7 **(a)** A cell with internal resistance supplies a current. Explain why the terminal potential difference (p.d.) is less than the electromotive force (e.m.f.) of the cell.

.....

.....

..... [1]

(b) A battery of e.m.f. 12 V and internal resistance 0.50 Ω is connected to a variable resistor X and a resistor Y of constant resistance, as shown in Fig. 7.1.

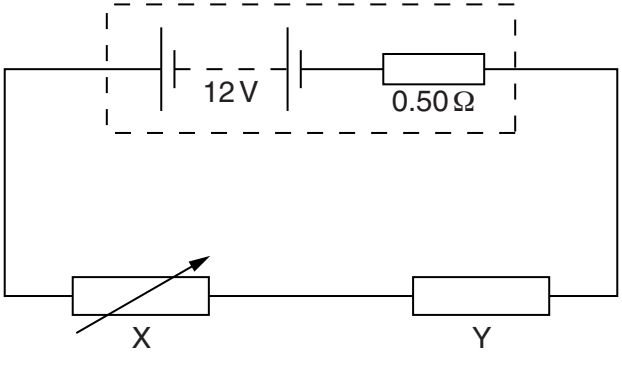

Fig. 7.1

The resistance R of X is increased from 2.0 Ω to 16 Ω. The variation with R of the current I in the circuit is shown in Fig. 7.2.

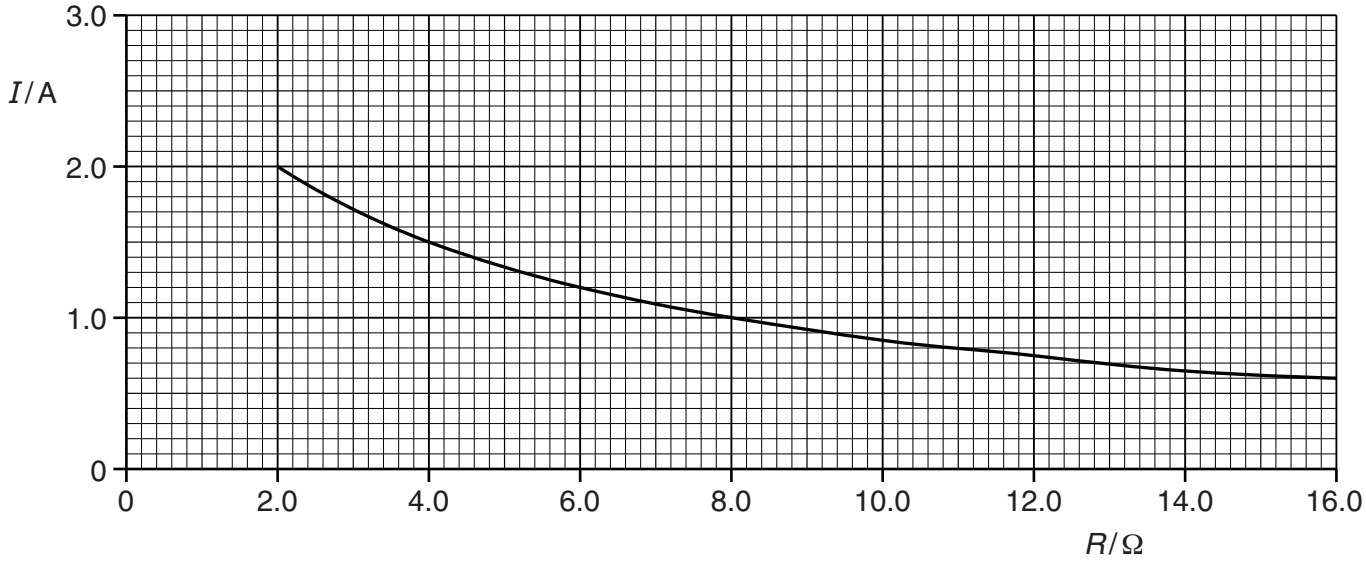

Fig. 7.2

Calculate, for I = 1.2 A,

(i) the p.d. across X,

p.d. = ... V [2]

(ii) the resistance of Y,

resistance = ... Ω [3]

(iii) the power dissipated in the battery.

power = ... W [2]

(c) Use Fig. 7.2 to explain the variation in the terminal p.d. of the battery as the resistance R of X is increased.

.....

..... [1]