A Level Physics Online

Eduqas Physics – Component 3

Module 2: Wave properties

This topic introduces the wave properties of diffraction and interference. Investigation of two source interference patterns and the diffraction grating are carried out. The topic deals with coherent and incoherent sources and the conditions needed for two source interference to be observed. Stationary waves are introduced, and the differences between stationary and progressive waves investigated.

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
Diffraction occuring when waves encounter slits or obstacles				
The idea that there is little diffraction when λ is much smaller than the dimensions of the obstacle or slit				
The idea that if λ is equal to or greater than the width of a slit, waves spread as roughly semi-circular wavefronts, but if λ is less than the slit width the main beam spreads through less than 180°				
How two source interference occurs				
The historical importance of Young's experiment				
The principle of superposition, giving appropriate sketch graphs				
The path difference rules for constructive and destructive interference between waves from in phase sources				
The use of $\lambda = \frac{a\Delta y}{D}$				
The derivation and use of $d \sin \theta = n\lambda$ for a diffraction grating				
The idea that for a diffraction grating a very small d makes beams ("orders") much further apart than in Young's experiment, and that the large number of slits makes the bright beams much sharper				
The idea that coherent sources are monochromatic with wavefronts continuous across the width of the beam and, (when comparing more than one source) with a constant phase relationship				
Examples of coherent and incoherent sources				
The idea that for two source interference to be observed, the sources must have a zero or constant phase difference and have oscillations in the same direction				

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
The differences between stationary and progressive waves				
The idea that a stationary wave can be regarded as a superposition of two progressive waves of equal amplitude and frequency, travelling in opposite directions, and that the internodal distance is $\frac{\lambda}{2}$				
SPECIFIED PRACTICAL WORK				
Determination of wavelength using Young's double slits				
Determination of wavelength using a diffraction grating				
Determination of the speed of sound using stationary waves				