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.

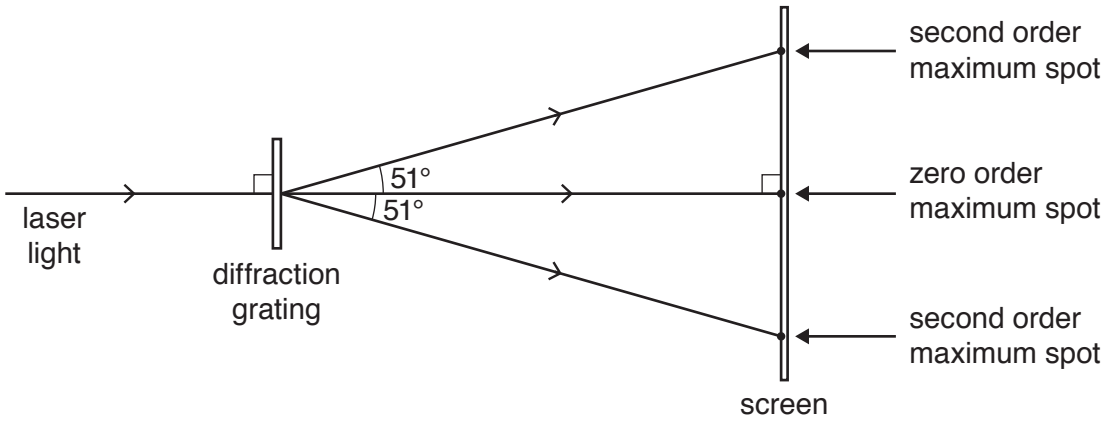

Fig. 5.1 (not to scale)

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°. The number of lines per unit length on the diffraction grating is $6.7 \times 10^5\,m^{-1}$.

(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.

.....

.....

.....[1]

[Total: 5]