

## G631: Electrons in Action – Sample Assignment D

<b>Unit Name:</b> Electrons in Action	<b>Unit Number:</b> G631
<b>Assignment Title:</b> Efficiency of Commercial Cells	<b>Assignment Number:</b> G631 Sample Assignment D
<b>Date Set:</b>	<b>Due Date:</b>
<b>Assessment Objective(s):</b> AO2(b)	

### Assignment Brief:

Your research work is now focusing on calculations on efficiency connected with batteries.

You have found that it is difficult to calculate the actual efficiency of a battery in use as the power output depends on many factors such as the current drawn and the temperature.

However it is possible to calculate the efficiency of the actual charger for rechargeable batteries. Other considerations such as the efficiency of the production of mains electricity also need to be considered if the complete question of use of energy is to be considered.

Calculations cannot be attempted without some knowledge of basic definitions.

### Task 1:

Define power and give units.

Write the equation connecting power to current and potential difference for an electrical circuit.

Write the equation for efficiency.

**Task 2:**

Calculations.

- (i) Mobile phones contain batteries which are able to be recharged. A recharger is supplied when the mobile phone is bought. The instructions included, or the charger itself, should have data on the input voltage and the current for the charger and the output current and voltage for the battery.

Look at the charger for your mobile phone and those of the rest of the group.

Complete the table as much as possible.

Type of Mobile	Battery Voltage	Input Voltage for Charger	Input Current for Charger	Output Voltage of Charger	Output Current of Charger	Efficiency of Charger

Calculate the efficiency of the charger when it is running at its rated current and voltage and so complete the last column for all chargers.

If the charger is not 100% efficient, what happens to the lost power?

- (ii) Digital cameras also use rechargeable batteries. The battery charger used to recharge such batteries has the following information stamped on it:

**Input:** 230V 50Hz 6W

**Output:** AA 2 x 2.8V 150 mA 0.42VA

AAA 2 x 2.8V 50 mA 0.14VA

6F22 2 x 9.0V 11mA 0.10VA

(VA stands for Volt-amps)

What do AA, AAA and 6F22 refer to?

Calculate the efficiency of the charger.

**[This task supports work for AO2b and it is suggested that additional calculations are completed if a max of 6 marks is to be achieved ]**

**Calculations will be completed during practical work and these can be used to support AO2b**