

## **A level Physics B**

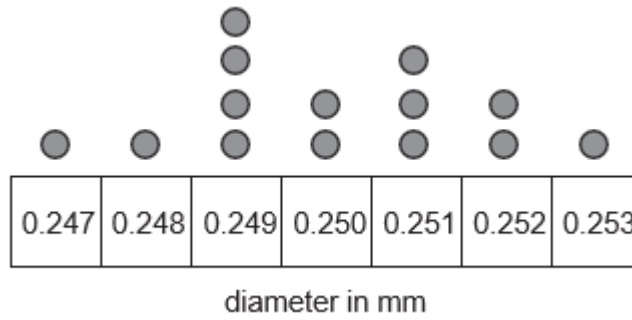
**H557/03** Practical skills in physics

### **Question Set 8**

1 (a)

This question is about an experiment to determine the Young modulus of a copper wire.

The diameter  $D$  of the wire was measured using a micrometer screw gauge in several places along the length of the wire. The values obtained are shown in the dot-plot shown in **Fig. 1.1**. Each dot represents one reading.



**Fig.1.1**

- (i) Use the information in the dot-plot to find the mean  $D$ . Use the spread to determine the percentage uncertainty.

mean  $D = \dots\dots\dots$  mm  $\pm \dots\dots\dots$  %

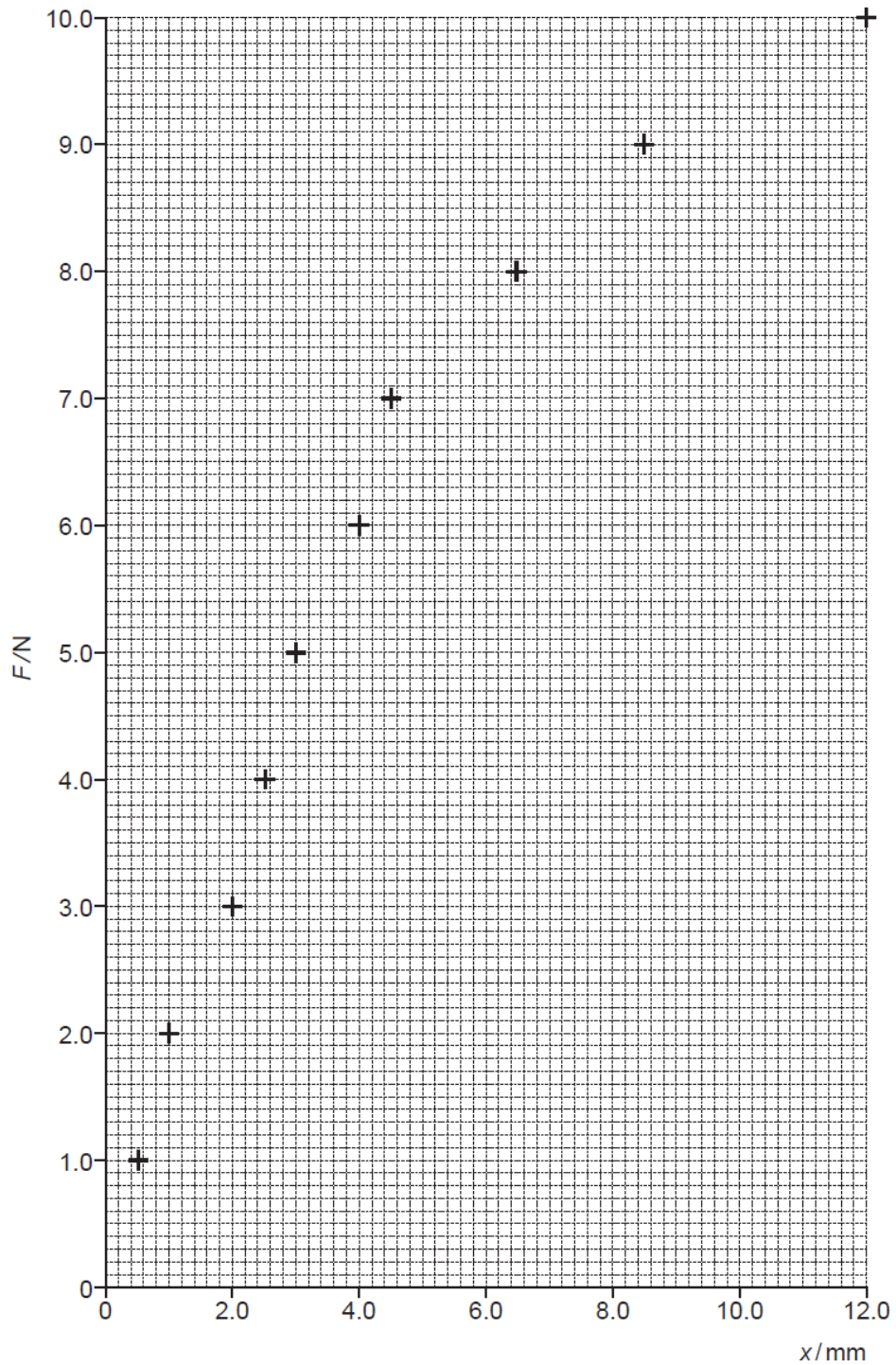
**[3]**

- (ii) Calculate the cross-sectional area  $A$  of the wire and include the uncertainty.

$A \dots\dots\dots \pm \dots\dots\dots$  m<sup>2</sup>

**[3]**

- (b) (i) A marker is placed to give an original length of the wire as  $4.00 \pm 0.02$  m. **Fig. 1.2** shows the extension  $x$  of a metal wire at different applied loads  $F$ .  $x$  is measured to  $\pm 0.5$  mm and  $F$  is measured to  $\pm 0.2$  N. **Fig. 1.2** shows the force-extension graph for the wire.



**Fig. 1.2**

On **Fig. 1.2**

- 1 complete vertical and horizontal error bars on each of the plots
- 2 label the regions of elastic and plastic deformation
- 3 draw a line of best fit through the straight section of the graph.

[4]

- (ii) Use the graph and the data given to calculate the value of the Young Modulus  $E$ . Include the appropriate unit.

$E = \dots\dots\dots$  unit  $\dots\dots\dots$

[5]

- (c)\* Use Fig. 1.2 and your answer to part (b)(ii) to estimate the percentage uncertainty in the calculated value of the Young Modulus and describe the main sources of error in the experiment. Suggest and explain possible improvements to the experiment.

[6]

**Total Marks for Question Set 8: 21**

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