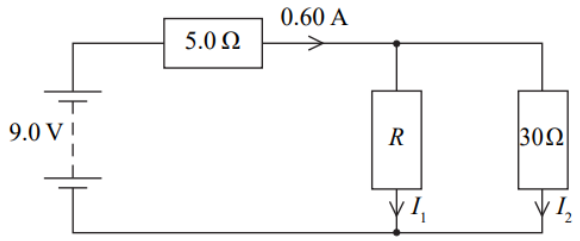
Circuit Problems 3

Have a go at the following exam questions.

EDEXCEL, 6PH02/01, JUNE 2009

15 The circuit diagram shows a battery of negligible internal resistance connected to three resistors.



(a) Calculate the potential difference across the 5 Ω resistor.

(2)

Potential difference = ...

(b) Calculate the current I_2.

(2)

I_2 = ...

(c) Calculate the resistance R.

(2)

R = ...

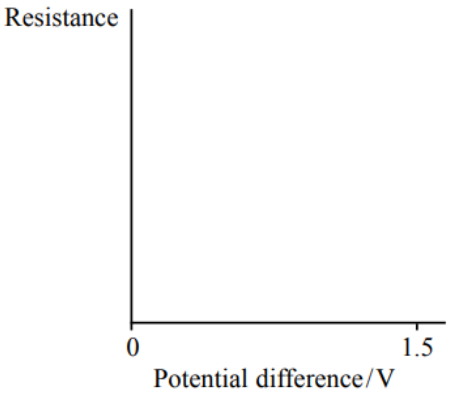
(Total for Question 15 = 6 marks)

11 (a) State Ohm's law.

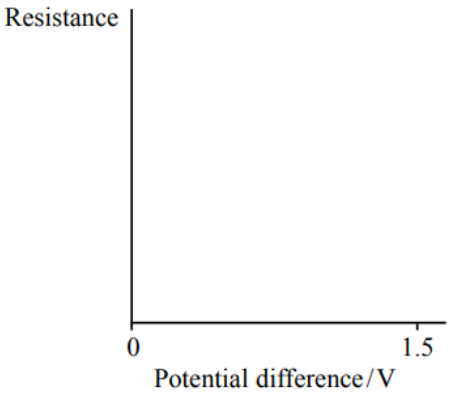
(2)

(b) Using the axes below sketch graphs to show how resistance varies with potential difference for a fixed resistor and a 1.5 V filament lamp.

(3)



FIXED RESISTOR



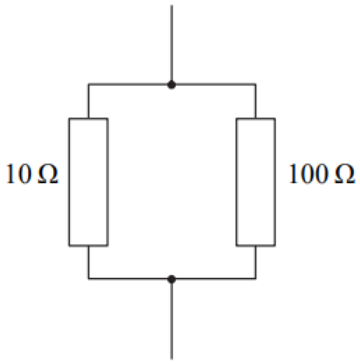
FILAMENT LAMP

(c) The filament of a lamp is made of metal. Explain why the lamp does not demonstrate Ohm's law.

(2)

(Total for Question 11 = 7 marks)

13 Two resistors are connected in parallel.



(a) Calculate the resistance of the combination.

(2)

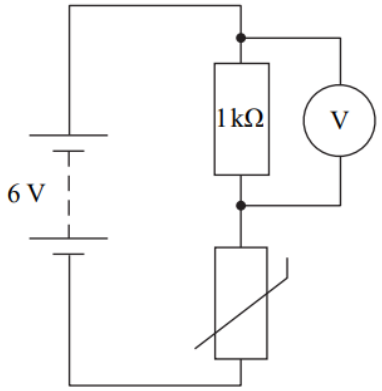
Resistance = ...

(b) This resistance combination is used in an electrical circuit. A student measures the potential difference across the combination with a high resistance voltmeter. Explain why the resistance of the combination is hardly changed by the addition of the voltmeter.

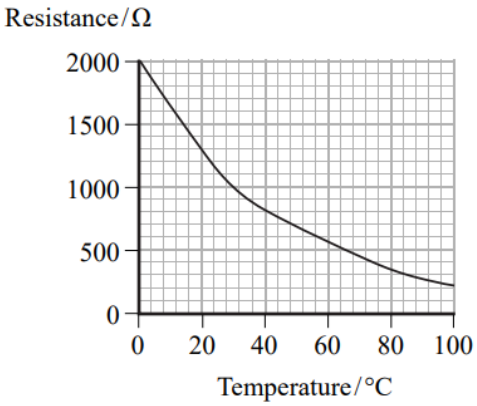
(3)

(Total for Question 13 = 5 marks)

13 The following circuit is used to monitor the temperature in a greenhouse. The battery has no internal resistance.



(a) The graph shows how the resistance of the thermistor varies with temperature.



(i) Use the graph to find the resistance of the thermistor at 20 °C.

(1)

Resistance = ...

(ii) Calculate the reading on the voltmeter when the thermistor is at 20 °C.

(3)

.....

.....

.....

.....

Reading on the voltmeter = ...

(b) Explain what will happen to the reading on the voltmeter as the temperature of the greenhouse decreases.

(2)

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.....

.....

.....

.....

(Total for Question 13 = 6 marks)

EDEXCEL, 6PH02/01, JAN 2011

15 (a) A kettle is rated at 1 kW, 220 V.

Calculate the working resistance of the kettle.

(2)

.....

.....

.....

Resistance = ...

(b) When connected to a 220 V supply, it takes 3 minutes for the water in the kettle to reach boiling point.

Calculate how much energy has been supplied.

(2)

.....

.....

.....

Energy = ...

(c) Different countries supply mains electricity at different voltages. Many hotels now offer a choice of voltage supplies as shown in the photograph.

(i) By mistake, the kettle is connected to the 110 V supply. Assuming that the working resistance of the kettle does not change, calculate the time it would take for the same amount of water to reach boiling point.

(3)

Time = ...

(ii) Explain what might happen if a kettle designed to operate at 110 V is connected to a 220 V supply.

(2)

(Total for Question 15 = 9 marks)