5 Fig. 5.1 shows a circuit that consists of a lamp, an ammeter, a voltmeter and a battery of unknown electromotive force (e.m.f.).

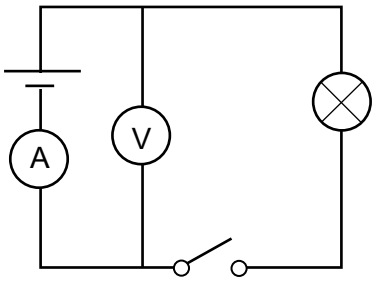

Fig. 5.1

When the switch is open, the ammeter and the voltmeter read 0 A and 3.00 V, respectively. When the switch is closed, the meters read 1.60 A and 2.20 V.

(a) State the e.m.f. of the battery.

e.m.f. = ... V [1]

(b) Determine the internal resistance of the battery.

internal resistance = ... Ω [2]

(c) **(i)** Calculate the power delivered to the lamp.

power = ... W [1]

(ii) Determine the efficiency of the power transfer of the battery.

efficiency = ... % [2]