**Physics**

**Wattage Lab**

**Purpose:**

In this lab, you will be determining your own personal wattage. You will be doing this lab using metric units of **kilograms, meters,** and **seconds.** These units will give you your power in terms of the metric unit of **Watts (W).**

**Testable Question:**

What kind of wattage can a student generate?

**Discussion:**

Work (**W**) can be done in many ways. The amount of time you take to do the work affects the power (**P**) necessary to do the work. The quicker you do work, the more **power** you need to do it. Power is the **rate** at which you do work, or.....

**P**ower **= W**ork

**t**ime

**Procedure:**

**Part 1**

In order to determine your wattage, you will need to identify and measure several different things. First of all, you need to know the amount of ***work*** you will be doing to lift your body up a flight of stairs. The work you do is the product of the **Force** you use to lift your body times the **Distance** you lift your body. The force you use to lift your body is your weight, which should be in units of **Newtons.**

**W**ork **= F**orce (or ***weight***) **x**  **D**istance

Record your weight in pounds here: **Weight:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lbs.

Convert your weight in pounds to weight in newtons: \_\_\_\_\_\_\_**lbs. x (4.45 newtons/lb) = \_\_\_\_\_\_\_\_\_\_ N**

**Part 2**

Now you will need to measure the distance over which you will be doing the work. You are lifting your body and doing work vertically against the force of gravity, so you need to measure the vertical height up

which you lift your body. This can be accomplished by measuring the height of one of the stairs using

meters as the measurement, and multiplying that height by the total number of stairs you climbed:

**Height of one stair: \_\_\_\_\_\_\_ cm. Height of one stair:** \_\_\_\_\_\_ **m**.  **Number of stairs:** \_\_\_\_\_

Total vertical **Distance** of lift (number of stairs x height per stair) = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ **m**.

So the work you’ll be doing would be:

**Work (J) = Weight (N) x**  *total vertical*  **Distance (m)** = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ **Nm** *(or Joules)*.

**Part 3**

Now you’re ready to figure out your power. In order to do this you must determine how quickly you did the work of lifting your body. You and your lab partner will time each other while running as quickly as you can up the flight of stairs you have measured. Do this three different times each. Record your times here:

**time 1: \_\_\_\_\_\_\_\_\_\_\_**secs. **time 2: \_\_\_\_\_\_\_\_\_\_\_\_**secs. **time 3: \_\_\_\_\_\_\_\_\_\_\_**secs

To figure out your power in **Joules/sec** or **Watts** , divide the work you did by the time it took you to do it:

**P**ower = **W**ork (J)

**t**ime (secs.)

**Power 1: \_\_\_\_\_\_\_\_**watts **Power 2: \_\_\_\_\_\_\_\_**watts **Power 3: \_\_\_\_\_\_\_\_**watts

**Part 4**

So how do you rate? Can you light up a light bulb? Mow a lawn? Beat a car on a race track?

Do the research and find out the wattage for the following common items. Be sure to include your source for your information.

|  |  |  |  |
| --- | --- | --- | --- |
| Object | Wattage | Horsepower | Information Source |
| Lawnmower |  |  |  |
| Light bulb |  |  |  |
| Microwave Oven |  |  |  |
| Bayliner boat |  |  |  |
| Toyota Prius |  |  |  |