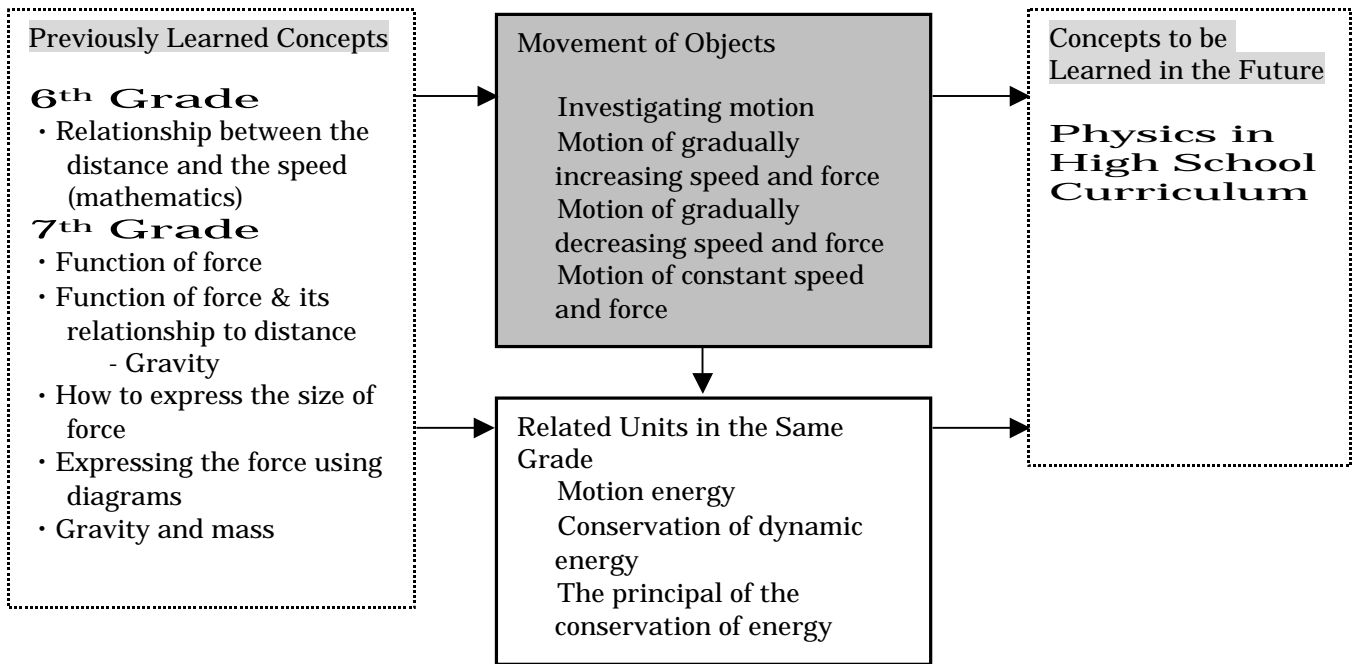


# 9<sup>th</sup> Grade, Class A Science Lesson Plan

November 14, 2000 (Tuesday)  
 3rd Period Gum #2  
 Instructor: Toru Shinomiya  
 Number of Students: 17

1. Name of the Unit: Movement of Objects

2. Relationship of the Unit to the Curriculum



3. Instructional Plan

Movement of Objects (Total: 11 lessons)

- How to investigate motion and speed . . . . . 1 lesson
- How to use the Recording Timer . . . . . 1 lesson
- Motion of gradually increasing speed (acceleration) and force . . . 2 lessons
- Motion of gradually decreasing speed (deceleration) and force . . . 1 lesson
- Motion of constant-straight-line speed and force . . . . . 2 lessons
- Inertia and the law of inertia . . . . . 1 lesson
- Investigating motion around us
  - Developing a plan for experiments . . . . . 1 lesson
  - Conducting experiments . . . . . 1 lesson
  - Presenting the results from experiments . . . . . 1 lesson (this lesson)

4. Instruction of this Lesson

(1) Title: Investigating Motion Around Us (this is the third lesson)

(2) Goal

- Be able to present the methods and results of experiments.
- Be able to explain the relationship between the change in speed of motion and the force that the students investigated.
- Be able to present findings with the cooperation of others in the group.

### (3) Relationship of the lesson to the Goal of Science Education at the School

Science Education Gal:

“Not only to rear students’ minds to autonomously connect with surrounding nature and to love nature, but also to foster their ability to investigate problems in nature.”

Up to now, the students learned some different kinds of motion through conducting experiments. For example, the students learned about constant acceleration through conducting two experiments: 1.) experiments involving experimental-carts sliding down slopes, 2.) experiments involving falling weights. , The students learned the concepts of straight line constant speed motion and decreasing speed motion by conducting experiments with a very smooth (very little friction) flat floor and dynamic-carts. From these experiments, the students investigated the relationships of time and speed, time and moving distance, and speed and its working force. In addition, they found the rules between these relationships. These experiments were conducted in a laboratory setting so that students could find the relational rules easily. Therefore, the motions that they investigated were not what they usually see in their everyday lives.

