# Horsepower Lab

Name _____

Purpose: To determine the work done in climbing a flight of stairs, and to determine the average and peak power you have.

Procedure: Calculate mass in kg. Determine total height climbed. Calculate work done. Determine the time needed to walk and then run up said distance. Calculate your power in watts and horsepower.

Data:

| | | | |
|---|---|---|---|
| Your weight in lbs<br>lbs | divided by 2.2 = mass<br>kg | x 9.81 = weight<br>N | Total height climbed<br>4.47 m |
| Force Lifted<br>N | x distance lifted<br>m | = work done<br>J | |

| | | | | |
|---|---|---|---|---|
| Work done ÷<br>J | walking time =<br>s | average power ÷<br>W | 745.7 = | Horsepower<br>Hp |
| Work done ÷<br>J | running time =<br>s | peak power ÷<br>W | 745.7 = | Horsepower<br>Hp |

Questions:

1. How does the work done compare between when you walked and ran?

2. Compare your work to some other people's: why do they differ if you both climbed the same distance?

3. Find someone that ran at about the same speed you did. How do your powers compare? Why do they differ?

4. Find someone who weighs about what you do. How do your powers compare? Why do they differ?

# Potential/Kinetic Energy Transfer Lab

Name _____

Purpose: to calculate the potential and kinetic energies of a hopping toy.
Procedure: Time the time down for 5 trials and average them. Find the mass of the toy. Estimate the approximate height projectile reaches.
Data:

| | Trial 1 | Trial 2 | Trial 3 | Trial 4 | Trial 5 | Average |
|---|---|---|---|---|---|---|
| Time | | | | | | |
| Height | | | | | | |

mass of toy:_____ kg ( <------- Make sure you convert to kg!)
Calculations:

1. Using the formula $d_V = 1/2\ gt^2$, calculate the maximum height fallen by the toy from its highest point. How does this compare with the estimated height?

2. What type of energy did the toy have at it's highest point?

3. Calculate in joules how much energy the toy had at its highest point. (use estimated height, not calculated height)

4. What type of energy did it have as it jumped off the table?

5. Since the KE lost = PE gained, how much K.E. did the toy have as it leaped off the table?

6. Knowing the KE the toy had, what was the velocity as it just left the table?

7. What did you have to do to the toy to give it the energy?

8. If you pushed the toy a total of 1.52 cm to add to its K.E., how much force did you have to apply to invert it?

9. Did 100% of your work turn into the KE as it leapt off the table? Why/Why not?