4 **(a)** Describe the diffraction of monochromatic light as it passes through a diffraction grating.

.....

.....

..... [2]

(b) White light is incident on a diffraction grating, as shown in Fig. 4.1.

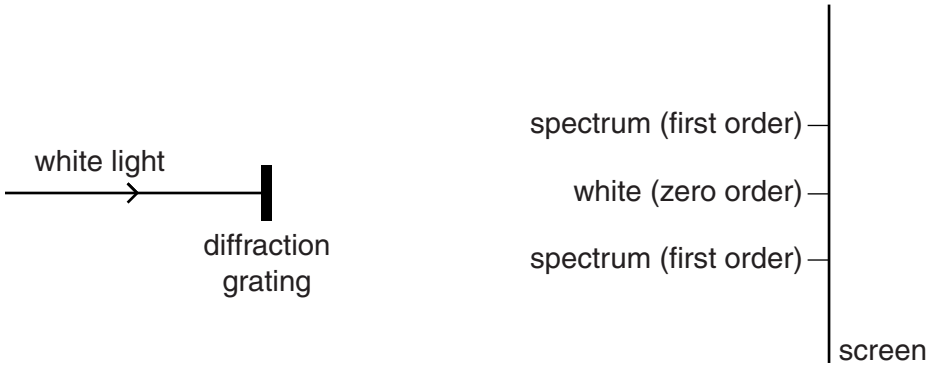

Fig. 4.1 (not to scale)

The diffraction pattern formed on the screen has white light, called zero order, and coloured spectra in other orders.

(i) Describe how the principle of superposition is used to explain

1. white light at the zero order,

.....

.....

..... [2]

2. the difference in position of red and blue light in the first-order spectrum.

.....

.....

..... [2]

(ii) Light of wavelength 625 nm produces a second-order maximum at an angle of 61.0° to the incident direction.
Determine the number of lines per metre of the diffraction grating.

For Examiner's Use

number of lines = ... m^{-1} [2]

(iii) Calculate the wavelength of another part of the visible spectrum that gives a maximum for a different order at the same angle as in **(ii)**.

wavelength = ……..……..nm [2]