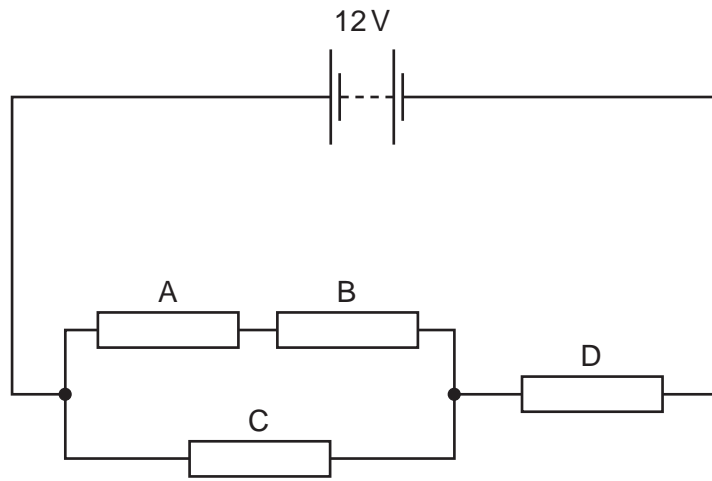


- 1 Fig. 9.1 shows a 12 V battery connected in a circuit containing resistors A, B, C and D. Each resistor has a resistance of  $6.0\ \Omega$ .



**Fig. 9.1**

**(a)** Calculate the combined resistance of

**(i)** resistors A and B,

resistance = ..... [1]

**(ii)** resistors A, B and C,

resistance = ..... [2]

**(iii)** resistors A, B, C and D.

resistance = ..... [1]

**(b)** Calculate

**(i)** the current in the battery,

current = ..... [1]

**(ii)** the energy transferred from the battery to the circuit in 50 s.

energy transferred = ..... [2]

[Total: 7]

2 (a) Fig. 8.1 shows 3 lamps and a fuse connected to a power supply.

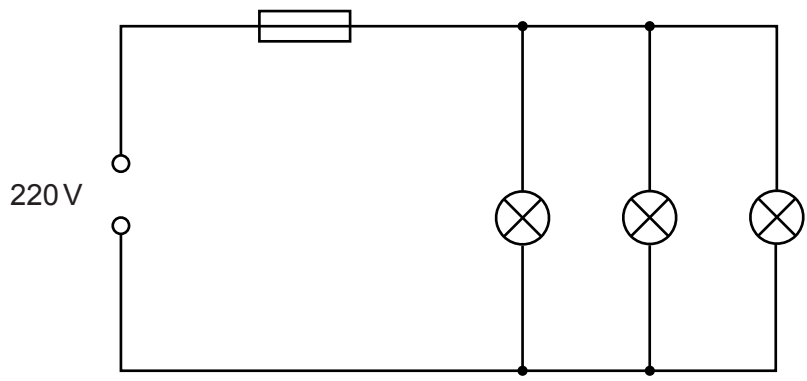


Fig. 8.1

The e.m.f. of the supply is 220V. Each lamp is labelled 220V, 40W. The rating of the fuse is 2.0A.

Calculate

(i) the current in each lamp,

current = .....[2]

(ii) the current in the fuse,

current = .....[1]

(iii) the total number of lamps, all in parallel, that could be connected without blowing the fuse.

number = .....[2]

**(b)** After a very long period of use, the wire filament of one of the lamps becomes thinner.

**(i)** Underline the effect of this change on the resistance of the filament.

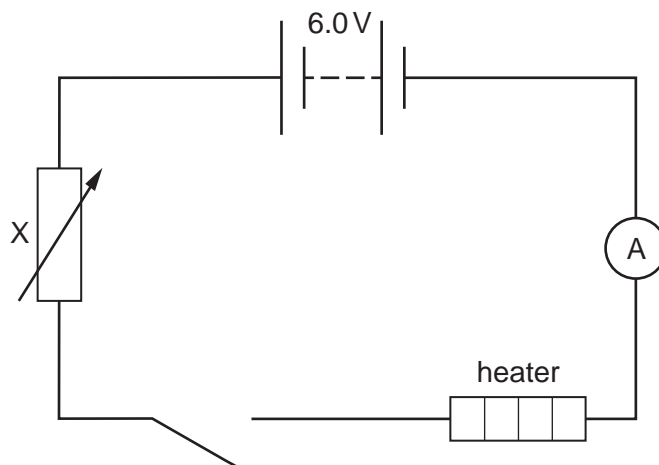
resistance increases      resistance remains the same      resistance decreases      [1]

**(ii)** State and explain the effect of this change on the power of the lamp.

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

[Total: 8]

- 3 The circuit of Fig. 7.1 includes an immersion heater and a 6.0V battery.



