

- 6 (a) Define *electric potential difference (p.d.)*.

.....  
..... [1]

- (b) The variation with potential difference  $V$  of the current  $I$  in a semiconductor diode is shown in Fig. 6.1.

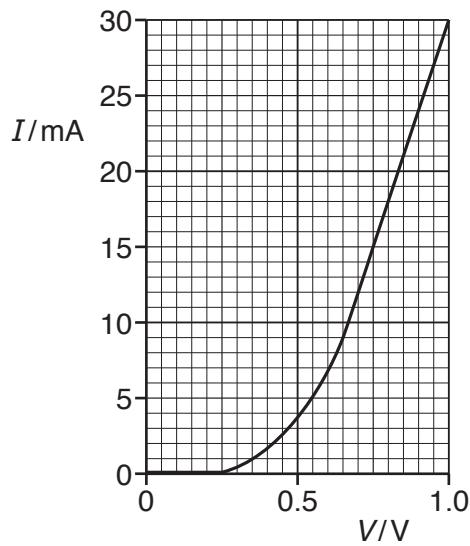
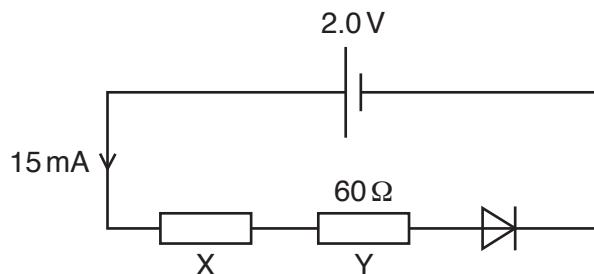


Fig. 6.1

Use Fig. 6.1 to describe qualitatively the variation of the resistance of the diode as  $V$  increases from 0 to 1.0 V.

.....  
.....  
.....  
..... [2]

- (c) The diode in (b) is part of the circuit shown in Fig. 6.2.



**Fig. 6.2**

The cell of electromotive force (e.m.f.) 2.0 V and negligible internal resistance is connected in series with the diode and resistors X and Y. The resistance of Y is  $60\Omega$ . The current in the cell is 15 mA.

- (i) Use Fig. 6.1 to determine the resistance of the diode.

$$\text{resistance} = \dots \Omega [3]$$

- (ii) Calculate:

1. the resistance of X

$$\text{resistance} = \dots \Omega [3]$$

2. the ratio

$$\frac{\text{power dissipated in resistor Y}}{\text{total power produced by the cell}}$$

$$\text{ratio} = \dots [2]$$

[Total: 11]

**[Turn over**