When the students talked about motion during the first lesson, “how to investigate motion and speed,” they gave many example of motion in their everyday life. Therefore, in this lesson, I thought about giving them a chance to explore the motion that they see in their everyday life by relating to the rules of motion that they learned so far on this unit and to the experimental procedures that they followed for investigating motion. This lesson will be a further exploration of their basic understanding of motion and their understanding of how to conduct experiments.

I like to help the students to better understand about motion by relating to their everyday life. In order to do this, first, I would like to motivate the students to interested in various kinds of motion surrounding their everyday lives. Second, I would like them to observe the phenomena very carefully over and over. Finally, I would like to them to investigate the rule behind the phenomena scientifically. In addition, I like to make sure that the students learn this topic in accordance with their individual interests and concerns. Thus I decided to ask them to conduct experiments and present their results of as a group. Providing opportunities for them to learn each other’s experiments by presenting at the end of the unit is important in order to help to deepen and widen their understanding.

(4) Learning Process (previous lesson)

Steps (min.)	Activity of the Students	Teacher's Support and Points to Remember	Evaluation View Point
Intro-Duction (5)	<div style="border: 1px solid black; padding: 5px; text-align: center; margin: 0 auto; width: fit-content;">                     Let's find out more about motion around us!                      (Conducting experiments as a group)                 </div> <p>Listen to the direction given by the teacher</p>	<ul style="list-style-type: none"> <li>• The teacher explain about the contents of this lesson and gives some points to remember for conducting experiments.</li> </ul>	
Develop-Ment #1 (25)	<p>Conducting experiments as a group and following the experimental plans each group developed.</p> <p>Anticipated students' experiments</p> <ul style="list-style-type: none"> <li>Basic motions of humans (walking, running, etc.)</li> <li>Motion related to sports</li> <li>Motion of a falling object</li> <li>Motion of two falling objects that have different weights</li> <li>Motion of the experimental carts with two different degree of slopes</li> <li>Motion of a fan and other things around us</li> <li>Motion of the combination of various motions (acceleration, deceleration, straight-line-constant speed, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Create 4 or 5 groups</li> <li>• Work around the classroom to see how the students are doing? Also pay attention to the recording timers if they are working well.</li> <li>• Make sure that all the members from the group receive the data tape of the recording device.</li> <li>• Provide appropriate suggestions if it is necessary.</li> </ul>	<p>Were the students able to record the motion? Were the students able to work with other students cooperatively?</p>
Develop-Ment #2 (10)	<p>Numbering the dots recorded on the recording tapes during the experiments</p> <p>Pasting the recording tapes on paper and analyzing them</p> <ul style="list-style-type: none"> <li>• Calculating speed</li> <li>• Making charts of speed</li> <li>• Making graphs of speed</li> </ul>	<ul style="list-style-type: none"> <li>• If the students' experimental results were not what was expected, the teacher should help them.</li> <li>• Check with the students to see if they understand how to use the recorded tapes.</li> <li>• Prepare charts and graph paper for investigating the speed.</li> <li>• Help the students who are having some trouble calculating speed or summarizing their investigation.</li> </ul>	<p>Were the students able to use/manipulate the result from their experiments?</p> <p>Were the students able to analyze the results from their experiments?</p>

Conclusion (10)	<p>The students discuss the results from the experiments in the group using the charts and graphs they created. They also try to find some rules of motion that apply.</p> <p>The students write down a summary of the experiments for their presentation.</p> <p>The students will be informed they will present their results during the following lesson.</p>	<ul style="list-style-type: none"> <li>• Inform the students that if they did not have enough time to discuss their result in the group because they spent too much time doing the experiments, they can discuss it after class.</li> </ul>	<p>Were the students able to find some rules from their experiments? Did they prepare their presentation materials as a group cooperatively?</p>
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(5) Lesson Process (this lesson)

Steps (min.)	Activity of the Students	Teacher's Support and Points to Remember	Evaluation View Point
Intro- Duction (5)	<div style="border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>Let's find out more about motion around us! (Presenting the result of the experiments)</p> </div> <p>Listen to the direction given by the teacher</p>	<ul style="list-style-type: none"> <li>• The teacher explains about the content of this lesson and gives some points to remember for the presentation.</li> </ul>	
Develop- Ment (40)	<p>Each group presents the results from their experiments</p> <p>The presenters will receive questions after their presentation</p>	<ul style="list-style-type: none"> <li>• Each group gets about 6 minutes for the presentation.</li> <li>• Ask the presenters to talk about their experiments and their procedures at the beginning of their presentation.</li> <li>• Help the students to do the presentation visually in order to get other students to understand easily.</li> <li>• Ask the presenters to spend enough time talking about the relationships they found between the changes in motion, speed, and working force.</li> <li>• Support the presenters if they have a difficulty answering questions.</li> </ul>	<p>Were the students able to find some rules from their experiments? Did they present their results as a group cooperatively?</p>
Conclu- sion (5)	<p>Listen to the teacher's evaluation for the presentation.</p>	<ul style="list-style-type: none"> <li>• Point out each group's good part of the presentation.</li> </ul>	

(5) Evaluation

Were the students able to describe their experiments: what they investigated and how they investigated it? ( skills, expression )

Were they able to describe the relationships between the changes in speed and the working force that they investigated? (knowledge, understanding) (thinking) (skills, expression)

Did they work cooperatively with other group members? (interest, desire, attitude) (skills, expression)