE Physics. Can you then produce a consolidation mind map or other revision resource for each of the topics identified below:

Electricity
Mechanics (Forces, energy and motion)
Materials (forces and springs)
Waves
Atoms and radioactivity

You can use the following resources to help you:

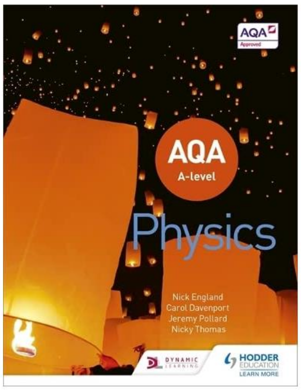
1. AQA GCSE Physics Revision Notes 2018 | Save My Exams
2. AQA GCSE (9-1) Physics Revision - PMT (physicsandmathstutor.com)
3. Seneca learning (scan QR code above). Please sign up with your full name and make sure you use the class code. 47jvif942g
4. Head start to A level Physics (ISBN 9781782944713)

We would like you to bring any preparation work you have done with you to your first lesson.

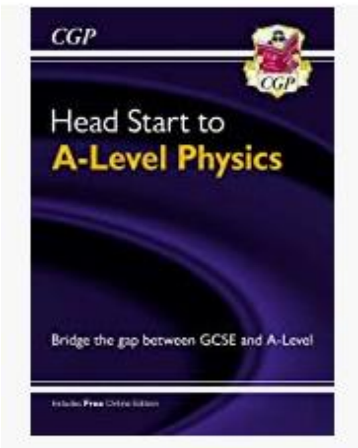
You will also need to purchase your own copy of the required textbook to bring to lessons and an A4 lever arch folder with at least 5 folder dividers

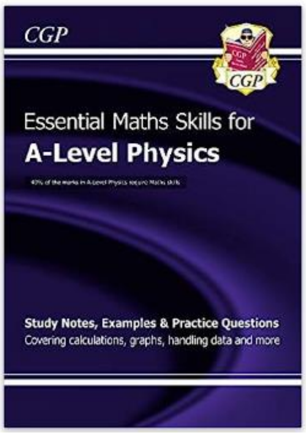
Required resources

You will need to purchase a copy of this textbook and bring it with you to your lessons.



Optional resources





Mechanics (Forces, energy and motion)

AQA Physics (8463) from 2016 Topics P4.1. Energy				
Topic	**Student Checklist**	**R**	**A**	**G**
4.1.1 Energy changes in a system, and the ways energy is stored before and after such changes	Define a system as an object or group of objects and state examples of changes in the way energy is stored in a system			
	Describe how all the energy changes involved in an energy transfer and calculate relative changes in energy when the heat, work done or flow of charge in a system changes			
	Use calculations to show on a common scale how energy in a system is redistributed			
	Calculate the kinetic energy of an object by recalling and applying the equation: ***[$E_k = ½mv^2$]***			
	Calculate the amount of elastic potential energy stored in a stretched spring by applying, but not recalling, the equation: ***[$E_e = ½ke^2$]***			
	Calculate the amount of gravitational potential energy gained by an object raised above ground level by recalling and applying, the equation: ***[$E_e = mgh$]***			
	Calculate the amount of energy stored in or released from a system as its temperature changes by applying, but not recalling, the equation: ***[$\Delta E = mc\Delta\theta$]***			
	Define the term 'specific heat capacity'			
	Define power as the rate at which energy is transferred or the rate at which work is done and the watt as an energy transfer of 1 joule per second			
	Calculate power by recalling and applying the ***equations: [$P = E/t$ & $P = W/t$]***			
	Explain, using examples, how two systems transferring the same amount of energy can differ in power output due to the time taken			
	State that energy can be transferred usefully, stored or dissipated, but cannot be created or destroyed and so the total energy in a system does not change			
	Explain that only some of the energy in a system is usefully transferred, with the rest ‘wasted’, giving examples of how this wasted energy can be reduced			