**Fig. 7.1**

- (a) State the name and purpose of component X.

name .....

purpose .....

[1]

- (b) The heater is designed to work from a 3.6 V supply. It has a power rating of 4.5 W at this voltage.

By considering the current in the heater, calculate the resistance of component X when there is the correct potential difference across the heater.

resistance = ..... [5]

- (c) Some time after the heater is switched on, the ammeter reading is seen to have decreased.

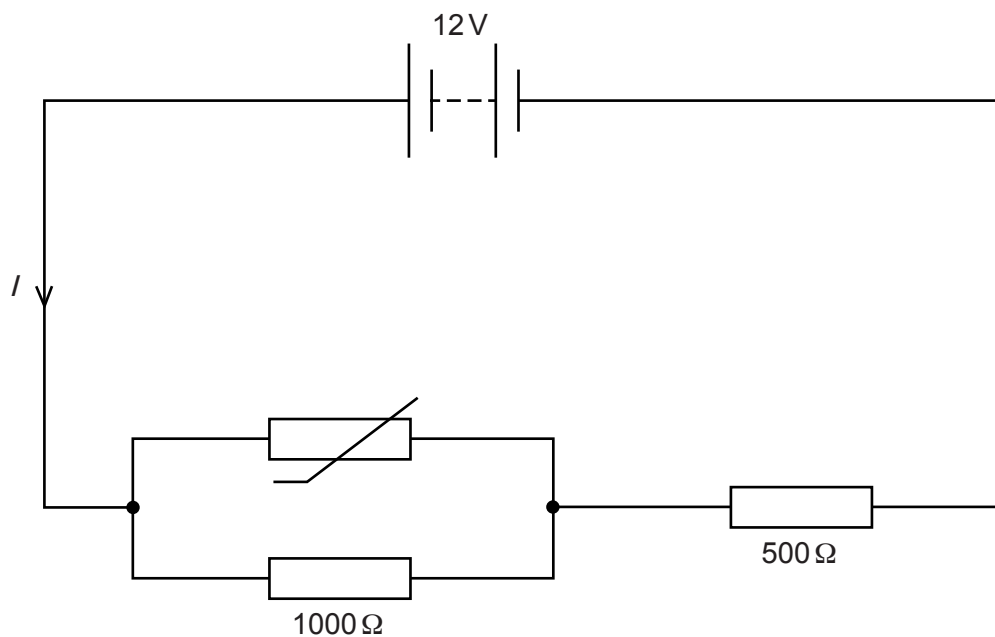
Suggest why this happens.

.....

..... [2]

[Total: 8]

- 4 In Fig. 9.1, a 12V battery supplies a current  $I$  to a circuit. The circuit contains a thermistor and a  $1000\ \Omega$  resistor in parallel, with a  $500\ \Omega$  resistor in series.



**Fig. 9.1**

- (a) At a certain temperature, the thermistor has a resistance of  $1000\ \Omega$ .

Calculate

- (i) the combined resistance of the thermistor and the  $1000\ \Omega$  resistor,

resistance = ..... [2]

- (ii) the current  $I$ ,

current = ..... [1]

- (iii) the potential difference across the  $500\ \Omega$  resistor.

potential difference = ..... [2]

**(b)** The temperature of the thermistor is increased so that its resistance decreases.

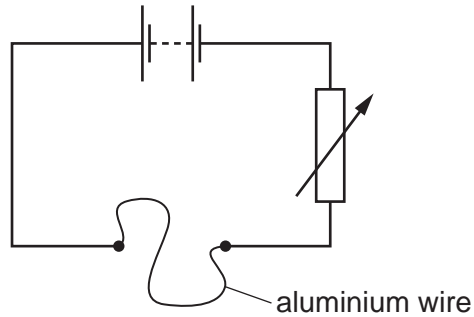
State the effect of this change in resistance on the current through the  $500\ \Omega$  resistor. Explain your answer.

