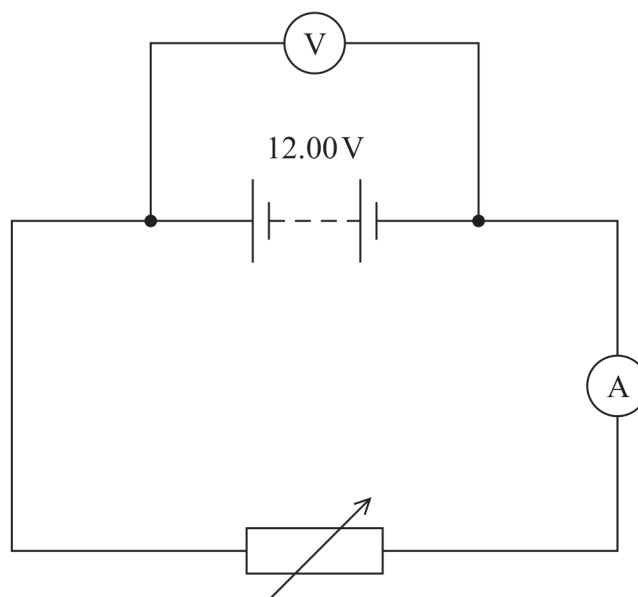


17 A car battery is constructed using six cells connected in series, with a combined electromotive force (e.m.f.) of 12.00 V.

(a) State what is meant by e.m.f.

(1)

(b) A student set up the circuit shown, using the car battery.



The student adjusted the variable resistor until the reading on the voltmeter was 11.81 V.
The reading on the ammeter was 9.83 A.

(i) Calculate the internal resistance of the car battery.

(2)

Internal resistance =



- (ii) The student adjusted the variable resistor several times and recorded corresponding values from the ammeter and voltmeter.

Describe how the values can be used to determine the internal resistance of the battery using a graphical method.

(3)

- (c) With use, the internal resistance of a battery will increase. Eventually the power available from a battery will become too small to be useful.

The student calculated the power available from a battery of e.m.f 9.0 V and internal resistance 0.10Ω when connected across a 5.0Ω resistor.

He concluded that when the internal resistance had risen to 0.50Ω , the power dissipated in the 5.0Ω resistor would reduce to 70% of its original value.

Determine whether the student's conclusion is correct.

(4)