AQA Physics (8463) from 2016 Topics P4.5. Forces				
Topic	**Student Checklist**	**R**	**A**	**G**
4.5.1 Forces and their interactions	Identify and describe scalar quantities and vector quantities			
	Identify and give examples of forces as contact or non-contact forces			
	Describe the interaction between two objects and the force produced on each as a vector			
	Describe weight and explain that its magnitude at a point depends on the gravitational field strength			
	Calculate weight by recalling and using the equation: ***[$W = mg$]***			
	Represent the weight of an object as acting at a single point which is referred to as the object's ‘centre of mass’			
	Calculate the resultant of two forces that act in a straight line			
	HT ONLY: describe examples of the forces acting on an isolated object or system			
	HT ONLY: Use free body diagrams to qualitatively describe examples where several forces act on an object and explain how that leads to a single resultant force or no force			
	HT ONLY: Use free body diagrams and accurate vector diagrams to scale, to resolve multiple forces and show magnitude and direction of the resultant			
	HT ONLY: Use vector diagrams to illustrate resolution of forces, equilibrium situations and determine the resultant of two forces, to include both magnitude and direction			
4.5.2 Work done and energy transfer	Describe energy transfers involved when work is done and calculate the work done by recalling and using the equation: *[$W = Fs$]*			
	Describe what a joule is and state what the joule is derived from			
	Convert between newton-metres and joules.			
	Explain why work done against the frictional forces acting on an object causes a rise in the temperature of the object			
4.5.4 Moments, levers and gears	*PHY ONLY: State that a body in equilibrium must experience equal sums of clockwise and anticlockwise moments, recall and apply the equation:* ***[$M = Fd$]***			
	PHY ONLY: Apply the idea that a body in equilibrium experiences an equal total of clockwise and anti-clockwise moments about any pivot			
	PHY ONLY: Explain why the distance, d, must be taken as the perpendicular distance from the line of action of the force to the pivot			
	PHY ONLY: Explain how levers and gears transmit the rotational effects of forces			

4.5.6 Forces and motion	Define distance and displacement and explain why they are scalar or vector quantities			
	Express a displacement in terms of both the magnitude and direction			
	Make measurements of distance and time and then calculate speeds of objects in calculating average speed for non-uniform motion			
	Explain why the speed of wind and of sound through air varies and calculate speed by recalling and applying the equation: ***[s = v t]***			
	Explain the vector–scalar distinction as it applies to displacement, distance, velocity and speed			
	HT ONLY: Explain qualitatively, with examples, that motion in a circle involves constant speed but changing velocity			
	Represent an object moving along a straight line using a distance-time graph, describing its motion and calculating its speed from the graph's gradient			
	Draw distance–time graphs from measurements and extract and interpret lines and slopes of distance–time graphs,			
	Describe an object which is slowing down as having a negative acceleration and estimate the magnitude of everyday accelerations			
	Calculate the average acceleration of an object by recalling and applying the equation: ***[a = Δv/t]***			
	Represent motion using velocity–time graphs, finding the acceleration from its gradient and distance travelled from the area underneath			
	HT ONLY: Interpret enclosed areas in velocity–time graphs to determine distance travelled (or displacement)			
	HT ONLY: Measure, when appropriate, the area under a velocity– time graph by counting square			
	Apply, but not recall, the equation: ***[$v^2 – u^2 = 2as$]***			
	PHY ONLY: Draw and interpret velocity-time graphs for objects that reach terminal velocity			
	PHY ONLY: Interpret and explain the changing motion of an object in terms of the forces acting on it			
	PHY ONLY: Explain how an object falling from rest through a fluid due to gravity reaches its terminal velocity			
	Explain the motion of an object moving with a uniform velocity and identify that forces must be in effect if its velocity is changing, by stating and applying Newton's First Law			
	Define and apply Newton's second law relating to the acceleration of an object			
	Recall and apply the equation: ***[F = ma]***			
	HT ONLY: Describe what inertia is and give a definition			
	Estimate the speed, accelerations and forces of large vehicles involved in everyday road transport			
	Apply Newton's Third Law to examples of equilibrium situations			

4.5.7 Momentum	**HT ONLY: Calculate momentum by recalling and applying the equation: *[p = mv]***			
	HT ONLY: Explain and apply the idea that, in a closed system, the total momentum before an event is equal to the total momentum after the event			
	HT ONLY: Describe examples of momentum in a collision			
	PHY & HT ONLY: Complete conservation of momentum calculations involving two objects			
	PHY & HT ONLY: Explain that when a force acts on an object that is moving, or able to move, a change in momentum occurs			
	PHY & HT ONLY: Calculate a force applied to an object, or the change in momentum it causes, by applying but not recalling the equation: [F = m Δv / Δt]			
	PHY & HT ONLY: Explain that an increased force delivers an increased rate of change of momentum			
	PHY & HT ONLY: Apply the idea of rate of change of momentum to explain safety features such as air bags, seat belts, helmets and cushioned surfaces			

