5 A student sets up a circuit with a battery, an ammeter, a heater and a light-dependent resistor (LDR) all in series.

The battery has negligible internal resistance.

A voltmeter is connected across (in parallel with) the heater.

(a) On Fig. 5.1, complete the circuit diagram of this arrangement.

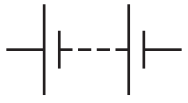

Fig. 5.1

[3]

(b) The heater is a wire made of metal of resistivity $1.1 \times 10^{-6}\,\Omega\,m$. The wire has length 2.0 m and cross-sectional area $3.8 \times 10^{-7}\,m^2$.

The reading on the voltmeter is 4.8 V.

Calculate:

(i) the resistance of the heater

resistance = ... Ω [2]

(ii) the reading on the ammeter.

reading on ammeter = ... A [1]

(c) The heater is replaced by a new wire. The new wire is made of the same metal as the wire in **(b)** and has the same length but a larger diameter.

The resistance of the LDR remains constant.

(i) State and explain whether the new wire has a resistance that is greater than, less than or the same as that of the wire in **(b)**.

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..... [2]

(ii) State and explain whether the new reading on the voltmeter is greater than, less than or equal to 4.8 V.

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..... [2]

[Total: 10]