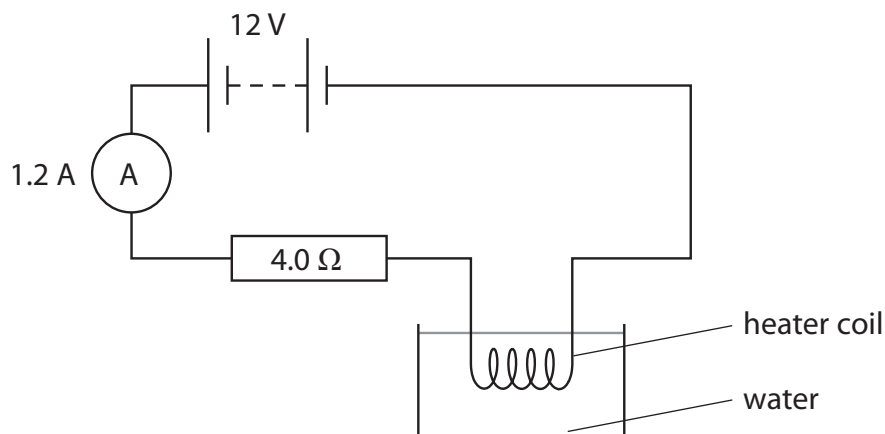


- 8 The diagram shows a heater coil and a resistor connected to a 12 V battery and an ammeter. The ammeter reading is 1.2 A.



- (a) (i) State the equation linking voltage, current and resistance.

(1)

- (ii) Calculate the voltage across the $4.0\ \Omega$ resistor.

(2)

Voltage = V

- (iii) Show that the voltage across the heater coil is about 7 V.

(2)

- (iv) Calculate the energy transferred to the heater coil in 5.0 minutes.

(3)

Energy transferred = J



(v) At first, the temperature of the water increases.

After a while, the temperature reaches a steady value below the boiling point of water.

Explain why the temperature reaches a steady value.

(2)

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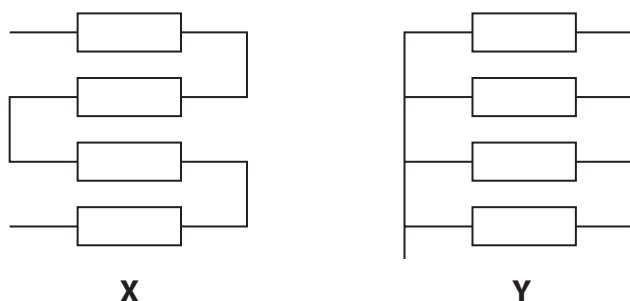
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(b) Resistors can be used as heating elements in the rear windows of cars.

The diagram shows two possible designs.



(i) Complete the table by placing a tick (✓) in the correct boxes.

(1)

Design	Series	Parallel
X		
Y		

(ii) Describe the advantages and disadvantages of design **X** when used as a heater in a car window.

(3)

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(Total for Question 8 = 14 marks)