Materials (forces and springs)

		R	A	G
4.5.3 Forces and elasticity	Describe examples of the forces involved in stretching, bending or compressing an object			
	Explain why, to change the shape of an object (by stretching, bending or compressing), more than one force has to be applied – this is limited to stationary objects only			
	Describe the difference between elastic deformation and inelastic deformation caused by stretching forces			
	Describe the extension of an elastic object below the limit of proportionality and calculate it by recalling and applying the equation: ***[F = ke]***			
	Explain why a change in the shape of an object only happens when more than one force is applied			
	Describe and interpret data from an investigation to explain possible causes of a linear and non-linear relationship between force and extension			
	Calculate work done in stretching (or compressing) a spring (up to the limit of proportionality) by applying, but not recalling, the equation: **[$E_e = ½ke^2$]**			

Electricity

AQA Physics (8463) from 2016 Topics P4.2. Electricity				
Topic	**Student Checklist**	**R**	**A**	**G**
4.2.1 Current, potential difference and resistance	Draw and interpret circuit diagrams, including all common circuit symbols			
	Define electric current as the rate of flow of electrical charge around a closed circuit			
	Calculate charge and current by recalling and applying the formula: ***[Q = It]***			
	Explain that current is caused by a source of potential difference and it has the same value at any point in a single closed loop of a circuit			
	Describe and apply the idea that the greater the resistance of a component, the smaller the current for a given potential difference (p.d.) across the component			
	Calculate current, potential difference or resistance by recalling and applying the equation: ***[V = IR]***			
	Define an ohmic conductor			
	Explain the resistance of components such as lamps, diodes, thermistors and LDRs and sketch/interpret IV graphs of their characteristic electrical behaviour			
	Explain how to measure the resistance of a component by drawing an appropriate circuit diagram using correct circuit symbols			
4.2.2 Series and parallel circuits	Show by calculation and explanation that components in series have the same current passing through them			
	Show by calculation and explanation that components connected in parallel have the same the potential difference across each of them			
	Calculate the total resistance of two components in series as the sum of the resistance of each component using the equation: **[$R_{total} = R_1 + R_2$]**			
	Explain qualitatively why adding resistors in series increases the total resistance whilst adding resistors in parallel decreases the total resistance			
	Solve problems for circuits which include resistors in series using the concept of equivalent resistance			
4.2.4 Energy transfers	Explain how the power transfer in any circuit device is related to the potential difference across it and the current through it			
	Calculate power by recalling and applying the equations: ***[P = VI]*** and **[$P = I^2 R$]**			
	Describe how appliances transfer energy to the kinetic energy of motors or the thermal energy of heating devices			
	Calculate and explain the amount of energy transferred by electrical work by recalling and applying the equations: ***[E = Pt]*** and ***[E = QV]***			
	Explain how the power of a circuit device is related to the potential difference across it, the current through it and the energy transferred over a given time.			
	PHY ONLY: Describe evidence that charged objects exert forces of attraction or repulsion on one another when not in contact			
	PHY ONLY: Draw the electric field pattern for an isolated charged sphere			
	PHY ONLY: Explain the concept of an electric field and the decrease in its strength as the distance from it increases			
	PHY ONLY: Explain how the concept of an electric field helps to Explain the non-contact force between charged objects as well as other electrostatic phenomena such as sparking			

