For Examiner's Use

3 The variation with potential difference V of current I for a semiconductor diode is shown in Fig. 3.1.

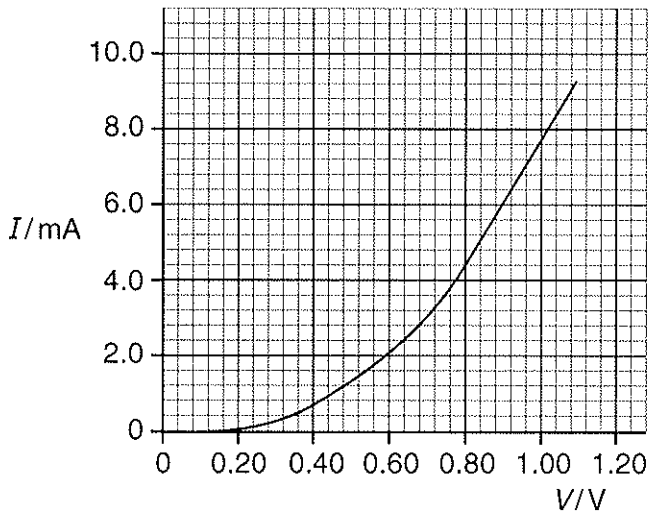

Fig. 3.1

(a) (i) Describe the main features of Fig. 3.1 that show the characteristics of the diode in terms of current, voltage and resistance.

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.....[4]

(ii) Use Fig. 3.1 to determine the resistance of the diode at 0.80V.

resistance = ... Ω [2]

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(b) In an attempt to obtain the graph of Fig. 3.1 for the diode, a student sets up a circuit as shown in Fig. 3.2.

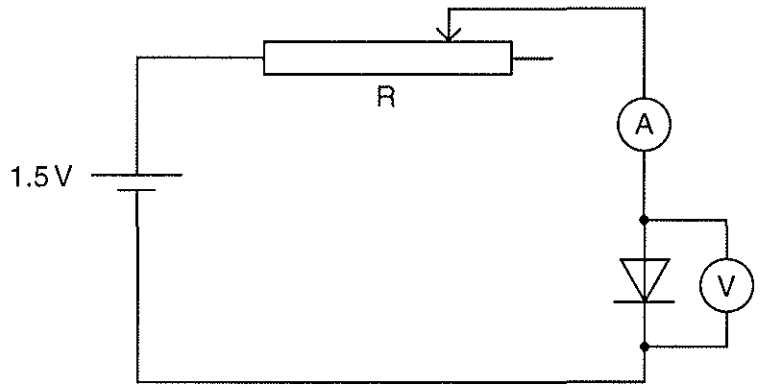

Fig. 3.2

The cell has an e.m.f. of 1.5 V and negligible internal resistance. The resistor R has a resistance that can be varied between zero and 100 Ω.

State and explain why the circuit shown in Fig. 3.2 is inappropriate for determining the graph of Fig. 3.1.

.....

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.....[2]

(c) **(i)** In the space below draw a circuit diagram, using the same components as shown in Fig. 3.2, from which the graph of Fig. 3.1 may be determined.

[1]

(ii) Explain why this circuit is appropriate for determining the graph of Fig. 3.1.

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.....[1]