

- 5 Parallel light of wavelength 590 nm is incident on a rectangular slit of width 0.60 mm, as shown in Fig. 5.1.

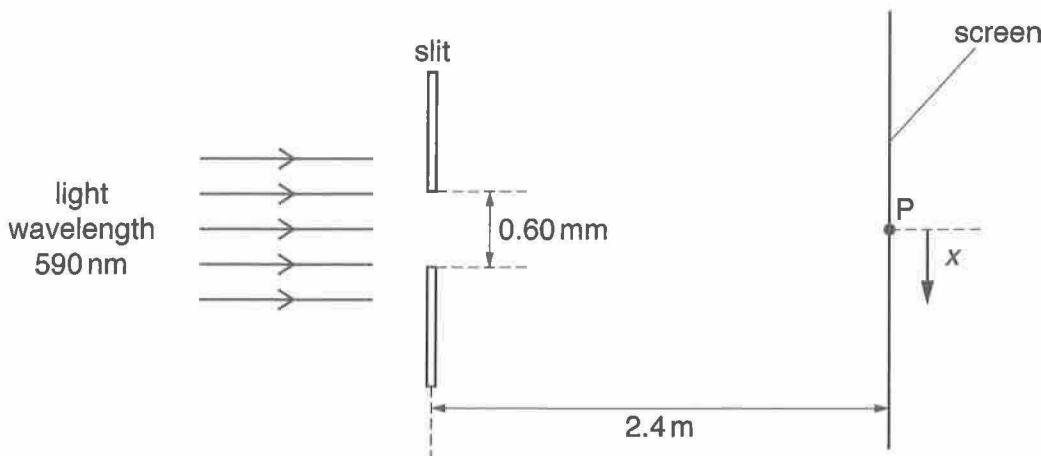


Fig. 5.1 (not to scale)

Light passing through the slit is incident on a screen that is 2.4 m from the plane of the slit.

The centre of the interference pattern formed on the screen is at P.

- (a) (i) Calculate the width of the central fringe, as observed on the screen.

$$\text{width} = \dots \text{mm} \quad [3]$$

- (ii) On Fig. 5.2, sketch a graph to show the variation with distance x from point P of the intensity I of the light on the screen.

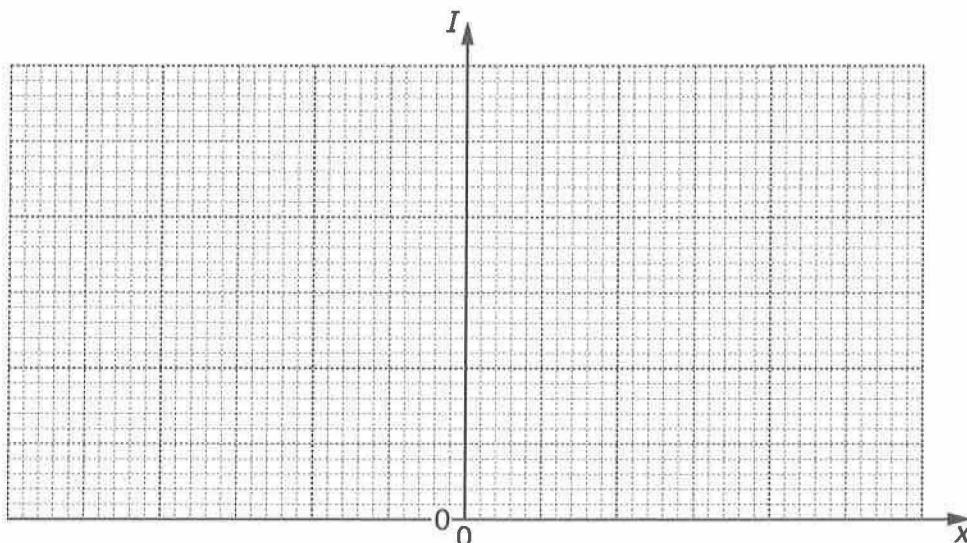


Fig. 5.2

[3]



- (b) Parallel light from a second source and of the same wavelength 590 nm is also incident on the slit. The angle between the two beams of light is θ , as shown in Fig. 5.3.

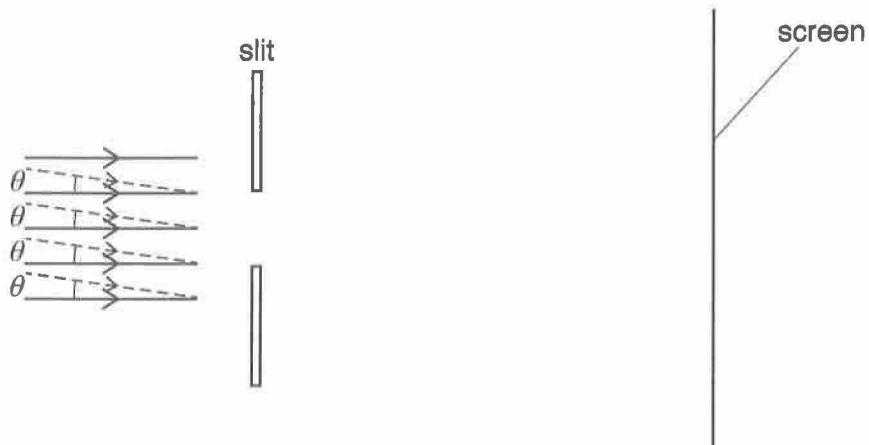


Fig. 5.3 (not to scale)

Each beam forms a separate interference pattern on the screen.

- (i) Explain what is meant by the *Rayleigh criterion* for the resolution of the two patterns.

[2]

- (ii) Calculate the angle θ , in rad, such that the two interference patterns are just resolved.

$$\theta = \dots \text{ rad} [2]$$