

5 (a) By reference to two waves, state:

(i) the principle of superposition

.....

 [2]

(ii) what is meant by *coherence*.

.....
 [1]

(b) Two coherent waves P and Q meet at a point in phase and superpose. Wave P has an amplitude of 1.5 cm and intensity I . The resultant intensity at the point where the waves meet is $3I$.

Calculate the amplitude of wave Q.

amplitude = cm [2]

(c) The apparatus shown in Fig. 5.1 is used to produce an interference pattern on a screen.

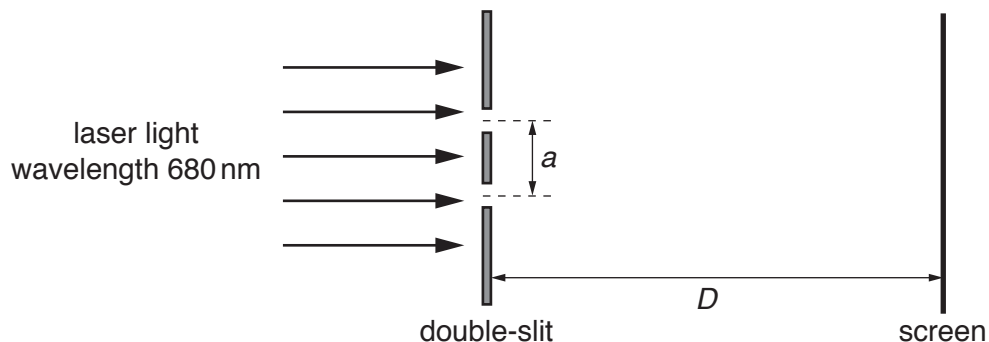


Fig. 5.1 (not to scale)

Light of wavelength 680 nm is incident on a double-slit. The slit separation is a . The separation between adjacent fringes is x . Fringes are viewed on a screen at distance D from the double-slit.

Distance D is varied from 2.0m to 3.5m. The variation with D of x is shown in Fig. 5.2.

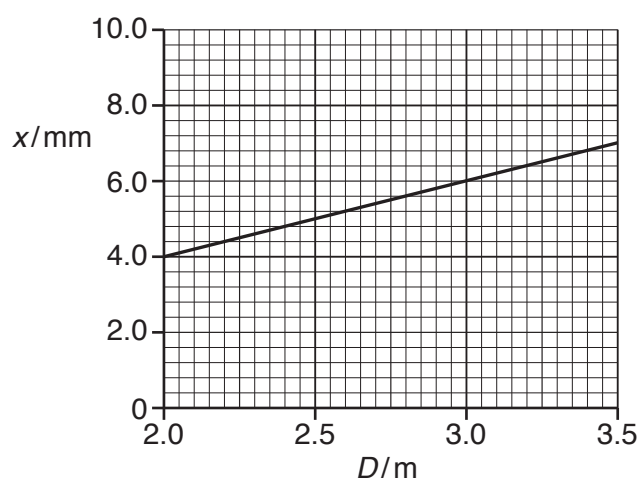


Fig. 5.2

- (i) Use Fig. 5.2 to determine the slit separation a .

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

- (ii) The laser is now replaced by another laser that emits light of a shorter wavelength.

On Fig. 5.2, sketch a possible line to show the variation with D of x for the fringes that are now produced. [2]

[Total: 10]