**Oak Ridge High School AP Physics C**

**Post-Exam Project: Experimental Design**

Choose a basic Physics concept from the list provided and develop a complete introductory level lab for 9th grade STEM teachers and students.

**Parameters:**

* The lab should last no more than one class period, 45 minutes maximum.
* The lab should have a real world “hook” to engage students.
* Your lab must be research based. You should *both* look up ideas on the internet *and* do the lab yourself.
* Use technology where possible and appropriate.
* K.I.S.S.- Keep It Simple Stupid
* Documents should be submitted electronically via email ([ebhondorf@ortn.edu](mailto:ebhondorf@ortn.edu)) and should adhere to the template provided ([www.hondorfphysics.weebly.com](http://www.hondorfphysics.weebly.com)).

**Document Contents:**

**Lab Title:** You can be clever here, but include the Physics Concept being studied.

**Objectives:** In the form of “Students will…” statements, bulleted list.

**Time Requirements:** Preparation time and Activity time, bulleted list.

**Materials and Equipment:** For each student or group. Indicate any per class needs. Bulleted list

**Concepts Students Should Already Know:** List of concepts students should be familiar with prior to beginning the activity, bulleted list

**Lab Preparation:** Describe how to set up the activity. Numbered steps and diagrams, if appropriate

**Student Document:**

* **Preliminary questions:** At least 3 questions to get students thinking about what will happen in the activity.
* **Explicit instructions to students:** Include how to set up the apparatus (diagrams where appropriate), collect data and mistakes to look for. Include a few questions about why the procedure is as it is. Provide data tables where appropriate. Identify the independent and dependent variables and relate them to the graph/equation.
* **Calculations:** If necessary provide instructions and an example of how to perform needed calculations.
* **Graph:** Provide axes. Either appropriately label the axes or give instructions for how to do so. Provide explicit directions for how to graph data.
* **Analysis/Conclusion:** Provide at least 3 higher order questions to elicit the appropriate conclusion. At least one question should address the graph.

**Teacher Guide:**

* **Written guide:** Prepare a sample student report with correct answers and notes about anticipated problems/errors/misconceptions.
* **Video guide:** Prepare a short video of the procedure correctly set up and data gathered. The MIT Physics Demo videos are great source to model (<http://techtv.mit.edu/collections/physicsdemos/videos>)

**Suggested Topic List:**

* **Friction**
* **Centripetal Force/Acceleration**
* **Newton’s Second Law**
* **Conservation of Energy**
* **Conservation of Momentum**
* **Impulse/Momentum Theorem**
* **Wave Equation**
* **Electrostatics**
* **Ohm’s Law/Resistance**
* **Displacement, Velocity, Acceleration- graphing**
* **Work Energy Theorem**
* **Power**
* **Simple Harmonic Motion- Springs and/or Pendula**
* **Simple Circuits**