



- 3 (a) Explain the meaning of the term *diffraction*.

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[1]

- (b) Laser light is incident normally on a single slit of width  $12\text{ }\mu\text{m}$ . The light diffracts and a diffraction pattern is observed on a screen 2.7 m away, as illustrated in Fig. 3.1.

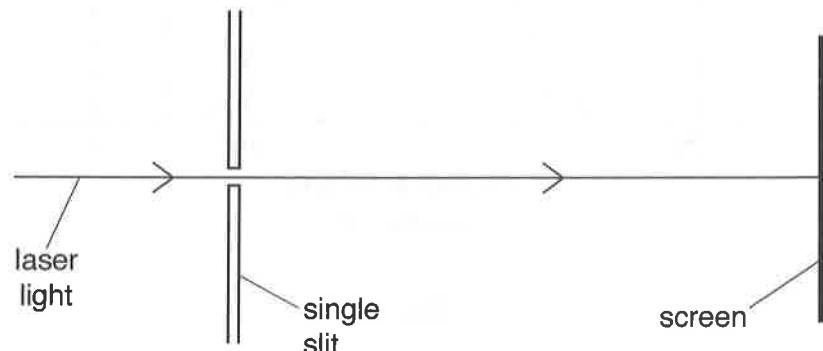


Fig. 3.1 (not to scale)

The screen is parallel to the plane of the single slit.

A diffraction pattern is formed on the screen. Part of the diffraction pattern showing the variation with displacement from the centre of the pattern of the intensity of the light is shown in Fig. 3.2 over the page.





10

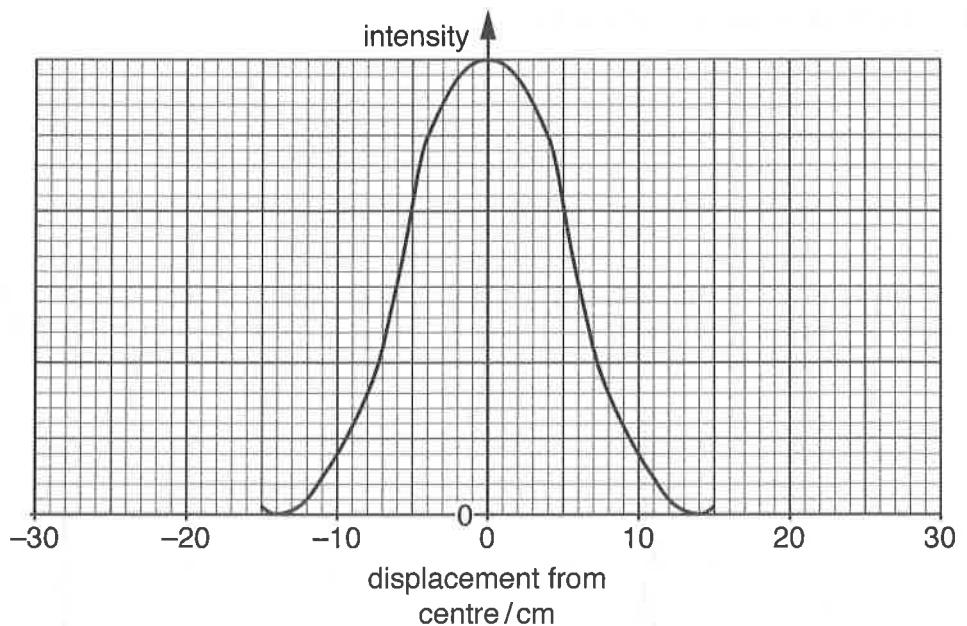


Fig. 3.2

Calculate the wavelength  $\lambda$  of the laser light.

$$\lambda = \dots \text{ m} [3]$$

- (c) The single slit in (b) is now replaced by a narrower slit. On Fig. 3.2, sketch the new diffraction pattern. [2]
- (d) (i) State and explain the changes to the observed diffraction pattern in Fig. 3.2 when visible light of a longer wavelength is used.

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[2]

- (ii) When white light is incident on a single slit, the central fringe is coloured at the edges and has a white central region. Explain this observation.

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[2]

[Total: 10]

