2 (a) Define electrical *resistance*.

....

.... [1]

(b) A circuit is set up to measure the resistance R of a metal wire. The potential difference (p.d.) V across the wire and the current I in the wire are to be measured.

(i) Draw a circuit diagram of the apparatus that could be used to make these measurements.

[3]

(ii) Readings for p.d. V and the corresponding current I are obtained. These are shown in Fig. 2.1.
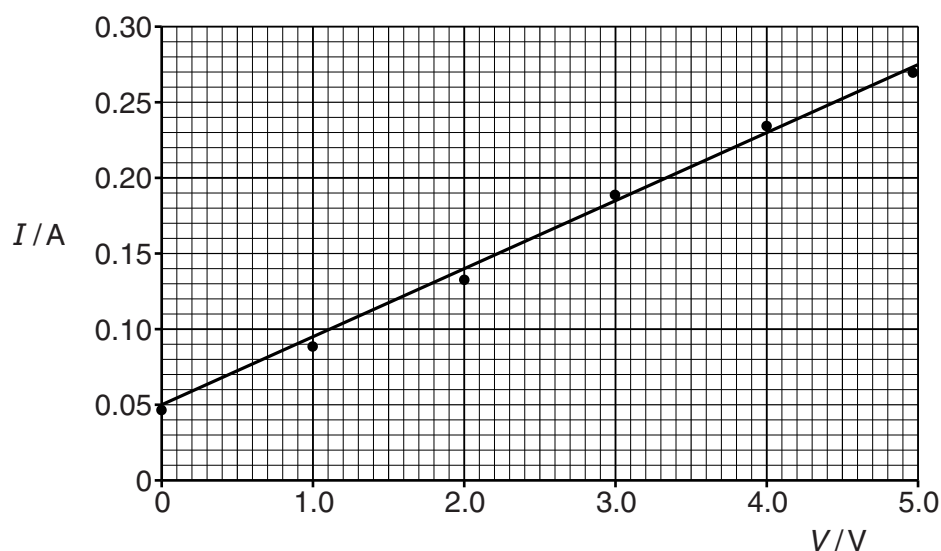

Fig. 2.1

Explain how Fig. 2.1 indicates that the readings are subject to

1. a systematic uncertainty,

....

.... [1]

2. random uncertainties.

....

.... [1]

(iii) data from Fig. 2.1 to determine R. Explain your working.

$R =$ .... Ω [3]

(c) In another experiment, a value of R is determined from the following data:

Current $I = 0.64 \pm 0.01$ A and p.d. $V = 6.8 \pm 0.1$ V.

Calculate the value of R, together with its uncertainty. Give your answer to an appropriate number of significant figures.

$R =$ .... ± ....Ω [3]