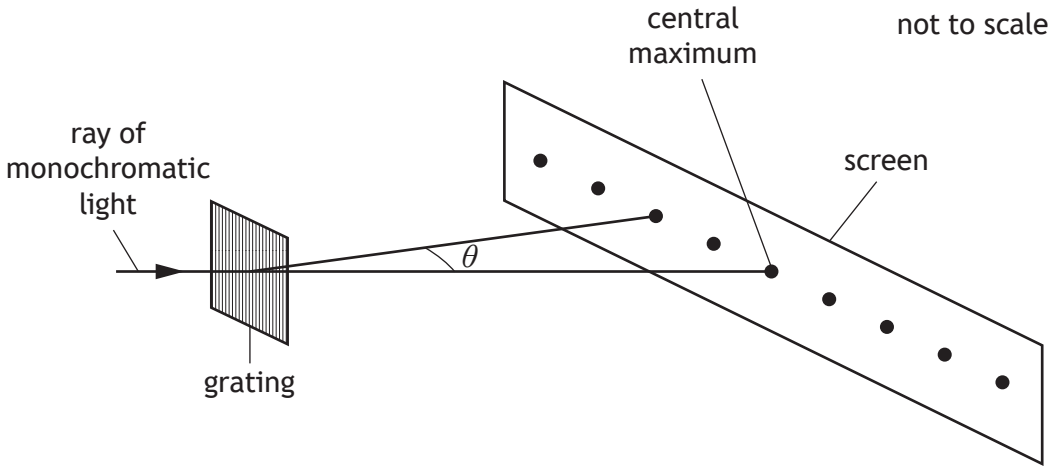
10. A technician carries out an experiment to determine the wavelength of monochromatic light from a laser.



(a) A pattern of bright spots is observed on the screen.

The technician measures the angle θ between the central maximum and the second order maximum five times.

The results are shown.

14·0° 13·5° 14·5° 14·5° 13·0°

(i) Calculate

(A) the mean value for the angle θ **1**

Space for working and answer

(B) the approximate random uncertainty in this value. **2**

Space for working and answer

10. (a) (continued)

(ii) The spacing between the lines on the grating is $4{\cdot}00 \times 10^{-6}$ m.

Calculate the wavelength of the light from the laser. **3**

Space for working and answer

(iii) The technician repeats the experiment and this time measures the angle between the central maximum and the third order maximum.

Explain why this gives a more precise value for the wavelength of the light. **1**

(b) The laser is now replaced by a source of white light. The pattern observed on the screen consists of a white central maximum and a series of continuous spectra on each side of the white central maximum.

Explain, in terms of path difference, why the central maximum is white. **1**

[Turn over