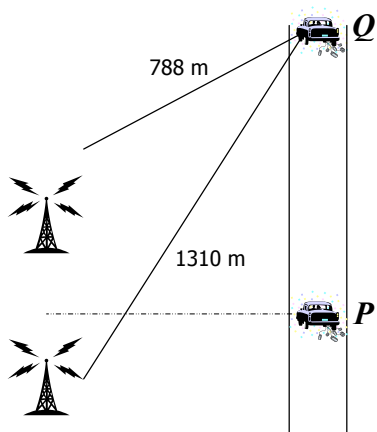


FORMAL HOMEWORK EXERCISE

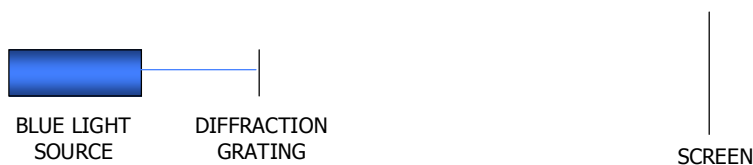
Radiation & Matter

Homework - Waves

1. A physicist is driving home from work, listening to the radio. As she moves between two transmitters, she notices the signal getting stronger and weaker at regular intervals. The strongest signal is halfway between the two transmitters - at position P on the diagram below. As she drives north, she passes through one other maximum, and reaches a **second** maximum at position Q . The distances to the two radio transmitters from this point are shown.



- (a) Use the information above to calculate the wavelength of the radio waves she is listening to.
(b) State and explain whether the waves from the two transmitters are in phase or out of phase at point Q .
2. The following equipment is set up in a darkened physics lab:



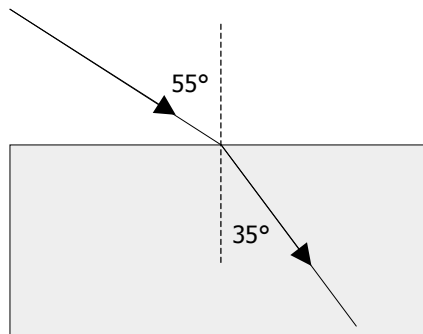
- (a) Describe what is seen on the screen.
(b) The blue light source is replaced with a red light source. Describe the difference this makes to the pattern, and explain why this happens.
(c) If the wavelength of the red light used is 700 nm, and the diffraction grating has 100 lines per millimetre, calculate the angle between the first order maximum and the second order maximum.

FORMAL HOMEWORK EXERCISE

Radiation & Matter

Homework 16 - Refraction of Light

3. A ray of red light has a wavelength of 700 nm in air. It is incident on a block of plastic, and is refracted as shown below:

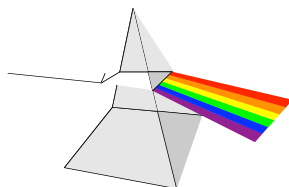


- (a) Calculate the refractive index of the block of plastic.
(b) What is the wavelength of the red light in the block of plastic?
(c) A blue light now replaces the red light. What happens to the angle of refraction?
4. A physics student decides to propose to his girlfriend. Just as he is presenting the diamond engagement ring to her, he notices the sparkling is caused by total internal reflection. He is so taken by this observation, he rushes off to find out the refractive index of diamond so that he can calculate the critical angle for the diamond.

His girlfriend immediately dumped him.



- (a) If the refractive index of diamond is 2.42, calculate the critical angle.
(b) What is meant by 'critical angle'?
5. White light is shone onto a triangular glass prism. A spectrum is viewed on the other side of the prism.



- (a) Why is a spectrum produced?
(b) List the colours in order from **most** deflected to **least** deflected.