OCR (B) Physics A-level

PAG 05.4 - Determining Wavelength Using Diffraction from a CD

Practical Flashcards

What equation relates wavelength of a light source to the angle of diffraction?

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$$\lambda = d \sin\theta$$

λ: wavelength

d: diffraction grating spacing

θ: angle from centre

(no use of *n* because only the first diffraction pattern is required in this experiment)

What happens to light as it passes through a slit?

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Light diffracts as it passes through a slit, with the maximum diffraction occurs when the slit spacing matches the light's wavelength.

Describe the diffraction pattern observed from the CD reflection.

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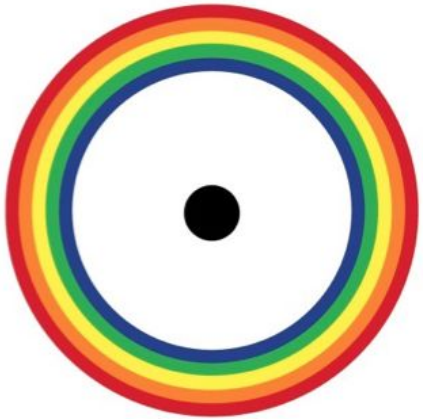
The pattern is a series of coloured concentric circles with red on the outside and violet on the inside.

(example from OCR Student Practical Sheet 5.4)



What procedure is carried out to get the required frequency of light on the edge of the CD?

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The CD is moved relative to the eye until the circle of the required frequency of light sits on the diameter of the CD.

What two measurements are recorded?

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- Distance of the eye to the CD (*D*)
  - Radius of the CD (*r*)

How can the angle of diffraction (θ) be determined from these two measurements?

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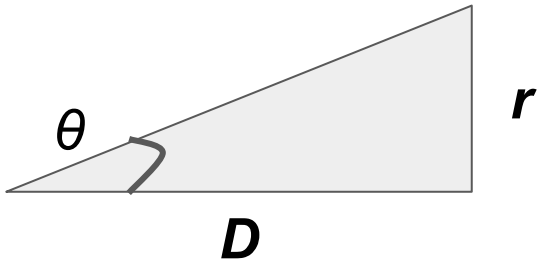
The angle is found using trigonometry and the two distances measured: $\tan\theta = r/D$



How can the wavelengths of light be calculated?

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Using the formula: $\lambda = d \sin\theta$, the calculated angles and the diffraction pattern spacing (d).

How can uncertainty in these values of wavelength be found?

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By comparing them to accepted value of wavelength for coloured LEDs.