

## **A level Physics B**

**H557/03** Practical skills in physics

### **Question Set 9**

1 (a)

Manufacturers of spectacles (glasses) are keen to develop new materials for lenses. The refractive index of such materials is an important property to consider.

This question is about a method to determine the refractive index of a transparent polymer.

A ray box is used to shine a narrow beam of light through a block of the polymer. Fig. 1 shows the path of the light.

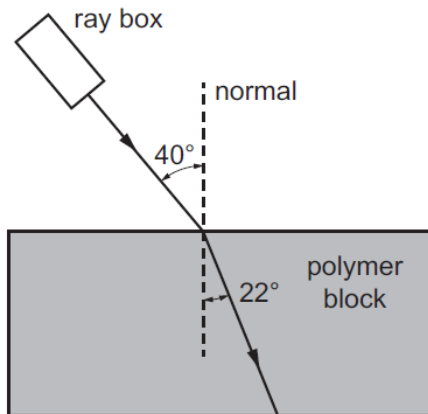


Fig. 1 (not to scale)

The angle of incidence is  $40^\circ$  and the angle of refraction is  $22^\circ$ .

(i) Calculate the refractive index  $n$  of the polymer.

$n = \dots\dots\dots$  [2]

(ii) The absolute uncertainty in the measurement of each angle is  $\pm 4^\circ$ .

Complete the table below with maximum and minimum values of the measured angles, and hence determine the absolute uncertainty in the calculated value of refractive index  $n$ .

Angle	Maximum value / $^\circ$	Minimum value / $^\circ$
angle of incidence, $i$		
angle of refraction, $r$		

absolute uncertainty in  $n = \pm \dots\dots\dots$  [3]

**(b)\*** Describe the method which could be used in this experiment to reduce the uncertainty in the calculated value of the refractive index of the polymer.

In your answer, include details of the experimental procedure and the analysis of data.

**[6]**

**Total Marks for Question Set 9: 11**

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