

- 4 (a) Express the ohm ( $\Omega$ ) in SI base units.

base units = ..... [3]

- (b) An electrician is connecting two identical electric cookers to a supply.

One of the cookers is connected to the supply using wire A, and the other cooker is connected using wire B.

The current in each wire is 25.0 A when the cookers are switched on.

Table 4.1 contains information on the two electrical wires A and B.

**Table 4.1**

wire	cross-sectional area/ $\text{mm}^2$	total length of wire/m	resistivity of wire material / $\Omega\text{m}$	voltage drop per metre / $\text{Vm}^{-1}$
A	4.00	8.0	$1.68 \times 10^{-8}$	
B	6.00	12.0	$2.65 \times 10^{-8}$	

- (i) Calculate the rate at which electrical energy is converted into thermal energy in each wire. Give the unit.

rate for wire A = .....

rate for wire B = .....

[4]

- (ii) Complete Table 4.1 to give the voltage drop per metre for each wire.

[2]

- (iii) Explain which wire is the most suitable for the connection to the cooker.

.....

..... [1]



- (c) In practice, for each of the connecting wires the electrician uses a cable made up of five thin wires which are electrically isolated from each other. Fig. 4.1 shows a cross-section of the cable.

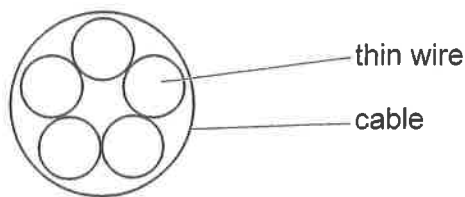


Fig. 4.1

- (i) Draw a circuit diagram, representing each thin wire as a separate resistor, to show one of these cables.

[1]

- (ii) The electrician measures the resistance of one of the cables as  $0.0458 \Omega$ .

Calculate the resistance of a single thin wire.

resistance = .....  $\Omega$  [2]

- (iii) Suggest why, for a cooker, a cable made of several thin wires is used rather than a single thick wire with the same resistance.

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

[Total: 15]