

Revised

Lab 6 Conservation of Energy

In the previous lab (Lab 5 Newton's Second Law), you took careful data for the velocities of an accelerated cart/mass system at two different locations along the track. You should have two groups of such data: one group in which you kept the hanging mass constant (constant F in $F = ma$) and one group in which you kept the total mass of the system constant but varied the force by transferring mass from the cart to the mass hanger. Both groups of data can be used to give you several scenarios in which to test the conservation of mechanical energy.

In one group, since the hanging mass was constant, the change in potential energy of the system from the initial state (with the cart in the first photogate) to the final state (with the cart in the second photogate) is always the same. However, since you changed the mass on the cart, the change in the kinetic energy of the system depends on both the total mass of the system (which you varied) and the change in velocity between the two gates.

In the other group, the change in potential energy was different for each trial, but the total mass of the system was constant, so the change in kinetic energy is determined solely by the change in velocity.

Thus you should be able to make a table of your values showing how closely the change in potential energy of the system matches the opposite of the change in kinetic energy of the system. Don't forget to calculate uncertainties for each of these calculated changes. Find the best way to argue, based on your data, how well total mechanical energy is conserved in your experiment. It's a full lab report, so don't forget diagrams, theory, etc.

Note that you should make a copy of your data sheet BEFORE you turn in your Lab 5 report so that you can complete the Lab 6 report. If you didn't do the Lab 5 experiment or you don't make a copy of your Lab 5 data sheet, you'll have to arrange with the TA to repeat the experiment during the usual Lab 6 week.