Atoms and radioactivity

AQA Physics (8463) from 2016 Topics P4.4. Atomic structure				
TOPIC	**Student Checklist**	**R**	**A**	**G**
4.4.1 Atoms and isotopes	Describe the basic structure of an atom and how the distance of the charged particles vary with the absorption or emission of electromagnetic radiation			
	Define electrons, neutrons, protons, isotopes and ions			
	Relate differences between isotopes to differences in conventional representations of their identities, charges and masses			
	Describe how the atomic model has changed over time due to new experimental evidence, inc discovery of the atom and scattering experiments (inc the work of James Chadwick)			
4.4.2 Atoms and nuclear radiation	Describe and apply the idea that the activity of a radioactive source is the rate at which its unstable nuclei decay, measured in Becquerel (Bq) by a Geiger-Muller tube			
	Describe the penetration through materials, the range in air and the ionising power for alpha particles, beta particles and gamma rays			
	Apply knowledge of the uses of radiation to evaluate the best sources of radiation to use in a given situation			
	Use the names and symbols of common nuclei and particles to complete balanced nuclear equations, by balancing the atomic numbers and mass numbers			
	Define half-life of a radioactive isotope			
	HT ONLY: Determine the half-life of a radioactive isotope from given information and calculate the net decline, expressed as a ratio, in a radioactive emission after a given number of half-lives			
	Compare the hazards associated with contamination and irradiation and outline suitable precautions taken to protect against any hazard the radioactive sources may present			
	Discuss the importance of publishing the findings of studies into the effects of radiation on humans and sharing findings with other scientists so that they can be checked by peer review			
4.4.3 Hazards and uses of radiation	*PHY ONLY: State, giving examples, that background radiation is caused by natural and man-made sources and that the level of radiation may be affected by occupation and/or location*			
	PHY ONLY: Explain the relationship between the instability and half-life of radioactive isotopes and why the hazards associated with radioactive material differ according to the half-life involved			
	PHY ONLY: Describe and evaluate the uses of nuclear radiation in exploration of internal organs and controlling or destroying unwanted tissue			
	PHY ONLY: Evaluate the perceived risks of using nuclear radiation in relation to given data and consequences			
	PHY ONLY: Describe nuclear fission			
	PHY ONLY: Draw/interpret diagrams representing nuclear fission and how a chain reaction may occur			
	PHY ONLY: Describe nuclear fusion			

Waves

AQA Physics (8463) from 2016 Topics P4.6. Waves				
Topic	**Student Checklist**	**R**	**A**	**G**
4.6.1 Waves in air, fluids and solids	Describe waves as either transverse or longitudinal, defining these waves in terms of the direction of their oscillation and energy transfer and giving examples of each			
	Define waves as transfers of energy from one place to another, carrying information			
	Define amplitude, wavelength, frequency, period and wave speed and Identify them where appropriate on diagrams			
	State examples of methods of measuring wave speeds in different media and Identify the suitability of apparatus of measuring frequency and wavelength			
	Calculate wave speed, frequency or wavelength by applying, but not recalling, the equation: ***[$v = f \lambda$] and*** calculate wave period by recalling and applying the equation: ***[$T = 1/f$]***			
	Identify amplitude and wavelength from given diagrams			
	Describe a method to measure the speed of sound waves in air			
	Describe a method to measure the speed of ripples on a water surface			
	PHY ONLY: Demonstrate how changes in velocity, frequency and wavelength are inter-related in the transmission of sound waves from one medium to another			
	PHY ONLY: Discuss the importance of understanding both mechanical and electromagnetic waves by giving examples, such as designing comfortable and safe structures and technologies			
	PHY ONLY: Describe a wave's ability to be reflected, absorbed or transmitted at the boundary between two different materials			
	PHY ONLY: Draw the reflection of a wave at a surface by constructing ray diagrams			
	PHY & HT ONLY: Describe, with examples, processes which convert wave disturbances between sound waves and vibrations in solids			

4.6.2 Electromagnetic waves	Describe what electromagnetic waves are and explain how they are grouped			
	List the groups of electromagnetic waves in order of wavelength			
	Explain that because our eyes only detect a limited range of electromagnetic waves, they can only detect visible light			
	HT ONLY: Explain how different wavelengths of electromagnetic radiation are reflected, refracted, absorbed or transmitted differently by different substances and types of surface			
	Illustrate the refraction of a wave at the boundary between two different media by constructing ray diagrams			
	HT ONLY: Describe what refraction is due to and illustrate this using wave front diagrams			
	Required practical activity 10: *investigate how the amount of infrared radiation absorbed or radiated by a surface depends on the nature of that surface.*			
	HT ONLY: Explain how radio waves can be produced by oscillations in electrical circuits, or absorbed by electrical circuits			
	Explain that changes in atoms and the nuclei of atoms can result in electromagnetic waves being generated or absorbed over a wide frequency range			
	PHY ONLY: State that a lens forms an image by refracting light and that the distance from the lens to the principal focus is called the focal length			
	PHY ONLY: Explain that images produced by a convex lens can be either real or virtual, but those produced by a concave lens are always virtual			
	PHY ONLY: Construct ray diagrams for both convex and concave lenses			
	PHY ONLY: Calculate magnification as a ratio with no units by applying, but not recalling, the formula: [magnification = image height / object height]			
	PHY ONLY: State that all bodies, no matter what temperature, emit and absorb infrared radiation and that the hotter the body, the more infrared radiation it radiates in a given time			
	PHY ONLY: Explain why when the temperature is increased, the intensity of every wavelength of radiation emitted increases, but the intensity of the shorter wavelengths increases more rapidly			
	PHY & HT ONLY: Explain and apply the idea that the temperature of a body is related to the balance between incoming radiation absorbed and radiation emitted			
	PHY & HT ONLY: Describe how the temperature of the Earth as dependent on the rates of absorption and emission of radiation and draw and interpret diagrams that show this			

