4 **(a)** For a progressive wave, state what is meant by:

(i) the *wavelength*

.....

..... [1]

(ii) the *amplitude*.

.....

..... [1]

(b) A beam of red laser light is incident normally on a diffraction grating.

(i) Diffraction of the light waves occurs at each slit of the grating. The light waves emerging from the slits are coherent.

Explain what is meant by:

1. *diffraction*

.....

..... [1]

2. *coherent*.

.....

..... [1]

(ii) The wavelength of the laser light is 650 nm. The angle between the **third** order diffraction maxima is 68°, as illustrated in Fig. 4.1.

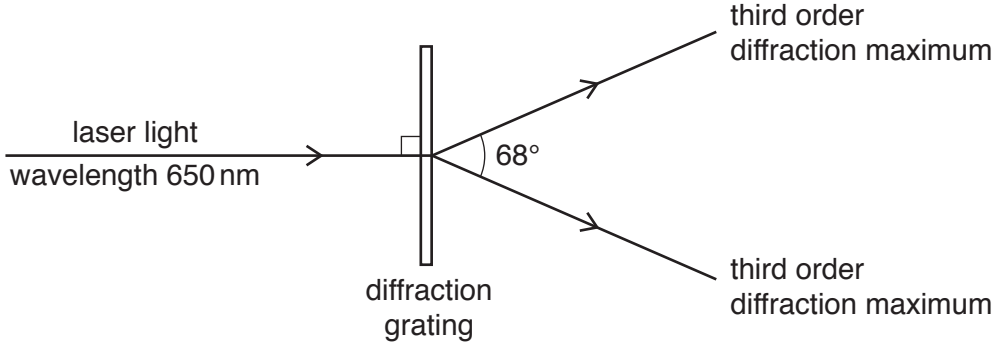

Fig. 4.1 (not to scale)

Calculate the separation d between the centres of adjacent slits of the grating.

d = ... m [3]

(iii) The red laser light is replaced with blue laser light.

State and explain the change, if any, to the angle between the third order diffraction maxima.

.....

.....

..... [2]

[Total: 9]