

A Level Physics A

H556/02 Exploring physics

Question Set 5

1 (a) Fig. 18.1 shows a circuit.

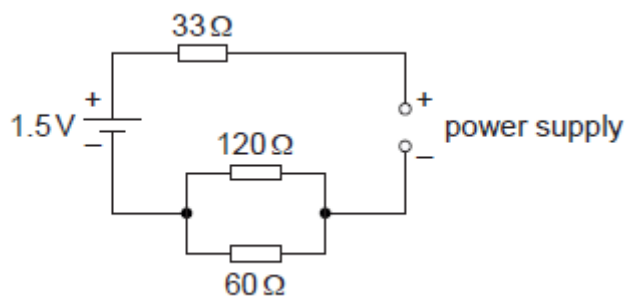


Fig. 18.1

The cell has e.m.f. 1.5 V. The cell and the variable power supply both have negligible internal resistance.

- (i) The e.m.f. of the power supply is set at 4.2V.
Calculate the current I in the 33Ω resistor.

$I = \dots\dots\dots$ A [3]

- (ii) The e.m.f. of the variable supply is now slowly decreased from 4.2V to 0V.
Describe the effect on the current I in the 33Ω resistor.

[2]

- (b)* A group of students are investigating the power dissipated in a variable resistor connected across the terminals of a cell. The cell has e.m.f. 1.5V.
The students determine the power P dissipated in the variable resistor of resistance R .

Fig. 18.2 shows the data points plotted by the students on a graph of P (y-axis) against R (x-axis).

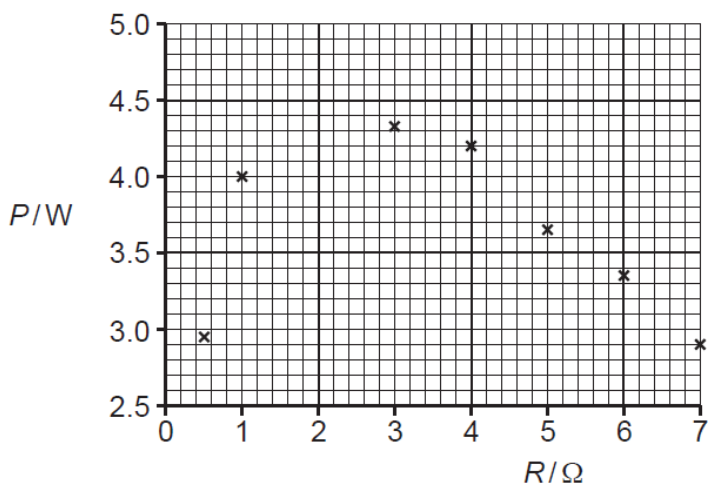


Fig. 18.2

The group of students know that **maximum power** is dissipated in the variable resistor when R is equal to the internal resistance r of the cell.

Describe, with the help of a suitable circuit diagram, how the students may have determined P and R . Use Fig. 18.2 to estimate the internal resistance r of the cell and discuss any limitations of the data plotted by the group.

[6]

Total Marks for Question Set 5: 11

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