

1. Lesson Plan Information	
Subject/Course: Science	Name: Mr. Peter Baumgarten
Grade Level: 3	Date: July 2, 2013 Time: 2:00 pm
Topic: Pendulums and Motion	Length of Period: 60 - 70 min

2. Expectation(s)
<p>Expectation(s) (Directly from The Ontario Curriculum):</p> <ul style="list-style-type: none"> - identify a force as a push or a pull that causes an object to move - explain how forces are exerted through direct contact - investigate forces that cause an object to start moving, stop moving, or change direction <p>Learning Skills (Where applicable):</p> <ul style="list-style-type: none"> - problem solve the factors that affect the period of a pendulum - work in a group setting

3. Content
<p>What do I want the learners to know and/or be able to do?</p> <p>Today learners will: Through an investigation, discover the best method of controlling the period of pendulum. They will do this by manipulating three possible variables.</p>

4. Assessment (collect data) / Evaluation (interpret data) (Recording Devices (where applicable): anecdotal record, checklist, rating scale, rubric)
<p>Based on the application, how will I know students have learned what I intended?</p> <p>Direct observation, experiment observation sheet, Learning Logs / investigation rubric</p>

5. Learning Context
<p>A. The Learners</p> <p>(i) What prior experiences, knowledge and skills do the learners bring with them to this learning experience?</p> <p>The students will have had some experience with inquiry-based science; can work cooperatively in groups;</p> <p>(ii) How will I differentiate the instruction (content, process and/or product) to ensure the inclusion of all learners? (Must include where applicable accommodations and/or modifications for learners identified as exceptional.)</p>
<p>B. Learning Environment</p> <p>Tables will be placed in groups. Leaving enough room between groups is important so that students can hang and swing various pendulums from the edges of the tables.</p>
<p>C. Resources/Materials</p> <p>Each group will need a set of 8 washers, 1 meter of string, tape, paper clips, recording sheet, stop watch or wall clock with second hand. The teacher will need a picture of a grandfather clock, a set of worksheets to record the experimental results.</p>

6. Teaching/Learning Strategies

INTRODUCTION

How will I engage the learners? (e.g., motivational strategy, hook, activation of learners' prior knowledge, activities, procedures, compelling problem)

(5 minutes)

Show students a picture of a grandfather clock. Ask students how a grandfather clock keeps time. What part of the clock provides the 'power'?

Keep probing until students have determined that it is the pendulum that powers the clock.

MIDDLE:

Teaching: How does the lesson develop?

How we teach new concepts, processes (e.g., gradual release of responsibility - modeled, shared, and guided instruction).

(30 minutes)

1. Explain that a friend, Scott, has an uncle who owns a grandfather clock factory and the person who keeps the clocks on time has quit. The job of the students is to figure out how to get the clocks back on time.
2. Students are to work in groups. Each group can assign a materials manager, recorder, time keeper, chief observer.
3. Have the materials manager gather the resources listed above and the worksheet entitled "You Are Getting Sleepy"
4. Emphasize the point that the pendulum must have a swing of one second. Question students as to an accurate method of determining the swing - How can we make sure that a swing is exactly one second?
5. Allow students time to explore the materials and construct their own pendulums. Circulate around the room. Question students about the different strategies that they are using - What have you tried to do first? What else could you try? Have you encountered any problems? How could you solve them?
6. Encourage students to record their results on the worksheet. Check to see that each group is addressing at least one important variable - length of string, mass, or angle of drop.

Consolidation and/or Recapitulation Process: How will I bring all the important ideas from the learning experiences together for/with the students? How will I check for understanding?

(10 minutes)

1. Have students regroup. Materials should be collected and the observation sheet should be filled in.
2. Have each group explain how they got their pendulum to have a swing of one second. Jot down responses on the board. Question any responses that are unclear - have students clarify.
3. Ask students what things they could have changed on the pendulum. Draw or show a pendulum to assist students visualize the parts of the pendulum. Lead students to determine that they could have changed the length of string, the masses on the end, or the angle of drop.
4. Introduce the term 'variable' - these are the things that could be changed. Ask students which variable made the biggest difference to the swing. Students should have determined that the length of string affects the swing.
5. Introduce the term 'period' - this a complete swing back and forth.
6. Introduce the term 'force' - what forces were acting on the pendulum? Was gravity pushing or pulling the washers?
7. Have students answer the following questions in their Science Journals
 - Describe the effect that changing mass, length of string, and angle of drop had on the period of the pendulum
 - You have been asked to create a pendulum with a period of 4 seconds. Explain how you would do this?
 - Describe the forces at work in this activity. What other forces are at work in a real grandfather clock?

Application: *What will learners do to demonstrate their learning? (Moving from guided, scaffolded practice, and gradual release of responsibility.)*

(15 minutes)

1. In order to assess students' understanding of the concept of a pendulum's period, challenge them to adjust the pendulum to have a period of one-half second, two seconds and four seconds.
2. Before redistributing the materials have students make predictions as to how the pendulum could be changed to have different periods.
3. Using the materials have students test their predictions and record their results.

CONCLUSION: *How will I conclude the lesson?*

(5 minutes)

1. Review the terms 'variable' and 'period'.
2. Have students take out their "Learning Logs" and explain that for homework students are to write a creative story that explains how Scott was able to get the clocks back on time. They must use the appropriate vocabulary in their story.

7. My Reflections on the Lesson

What do I need to do to become more effective as a teacher in supporting student learning?