

Resistors

1. You are provided with the following apparatus: connecting wires, an ammeter, fixed resistors,

a voltmeter, a variable resistor, a switch and two dry cells in a cell holder.

Draw a circuit that

can be used using the apparatus above to verify Ohm's law. (a) Three resistors **A**, **B** and **C** where **A** is resistor $200\ \Omega$ **C** of resistance $100\ \Omega$ and **B** is of

unknown resistance are connected in parallel. This arrangement is then placed in a circuit

and current passing through and potential difference across it measured.

The table below

shows the result.

p.d.v.	3.0	6.0	9.0	12.0	15.0
Current A	0.15	0.30	0.45	0.60	0.75

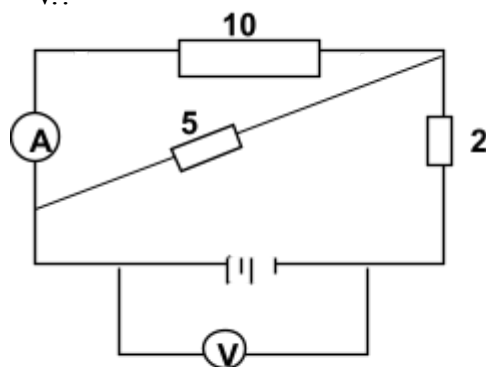
(i) Plot a graph of p.d. against current A

(ii) From the graph calculate the total resistance of the resistors.

(iii) What is the value of the unknown resistor?

(b) The ammeter in the figure below shows a reading of 2A. What is the reading of the

voltmeter v.?



3. a) Three resistors of resistance $2.0\ \Omega$ and $6.0\ \Omega$ are connected together in a circuit. Draw

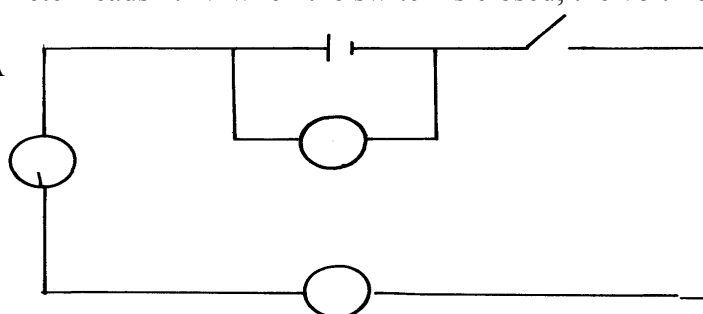
a circuit diagram to show the arrangement of the resistors which gives

i) Effective resistance of $3.0\ \Omega$

ii) Minimum resistance

b) In figure 9 the voltmeter reads 2.1V when the switch is closed, the voltmeter reads 1.8V and

the ammeter 0.1 A



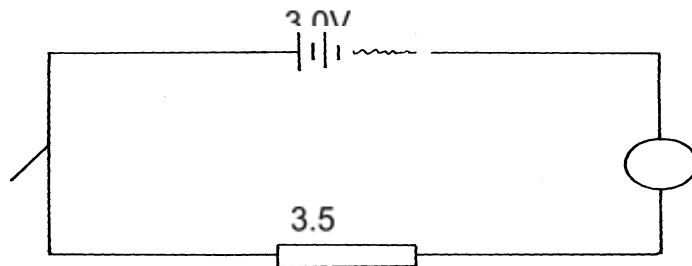
A

V

X

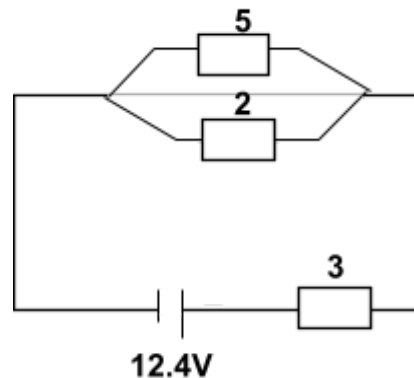
Determine:

- i) The e.m.f of the cell
 - ii) The internal resistance of the cell
 - iii) The resistance of the of the lamp
- c) One reason why the earth pin is longer than the neutral and the live pins is to open the shutters of the socket, state **one** other reason why it is longer
- d) Why are lamps in a house always connected in parallel but not in series?
4. State **two** other factors, which would affect the resistance of a metal conductor other than the temperature
- b) The ammeter in the circuit below has negligible internal resistance. The cell has internal resistance of 0.5Ω and an electromotive force of 3.0V



