

- 4 (a) Mains electricity is supplied for use in homes at a potential difference (p.d.) of 230 V.

However, it is supplied at 130 kV by a power station.

A transmission wire connects the power station to substations near homes where the voltage is reduced to 230 V.

- (i) The power output of the power station is 400 MW.

Calculate the current in the transmission wire at 130 kV.

current = ..... A [1]

- (ii) Calculate the current required to transfer a power of 400 MW at 230 V.

current = ..... A [1]

- (iii) A typical home uses a maximum current of 80 A.

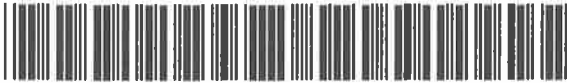
Based on this information, suggest and explain whether individual homes are connected in series or in parallel to the electricity supply.

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

- (iv) Suggest why a current-carrying wire becomes warm. Use ideas about particles in your answer.

.....  
 .....  
 .....  
 ..... [2]





- (v) The resistance of a transmission wire is  $0.10\ \Omega$ .

Calculate the power wasted as thermal energy in the transmission wire when the potential difference supplied is 130 kV.

power = ..... W [1]

- (vi) Suggest why the transmission wires are supplied at 130 kV rather than 230 V.

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

- (b) (i) A student collects data to investigate the  $I$ – $V$  characteristic of a resistor.

Draw the circuit diagram of the electrical circuit used in this experiment.

[3]

- (ii) Describe how the circuit is used to collect the necessary data.

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 .....  
 .....  
 ..... [2]

[Total: 12]

