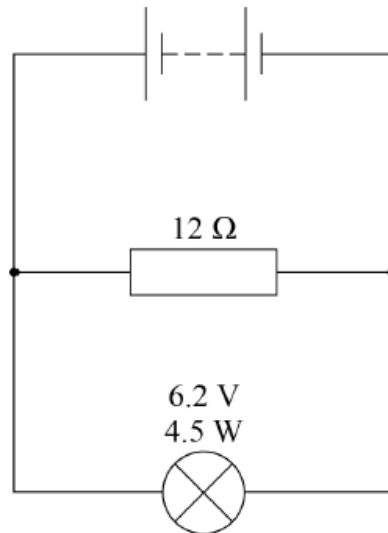


**Electricity – A2 Physics P1 2022**

1. June /2022/Paper\_7408/1/No.04

0 4

A student assembles the circuit in **Figure 6**.**Figure 6**The battery has an internal resistance of  $2.5 \Omega$ .

0 4 . 1

Show that the resistance of the  $6.2 \text{ V}$ ,  $4.5 \text{ W}$  lamp at its working potential difference (pd) is about  $9 \Omega$ .**[1 mark]**

0 4 . 2

The terminal pd across the battery is  $6.2 \text{ V}$ .

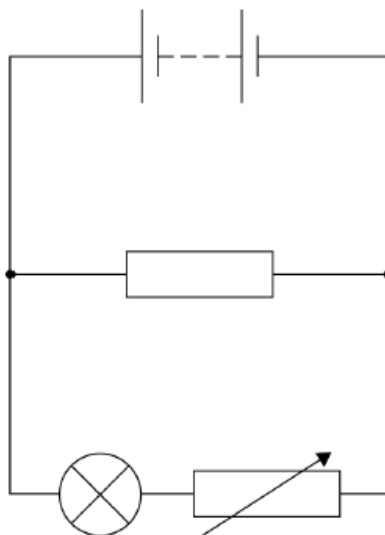
Calculate the emf of the battery.

**[3 marks]**

emf = \_\_\_\_\_ V

The student makes a variable resistor to control the brightness of the lamp. **Figure 7** shows her circuit.

**Figure 7**



0 4 . 3

She uses a resistance wire with a diameter of 0.19 mm to make the variable resistor. A 5.0 m length of this wire has a resistance of 9.0  $\Omega$ .

Calculate the resistivity of the wire.

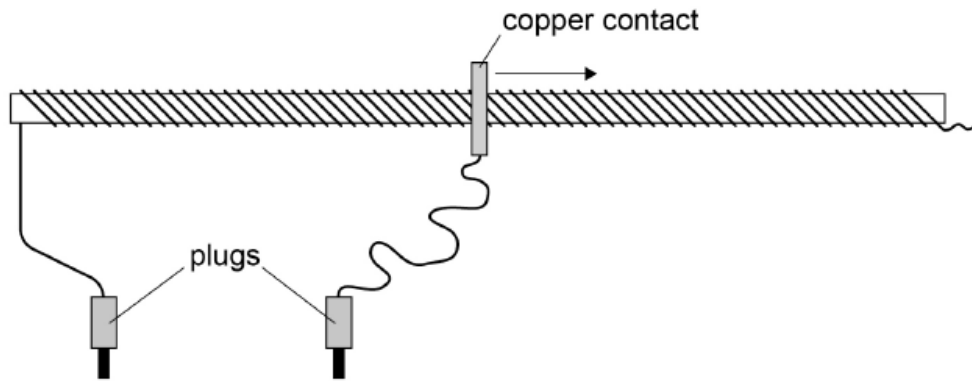
[3 marks]

resistivity = \_\_\_\_\_  $\Omega$  m

0 4 . 4

**Figure 8** shows the 5.0 m length of wire wrapped around a tube to make the variable resistor.

**Figure 8**



Two plugs connect the variable resistor into the circuit. A moveable copper contact is used to vary the length of wire in series with the lamp.

When the contact is placed on the tube at one particular position, the lamp is dim. The contact is then moved slowly to the right as shown in **Figure 8**.

Explain, without calculation, what happens to the brightness of the lamp as the contact is moved.

**[2 marks]**

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0 4 . 5

The student now makes a different circuit by connecting the variable resistor **in parallel** with the lamp.

The contact is returned to its original position on the tube as shown in **Figure 8** and the lamp is dim. The contact is again slowly moved to the right.

Explain, without calculation, what happens to the brightness of the lamp as the contact is moved.

[2 marks]

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2. [June /2022/Paper\\_ 7408/1/No.29](#)

The current in a metallic conductor is 1.5 mA.

How many electrons pass a point in the conductor in two minutes?

[1 mark]

A  $1.1 \times 10^{18}$

B  $1.9 \times 10^{19}$

C  $1.4 \times 10^{20}$

D  $2.0 \times 10^{29}$