Atwood Machine Lab
online version

Purpose:
To determine the mathematical relationship between acceleration (**a** in m/s^2) and the total mass of a system ($\mathbf{m_{TOT}}$ in kg) and acceleration (a in m/s^2)and the net force($\mathbf{F_{NET}}$ in N which is a kgm/s^2) by using both an Atwood machine and a modified Atwood machine.

Some instructions and pointers:

1. Do the Prelab worksheet and make hypotheses before beginning the lab and collecting data.

    http://www.geocities.com/perry_science/physics/atwood_prelab.pdf

2. You may work by yourself or in a group of 2. Use the simulations on the following websites to get your data (at least six points per graph).

    Atwood Machine
    (set mass 3 = 0 and click "no friction")
    http://www.msu.edu/user/brechtjo/physics/atwood/atwood.html

    Alternative Atwood Machine applet
    (already has a frictionless, massless pulley)
    http://lectureonline.cl.msu.edu/~mmp/kap4/cd097a.htm

    Modifed Atwood Machine
    set the coefficient of friction, μ=0
    http://www.walter-fendt.de/ph11e/n2law.htm

3. Write your procedure section detailing the steps you used on these simulations. Refer back to to the prelab worksheet for help on what you need to do to gather the data. Include a picture of the Atwood machine and modified Atwood machine.

4. In your data section, include freebody diagrams (see prelab) and anything held constant within the experiment as well as your data points.

5. For your data analysis, you may have to do some calculations with your data before you are ready to graph it. Show one of each type of calculation; the rest may be recorded in a table.

6. You will have 4 graphs total, two for the Atwood machine and two for the modified Atwood machine. If graphs are done on graphing calculators rather than graphical analysis on the computer, please include sketches of the graphs with titles and labeled axes as well as the mathematical models and correlation coefficients (r). To help with slope units, note that a N is the same as a kgm/s^2.

7. Each member of the group writes his/her own conclusion. The rest of the lab report can be done together. In the conclusion, show how the slopes compare to the quantities you held constant. Also show how the models for **a vs** $\mathbf{F_{NET}}$ and **a vs** $\mathbf{m_{TOT}}$ can be combined into one equation.