INTRODUCTION TO WORK LAB

Part 1: Lifting objects

Has any ever asked you to help you lift something heavy? If so you probably made the comment "that was a lot of work!" This simple activity will allow you better understand how work is defined in Physics.

Purpose: To determine the amount of work done using objects of different mass.

Hypothesis: (make a prediction as to how you think work and mass are related).

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Materials: (you list)

Procedures: Part 1

IMPORTANT! YOU MUST CONVERT ALL GRAMS TO KILOGRAMS WHEN RECORDING DATA IN THE TABLE FOR MASS!!!

1. Attach the 50 g mass to the spring scale and lift it to a height of 0.50 meters.
2. **Make sure the electronic scale is using the unit "lb". Look at the lb reading on the spring scale. In order to determine the amount of force (N) needed to lift the mass to this height, multiply your reading by 4.44. Record information in the table.**
3. Now lift the same mass to a height of 1.0 meters. Look at the reading on the spring scale in order to determine the amount of force needed to lift the mass to this height. Record information in the table.
4. Repeat steps 1 – 3 with the 100g, 200g and 500g masses and record information in the table.

Calculations and Data:

Mass (kg)	Height (m)	Force (N)	Height (m)	Force (N)
0.05 kg	0.50m		1.0m	

Part 2: Determining Work

How much work did you actually do in the first part of the lab? You may think that the activity was pretty simple but you DID do work! In Physics, work is a product of force and distance. This means that you have to exert a force over a certain distance in order to actually do work! The formula for work is: **work = force X distance.** The unit for work is N-m but is expressed in **Joules (J)**.

Procedure:

1. Determine the amount of work done for each trial by completing the table below using previous information from your first table.

Calculations and Data:

Mass (kg)	Height (m)	Force (N)	Work (J)	Height (m)	Force (N)	Work (J)

Part 3: Pulling objects

Procedure:

1. Attach the electronic spring scale to the block of wood. **Make sure the units is in kilograms**. Record the mass of the block of wood in the table.
2. **Change the units on the electronic scale back to lbs.** Pull the block across the lab table a distance of 1 meter. While pulling, read the spring scale to determine the amount of force in lbs needed to pull the block of wood. **In order to determine the amount of force (N) needed to pull the wood, multiply your reading by 4.44.** Record this data in the table below.
3. Repeat steps 1 and 2 with the brick.
3. Calculate the amount of work done for each task.

Calculations and Data:

Object	Mass (kg)	Distance (m)	Force (N)	Work (J)
		1m		
		1m		

Questions and Conclusions
Answer these questions in your Full lab report

1. When you lifted each mass in part 1, what force were you acting against?

2. In Part 1 you lifted a mass to two different heights. The height changed however the amount of force needed to lift a mass higher did not. Why?

3. In Part 2, did it require more work to lift a mass to a greater height? Compare the work numbers for 0.5m and 1.0m height. Notice any pattern? Explain.

4. Compare the amount of work done to lift each mass to a height of 1 meter. Which mass required the most amount of work? Why?

5. What is the formula for work? What is the unit for work?

6. At first, both the block of wood and the brick were at rest. What type of friction did you have to overcome in order to set each one in motion?

7. Once the block of wood and brick were in motion, what type of friction was acting against you?

8. You pulled both the brick and block of wood the same distance. Which required more work? Why did one require more work than the other?

9. How much work do you do just by walking? In order to determine this, you need to know your weight in pounds. After, multiply your weight in pounds by 4.45 to convert to Newtons for force. Then use the formula for work to determine how much work you do to walk a distance of 100 meters.

10. Would a person who weighed less than you do more, or less work than you if they walked the same distance?

Final Summary
Write a paragraph that summarizes the relationship between force, mass, distance and work. Use examples from this lab to support your statements. Do not just repeat the procedure!