5 **(a)** A d.c. supply is connected across a variable resistor. The resistance of the variable resistor is changed. Fig. 5.1 shows the variation of the power P dissipated in the resistance R of the variable resistor.

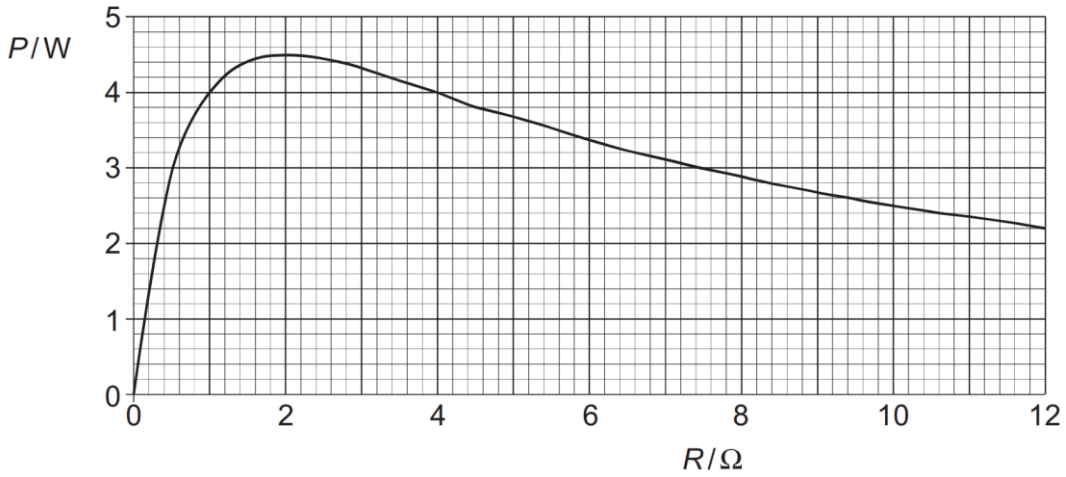

Fig. 5.1

(i) Use Fig. 5.1 to determine the potential difference across the variable resistor when it dissipates maximum power.

potential difference = ……. V [2]

(ii) Explain why your answer in **(i)** is not equal to the e.m.f. of the supply.

……

……

……[1]

(b) Fig. 5.2 shows a circuit. The battery has negligible internal resistance.

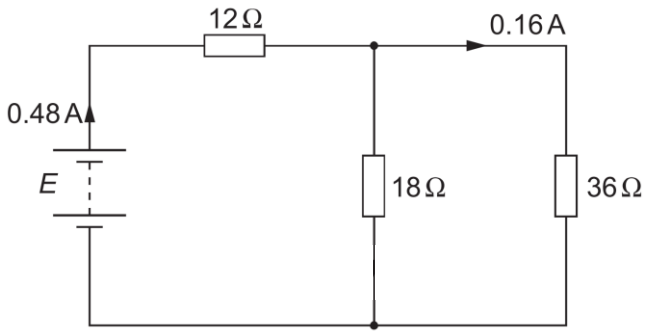

Fig. 5.2

(i) Determine the number of electrons passing through the battery in a time of 150 s.

number = …….. [1]

(ii) Determine the e.m.f. *E* of the battery.

e.m.f. = …….. V [2]