5 **(a)** When monochromatic light is incident normally on a diffraction grating, the emergent light waves have been diffracted and are coherent.

Explain what is meant by

(i) *diffracted* waves,

.....

.....[1]

(ii) *coherent* waves.

.....

.....[1]

(b) Light consisting of only two wavelengths λ_1 and λ_2 is incident normally on a diffraction grating.

The third order diffraction maximum of the light of wavelength λ_1 and the fourth order diffraction maximum of the light of wavelength λ_2 are at the same angle θ to the direction of the incident light.

(i) Show that the ratio $\frac{\lambda_2}{\lambda_1}$ is 0.75.

Explain your working.

[2]

(ii) The difference between the two wavelengths is 170 nm.

Determine wavelength λ_1.

λ_1 = ... nm [1]

[Total: 5]