**5** **(a)** The $I$-$V$ characteristic of a semiconductor diode is shown in Fig. 5.1.

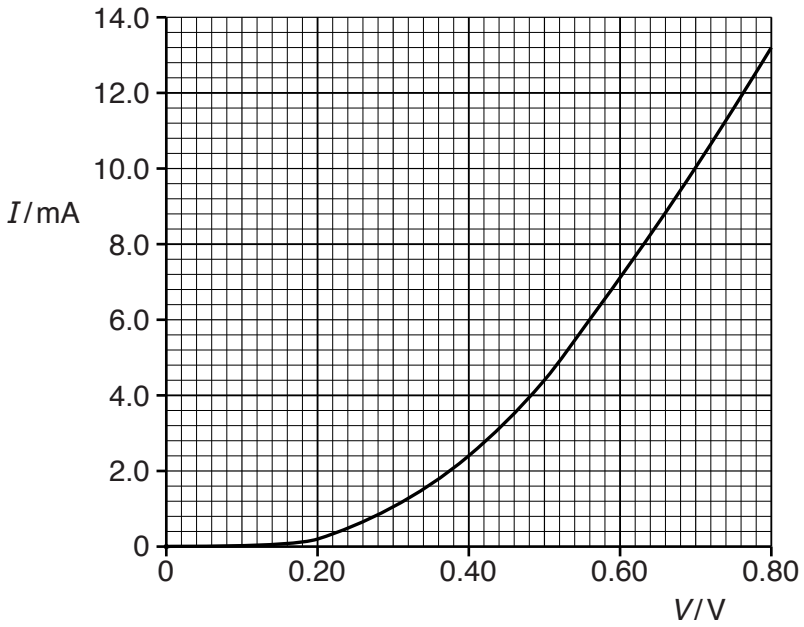


**Fig. 5.1**

**(i)** Use Fig. 5.1 to explain the variation of the resistance of the diode as $V$ increases from zero to 0.8 V.

.....

.....

.....

.....

.....

.....[3]

**(ii)** Use Fig. 5.1 to determine the resistance of the diode for a current of 4.4 mA.

resistance = .....Ω [2]

**(b)** A cell of e.m.f. 1.2 V and negligible internal resistance is connected in series to a semiconductor diode and a resistor $R_1$, as shown in Fig. 5.2.

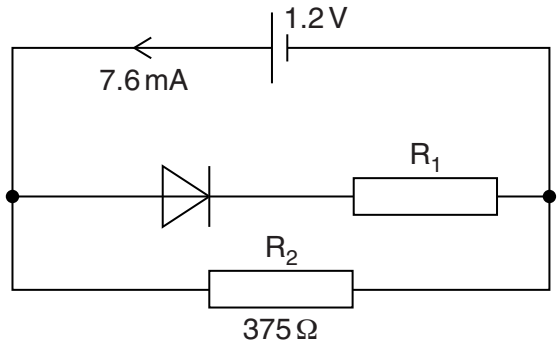


**Fig. 5.2**

A resistor $R_2$ of resistance 375 Ω is connected across the cell.
The diode has the characteristic shown in Fig. 5.1. The current supplied by the cell is 7.6 mA.

Calculate

**(i)** the current in $R_2$,

current = ..... A [1]

**(ii)** the resistance of $R_1$,

resistance = .....Ω [2]

**(iii)** the ratio

$$\frac{\text{power dissipated in the diode}}{\text{power dissipated in } R_2}.$$

ratio = .....[2]