

- 5 (a) Light waves emerging from the slits of a diffraction grating are coherent and produce an interference pattern.

Explain what is meant by:

- (i) *coherence*

.....  
 ..... [1]

- (ii) *interference*.

.....  
 ..... [1]

- (b) A narrow beam of light from a laser is incident normally on a diffraction grating, as shown in Fig. 5.1.

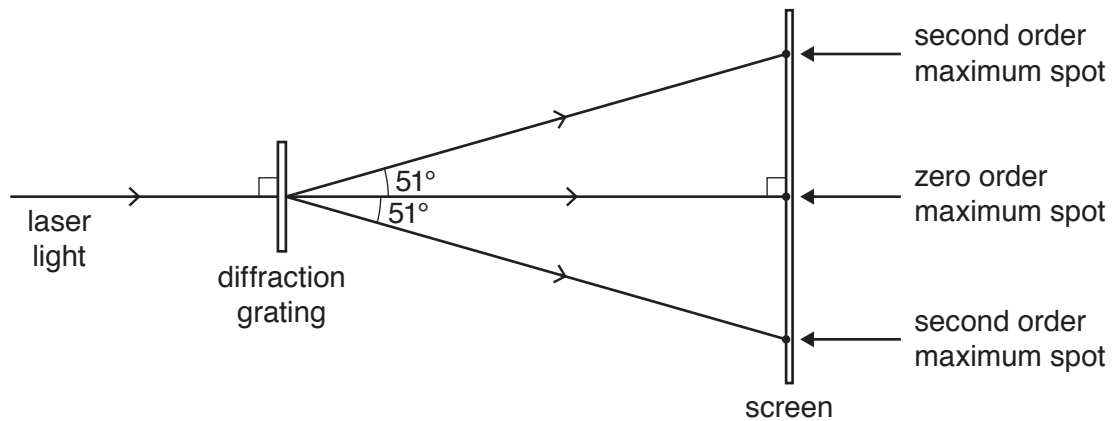


Fig. 5.1 (not to scale)

Spots of light are seen on a screen positioned parallel to the grating. The angle corresponding to each of the **second** order maxima is  $51^\circ$ . The number of lines per unit length on the diffraction grating is  $6.7 \times 10^5 \text{ m}^{-1}$ .

- (i) Determine the wavelength of the light.

wavelength = ..... m [2]

- (ii) State and explain the change, if any, to the distance between the second order maximum spots on the screen when the light from the laser is replaced by light of a shorter wavelength.

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.....  
.....[1]

[Total: 5]