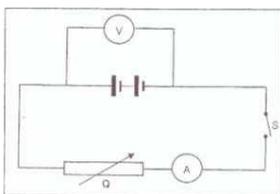


PRAC EXAM 2018

QUESTION 8 INTERNAL RESISTANCE

Learners do an experiment to determine the internal resistance of a battery using the following setup.



When taking readings the switch is closed for short periods of time. The learners record their results in the following table:

8.1 What is the function of component Q? (1)

8.2 Why must the switch be closed for short periods of time when taking the readings? (1)

Current (A)	Voltage (V)
0,19	3,9
0,25	3,7
0,30	3,5
0,45	3,0

3.3 Use the above readings to draw a graph of the voltmeter reading versus the ammeter reading ON THE GRAPH SHEET PROVIDED.

Plot the values of V on the y-axis and draw the line of best fit. (4)

WRITE YOUR NAME ON THIS SHEET AND SUBMIT WITH YOUR ANSWER BOOKLET

8.4 Use the graph to determine:

8.4.1 The emf of the battery. (1)

8.4.2 The internal resistance of the battery. (4)

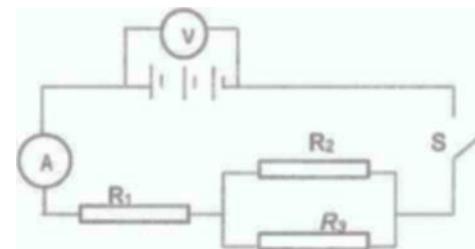
[11]

QUESTION 9 SERIES-PARALLEL NETWORK

Learners want to determine the equivalent resistance of a network of resistors.

They use the following apparatus: Battery, Connecting wires, 3 Resistors, Voltmeter, Ammeter and a Switch

They set up the circuit using the following circuit diagram:

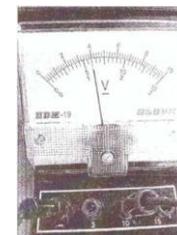


The following table reflects the results obtained:

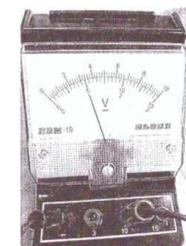
Reading	Resistance (R) in Ω			Open Switch		Closed Switch	
	R ₁	R ₂	R ₃	Voltmeter	Ammeter	Voltmeter	Ammeter
	10	15	22		0		179 mA

Below are pictures indicating readings on the voltmeter when the switch is OPEN and when CLOSED.

OPEN SWITCH SWITCH



CLOSED SWITCH



9.1 Write down the readings on the voltmeter when the switch is:

9.1.1 Open. (2)

9.1.2 Closed. (2)

9.2 Calculate the theoretical value of the equivalent resistance of the circuit. (3)

9.3 Calculate the experimental value of the equivalent resistance. (3)

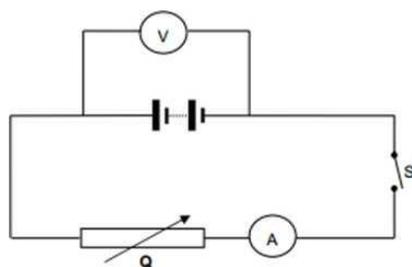
9.4 Why is there a difference in the answers to Questions 9.2 and 9.3? (2)

[12]