Additional GCSE content required for the course

AQA Physics (8463) from 2016 Topics P4.3. Particle model of matter				
TOPIC	**Student Checklist**	**R**	**A**	**G**
4.3.1 Changes of state and the particle model	Calculate the density of a material by recalling and applying the equation: [ρ = m/V]			
	Recognise/draw simple diagrams to model the difference between solids, liquids and gases			
	Use the particle model to explain the properties of different states of matter and differences in the density of materials			
	Recall and describe the names of the processes by which substances change state			
	Use the particle model to explain why a change of state is reversible and affects the properties of a substance, but not its mass			
4.3.2 Internal energy and energy transfers	State that the internal energy of a system is stored in the atoms and molecules that make up the system			
	Explain that internal energy is the total kinetic energy and potential energy of all the particles in a system			
	Calculate the change in thermal energy by applying but not recalling the equation ***[ΔE =m c Δθ]***			
	Calculate the specific latent heat of fusion/vaporisation by applying, but not recalling, the equation: ***[E = mL]***			
	Interpret and draw heating and cooling graphs that include changes of state			
	Distinguish between specific heat capacity and specific latent heat			
4.3.3 Particle model and pressure	Explain why the molecules of a gas are in constant random motion and that the higher the temperature of a gas, the greater the particles' average kinetic energy			
	Explain, with reference to the particle model, the effect of changing the temperature of a gas held at constant volume on its pressure			
	Calculate the change in the pressure of a gas or the volume of a gas (a fixed mass held at constant temperature) when either the pressure or volume is increased or decreased			
	PHY ONLY: Explain, with reference to the particle model, how increasing the volume in which a gas is contained can lead to a decrease in pressure when the temperature is constant			
	PHY ONLY: Calculate the pressure for a fixed mass of gas held at a constant temperature by applying, but not recalling, the equation: [pV = constant]			
	PHY & HT ONLY: Explain how work done on an enclosed gas can lead to an increase in the temperature of the gas, as in a bicycle pump			

4.5.5 Pressure and pressure differences in fluid	*PHY ONLY: Describe a fluid as either a liquid or a gas and explain that the pressure in a fluid causes a force to act at right angles (normal) to the surface of its container*			
	PHY ONLY: Recall and apply the equation: ***[p = F/A]***			
	PHY & HT ONLY: Explain why the pressure at a point in a fluid increases with the height of the column of fluid above and calculate differences in pressure in a liquid by applying [p = h ρ g]			
	PHY & HT ONLY: Describe up thrust an object and explain why the density of the fluid has an effect on the up thrust experienced by an object submerged in it			
	PHY & HT ONLY: Explain why an object floats or sinks, with reference to its weight, volume and the up thrust it experiences			
	PHY ONLY: Describe a simple model of the Earth's atmosphere and of atmospheric pressure, explaining why atmospheric pressure varies with height above a surface			

AQA Physics (8463) from 2016 Topics P4.8. Space physics				
TOPIC	**Student Checklist**	**R**	**A**	**G**
4.8.1 Solar system; stability of orbital motions; satellites	*PHY ONLY: List the types of body that make up the solar system and describe our solar system as part of a galaxy*			
	PHY ONLY: Explain how stars are formed			
	PHY ONLY: Describe the life cycle of a star the size of the Sun and of a star which is much more massive than the Sun			
	PHY ONLY: Explain how fusion processes lead to the formation of new elements and how supernovas have allowed heavy elements to appear in later solar systems			
	PHY & HT ONLY: Explain that, for circular orbits, the force of gravity leads to a constantly changing velocity but unchanged speed			
	PHY & HT ONLY: Explain that, for a stable orbit, the radius must change if the speed changes			
4.8.2 Red-shift	*PHY ONLY: Explain, qualitatively, the red-shift of light from galaxies that are receding and how this red-shift changes with distance from Earth*			
	PHY ONLY: Explain why the change of each galaxy's speed with distance is evidence of an expanding universe			
	PHY ONLY: Explain how scientists are able to use observations to arrive at theories, such as the Big Bang theory and discuss that there is still much about the universe that is not understood			

