

Calculating Work and Power

State the Problem

How much work & power is required to lift an object?

The Materials

string mass (1-kg) dowel (wood, about 50 cm long) meter stick stopwatch

The Procedure

1. Hold the dowel at both ends as shown in Figure 1.
2. Raise the 1-kg mass by winding up the string on the dowel as shown in Figure 2.
3. Keep the winding motion steady so that the string winds up and the mass rises at a constant speed. Practice raising the mass in this manner several times.
4. You are now ready to have your lab partners measure the time it takes for you to raise the mass a distance of 1 m. (using the meter stick)
5. At a signal from your lab partners, begin to raise the mass at a constant speed by winding the string on the dowel.
6. Have your lab partners use a stopwatch to measure the time required for the bottom of the 1kg mass to reach the top of the meter stick. Record this value under Table 1.
7. Reverse roles with your lab partners and allow them to repeat steps 3-6.
8. The size of the force that was needed to raise the 1-kg mass is equal to the weight of 1 kg. The distance that the 1-kg mass was raised is the distance between from the floor to the top of the meter stick, which is 1 m. Record the values for the force and distance in Table 1.
9. Calculate the work you did to raise the 1-kg mass and record this value in Table 2.
10. Calculate the power you developed lifting the 1-kg mass. Record the value in Table 2.

Figure 1

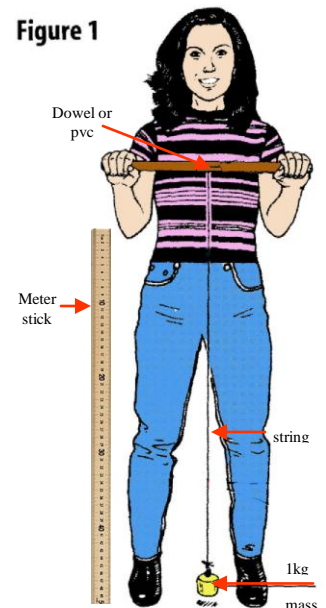
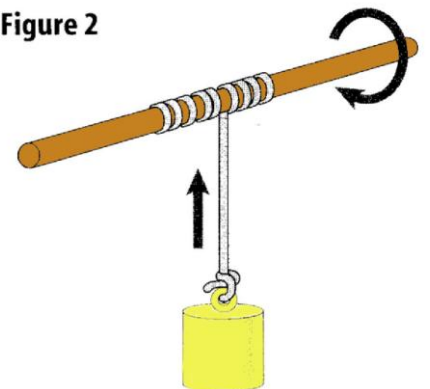


Figure 2



$$\text{Work} = \text{Force} \times \text{distance}$$

$$\text{Power} = \text{Work} / \text{time}$$