5 **(a)** A diffraction grating is used to determine the wavelength of light.

(i) Describe the diffraction of light at a diffraction grating.

.....

.....

.....[2]

(ii) By reference to interference, explain

1. the zero order maximum,

.....

.....

.....

2. the first order maximum.

.....

.....
[3]

(b) A diffraction grating is used with different wavelengths of light. The angle θ of the second order maximum is measured for each wavelength. The variation with wavelength λ of $\sin\theta$ is shown in Fig. 5.1.

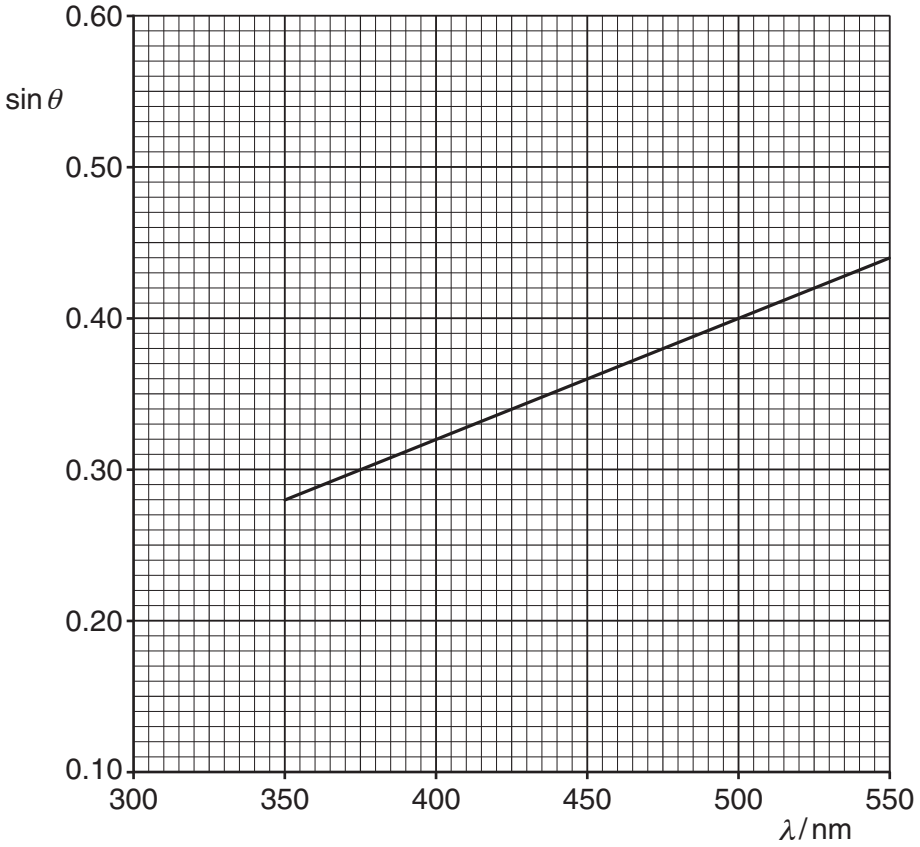

Fig. 5.1

(i) Determine the gradient of the line shown in Fig. 5.1.

gradient = ...[2]

(ii) Use the gradient determined in **(i)** to calculate the slit separation *d* of the diffraction grating.

d = ...m [2]

(iii) On Fig. 5.1, sketch a line to show the results that would be obtained for the first order maxima. [1]

[Total: 10]

[Turn over