WJEC Wales Physics A Level

SP Unit 2 05 : Wave Properties

Practical notes

1. Determination of Wavelength Using Young's Double Slits

Equipment:

- Laser beam
- Slide with two slits, a known distance apart (can be measured using a micrometer)
- Screen
- Ruler

Method:

1. Set up the slide in front of the laser source, at a distance of approximately 50cm from the screen.
2. Turn on the laser source and observe the fringe pattern on the screen.
3. Use the ruler to measure the distance between the slide and screen.
4. Use the ruler to measure the fringe separation on the screen.
5. Calculate the wavelength:

$$\lambda = dx/L$$

λ = wavelength
d = slit separation
x = fringe separation
L = distance between screen and slit

Tips:

- All lengths should be measured in metres.

2. Determination of Wavelength using Diffraction Gratings

Equipment:

- Laser beam
- Diffraction grating
- Screen
- Ruler

Method:

1. Set up the slide in front of the laser source, at a distance of approximately 50cm from the screen.
2. Turn on the laser source and observe the fringe pattern on the screen.
3. Use the ruler to measure the distance between the slide and screen.
4. Use the ruler to measure the fringe separation on the screen.
5. Calculate the slit separation. Diffraction gratings usually give lines per mm, so divide 1×10^{-3} / number of lines.
6. Calculate the wavelength:

   $\lambda = dx/L$

   λ = wavelength
   d = slit separation
   x = fringe separation
   L = distance between screen and slit

Tips:

- All lengths should be measured in metres.

3. Determination of the Speed of Sound Using Stationary Waves

Equipment:

- Tuning forks of varying frequency
- Glass resonance tube
- Water
- Cylindrical container, slightly wider than resonance tube

Method:

1. Fill the container with water up to about ¾ depth.
2. Place the resonance tube as deep as possible into the water and strike the tuning fork. Hold it above the open end of the resonance tube.
3. Move the resonance tube up slowly until resonance occurs (the sound will become louder).
4. Record the length that produces resonance.
5. Repeat with each tuning fork.
6. Plot a graph of length against 1/frequency.
7. Calculate the speed of sound by multiplying by 4.