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

.....

.....

..... [2]

(b) Coherent light of wavelength 590 nm is incident normally on a double slit, as shown in Fig. 6.1.

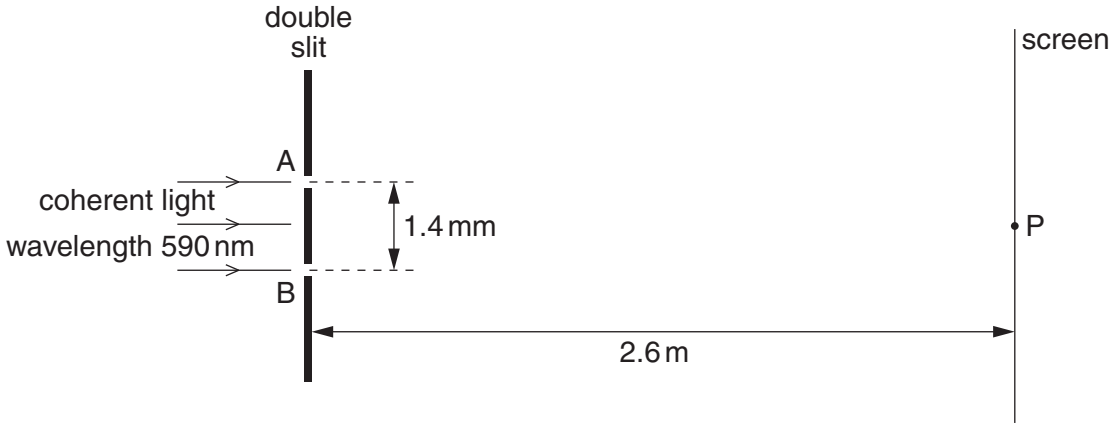

Fig. 6.1 (not to scale)

The separation of the slits A and B is 1.4 mm.
Interference fringes are observed on a screen placed parallel to the plane of the double slit.
The distance between the screen and the double slit is 2.6 m.

At point P on the screen, the path difference is zero for light arriving at P from the slits A and B.

(i) Determine the separation of bright fringes on the screen near to point P.

separation = ... mm [3]

(ii) The variation with time of the displacement x of the light wave arriving at point P on the screen from slit A and from slit B is shown in Fig. 6.2a and Fig. 6.2b respectively.

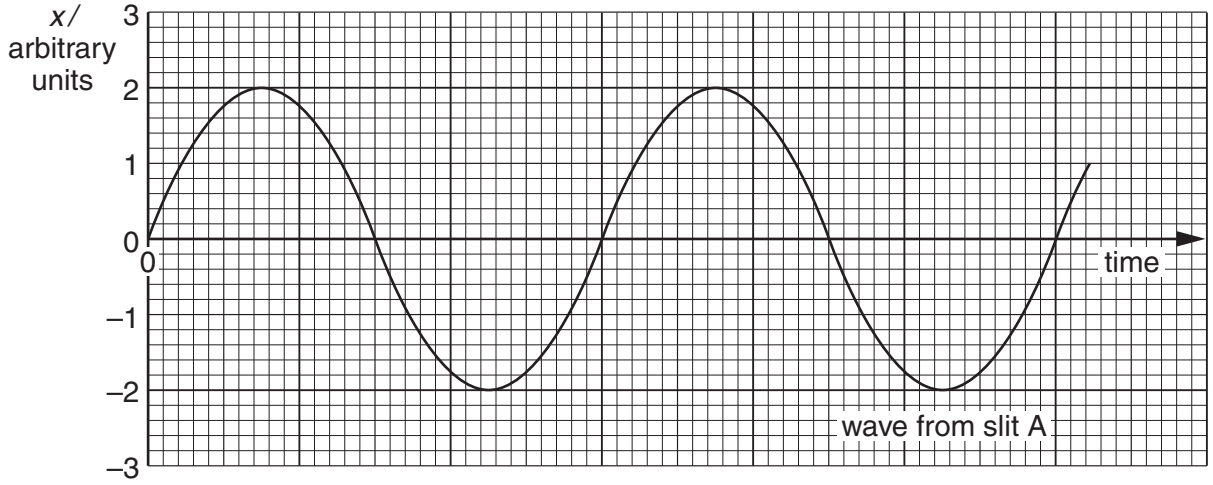

Fig. 6.2a

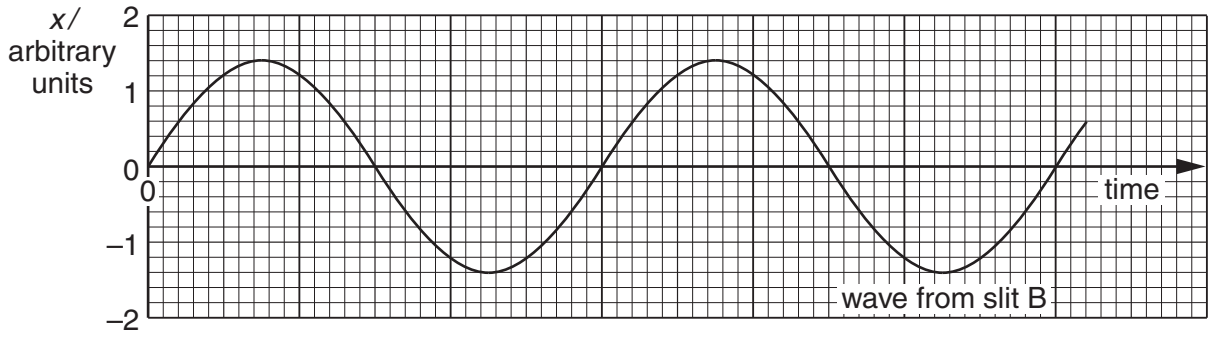

Fig. 6.2b

1. State the phase difference between waves forming the dark fringe on the screen that is next to point P.

phase difference = ... ° [1]

2. Determine the ratio

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

ratio = ... [3]