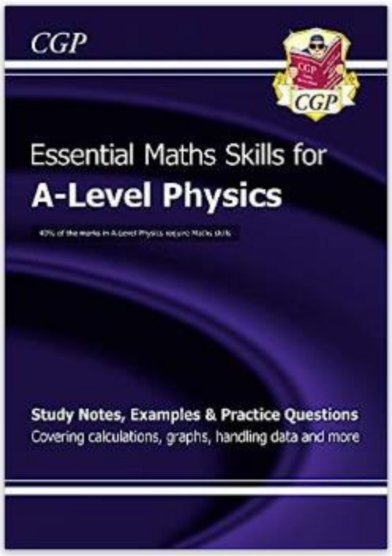
AQA Physics (8463) from 2016 Topics P4.7. Magnetism and electromagnetism				
TOPIC	**Student Checklist**	**R**	**A**	**G**
4.7.1 Permanent and induced magnetism, magnetic forces and	Describe the attraction and repulsion between unlike and like poles of permanent magnets and explain the difference between permanent and induced magnets			
	Draw the magnetic field pattern of a bar magnet, showing how field strength and direction are indicated and change from one point to another			
	Explain how the behaviour of a magnetic compass is related to evidence that the core of the Earth must be magnetic			
	Describe how to plot the magnetic field pattern of a magnet using a compass			
4.7.2 The motor effect	State examples of how the magnetic effect of a current can be demonstrated and explain how a solenoid arrangement can increase the magnetic effect of the current			
	Draw the magnetic field pattern for a straight wire carrying a current and for a solenoid (showing the direction of the field)			
	PHY ONLY: Interpret diagrams of electromagnetic devices in order to explain how they work			
	HT ONLY: State and use Fleming's left-hand rule and explain what the size of the induced force depends on			
	HT ONLY: Calculate the force on a conductor carrying a current at right angles to a magnetic field by applying, but not recalling, the equation: *[F = BIL]*			
	HT ONLY: Explain how rotation is caused in an electric motor			
	PHY & HT ONLY: Explain how a moving-coil loudspeaker and headphones work			
4.7.3 Induced potential, transformers and the National Grid	***PHY & HT ONLY: Describe the principles of the generator effect, including the direction of induced current, effects of Lenz' Law and factors that increase induced p.d.***			
	PHY & HT ONLY: Explain how the generator effect is used in an alternator to generate a.c. and in a dynamo to generate d.c.			
	PHY & HT ONLY: Draw/interpret graphs of potential difference generated in the coil against time			
	PHY & HT ONLY: Explain how a moving-coil microphone works			
	PHY & HT ONLY: Explain how the effect of an alternating current in one coil inducing a current in another is used in transformers			
	PHY & HT ONLY: Explain how the ratio of the potential differences across the two coils depends on the ratio of the number of turns on each			
	PHY & HT ONLY: Apply the equation linking the p.d.s and number of turns in the two coils of a transformer to the currents and the power transfer			
	PHY & HT ONLY: Apply but not recalling the equations: [Vs × Is = Vp × Ip] and [vp / vs = np / ns] for transformers			

Maths for Physics Specification

Outlined are the Maths skills for A level Physics. Some of these you are expected to know from GCSE Maths and Physics. The others you will learn during the A level course.

Task: The areas shaded in grey are the ones you will learn at A level.

1. Please go through and RAG rate the Skills in the boxes which have been left white. (These are the ones from GCSE Maths)



If some of you feel that you may struggle with some of the maths skills required for A-level Physics and would feel more confident by improving areas of your GCSE maths knowledge, then we would recommend this textbook. We have directed you towards the relevant pages for each skill in the Math's for A-level Physics document below:

