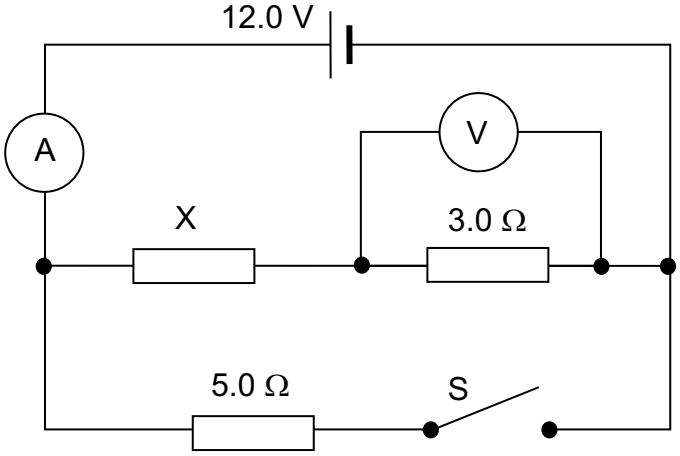
Practice Questions: Electric Circuits – 1

1 In the circuit shown below the resistance of the battery and the meters may be ignored. The switch S is initially **closed**.



(a) Given that the voltmeter reads 4.0 V, calculate the value of resistor X.

resistance X = …… [1]

(b) Calculate the reading on the ammeter.

ammeter reading = …… [2]

(c) State the changes, if any, that would be observed on the ammeter and voltmeter when S is opened.

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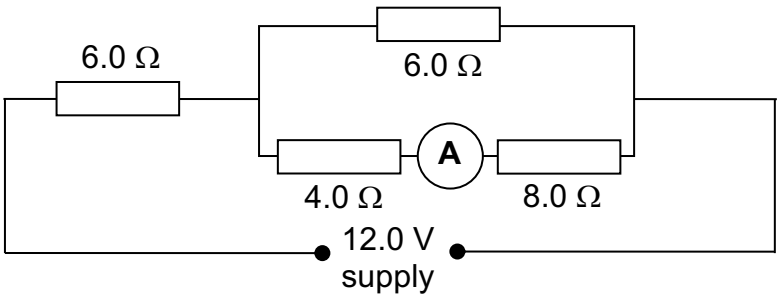
…… [1]

2 Four resistors and an ammeter are connected to a 12.0 V d.c. supply as shown below:



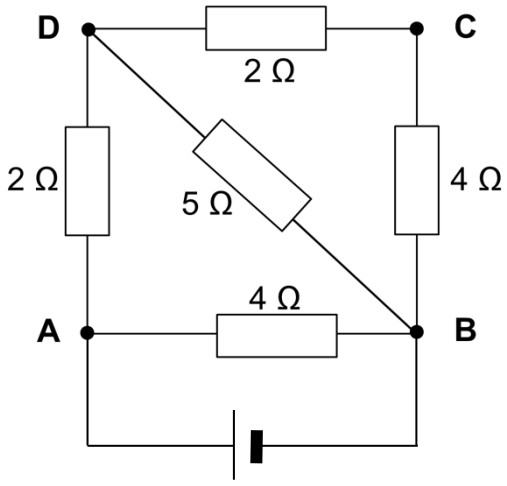
(a) Calculate the effective resistance of the circuit.

effective resistance = …… [2]

(b) Determine the reading shown on the ammeter.

reading on ammeter = …… [2]

3 Calculate the effective resistance across **AB**.



effective resistance = …… [2]

4 A lamp and a resistor are connected in series to a battery as shown in **Fig. 1.**
Fig. 2 is the characteristic graph of the lamp and the resistor which shows how the current through each component changes as the potential difference changes.

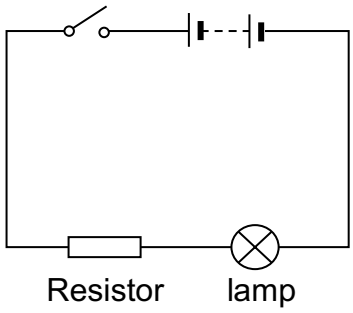


Fig. 1

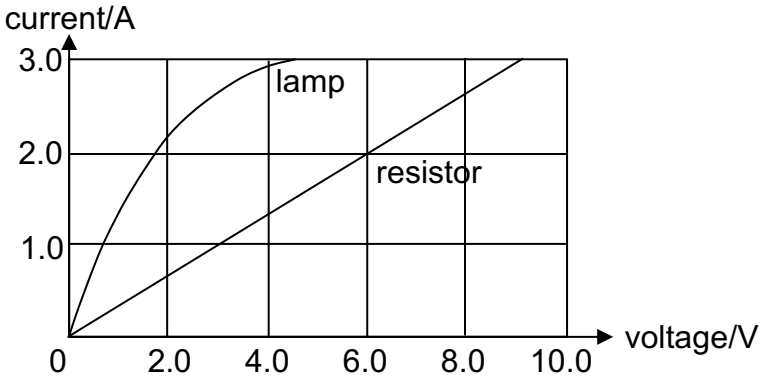


Fig. 2

(a) State Ohm's Law.

