**6** A filament lamp is rated as 30 W, 120 V. A potential difference of 120 V is applied across the lamp.

**(a)** For the filament wire of the lamp, calculate

**(i)** the current,

current = ...................................................... A [2]

**(ii)** the number of electrons passing a point in 3.0 hours.

number = ...........................................................[2]

**(b)** Show that the resistance of the filament wire is 480 Ω.

[2]

**(c)** The filament wire has an uncoiled length of 580 mm and is made of metal. The metal has resistivity $6.1 \times 10^{-7}$ Ω m at the operating temperature of the lamp.

Calculate the diameter of the wire.

diameter = ..................................................... m [3]

**(d)** The potential difference across the lamp is now reduced. State and explain the effect, if any, on the resistance of the filament wire.

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...............................................................................................................................................[1]

[Total: 10]