4 **(a)** Explain what is meant by the term *diffraction*.

.....

..... [1]

(b) State two conditions necessary for two-source interference fringes to be observed.

1. .....

2. .....

[2]

(c) A laser is used to produce two-source interference fringes on a screen.

The incident laser light is normal to the plane of a double slit. The plane of the double slit is parallel to the screen.

The variation of the fringe width x with distance D between the double slit and the screen is shown in Fig. 4.1.

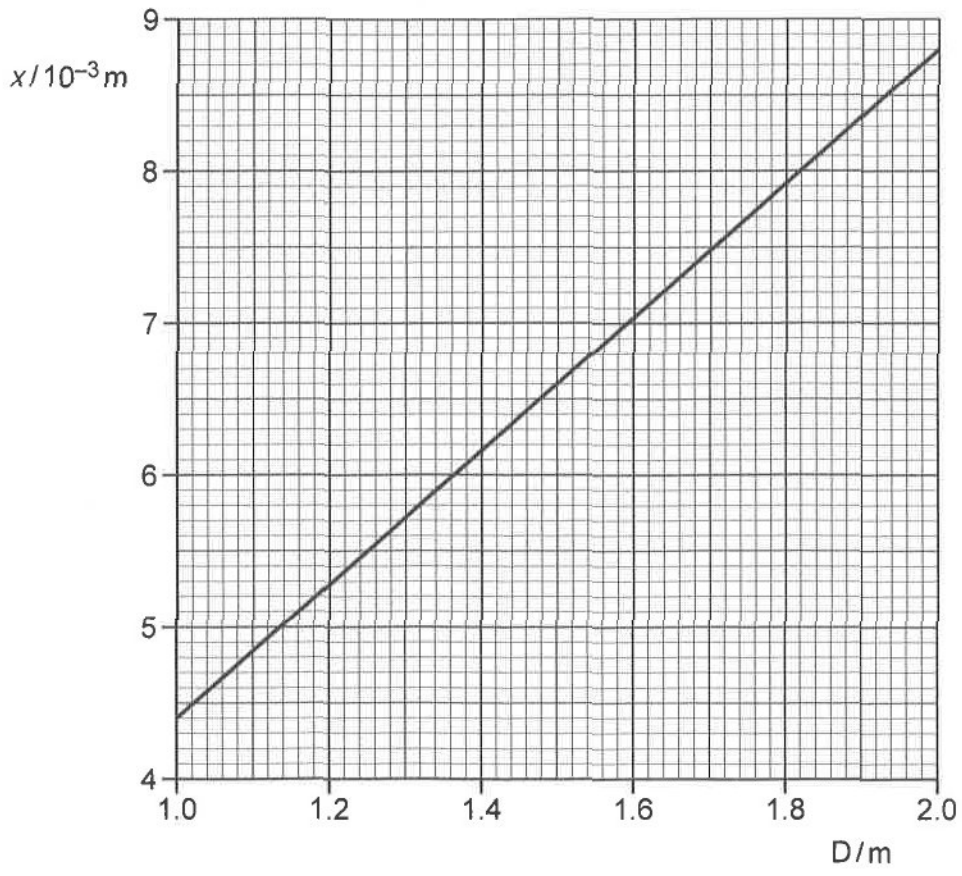

Fig. 4.1

The separation a of the slits is 0.12 mm.

(i) Calculate the wavelength λ of the laser light.

λ = ... m [2]

(ii) A filter is used so that the amplitude of the light from one slit is halved.

Calculate the ratio

$$\frac{\text{maximum intensity of central bright fringe}}{\text{maximum intensity of adjacent dark fringe}}.$$

ratio = ... [3]

[Total: 8]