Determine the value of current the ammeter registers when switch S is closed

5. a) State **Ohms law**
6. In the configuration of resistors given below, determine the current through the 5Ω resistor



7. **Figure 5** is a circuit diagram of three resistors connected to a 6V battery

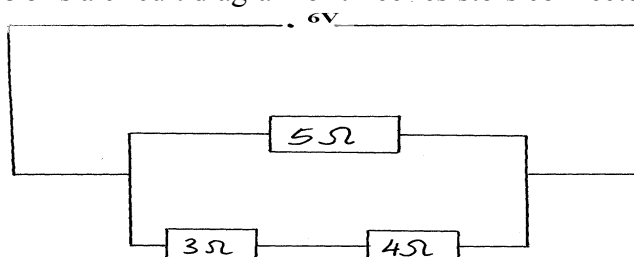
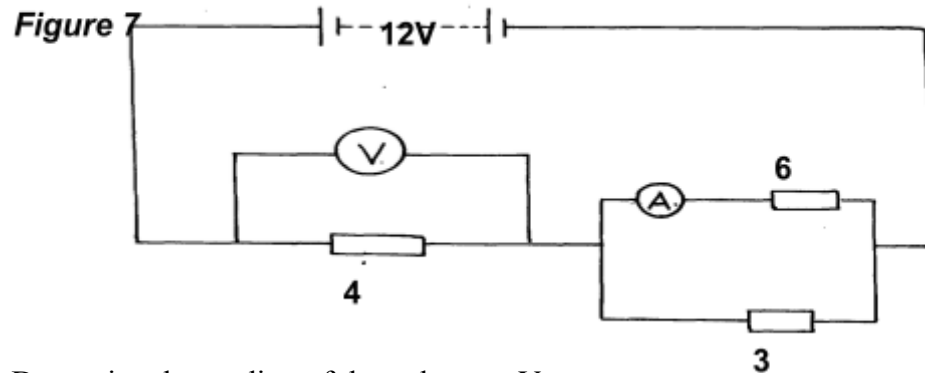


Figure 5

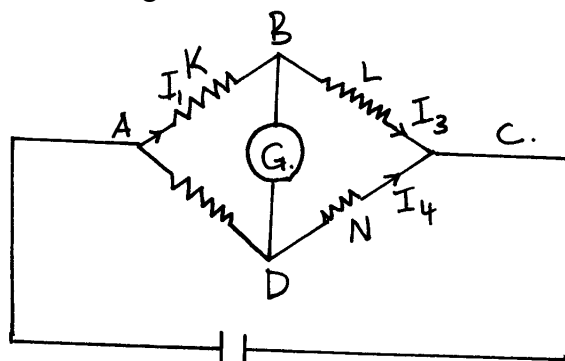
Determine the potential difference across the 3Ω resistor

8. (a) Study the circuit diagram shown below.



- (i) Determine the reading of the voltmeter V.
 - (ii) Determine the reading of the ammeter A.
 - (iii) Explain the effect on the reading of the voltmeter if the 3Ω resistor is altered to be 6Ω
- (b) A transformer is designed to work from a 240V a.c. mains and to give a supply of 8V to ring house bells. The primary has 4800 turns.
- (i) What type of transformer is this? Give a reason.
 - (ii) Why is the iron core laminated?
 - (iii) Calculate the secondary turns if the efficiency is 100%.

9. The diagram in the figure below shows a wheat stone bridge



K, L, M and **N** are four resistors joined as shown. The value of resistance of resistor **K** is

unknown. I_1 , I_2 , I_3 and I_4 are the amount of current passing through **K**, **M**, **L** and **N** respectively.

It is also provided that **L** is a variable resistor.

