Muscle Up!

Name_____

Work is done on an object whenever a force is delivered, and the object is displaced at all parallel to the force. If the object moves in the direction of the force, the work done is found by **W = F * d**. In general, the work done is found by **W = F * d * cos θ**, where **θ** is the angle between **F** and **d**. Power is the rate at which work is accomplished. In other words, time is a factor in the amount of power developed in an activity. In fact,

P = W / t

OBJECTIVE: To investigate the relationship between work, power and time in a number of simple exercises.

PROCEDURES:

1. Pick any five activities from the suggested list below.

Exercise	Required Force	Displacement
Running Stairs	Weight of runner	Vertical displacement of stairs
Vertical Leap	Weight of jumper	Vertical displacement of jumper
Push-Ups	½ weight of push-up person	Displacement from waist to floor
Chair Pull	Spring scale reading	Distance measured in hall
Dips	Weight of "dipper"	Vertical displacement of "dipper"
See-Saw	Weight of liftee	Vertical displacement of rider
Leg Curls	Weight of object lifted	Leg length
Arm Curls	Weight of object lifted	Arm length

NOTE: Your weight (in Newtons) = your weight (in pounds) / 2.2 multiplied by 9.8 m/s^2.

2. Perform the exercise for a series or repetitions and note the distance the object needs to be moved during each repetition and the total time elapsed.
3. Record your results in **Table 1** provided.
4. Continue for 4 different exercises and record data.
5. Now, exchange data with another lab pair so each group has data for 10 exercises total.
6. Calculate the **work done (in Joules)** and the **power developed (in Watts)** during each exercise and record results in **Table 2**.

DATA & RESULTS:

Table 1

	1	2	3	4	5	6	7	8	9	10
Exercise Name										
Force (N)										
Displacement (m)										
# Reps										
Time (s)										

Table 2

	1	2	3	4	5	6	7	8	9	10
Work (J)										
Power (W)										

7. Which activity developed the most power throughout? What muscle groups were used?

8. Comment on whether or not the largest power coincided with the largest force required. Must they coincide? Explain why or why not.

10. Is it possible to have a large power developed even though a small force was used? Explain.