

Time: 20 minutes

**Answer ALL questions.**

1 (a) The diagram shows some electrical circuit symbols.

**A****B****C****D**

(i) Which symbol represents a switch?

(1)

 **A** **B** **C** **D**

(ii) Which symbol represents a diode?

(1)

 **A** **B** **C** **D**

(b) A hairdryer connected to the mains supply takes a current of 5.5 A.

(i) Which of these fuses should be used with the hairdryer?

(1)

 **A** 3 A **B** 5 A **C** 7 A **D** 13 A

(ii) Explain your answer.

(1)

.....

.....

.....

(iii) The hairdryer has a plastic case so there is no need for an earth wire connection in the plug.

Explain why the hairdryer is still safe to use.

(2)

.....

.....

.....

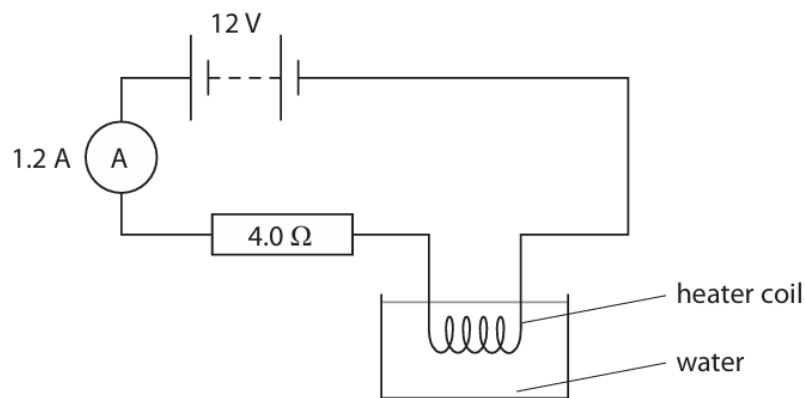
.....

.....

.....

**(Total for Question 1 = 6 marks)**

**2** 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 Ω 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)

(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)

.....

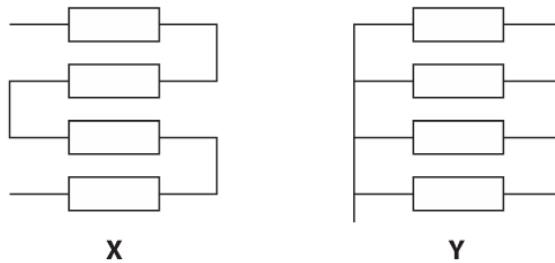
.....

.....

.....

(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
<b>X</b>		
<b>Y</b>		

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

(3)

.....

.....

.....

.....

.....

.....

.....

.....

**(Total for Question 2= 4 marks)**

**Total= 10 marks**