Grandfather Clock (Part 1)

You have come across an old grandfather clock that someone has discarded. It has a big pendulum that swings back and forth, making the clock tick forward once per swing. You have decided to build a new housing for the clock, decorate the face, and build a new pendulum out of materials from your studio. However, when you assemble the clock with the new pendulum, which is *lighter* and *longer*, you notice that the clock no longer keeps the correct time. Before you rebuild the pendulum, you decide to figure out how the mass and length of the pendulum affect the time it takes to complete a swing (the period.) Then you can be sure you can build both an interesting and accurate clock.

Questions:

For this week:

1. **Does changing the length change the period?**
2. **Does changing the mass change the period?**

For next week:

3. (How does changing one of these factors change the period, quantitatively?)

You will spend two weeks on this activity. This week will be devoted to *data-collecting,* while next week will be devoted to *data analysis.* Try to take as much data this week as you can, since next week you won't have access to your measurement apparatus.

I. Introduction — 10 min — Whole class

II. Brainstorm and plan — 15 min — Groups of 4

How much data will you need?
How much data do you have time to take?

III. Carry out the experiment — 80 min — Groups of 4

Keep an eye on the *real* clock! Write the journal section while you work.

IV. Evaluate your experiment — 15 min — Groups of 4

Write the evaluation of your experimental design, including what steps you would take to decrease the uncertainty in your measurements. The data analysis and its evaluation are for next week – don't submit a lab report today.

MAJOR GOAL:
Decide how much of a difference between measured values is significant. Explain how the decision depends on the specifics of the experiment: that is, explain why the same difference might be significant in some experiments and insignificant in others.