Stage 2 Physics

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LIGHT AND MATTER

Electromagnetic waves

Accelerating charged particles ---

Light Wave

λ = wavelength
E = amplitude of electric field
M = amplitude of magnetic field

distance
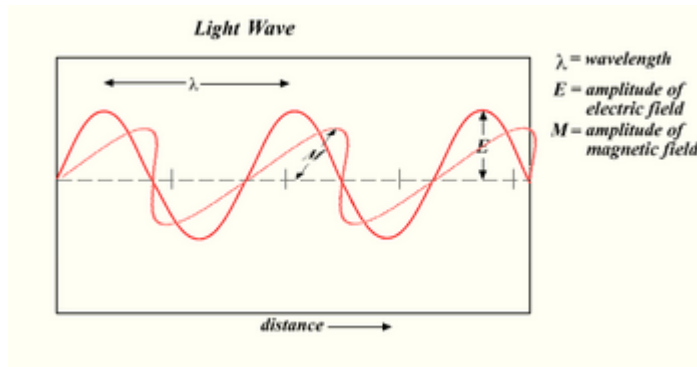
Indicate direction of propagation and direction of oscillation

How does this knowledge relate to the shape and orientation of television antenna? Think about what the wave must make happen in the antenna for a signal to be received.

Polarisation of television channels

Frequency of oscillating source =

Speed of light in a vacuum =

Wave equation using c and v

Laser Airborne Depth Sounder – create a series of diagrams showing how this device works. Why do they use such a powerful laser?

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The interference of light

Coherent wave sources

Superposition

Constructive interference

Destructive interference

Two source interference
A path difference of $m\lambda$ produces

A path difference of $(m + \frac{1}{2})\lambda$ produces

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Diffraction: definition ..

What happens when a wave passes through an opening about the same size as the wavelength of the wave?

Young's double slit experiment:

Try the apparatus, describe what is happening to create the bright lines, use a diagram to help you do this.

Sketch a graph showing intensity of light against position for a two slit interference.

Equation for two slit interference is $d \sin \theta = m\lambda$
d is _____
θ is _____
m is _____
λ is _____
Derive this expression

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This is quite possibly exam week
(if not substitute for the week that is)
In this case use this week to revise previous learning and record main points here.

Solve problems using $d \sin \theta = m\lambda$ and $\Delta y = \lambda L/d$ where Δy is

L is   and d is

Transmission Diffraction Gratings
Definition

Production of maxima by a diffraction grating

Derive $d \sin \theta = m\lambda$ for a diffraction grating

Explain how to find the value d for a diffraction grating

Sketch an intensity vs distribution graph for a diffraction grating

Why is there so little light intensity between the maxima?

Explain what happens to produce the rainbow seen when white light passes through the diffraction grating

Why are diffraction gratings useful in spectroscopy?

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Application: Compact disc players
Explain with diagrams and words how they work

Examine and comment on the speckling produced by lasers

Practice questions