ICP - Power Lab

Experiment: Stair Climbing and Power

Purpose:

To examine factors that contribute to the power that a student can generate in climbing stairs

Hypothesis #1:

Estimate how much power you need to generate in order to climb the stairs. Show/explain the reasoning that leads to your hypothesis.

Hypothesis #2:

What can you do to increase your power output by 50% as you climb the same flight of stairs. Show/explain the reasoning that leads to your hypothesis.

Materials:

1. measuring tape
2. stopwatch
3. bathroom scale

Experimental Design - PART 1: Determining your power output

Given the materials you have available, DESIGN your OWN procedure. Get your procedure approved before conducting your experiment. Each group member will carry out the procedure and gather their own data. Each member will run through the procedure three (3) times.

Experimental Design - PART 2: Increasing your power output

Given the materials you have available, DESIGN your OWN procedure. Get your procedure approved before conducting your experiment. Each group member will carry out the procedure and gather their own data. Each member will run through the procedure as many times as necessary in order to accomplish a minimal increase of 50% in their power output.

Experimental Data:

Design your own observation table to record the relevant data for your experiment.

Mathematical Analysis - Calculations:

1. Calculate the amount of work you did in climbing the stairs. Show your calculations.

2. Calculate the amount of power you developed in climbing the stairs. Show your calculations.

3. I am going to compile a class data set which you will analyze. So you need to give me the following data:

   (a) your work done,
   (b) your time taken,
   (c) your power developed

4. From our class data, you will prepare 3 graphs and include a line of best fit through the data:

   (a) time (x-axis) vs work (y-axis),
   (b) work (x-axis) vs power (y-axis),
   (c) time (x-axis) vs power (y-axis)

Experimental Analysis:

1. Did each person in your group have the same power output? Why or why not?

2. Which graph(s) showed a definite relationship between the 2 variables? How do you know?

3. Explain why this relationship exists.

4. What three (3) things can be done to increase the power you develop while climbing a flight of stairs?

5. Considering the class data or your group data, do the fastest climbers develop the most power? Why or why not?