Maths Skill	Example	R / A / G	Activity (page / Qs)
Arithmetic and Numerical Computation			
Recognise and make use of appropriate units in calculations	Students may be tested on their ability to: • identify the correct units for physical properties such as $m\ s^{-1}$, the unit for velocity • convert between units with different prefixes eg cm^3 to m^3		Read page 8 - 10 Complete Q1-5
Recognise and use expressions in decimal and ordinary form	Students will be tested on their ability to: • use physical constants expressed in standard form such as c = 3.00 x 108 $m\ s^{-1}$		Read page 4 - 5 Complete Q1 -4
Use ratios, fractions and percentages	Students may be tested on their ability to: • calculate efficiency of devices • calculate percentage uncertainties in measurements		Read page 11 - 13 Complete Q1 and 2
Estimate results	Students may be tested on their ability to: • estimate the effect of changing experimental parameters on measurable values		Read page 30 - 31 Complete Q1
Use calculators to find power, exponential and logarithmic functions	Students may be tested on their ability to: • Solve unknows in decay problems $N=N_{0e}\ -\lambda t$		
Use calculators to handle *cos x*, *sin x*, *tan x* when *x* is expressed and degrees or radians	Students may be tested on their ability to: • Calculate the direction of resultant vectors		
Handling Data			

Use an appropriate number of significant figures	Students may be tested on their ability to: • report calculations to an appropriate number of significant figures given raw data quoted to varying numbers of significant figures • understand that calculated results can only be reported to the limits of the least accurate measurement		Read page 2 and 3 Complete Q1 and 3
Find the arithmetic mean	Students may be tested on their ability to: • calculate a mean value for repeated experimental readings		Read page 76 – 77 Complete Q1 and 2
Understand simple probability	Students will be tested on their ability to: • Understand probability in the context of radioactive decay		Read page 14 – 15 Complete Q1 and 2
Make order of magnitude calculations	Students will be tested on their ability to: • evaluate equations with variables expressed in different orders of magnitude		Read page 24 - 26
Identify uncertainties in measurements and use a simple techniques to determine uncertainty when data are combined	Students may be tested on their ability to: • Determine uncertainty when two readings for length need to be added together		
Algebra			
Understand and use the symbols: =, <, <<, >>, >, ∝,	Students may be tested on their ability to: Recognise the significance of the symbols in the expression $F \propto \frac{\Delta p}{\Delta t}$		Read page 16
Change the subject of	Students may be tested on their ability		Read page 18 -21

an equation including non linear equations	to: • Rearrange $E = mc^2$ to make *m* the subject		
Substitute numerical values into algebraic equations using appropriate units and physical quantities	Students may be tested on their ability to: • Calculate momentum p of an object by substituting the values for mass *m* and velocity *v* into the equation *p= mv*		Read page 16 – 17 Complete Q1
Solve algebraic equations including quadratic equations	Students may be tested on their ability to: • solve kinematic equations for constant acceleration such as v = u + at and s = ut + ½ at 2		Read page 20
Use logarithms in relation to quantities that range over several orders of magnitude	Students may be tested on their ability to: • Recognise and interpret real world examples of logarithmic scales		
Graphs			
Translate information between graphical, numerical and algebraic forms	Students may be tested on their ability to: • Calculate Young modulus from materials using stress – strain graphs		
Plot two variables from experimental or other data	Students may be tested on their ability to: • Plot graphs of extension of a wire against force applied		Read page 52-53 Complete Q1 and 5
Understand that *y = mx + c* represents a linear relationship	Students may be tested on their ability to: rearrange and compare v = u + at with y = mx + c for velocity–time graph in constant acceleration problems		Reda page 54 – 55 Complete Q1
Determine the slope and the intercept of a linear graph	Students may be tested on their ability to:		Read page 54 – 55 Complete Q1

	• read off and interpret intercept point from a graph eg the initial velocity in a velocity–time graph		
Calculate rate of change from a graph showing a linear relationship	Students may be tested on their ability to: • calculate acceleration from a linear velocity– time graph		Read page 54 – 55 Complete Q1
Draw and use the slope of a tangent to a curve as a measure of rate of change	Students may be tested on their ability to: • draw a tangent to the curve of a displacement–time graph and use the gradient to approximate the velocity at a specific time		Read page 56 -57 Complete Q1
Distinguish between instantaneous rate of change and average rate of change	Students may be tested on their ability to: • Understand that the gradient of the tangent of a displacement – time graph gives the velocity at a point in time which is different to the average velocity		Read page 56- 57 Complete Q1
Understand the possible physical significance of the area between a curve and the x axis and be able to calculate it or estimate it by graphical methods as appropriate	Students may be tested on their ability to: • Recognise that for a capacitor the area under a voltage – change graph is the equivalent to the energy stored		Read page 68 – 70 Complete Q1 and 2
Apply the concepts underlying calculus (but without requiring the explicit use of derivatives or integrals) by solving equations involving rates of change using graphical methods or spreadsheet modelling	Students may be tested on their ability to: Determine g from distance – time plot for projectile.		

