

# Measuring Power

## Physics Laboratory

Name \_\_\_\_\_

Date \_\_\_\_\_ Period \_\_\_\_\_

Purpose: \_\_\_\_\_  
\_\_\_\_\_

Materials: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

### Procedure:

1. Use a stopwatch to measure the time it takes for one of your lab group to run up a short flight of stairs as fast as they can. Do not skip any steps; we need a level playing field. Take three trials with a thirty second break in between. Find the average on the data table.
2. Measure the vertical height of the stairs. Use some ingenuity; there are several ways this can be accomplished. Place your answer in the data table.
3. Determine the weight of the person in your group that ran up the stairs, in newtons. Weigh the person on the scale. The conversion for US pounds to newtons is  $1 \text{ lb.} = 4.45 \text{ N}$ . Show the work here and place the answer with the proper unit in the space to the right.

4. Use the weight, from above to determine the work done in running up the stairs. Show the work below using the equation  $W = Fd$ . Place the answer in the space provided with the unit.

5. Compute the power that was produced by your subject that ran up the stairs.  $P = W/t$  or  $P = Fd/t$ . Again place answer in the space with the correct unit.

6. Horsepower is an antiquated method of power comparison but is still used in engines and generators. Find the horsepower produced by your runner. Using the result from the previous procedure, calculate hp by using the conversion  $1 \text{ hp} = 746 \text{ W}$ . Show your work and answer in the space provided.

\_\_\_\_\_

7. Fill in the data table C with your group's result for power (pro. #5) and the associated weight of the subject. Then find nine other groups results and list those too. Create a graph of power (W) vs. weight (N).

DATA TABLE

A. Average time: trial #1 \_\_\_\_\_, trial #2 \_\_\_\_\_, trial #3 \_\_\_\_\_  
 Total time \_\_\_\_\_ - 3 = \_\_\_\_\_ (average time)

B. Vertical Height: \_\_\_\_\_ m

C. Class Data:

	Power (W)	Weight (N)
Your group	1. _____	_____
	2. _____	_____
	3. _____	_____
	4. _____	_____
	5. _____	_____
	6. _____	_____
	7. _____	_____
	8. _____	_____
	9. _____	_____
	10. _____	_____

Discussion Questions:

1. What factors were important in determining how much power was produced? Back up your answer with your graph.
2. What physical characteristics produce the highest horsepower rating in this experiment?
3. How did you personally find the vertical height the runner traveled?
4. How does the horsepower produced in this experiment compare to that of your automobile?

