

- 4 (a) For a progressive wave, state what is meant by *wavelength*.

..... [1]

- (b) A light wave from a laser has a wavelength of 460 nm in a vacuum.

Calculate the period of the wave.

$$\text{period} = \dots \text{ s} \quad [3]$$

- (c) The light from the laser is incident normally on a diffraction grating.

Describe the diffraction of the light waves at the grating.

.....
.....
.....

[2]

- (d) A diffraction grating is used with different wavelengths of visible light. The angle θ of the **fourth-order** maximum from the zero-order (central) maximum is measured for each wavelength. The variation with wavelength λ of $\sin \theta$ is shown in Fig. 4.1.

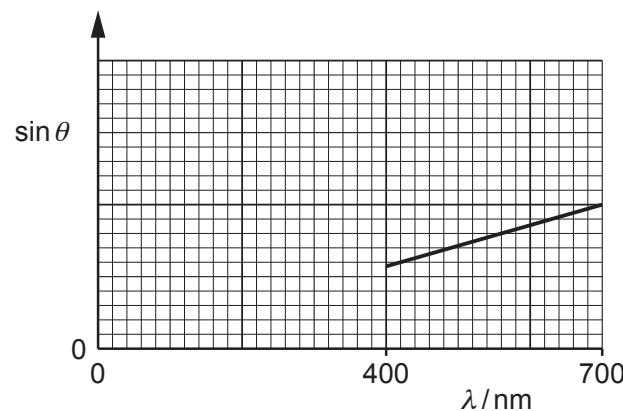


Fig. 4.1

- (i) The gradient of the graph is G .

Determine an expression, in terms of G , for the distance d between the centres of two adjacent slits in the diffraction grating.

$$d = \dots \quad [2]$$

- (ii) On Fig. 4.1, sketch a graph to show the results that would be obtained for the **second**-order maxima. [2]