Do I Understand The Syllabus?

Unit 4

Redruth School Physics Department **Assess your understanding of the points set out below**

Key to completing:

Red	I do not understand any of this and need to revise it thoroughly (e.g. Read CGP Revision Guide, learn Summary Sheets, make notes, ask questions, ask for help, do many worksheets/lesson questions and complete all practice paper questions and self-mark).
Amber	I understand some of this and need to revise it (e.g. Learn Summary Sheets, reading and writing some notes, review in CGP Revision Guide, complete all practice paper questions and self-mark).
Green	I understand this and only need the slightest revision (e.g. Check Summary Sheets, complete some practice questions and self-mark).

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Further Mechanics

You will be assessed on your ability to:	**Understanding**		
	Red	*Amber*	*Green*
Use the expression $p = mv$.			
Investigate and apply the principle of conservation of linear momentum in one dimension			
Investigate and relate net force to rate of change of momentum in situations where mass is constant...			
(know this as the A2 version of Newton's Second Law of Motion)			
Derive...,			
and use the expression $E_k = p^2/2m$ for the kinetic energy of a non-relativistic particle.			
Analyse and interpret data to calculate the momentum of (non-relativistic) particles and apply the principle of conservation of linear momentum to problems in one and two dimensions.			
Explain and apply the conservation of energy, and determine whether a collision is elastic...			
or inelastic.			
Express angular displacement (angle) in radians and degrees...,			
and convert between those units.			
Explain the concept of angular velocity...,			
and recognise and use the relationships $v = \omega r$ and $T = 2\pi/\omega$.			
Explain that a resultant force (centripetal force) is required to produce and maintain circular motion.			
Use the expression for centripetal force $F = ma = mv^2/r$...			
and hence derive...			
and use the expressions for centripetal acceleration $a = v^2/r$ and $a = r\omega^2$.			

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Electric & Magnetic Fields

You will be assessed on your ability to:	**Understanding**		
	Red	*Amber*	*Green*
Explain what is meant by an electric field... and recognise and use the expression, electric field strength $E = F/Q$.			
Draw and interpret diagrams using lines of force to describe radial and uniform electric fields qualitively.			
Use the expression $F = kQ_1Q_2/r^2$, where $k = 1/4\pi\varepsilon_0$... and derive and use the expression $E = kQ/r^2$ for electric field due to a point charge.			
Investigate and recall that applying a potential difference to two parallel plates produces a uniform electric field in the central region between them... and recognise and use the expression $E = V/d$.			
Investigate and use the expression $C = Q/V$.			
Recognise and use the expression $W = ½QV$ for the energy stored in a capacitor..., derive the expression from the area under a graph of potential difference against charge stored..., and derive and use related expressions, for example, $W = ½CV^2$.			
Investigate and recall that the growth and decay curves for resistor-capacitor circuits are exponential..., and know the significance of the time constant *RC*.			
Recognise and use the expression $Q = Q_0e^{-t/RC}$..., and derive and use related expressions, for exponential discharge in *RC* circuits, for example, $I = I_0e^{-t/RC}$.			
Explore and use the terms magnetic flux density, B..., flux, Φ...,			

and flux linkage, NΦ.			
Investigate, recognise and use the expression $F = BIlsin\theta$..., and apply Fleming's Left Hand Rule to currents.			
Recognise and use the expression $F = Bqvsin\theta$..., and apply Fleming's Left Hand Rule to charges.			
Investigate and explain qualitatively the factors affecting the emf induced in a coil when there is relative motion between the coil and a permanent magnet and when there is a change of current in a primary coil linked with it.			
Investigate, recognise and use the expression $\varepsilon = -d(N\Phi)/dt$..., and explain how it is a consequence of Faraday's and Lenz's laws.			

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Particle Physics

You will be assessed on your ability to:	**Understanding**		
	Red	*Amber*	*Green*
Use the terms nucleon number (mass number)..., and proton number (atomic number).			
Describe how large-angle alpha particle scattering gives evidence for a nuclear atom.			
Recall that electrons are released in the process of thermionic emission..., and explain how they can be accelerated by electric and magnetic fields.			
Explain the role of electric and magnetic fields in particle accelerators. (linac and cyclotron)..., and detectors (general principles of ionisation and detection only).			
Recognise and use the expression $r = p/BQ$ for a charged particle in a magnetic field.			
Recall and use the fact that charge, energy and momentum are always conserved in interactions between particles..., and hence interpret records of particle tracks.			
Explain why high energies are required to break particles into their constituents..., and to see fine structure.			
Recognise and use the expression $\Delta E = c^2 \Delta m$ in situations involving the creation and annihilation of matter and antimatter particles.			
Use the non SI units MeV and GeV (energy)..., and MeV/c^2, GeV/ c^2 (mass)..., and atomic mass unit, u..., and convert between these and SI units.			
Be aware of relativistic effects...,			

and that these need to be taken into account at speeds near that of light (use of relativistic equations not required).			
Recall that in the standard quark-lepton model each particle has a corresponding antiparticle..., that baryons (e.g. neutrons and protons) are made from three quarks and mesons (e.g. pions) from a quark and anti-quark..., and that the symmetry of the model predicted the top and bottom quark.			
Write and interpret equations including standard notation and standard particle symbols. (eg, π^+,e^-)			
Use de Broglie's wave equation $\lambda = h/p$**.**			