Interpret logarithmic plots	Students may be tested on their ability to: • Obtain time – constant for capacitor		
Use logarithmic plots to test exponential and power law variations	Students may be tested on their ability to: • Use logarithmic plots with decay law of radioactivity / charging and discharging of a capacitor		
Sketch relationships which are modelled by y = k/x, y = kx2 , y = k/x 2 , y = kx, y = sin x, y = cos x, y = e ±x , and y = sin2 x, y = cos2 x as applied to physical relationships	Students may be tested on their ability to: Sketch relationships between pressure and volume for an ideal gas		
Geometry and Trigonometry			
Use angles in regular 2D and 3D structures	Students may be tested on their ability to; • Interpret force diagrams to solve problems		
Visualise and represent 2D and 3D forms including two dimensional representations of 3D objects	Students may be tested on their ability to: • Solve force diagrams to solve mechanics problems		
Calculate the area of triangles, circumferences and areas of circles, surface area and volumes of rectangular blocks, cylinders and spheres	Students may be tested on their ability to: • Calculate the cross section to work out the resistance of a conductor given its length and resistivity		Read page 32 – 33
Use Pythagoras' theorem, and the angle sum of a triangle	Students may be tested on their ability to: • Calculate the magnitude of a resultant vector, resolving forces into components to solve problems		Read page 36 – 39

Use sin, cos and tan in physical problems	Students may be tested on their ability to: • resolve forces into components		Read page 40 – 41 Complete Q1
Use of small angle approximations including **sinθ ≈ θ, tanθ ≈ θ, cosθ ≈ 1 for small θ where appropriate**	Students may be tested on their ability to: • Calculate fringe separations in interference patterns		
Understand the relationship between degrees and radians and translate from one to the other	Students may be tested on their ability to: Convert angles in degrees to angle in radians		

How can I revise in an effective way?

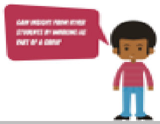
WARNING! There is no quick and easy way to revise effectively for your exam.

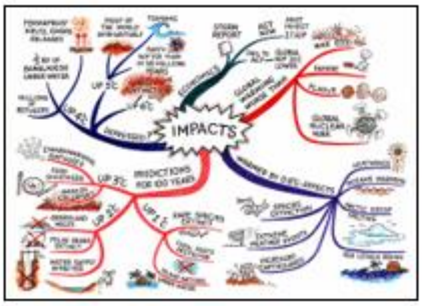
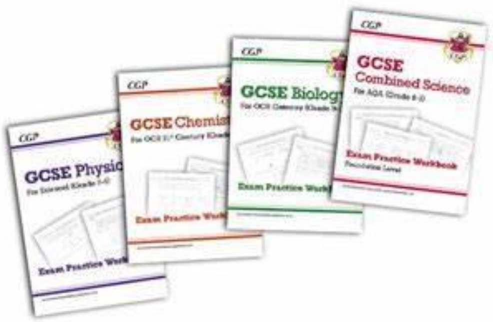
...There are, however, several **logical, interesting, effective** ways to revise and recap your **knowledge and understanding** - and therefore making it easier to apply in your GCSE examinations...

Create a revision timetable

Practice, Practice, Practice

Join with classmates



Making flash cards.	Making a mind map.
Create a set of cards with either key words on one side their definitions on the other or questions on one side with answers on the other. These can include equations / labelled diagrams etc? This is a great way of recalling the most important words / information in a topic – and will help you to use the words correctly in an exam 	Really useful for **<u>linking ideas together</u>**, concept maps allow you to **<u>elaborate on your points</u>** more than mind maps. Different colours could indicate social, environmental and economic factors. Add diagrams, make physical links use and symbols to make the concept map more interesting and visual. 
Completing relevant questions in your science workbooks.	Using an Internet resource like GCSE Pod / Seneca learning*/ BBC Bitesize (you will need some proof of this though – screen shots are fine)
Use the corresponding pages from your revision guide and answer the questions in your workbooks: 	Log on to any of the below resources and complete their quizzes / activities: www.gcsepod.com www.senecalearning.com www.bbc.co.uk/bitesize/subjects/zrkw2hv (choose AQA)