A Level Physics Online

AQA Physics - 7407/7408

Module 3: Waves

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
3.1 Progressive and Stationary waves				
3.1.1 Progressive Waves				
Direction of oscillations of the particles in the medium.				
The definitions of amplitude, frequency, wavelength, speed, phase, phase difference and their units (including radians).				
The equations: $c = f\lambda$ and $f = 1/T$				
3.1.2 Longitudinal and Transverse Waves				
The nature of longitudinal and transverse waves, with examples of each (sound, electromagnetic, waves on a string etc).				
The direction of particle oscillation (if applicable) in relation to the direction of energy transfer.				
You will be expected to know the direction of displacement of particles/fields relative to the direction of energy propagation and that all electromagnetic waves travel at the same speed in a vacuum.				
Polarisation as evidence for the nature of transverse waves.				
Applications of polarisers to include Polaroid material and the alignment of aerials for transmission and reception.				
Malus's law will not be expected.				
3.1.3 Principle of Superposition of Waves and Formation of Stationary Waves				
Stationary waves.				
Nodes and antinodes on strings.				

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For the first harmonic: $f = \frac{1}{2l}\sqrt{\frac{T}{\mu}}$				
The formation of stationary waves by two waves of the same frequency travelling in opposite directions.				
A graphical explanation of formation of stationary waves will be expected.				
Stationary waves formed on a string and those produced with microwaves and sound waves should be considered.				
Stationary waves on strings will be described in terms of harmonics.				
The terms fundamental (for first harmonic) and overtone will not be used.				
3.2 Refraction, Diffraction and Interference				
3.2.1 Interference				
The definitions of path difference and coherence.				
Interference and diffraction using a laser as a source of monochromatic light.				
Young's double-slit experiment: the use of two coherent sources or the use of a single source with double slits to produce an interference pattern.				
Fringe spacing, $w = \lambda D/s$				
Production of interference pattern using white light.				
You are expected to show awareness of safety issues associated with using lasers.				
You will not be required to describe how a laser works.				
You will be expected to describe and explain interference produced with sound and electromagnetic waves.				
Appreciation of how knowledge and understanding of nature of electromagnetic radiation has changed over time.				

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
3.2.2 Diffraction				
The patterns produced when monochromatic or white light is shone through a single slit.				
Qualitative treatment of the variation of the width of the central diffraction maximum with wavelength and slit width.				
The graph of intensity against angular separation is not required.				
Plane transmission diffraction grating at normal incidence.				
Derivation of $d\sin\theta = n\lambda$				
Use of the spectrometer will not be tested.				
Applications of diffraction gratings.				
3.2.3 Refraction at a Plane Surface				
Refractive index of a substance: $n = c / c_s$				
Students should recall that the refractive index of air is approximately 1.				
Snell's law of refraction for a boundary: $n_1 \sin\theta_1 = n_2 \sin\theta_2$				
Total internal reflection: $\sin\theta_c = n_2 / n_1$				
Simple treatment of fibre optics including the function of the cladding. (Optical fibres will be limited to step index only).				
Material and modal dispersion.				
You are expected to understand the principles and consequences of pulse broadening and absorption.				