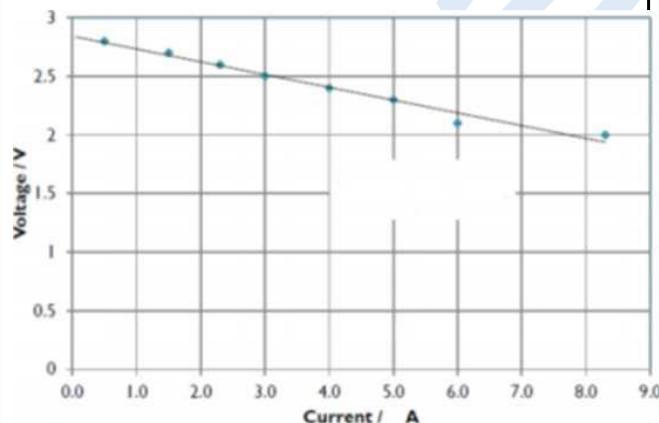
PRAC EXAM 2017

QUESTION FIVE: INTERNAL RESISTANCE

Learners do an experiment to determine the internal resistance of a battery. They use the following circuit in which a variable resistor Q is used to adjust the total resistance of the circuit. They set up the variable resistor on various resistances and then measure the voltage (potential difference) and the current through the circuit. In order to take the voltmeter and ammeter readings, the switch is closed for a SHORT PERIOD.



They present their results in the following graph.



5.1 Write down the name of component Q . (1)

5.2 What quantity does the voltmeter measure when the switch is open? (1)

5.2 What quantity does the voltmeter measure when the switch is closed? (1)

5.4 Use the graph to determine:

5.4.1 The internal resistance of the battery. (4)

5.4.2 The emf of the battery. (1)

5.5 Why is not advisable to keep the switch on for an extended period of time? (2)

QUESTION SIX: SERIES - PARALLEL NETWORK

Learners want to determine the equivalent resistance of a SERIES - PARALLEL network.

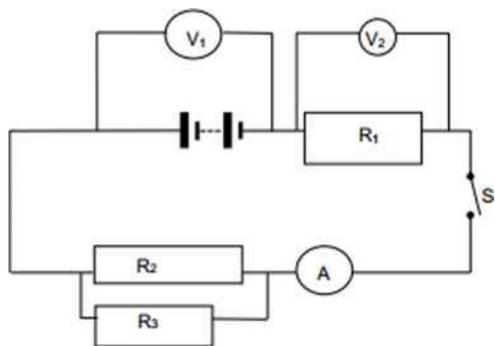
They set up a circuit with the following components:

A number of 1,5 V cells, three resistors R_1 , R_2 and R_3 Of unknown resistances, connecting wires, switch, an ammeter and two voltmeters.

The internal resistance of the battery and the resistance of the connecting wires are negligible and can be ignored.

They connect the components of the circuit as shown below.

The switch is closed and record the following readings:



When switch S is open:

$$V_1 = 6 \text{ V}$$

When switch S is closed:

$$\text{Ammeter reading} = 0,5 \text{ A}$$

$$V_2 = 2,0 \text{ V}$$

6.1 State Ohm's Law, in words. (2)

6.2 If R_2 is twice the size of R_3 , calculate the value of each resistor. (8)

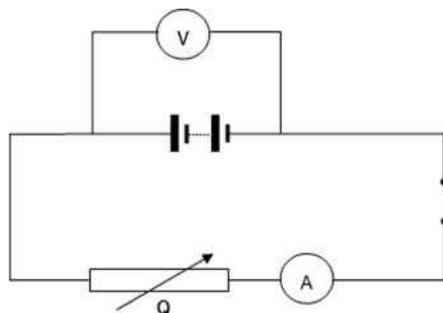
[10]

PRAC EXAM 2016

QUESTION SIX

Learners do an experiment to determine the internal resistance of a battery. They use the following circuit in which a variable resistor Q is used to adjust the total resistance of the circuit. In order to take the voltmeter and ammeter readings,

the switch is closed for a SHORT PERIOD. The switch is then opened.



They record their results in the following table.

