Instruction sheet for internal resistance

TOTAL MARKS FOR INTERNAL RESISTANCE: [50]

INTERNAL RESISTANCE: PART 1

PRESCRIBED EXPERIMENT	PHYSICAL SCIENCE GRADE 12	TERM 3 Week 23 at 90 hrs

KNOWLEDGE AREA: ELECTRICITY AND MAGNETISM
TOPIC: ELECTRIC CIRCUITS

INTRODUCTION

The term 'lost volts' refers to the difference between the emf and the terminal voltage. The voltage is not 'lost'. It is the voltage across the internal resistance of the battery, but 'lost' for use in the external circuit.

The internal resistance of the battery can be treated just like another resistor in series in the circuit. The sum of the voltages across the external circuit plus the voltage across the internal resistance is equal to the emf:

$\varepsilon = V_{load} + V_{internal\ resistance}$

$= IR_{external} + Ir$

Rearrange to get: $V = -rI + \varepsilon$

in the form $y = mx + c$ where $m = -r$

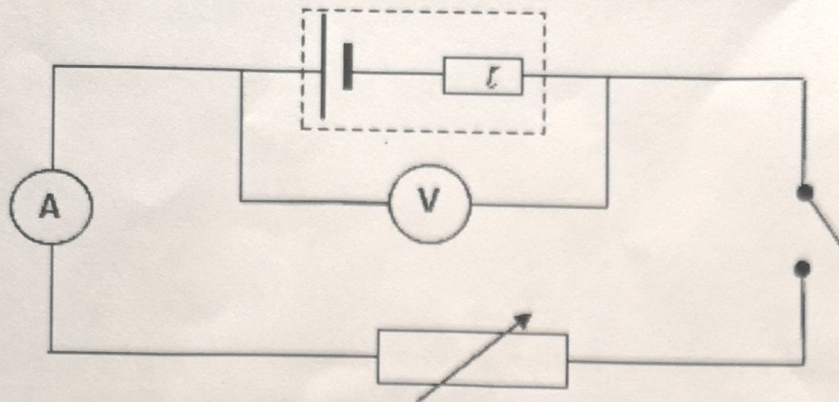**Aim:** To determine the internal resistance of a battery   **(Part 1)**   page 129 CAPS

Apparatus: Battery, Ammeter
              Voltmeter (millimeters)
              Rheostat (or various resistors)
              Connecting wires
              Switch, Cell holder

Method:

1. Set up the circuit as shown below:

2. With the switch open, take the reading on the voltmeter and ammeter.

3. Close the switch.

4. Take readings on the voltmeter and ammeter quickly and open the switch.

5. Vary the readings of the circuit by changing the settings on the rheostat.
   Close the switch and take the readings of current and potential difference. Open the switch.

6. Repeat the previous step 4 / 5 times.

7. Record the results in a suitable table

(5)

INTERNAL RESISTANCE

(7)   Rewrite your results in your worksheet   (6)

(8)   Draw a graph of potential difference. versus current in a graph paper provided   (6)

(9)   Calculate/determine the internal resistance of the battery from the graph   (4)

_____

_____

_____

_____

(10)   List possible sources of errors in this experiment   (2)

_____

_____

(11)   How can errors be minimized in this experiment   (2)

_____

_____

_____

(12)   List a precaution before you conduct the experiment   (1)

_____

_____

_____

Follow up questions

(13)   What is the y intercept of the graph?   (1)

_____

(14)   What does the y intercept represent?   (1)

(15)   Identify the following variable in this experiment: (3)

   15.1 independent variable

   15.2 dependent variable

   15.3 Identify the control variable

                                                                                           (25)

   TOTAL PART 1

_____   **[30]**

INSTRUCTION SHEET FOR INTERNAL RESISTANCE PART 2

PRESCRIBED EXPERIMENT	PHYSICAL SCIENCE GRADE 12	TERM 3 Week 23 at 90 hrs

KNOWLEDGE AREA: ELECTRICITY AND MAGNETISM
TOPIC: ELECTRIC CIRCUITS

___

**Aim:** Set up a series parallel network with known resistors.

Determine the equivalent resistance using an ammeter and a voltmeter and compare it with the theoretical value.

(Part 2)   page 129

Apparatus: (Three) 1,5 V cells, three resistors, voltmeters, ammeter, (or multimeters) conducting wires, Switches, battery holder (Circuit board if available)

Method:

1   Set up the circuit as shown in the accompanying diagram, with the switch open.
2   Close the switch and record the readings on the ammeter and voltmeter.
   Open the switch.
3   Repeat the above steps once more and calculate the average of the measurements.   (4)
   Marks for practical skills
4   Record your results in a suitable table   (4)
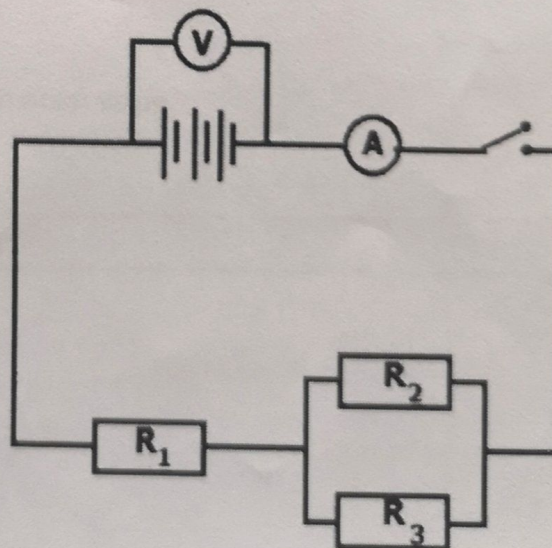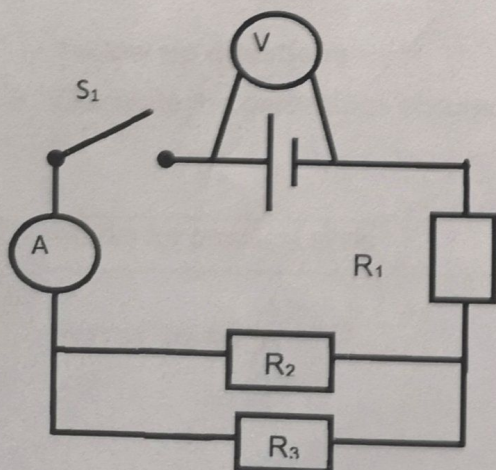
WORKSHEET ON INTERNAL RESISTANCE PART 2

4   Rewrite your results in your worksheet

5   Calculate the equivalent resistance of the circuit from your results.

(4)

_____

_____

_____

_____

6   Calculate the theoretical value of the equivalent resistance from the given data

(5)

_____

_____

_____

_____

7   Compare the results obtained in 5 and 6 above. Give any reason for the difference in values.

(1)

_____

_____

Follow up questions

8   Calculate the percentage accuracy of your experimental value.

(2)

_____

Marks for practical skills

(4)

_____

TOTAL PART 2

[20]