2 (a) (i) State what is meant by a *transverse* wave. Give an example.

.....

.....

.....

..... [2]

(ii) State what is meant by *plane polarisation* of a wave.

.....

.....

..... [1]

(b) Two polarising filters are held in line with one another and at different angles to an incoming polarised beam of light of intensity I_0, as shown in Fig. 2.1.

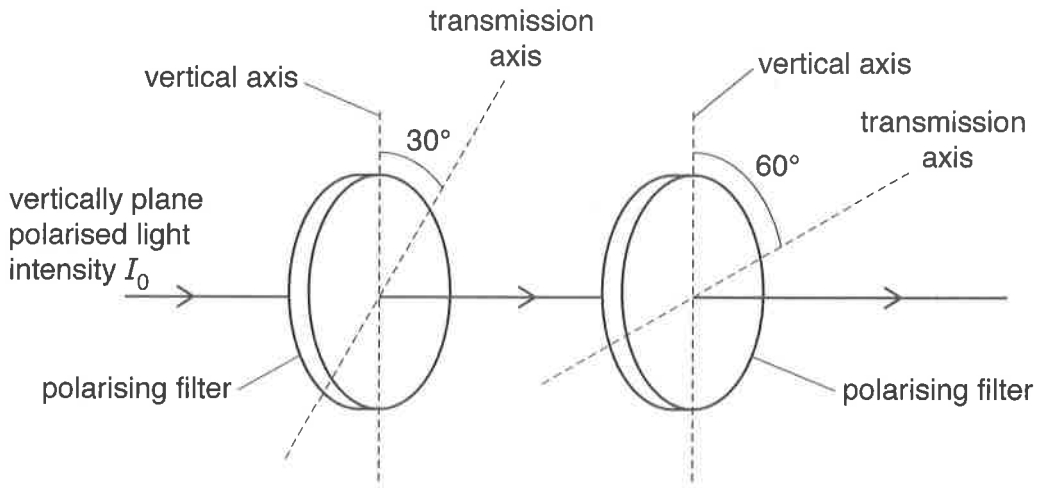

Fig. 2.1

The incoming light is vertically plane polarised. The transmission axis of the first filter is at an angle of 30° to the vertical. The transmission axis of the second filter is at an angle of 60° to the vertical.

(i) Calculate, in terms of I_0, the intensity I_T of the beam emerging from the second filter.

I_T = ... [3]

(ii) Use your answer in **(b)(i)** to calculate the ratio

$$\frac{\text{amplitude of beam emerging from second filter}}{\text{amplitude of beam incident on first filter}}.$$

ratio = ... [2]

(iii) The second polarising filter is now removed. The first filter is then placed so its transmission axis is parallel to the plane of polarisation of the incoming light. The transmission axis is then rotated through 360°.

Complete Fig. 2.2 to show the variation with the angle of rotation of the intensity of the transmitted light.

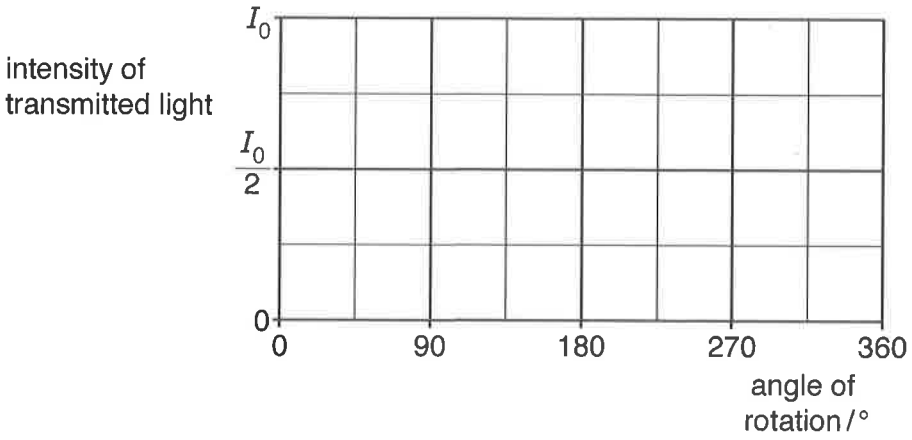

Fig. 2.2

[2]

(c) **(i)** State why a sound wave **cannot** be polarised.

.....

..... [1]

(ii) A microphone and an oscilloscope are used to measure the period of a sound wave of frequency 740 Hz.

The distance between two adjacent peaks of the waveform displayed on the oscilloscope screen is 6.8 cm.

Calculate the time-base setting on the oscilloscope in $ms\,cm^{-1}$.

time-base setting = ... $ms\,cm^{-1}$ [2]

[Total: 13]