5 **(a)** A beam of vertically polarised light is incident normally on a polarising filter, as shown in Fig. 5.1.

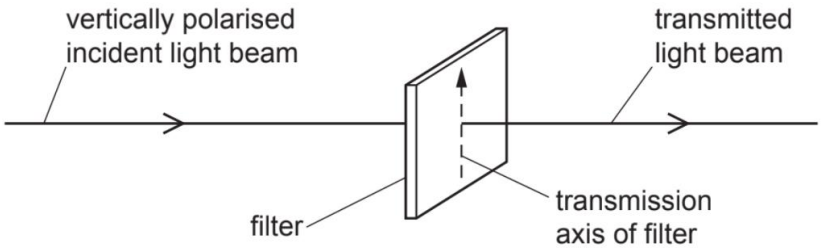
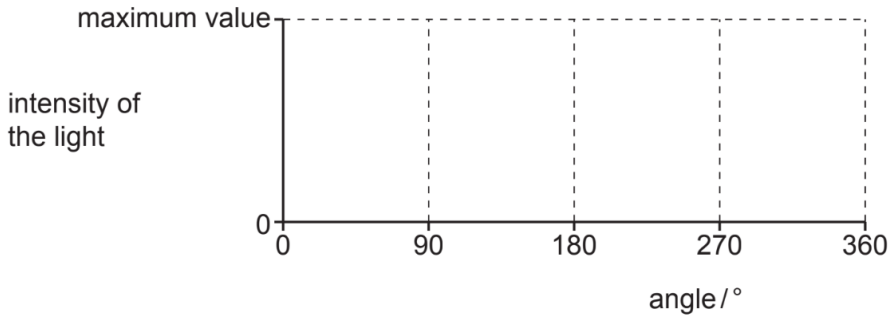


Fig. 5.1

(i) The transmission axis of the filter is initially vertical. The filter is then rotated through an angle of 360° while the plane of the filter remains perpendicular to the beam.

On Fig. 5.2, sketch a graph to show the variation of the intensity of the light in the transmitted beam with the angle through which the transmission axis is rotated.



[2]

Fig. 5.2

(ii) The intensity of the light in the incident beam is 7.6 W m^{-2}. When the transmission axis of the filter is at angle θ to the vertical, the light intensity of the transmitted beam is 4.2 W m^{-2}.

Calculate angle θ.

θ = ...° [1]

(b) State what is meant by the diffraction of a wave.

.....

.....

..... [1]

(c) A beam of light of wavelength 4.3×10^{-7} m is incident normally on a diffraction grating in air, as shown in Fig. 5.3.

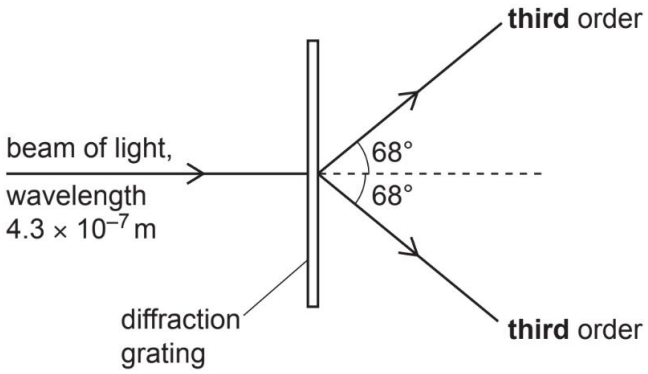


Fig. 5.3 (not to scale)

The **third**-order diffraction maximum of the light is at an angle of 68° to the direction of the incident light beam.

Determine a different wavelength of visible light that will also produce a diffraction maximum at an angle of 68°.

wavelength = ...m [3]