A Level Physics Online

Edexcel Physics – 9PH0

Module 5: Waves and the Particle Nature of Light

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
Waves and the Particle Nature of Light				
Understand the terms amplitude, frequency, period, speed and wavelength				
The wave equation: $v = f\lambda$				
How to describe longitudinal waves in terms of pressure variation and the displacement of molecules				
How to describe transverse waves				
Graphs representing transverse and longitudinal waves including standing/stationary waves, and how to interpret them				
CORE PRACTICAL 6: Determine the speed of sound in air using a 2-beam oscilloscope, signal generator, speaker and microphone				
What is meant by **wavefront**, **coherence**, **path difference**, **superposition**, **interference and phase**				
The relationship between **phase difference** and **path difference**				
What is meant by a **standing/stationary wave** and understand how such a wave is formed, know how to identify nodes and antinodes				
The equation for the speed of a transverse wave on a string: $v = \sqrt{\frac{T}{\mu}}$				
CORE PRACTICAL 7: Investigate the effects of length, tension and mass per unit length on the frequency of a vibrating string of wire				
How to use the equation for intensity of radiation: $I = \frac{P}{A}$				

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
Interfaces between medium 1 and medium 2 where: $$n_1 sin\theta_1 = n_2 \sin\theta_2 \, where \, n = \frac{c}{v}$$				
Critical angle using $\sin C = \frac{1}{n}$				
Whether **total internal reflection** will occur at an interface				
How to measure the refractive index of a solid material				
Understand the term focal length of converging and diverging lenses				
Be able to use ray diagrams to trace the path of light through a lens and locate the position of an image				
The equation: $$P = \frac{1}{f}$$				
The equation for the power of thin lenses: $$P = P1 + P2 + \cdots + Pn$$				
Know and understand the terms real image and virtual image				
The equation for a thin converge or diverging lens: $$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$				
Magnification and that *magnification = image height / object height* and: $$m = \frac{v}{u}$$				
Plane polarisation and what is meant by it				
Diffraction and the use of Huygens' obstruction to explain what happens to a wave when it meets an obstruction or slit				
Diffraction gratings, and the equation: $$n\lambda = d \sin\theta$$				
CORE PRACTICAL 8: Determine the wavelength of light from a laser or other light source using a diffraction grating.				
How diffraction experiments provide the evidence for wave nature of electrons				

You should be able to demonstrate and show your understanding of:	Progress and understanding:			
	1	2	3	4
The use of the equation: $$\lambda = \frac{h}{p}$$				
Waves and that they can be transmitted and reflected at an interface between media				
How **pulse-echo technologies** can provide information about the position of an object				
How the behaviour of electromagnetic radiation can be described in terms of the **wave model** and **photon model**, along with their development over time				
The equation: $$E = hf$$ that relates the photon energy to the frequency of the wave				
Absorption of photons and how this results in the emission of a photoelectron				
The terms **threshold frequency and work function** and use of the equation: $$hf = \phi + \frac{1}{2}mv^2$$				
The **electronvolt (eV)** to express small energies				
Photoelectric effect and how it provides the evidence for the particle nature of EM radiation				
Atomic line spectra in terms of *transitions between **discrete energy levels*** and how to calculate the frequency of radiation that could be emitted / absorbed between energy levels				