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

[Total: 7]

- 5 (a) A student determines the resistance of a length of aluminium wire.

She connects the wire in series with a battery and a variable resistor. The circuit is shown in Fig. 8.1.



**Fig. 8.1**

She knows that an ammeter and a voltmeter are needed in the circuit.

- (i) On Fig. 8.1, draw the circuit symbol for an ammeter connected in a suitable position. [1]
- (ii) A variable resistor is included so that the current in the circuit may be changed.

Suggest an advantage of being able to change the current.

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

- (b) Electricity is transmitted from a power station to a distant city using an aluminium cable of resistance  $1.2\ \Omega$ . Power loss occurs because of the resistance of the cable.

The current in the cable is 250 A.

- (i) Calculate the power loss in the cable.

power loss = .....[3]



- (ii) The aluminium cable is replaced with a new aluminium cable of the same length. The current remains at 250 A. The diameter of the new cable is double the diameter of the original cable.

State and explain how the power loss is affected by this change.

.....  
.....  
.....[3]

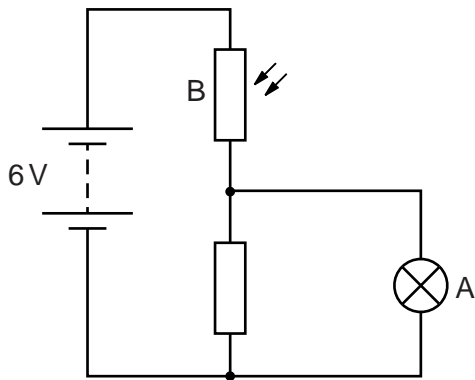
[Total: 8]

6 (a) Place **one** tick in each row of the table to indicate one use of a thermistor and one use of a transistor.

	heat detector	light detector	magnetic field detector	rectifier	switch
thermistor					
transistor					

[2]

(b) In Fig. 9.1, lamp A is not glowing brightly.



**Fig. 9.1**

Suggest and explain what could be done to component B to make lamp A glow brightly.

.....

.....

.....

.....

.....

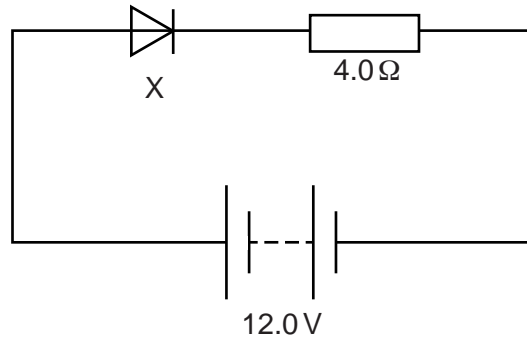
.....

.....

.....[4]

[Total: 6]

7 (a) Fig. 8.1 shows a 12.0V battery connected to a resistor and a component X in series.



**Fig. 8.1**

(i) Identify the component X.

..... [1]

(ii) The p.d. across the 4.0Ω resistor is 11.3V.

Calculate

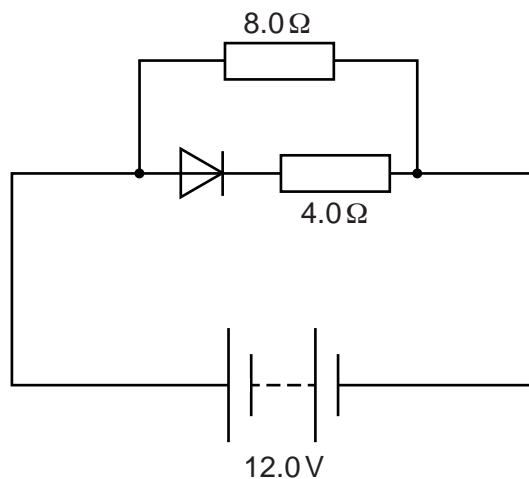
1. the p.d. across component X,

p.d. = ..... [1]

2. the current in the 4.0Ω resistor.

current = ..... [2]

(b) The circuit in Fig. 8.1 is now modified as shown in Fig. 8.2.



**Fig. 8.2**

(i) Calculate

1. the current in the  $8.0\Omega$  resistor,

current = ..... [1]

2. the current in the battery.

current = ..... [1]

(ii) The battery is now reversed.

State the current in the battery.

current = ..... [1]

[Total: 7]