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(b) Describe how the resistance of the lamp changes as the potential difference increases?

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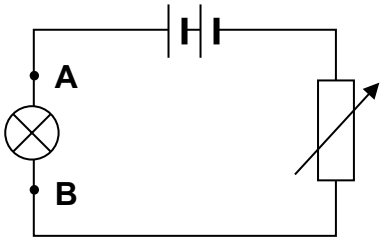
(c) When the circuit in **Fig. 1** is closed, the current flowing in the circuit is 3.0 A, find the potential difference across the battery.

5



Describe the effect on the light bulb in the circuit shown 1 above if

(a) a piece of copper wire is connected between the points **A** and **B**;

……..

……[1]

(b) a second identical light bulb is connected between the points **A** and **B**;

……..

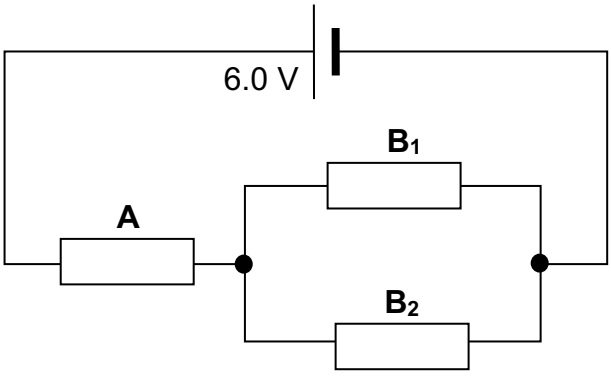
……[1]

(c) one of the two cells is connected in the opposite way (its terminals are reversed).

……..

……[1]

6 An electrical circuit is set up according to the diagram given below. Resistors **A**, $\mathbf{B_1}$ and $\mathbf{B_2}$ are identical resistors, each with 4.0 Ω resistance.



(a) A student wishes to measure the current flowing through resistor $\mathbf{B_2}$, $\mathbf{I_2}$, and the potential difference across that same resistor, $\mathbf{V_2}$.

In the space given below, redraw the above circuit diagram to show how you would connect an ammeter and a voltmeter to measure $\mathbf{I_2}$ and $\mathbf{V_2}$.

(b) Given that resistors $\mathbf{B_1}$ and $\mathbf{B_2}$ together have an effective resistance of 2.0 Ω,

(i) Calculate the expected value for the current flowing through resistor **A**. [1]

(ii) Hence, state the expected current flowing through resistor $\mathbf{B_2}$. [1]

(c) Using your answers from part **(b)**,

(i) Calculate the expected potential difference across resistor $\mathbf{B_2}$. [1]

Hence, state the expected potential difference across

(ii) Resistor **A**. [1]

(iii) Resistor $\mathbf{B_1}$. [1]

(d) It was found that the current *measured* flowing through resistor **A** was smaller than the expected value. Suggest a reason for this observation.

……

…… [1]

(e) It was found that the potential difference *measured* across resistor **A** was **larger** than the expected value. Suggest a reason for this observation.

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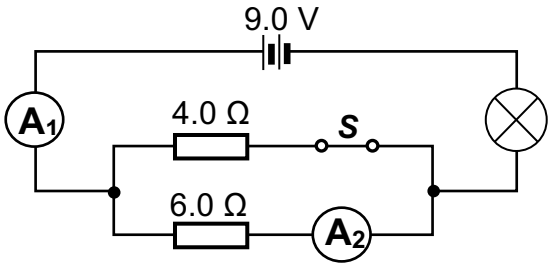
…… [1]

7 In the circuit shown below, the resistance of the battery and the meters may be ignored.



The reading on ammeter A_1 is 2.5 A and the reading on A_2 is 1.0 A.

(a) Determine the current flowing through the 4.0 Ω resistor.

current = ……[1]

(b) Calculate potential difference across the 6.0 Ω resistor.

potential difference = ……[1]

(c) Calculate the potential difference across the bulb.

potential difference = ……[1]

(d) Suggest and explain how the brightness of the bulb will be affected when switch ***S*** is opened.

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