Name(s): _____ Section: _____
_____ Date: _____

Force and Motion
Activity 2: Gravity

http://sunshine.chpc.utah.edu/javalabs/

Lab Instructions

Before starting your run, you must first choose the amount of gravity by clicking on the edge of the Gravity Selection Box. As you point and click on a position, your chosen value will appear in the box below, and an example of a body which has gravity close to the value which you've chosen. Also, your chosen value will automatically be recorded in the Data Table when you start the run.

Next, click on the Start Run button. You will immediately see the luge and rider begin the descent. You may click on the luge at any point for an instantaneous measurement of speed, distance, and time. If you need this information, make a record of it in your notebook. Note: You will be recording time, speed, and distance. Your chart is not labeled this way. As the luge passes the mid-point flag, the time at mid-point will be given, along with a picture of the luge and rider. As the luge passes the finish line, the total time will be given. Both the mid-point and final times will be automatically recorded in the Data Table. However, if you made any instantaneous measurements during the run, these would have to have been recorded manually when you took them.

To repeat a run using the same value of gravity, click on the Repeat Run button. If you want to change the gravity, do this before clicking on the Repeat Run button. It is suggested that for each value of gravity, you make at least 3 trial runs.

After you have collected data for at least 5 different values of gravity, you are ready to use this data to proceed to a series of questions and problems to allow you to apply what you have learned. To move to this section of the lesson, click on the Analysis button. Be sure you have transfered all of your data to your lab packet or notebook.

Gravity (*Earth)	Time at Mid-Point (645 meters)	Final Time (1294 meters)

Analysis Questions

1. What is the relationship between gravitational force and the time for the luge run? (Direct or inverse.) State your answer in a complete sentence. Is the same relationship true for the 1/2 time values?

2. Which planet or cosmic body gave the fastest run? Why? Which gave the slowest run?

3. Pick one gravitational force and calculate the average speed for the total run. Show your work. Try to convert your answer in km/sec to km/hr. What is the average speed for the first half of the run? What is the average speed for the second half of the run?

4. Do the same average speed calculation as you did in question three for a different gravitational value. Do you see the same or different patterns as you compare this calculation with the one in question three?

5. How is speed changing as the luge travels downward? What do we call this change in speed?

6. What was your average speed (in km/hr) during the last half of the run with Earth's gravity? Can you suggest a reason or hypothesis?

7. With your partner, design a test you could perform to check your reason or hypothesis.

8. What other variable(s) would you like to change in this lab to gain more information?

9. What explanation can you give for the path of luge and rider under zero gravity? Write your answer in complete sentences.

Challenge Problem:

If a luge rider made the run on an unknown planet and got the following data, what value of gravity would you predict for this planet?

Time at Mid-Point (645 meters)	Final Time (1294 meters)
30.0 sec.	44.4 sec.
30.2 sec.	44.6 sec.
30.8 sec.	45.3 sec.
30.1 sec.	44.5 sec.
30.8 sec.	45.3 sec