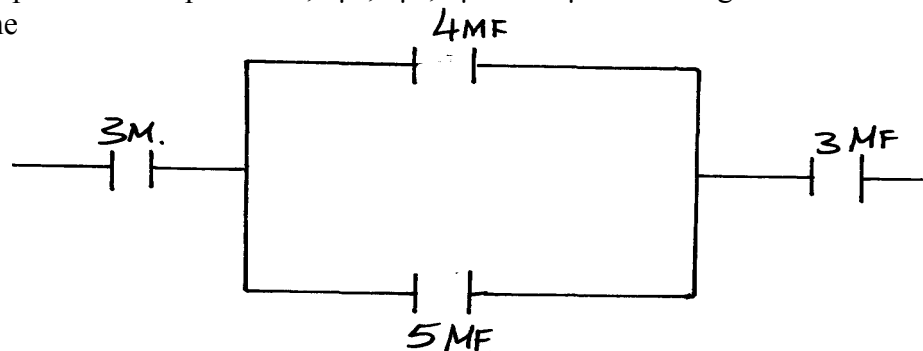
- (i) Explain how the set-up is used to determine the value of unknown resistance of **K** (ii) State why wheat stone bridge is more accurate in measuring resistance than the voltmeter-ammeter method

(b) In an experiment to determine the resistance of a nichrome wire using the metre bridge, the

balance point was found to be at 38cm mark. If the value of the resistance in the right hand

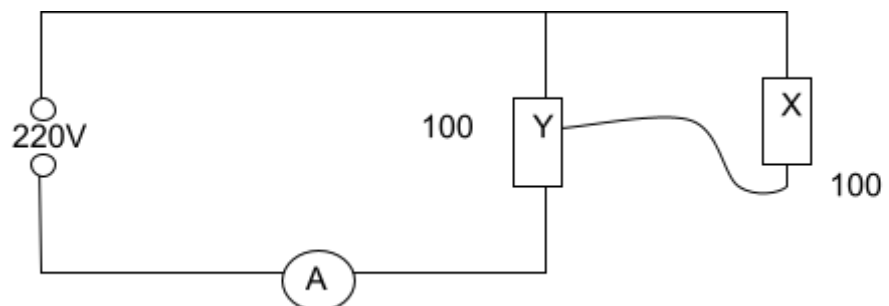
gap needed to balance the bridge was 25Ω , Calculate the value of resistance of nichrome wire

10. Four capacitors of capacitance, $3\mu\text{f}$, $4\mu\text{f}$, $5\mu\text{f}$ and $3\mu\text{f}$ are arranged as shown below. Find the



11. In the circuit diagram below, **X** is a fixed resistor while **Y** can be varied between 0

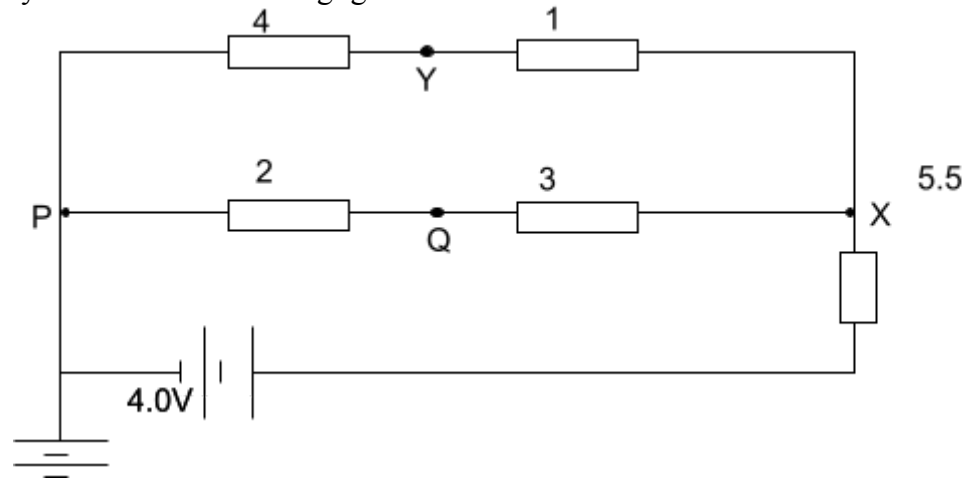
and 100Ω using a sliding jockey



Calculate:

- (i) The minimum possible current in the circuit (2mks)

- (ii) The maximum possible current in the circuit
(2mks)
- (c) The following figure shows an electric circuit in which five resistors are connected to a battery of e.m.f. 4.0V and negligible internal resistance



Determine:

- (i) The total resistance of the circuit
- (ii) The potential difference between Y and Q
- (d) Explain **two** factors that affect the resistance of a metallic conductor

12. Three identical cells of e.m.f. 2.0V and of negligible internal resistance are connected as shown in figure below. Determine the ammeter reading.

