



Drexel-SDP GK-12 ACTIVITY

Activity

Subject Area(s): *Electricity, Rates, Energy*

Associated Unit: *Nanotechnology and Electricity*

Associated Lesson: *Powered by Fruit*

Activity Title: *Charging your Battery*

Grade Level: (6-8)

Time Required: 30-60 minutes

Group Size: Classroom

Summary: *Students are asked a series of questions building on knowledge of current and batteries from previous lessons. This helps build an understanding of current as a function of time.*

Engineering Connections: Students take prior lessons on electricity and batteries and apply them to an everyday activity such as charging a cell phone. The real life context helps explain briefly why current is important and how it affects their lives.

Keywords: *Electricity, Rates, Energy*

Educational Standards: [PA]2.1.8DG, 2.2.8AB, 2.3.8B, 3.4.7C, 3.6.7C

Learning Objectives: Students should be able to identify the basic concepts of electricity using Ohm's Law. Using basic concepts of division and multiplication they can learn about current and voltage relationships.

Materials List

- Old Cell Phone, Worksheet

Introduction/Motivation: All kids nowadays have cell phones or have used cell phones. They understand the concept of charging the battery before it loses its power and working ability. After introducing Ohm's Law in prior lessons within this module, this shorter activity becomes a good enforcer. Kids really enjoy seeing an older cell phone taken apart and actually looking at the battery, reading the label to see what the voltage is, and then identifying with numbers what charging a battery really is about.

Methods and Procedure:

1. If possible bring in an old cell phone and remove the battery for the class. It will tell you the voltage requirements, which the students can write down in the first question. The second item is a normal phone charger, it doesn't need to match the phone, but just so the current requirements on the charger itself may be told to the class so that they may complete the worksheets.

2. The worksheet is an assessment for this and prior activities. I noticed that since it is difficult subject matter the kids tend to get held up on the words of the problems rather than the actual math.

Assessment: The provided worksheet possesses questions that evaluate the students ability to grasp the concepts of Ohm's Law.

Attachments: **Battery Worksheet**

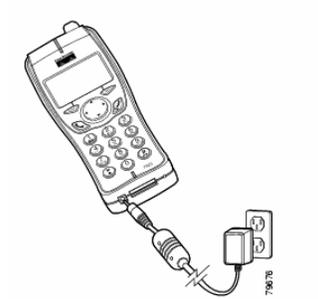
References: n/a

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Charging your battery

Cell phones need wall adapters to supply enough charge to the battery. This is typically done with a constant current, or one unit of charge (Coulomb) per second. This can help you determine how fast you will charge your cell phone battery.

Questions:

1. Mr N's cell phone has a battery with ____ volts, which holds 4,250 C. His charger produces ____ Amps. How much time, in hours, will it take Mr. N's charger to charge his cell phone?

2. If an iPod has a 1.4 Amp charger, and it takes 3.333 hours to fully charge the battery. How many Coulombs does the battery have?

3. Ms. McGuire's cell phone has 6782 C in her battery which needs to be recharged. She knows it will take until the end of school to charge it. How fast does her charger need to be (in Amps)?