

Measuring Work Lab

Name(s) : _____

Problem: How do changes in the force applied to an object and the distance the object is moved by the force affect the amount of work done?

Goals: In this investigation, you will measure the forces involved in pulling a wood block under different circumstances. You will also measure the distances the block moves and then calculate the work involved.

Prediction: Carefully read the investigation before stating your prediction. Remember to give the reasons for your prediction.

Materials: spring scale calibrated in newtons long table
wood block fitted with a screw-eye hook meter stick

Prelab Prep: Practice using a spring scale to pull a wood block smoothly and at a constant speed. The large amount of initial force needed to get the block moving is NOT the force you will be measuring and should be ignored.

Procedure:

Step 1:

Attach the spring scale to the wood block and place the block on a long, smooth table. For Trial 1, hold the scale horizontal to the table and use it to pull the block. Once the wood block overcomes inertia, keep the block moving slowly and at a constant speed through a distance of 1 meter. Record distance the block moved, the position of the scale (*horizontal or vertical*), and the force reading on the scale in the Data Table.

Step 2:

For Trial 2, again slide the block slowly and at a constant speed along the table. This time, move the block a distance of 2 m. Try to keep the speed as close as possible to that in Trial 1. Record distance the block moved, the position of the scale (*horizontal or vertical*), and the force reading on the scale in the Data Table.

Step 3:

For Trial 3, stand the block on the floor, with the scale at the top. Use the scale to pull the block straight upward. Note the force reading once the block has begun moving at a constant speed. Lift the block through a distance of 1 m. Record distance the block moved, the position of the scale (*horizontal or vertical*), and the force reading on the scale.

Step 4:

For Trial 4, simply hold the block at a height of 1 m above the floor for 1 minute. Record distance the block moved, the position of the scale (*horizontal or vertical*), and the force reading on the scale in the Data Table.

Step 5:

Calculate the work done in each trial. Record this data in your Data Table.

	Force (Newtons)	Distance (meters)	Work (Joules)	Position
Trial 1				
Trial 2				
Trial 3				
Trial 4				

Observations:

1. How did the force required to move the block in Trial 1 compare to the force required to move it in Trial 2?

2. Was force involved in lifting the block in Trial 3? Was force involved in holding the block up without moving it in Trial 4? Did it feel as if you were doing work in both cases?

Analysis:

1. How did the work done in Trial 1 compare to that in Trial 2? Which factor makes the quantity of actual work done in Trial 2 different from that in Trial 1.

2. Was more work done in Trial 1 or Trial 3? In Trial 3 or Trial 4? Explain your answers.

Conclusion:

How do force and distance affect the amount of work done?
