Physics 1 Topic 6: Energy in Circuits

Extended Writing Task: **Finding ε and r**

Describe how you would use a voltmeter, ammeter and other standard laboratory equipment to obtain accurate and reliable measurement of the e.m.f. and internal resistance of a battery. Your description should include:

* A labelled circuit diagram
* Details of measurements you would take
* An account of how you would use your measurements to determine the values
* Details of how to improve the precision of your measurements and values.

Continue this task on lined paper and attach it behind this sheet.

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Physics 1 Topic 6: Energy in Circuits Extended Writing Task: **Finding ε and r**

This work was done by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and was marked by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| P | **Praise. What were the positive aspects of the work? What did they do well? What skills did they demonstrate?** |
|  |
| I | **Improvements. What were the literacy issues in the piece of work?** | *Write in ink.*  |  | *Draw in Pencil.* |  | *Use a ruler.* |  |
| Always use capital letters at the beginning of a sentence. |  | Learn the spellings identified in your work. |  |
| Always use capital letters for proper nouns. |  | Ensure sentences make sense. |  |
| Make sure you write on the line and not above or below it. |  | Use correct punctuation. |  |
| Use scientific vocabulary appropriate to the task. |  | Vary your sentences to demonstrate your understanding. |  |
|  |
| **D answer** | **B answer** | **A\* answer** |
| The circuit diagram contains a voltmeter, ammeter, battery and external resistor... |  | ...the voltmeter is connected in parallel to the batteryand the ammeter in series... |  | ...there is a switch and a variable resistor in series with the battery and ammeter. |  |
| There is a description of how the external resistance will be changed either by replacing the external resistor or altering the variable resistor... |  | ...with (between 5 and 10) values of external resistance (R)... |  | ...to clearly show the relationship between voltmeter reading and ammeter reading. |  |
| The battery must be disconnected or switched off between readings... |  | ...as this will change the value of the e.m.f./the battery will run down. |  |
| For each value of external resistance (R) the current and voltage is measured(at least) three times... |  | ...anomalous results are removed and a mean is calculated... |  | ...accuracy is improved further by using a wide(r) range of values of R so a more detailed line (of best fit) can be drawn. |  |
| The voltmeter reading is plotted (on the y axis) against the ammeter reading (on the x axis)... |  | ...a (straight) line of best fit is drawn... |  | ...and extrapolated (owtte). |  |
| The e.m.f. is obtained from where the line (of best fit) intercepts (or cuts) the y axis... |  | ...the internal resistance is given by the **\***gradient of the line (of best fit) |  | **\***some reference to ‘negative’ or the gradient giving **–**r. |  |
| The precision of the measurements could be improved by using a probe with smaller scale divisions connected to a data logger... |  | ...the values of e.m.f. and internal resistance could be more precise by having smaller scale divisions on the graph... |  | ...or using a computer program to draw the graph (previous statements needed for this to be awarded). |  |
| N | **Next Steps. How can they move their work onto the next grade? What didn’t they include?** | **Grade** | **Effort** |
|  |  |  |