Current (A)	Voltage (V)
2	6,0
3	4,5
4	3,0
5	1,5

6.1 Why must the switch be closed for short periods of time while taking the readings? (1)

6.2 Write down the controlled variable for this experiment. (1)

6.3 Use the above results to draw a graph of the voltmeter reading V versus the

ammeter reading I on the graph paper provided. Plot the values of V on the vertical axis and I on the horizontal axis. (4)

6.4 Use the graph to determine:

6.4.1 The internal of the battery. (4)

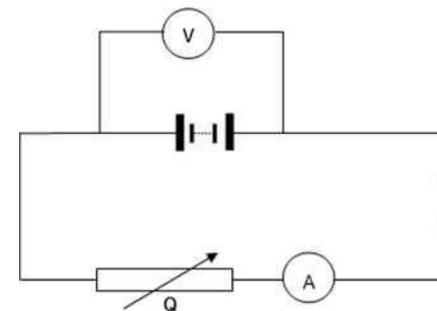
6.4.2 The Emf of the battery. (1)

6.4.3 The voltmeter reading when the current through the variable resistor is 1 A. (1)

6.5 Another resistor is connected in series to Q. How will this affect the internal resistance of the battery?

Choose from INCREASES, DECREASES or NO EFFECT (1)

6.6 Another group of learners conducting the same experiment set up their circuit as shown in the diagram below. They notice that their ammeter reading is zero EVEN when the switch is CLOSED.



Why is the ammeter reading zero? (1)
[14]

QUESTION SEVEN

Learners want to determine the equivalent resistance of two resistors connected in PARALLEL.

They use a circuit with the following components: a battery, two resistors R1 and R2 of unknown resistance, connecting wires, switch, two ammeters and a voltmeter. The internal resistance of the battery and the resistance of the connecting wires are negligible and can be ignored.

They connect the components of the circuit, close the switch and record the following readings:

Current through R1 = 0,3 A

Current through R2 = 0,2 A

Voltage across R1 = 6,0 V

7.1 Draw the circuit diagram. (2)

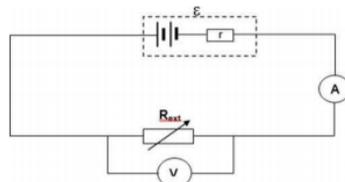
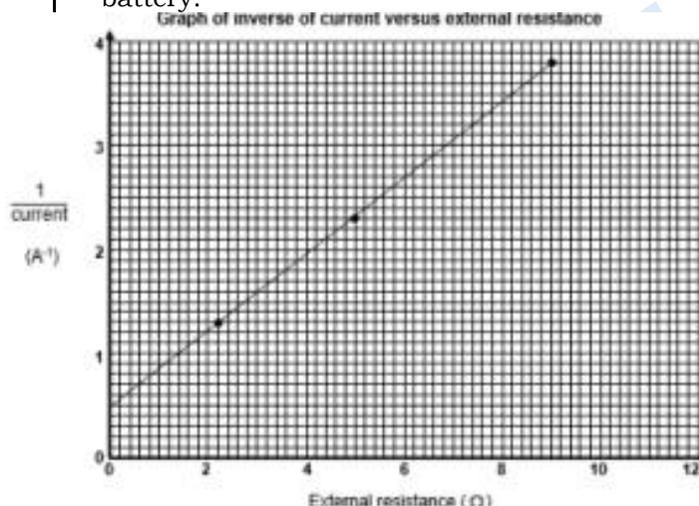
7.2 Use this information to calculate the equivalent resistance of R1 and R2. (5)

[7]

Additional Questions

QUESTION 3

A learner set up the circuit shown below to measure the internal resistance of a battery.



She records the readings on the

voltmeter and ammeter for different resistances of the rheostat. The graph below was obtained from the results.

3.1 Define the term emf in words. (2)

3.2 Calculate the gradient of the above graph. (3)

3.3 What is represented by the gradient in Question 3.2? (1)

3.4 Use the information on the graph to calculate the:

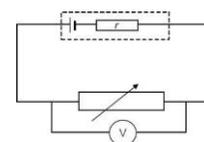
3.4.1 Emf of the battery (2)

3.4.2 Internal resistance of the battery (3)

[11]

QUESTION 5

In an experiment, learners use the circuit below to determine the internal resistance of a cell.



