PHYSICS IN MOTION
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Unit 3C

Newton's Second Law Part 1

Newton's Second Law Lab

Name:

Date:

In today's activity, you will be exploring Newton's second law as a constant force is applied to you or a classmate.

Materials:

- bathroom or high force spring scale
- scooter
- timer
- measuring tape

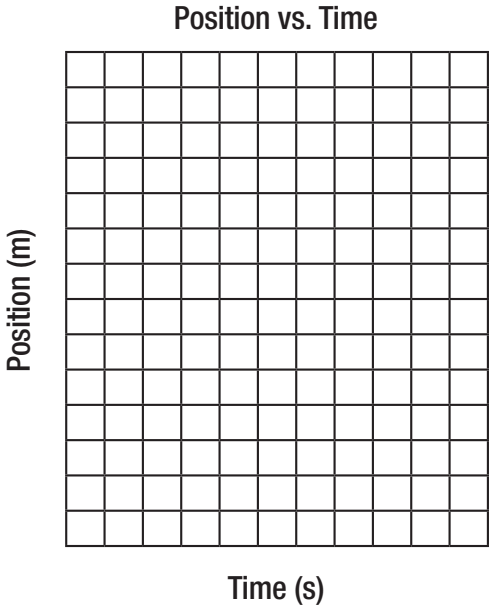
Pre-Lab Questions:

1. **Define Newton's second law in your own words.**

_____

_____

2. **Draw a position versus time graph for an object undergoing a positive, constant acceleration.**



Procedure:

Rest a scale on the back of a student who is sitting on a scooter or in a rolling chair. Apply a constant force to the scale, and mark the student's motion by dropping a bean bag at equal time intervals. Enter the data for this student's motion in the table below, graphing:

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Student's Mass (kg) = _____

Force Applied by Scale (N) = _____

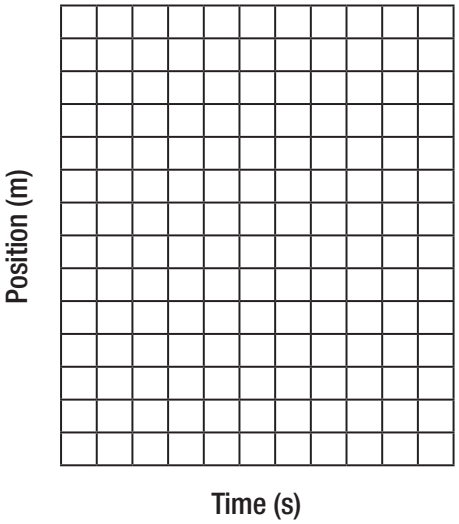
Theoretical Acceleration (m/s^2) = _____

Data Table I. Student 1 Motion

Time (s)	Position (m)

Graph I. Student 1 Motion

Position vs. Time



Extension Activity: Using Microsoft Excel, determine the acceleration of the student.

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Repeat the procedure above for a student with more mass.

Student's Mass (kg) = _____

Force Applied by Scale (N) = _____

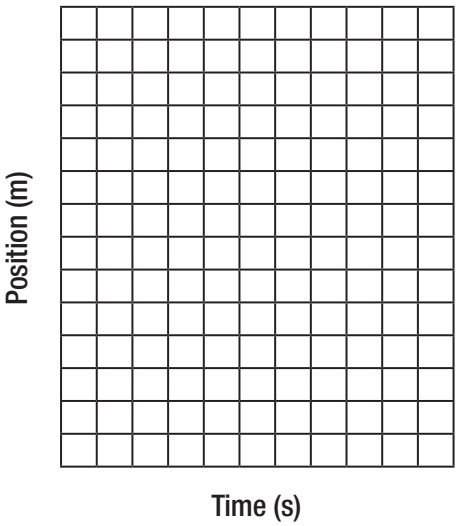
Theoretical Acceleration (m/s^2) = _____

Data Table II. Student 2 Motion

Time (s)	Position (m)

Graph II. Student 2 Motion

Position vs. Time



Extension Activity: Using Microsoft Excel, determine the acceleration of the student.

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Newton's Second Law Lab

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Questions to consider:

1. Compare the position versus time graph for the less massive student to the more massive student.

2. Based on your answer to question one, how did the acceleration of the more massive student compare to the less massive student?

3. If you had applied a greater force to the first student, how would the resulting acceleration have compared to what you saw in the lab today? Why?

4. If you did the extension activity, how did the actual acceleration of the student compare to the theoretical acceleration? Explain why this difference occurs.