

2001 HIGHER SCHOOL CERTIFICATE EXAMINATION

Physics

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Centre Number

Section I – Part B (continued)

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Student Number

Marks

Question 24 (6 marks)

Sir William Bragg and his son Sir Lawrence Bragg shared the Nobel prize for physics in 1915 for their work on X-ray diffraction and crystal structure analysis.

- (a) Describe ONE way in which an understanding of crystal structure has impacted on science. **2**

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- (b) Outline the methods of X-ray diffraction used by the Braggs to determine the structure of crystals. **4**

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Question 25 (6 marks)

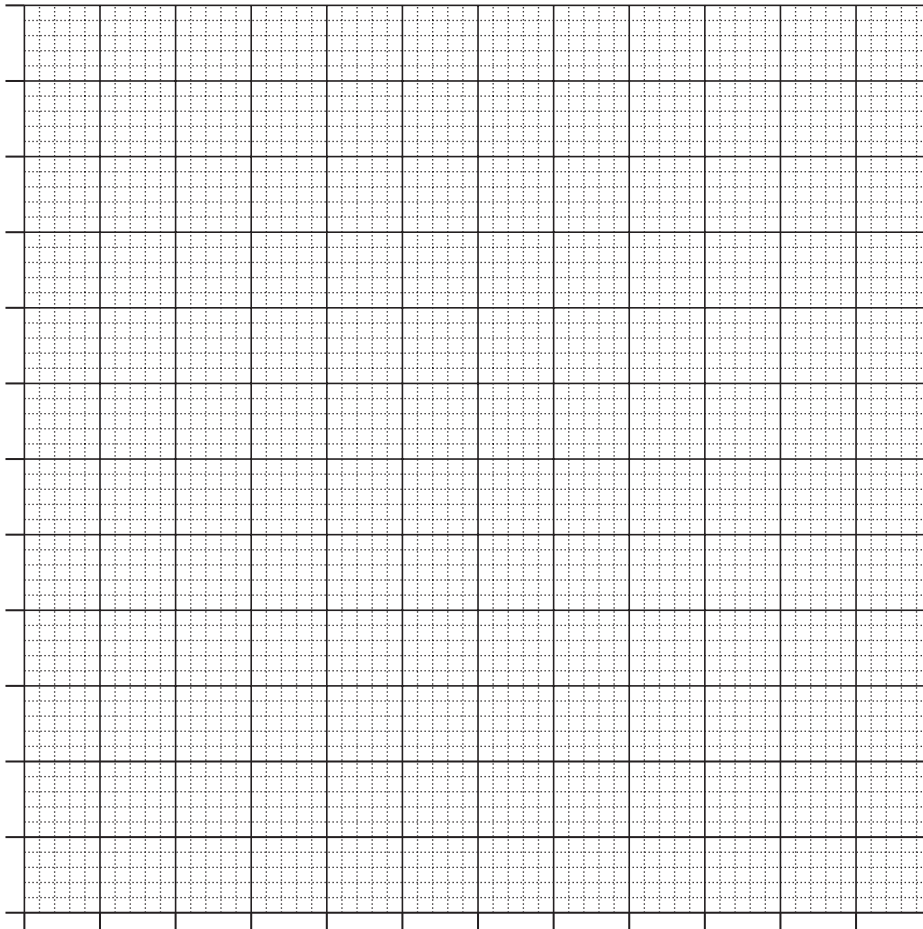
A student carried out an experiment on the photoelectric effect. The frequency of the incident radiation and the energy of the photoelectrons were both determined from measurements taken during the experiment.

The results obtained are shown in the table:

<i>Frequency of incident radiation</i> ($\times 10^{14}$ Hz)	<i>Energy of photoelectrons</i> ($\times 10^{-19}$ J)
6.9	1.22
8.2	1.70
9.1	3.70
9.9	3.05
10.6	3.38
11.8	3.91

- (a) Graph these results on the grid, including the line of best fit.

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Question 25 continues on page 23

Marks

Question 25 (continued)

(b) How could the reliability of the experiment be improved?

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Question 26 (8 marks)

In the context of semiconductors, explain the concept of *electrons* and *holes*.

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