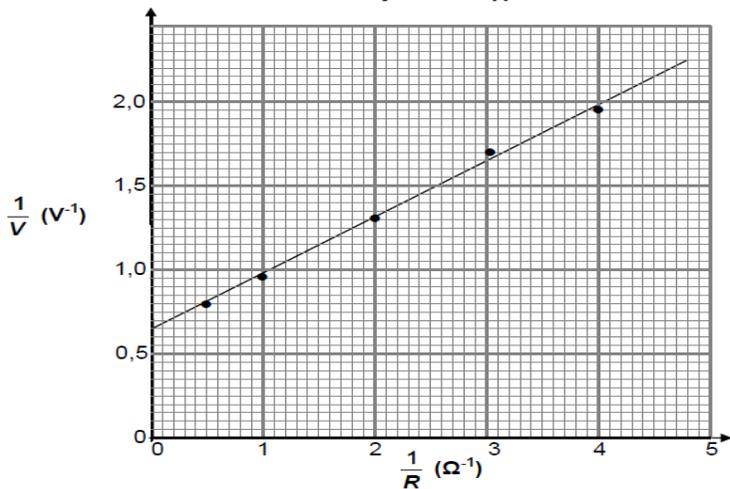
The circuit consists of a cell of emf \mathcal{E} and internal resistance r . A voltmeter is placed across a variable resistor which can be set to known values R .

The equation used by the learners is:

$$\frac{1}{V} = \frac{r}{\mathcal{E}R} + \frac{1}{\mathcal{E}}$$

They obtain the graph below.

Graph of $\frac{1}{V}$ versus $\frac{1}{R}$



5.1.1 Write down a mathematical relationship for the slope of the graph. Show how you arrived at your answer. (3)

Use the information in the graph and calculate the:

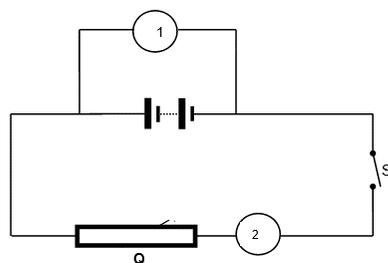
5.1.2 Emf of the cell (2)

5.1.3 Internal resistance of the cell (3)

PRACTICAL TEST : EMF AND INTERNAL RESISTANCE

QUESTION ONE

Learners do an experiment to determine the internal resistance of a battery. They use the following circuit in which a



variable resistor Q is used to adjust the total

resistance of the circuit. In order to take the readings, the switch is closed for a SHORT PERIOD. The switch is then opened.

They record their results in the following table.

CURRENT (A)	VOLTAGE (V)
2	6,0
3	4,5
4	X
5	1,5

1.1 State the aim of the experiment. (2)

1.2 What does Apparatus 1 and 2 represent? (2)

1.3 State the function of each apparatus in 1.2 (2)

1.4 One of the symbols in circuit diagram is drawn incorrectly. Which one is it? (Choose from 1, 2, Q and S). (1)

1.5 Redraw the correct symbol for your answer in 1.4. (1)

1.6 Why must the switch be closed for short periods of time while taking the readings? (1)

1.7 Write down the dependant variable for this experiment. (1)

1.8 Use the above results to draw a graph of the reading V versus the reading I on the graph paper provided. (4)

1.9 Use the graph to determine:

1.9.1 The internal of the battery. (4)

1.9.2 The emf of the battery. (2)

1.9.3 The reading on apparatus 1 when the current through the variable resistor is 1 A. (1)

1.9.4 The value of X. (1)

1.9.5 The lost volts when the reading on apparatus 2 is 4.5 A (3)

1.10 Another resistor is connected in series to Q. How will this affect the reading on apparatus 1? (Choose from INCREASES, DECREASES or NO EFFECT). Explain (5)