4 **(a)** State the *principle of superposition.*

.....

.....

..... [2]

(b) Coherent light is incident normally on a double slit, as shown in Fig. 4.1.

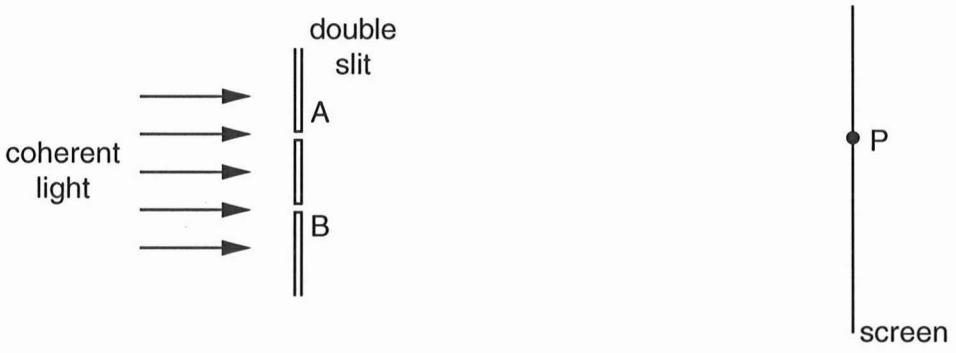

Fig. 4.1 (not to scale)

Light passes through the two slits A and B and is incident on a screen.

The variation with time *t* of the displacement *x* of the light arriving at point P on the screen is shown in Fig. 4.2.

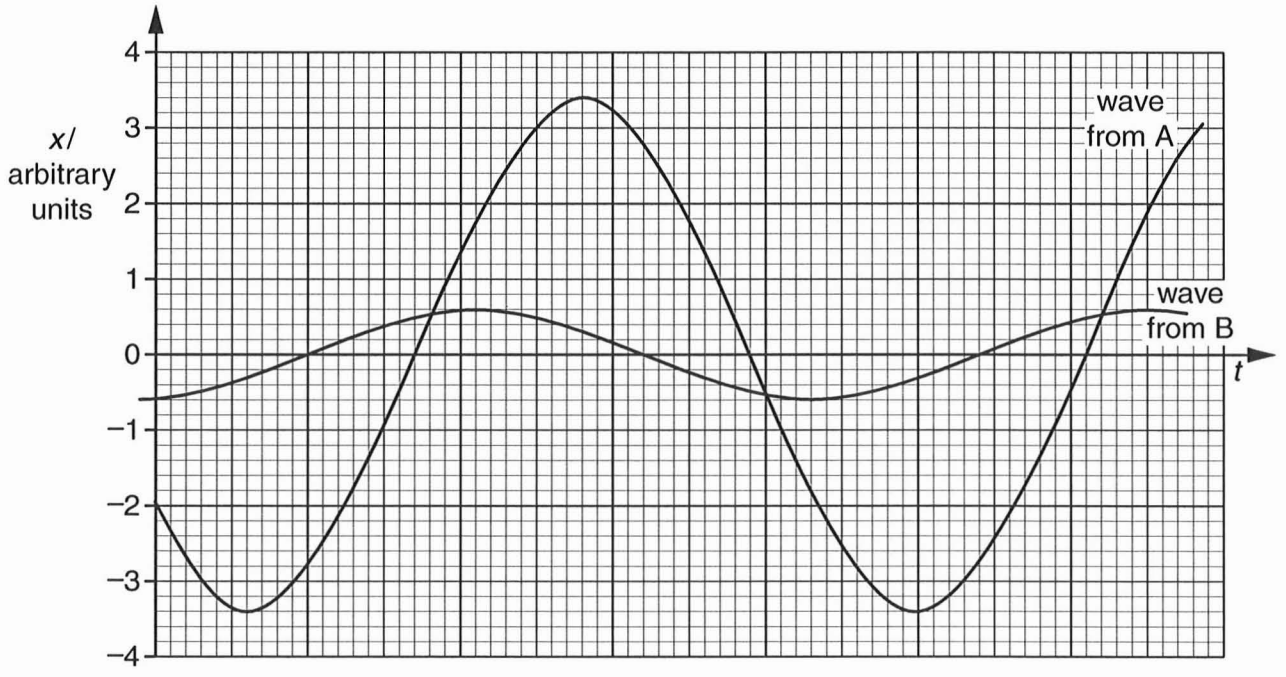

Fig. 4.2

(i) Use Fig. 4.2 to determine the phase difference between the waves from slit A and from slit B that arrive at point P.

phase difference = ... ° [1]

(ii) Dark fringes and bright fringes are both formed on the screen.

Use Fig. 4.2 to determine, for the bright fringe and the dark fringe closest to point P, the ratio

$$\frac{\text{intensity of light at the dark fringe}}{\text{intensity of light at the bright fringe}}.$$

ratio = ... [3]