

# Work, Power, & Efficiency Worksheet

Equations to use:  $W=F*d$   $P=W/t$   $\text{Efficiency}=(W_{\text{out}}/W_{\text{in}})\times 100$

For Ideal Machines:  $W_{\text{in}} = W_{\text{out}}$

**Answer on a separate sheet of paper. Show ALL of your work.**  
**Use the GUESS or GUPPIES<sup>3</sup> method.**

1. You move a refrigerator up a 10 meter high staircase. This requires a force of 90 N. How much work was done while moving the refrigerator?
2. When you and a friend move a couch to another room, you exert a force of 75 N over 5 m. How much work did you do against gravity?
3. A crane took 5 min to lift a crate and did 3150 J of work in the process. How much power was required to move the crate? (Hint: you need to convert 5 minutes into seconds to get the correct answer 😊)
4. How much power is required to push a car for 10 seconds if the amount of work done during that time is 5500 J?
5. A passenger weighing 500 N is inside an elevator weighing 24500 N that rises 30 meters in 1 minute. How much power is needed for the elevator's trip? (hint: calculate work, then power 😊)
6. A conveyor does 789 joules of work to lift products 7 meters. If the conveyor uses 900 joules of energy (work input), what is the conveyor's efficiency?
7. How efficient is a pulley system if it enables you to lift a 700.0 Newton engine ( $F_r$ ) 0.550 meters ( $d_r$ ) if you exerted 35.7 Newtons ( $F_e$ ) of force while pulling 11.43 meters ( $d_e$ ) of rope? (Hint: calculate  $W_{\text{in}}$  &  $W_{\text{out}}$ , then efficiency 😊)
8. Using a ramp 6 meters long, workers apply an effort force of 1250 N to move a 2000 N ( $F_r$ ) crate onto a platform 2 meters high. What is the efficiency of the ramp? (Hint: calculate  $W_{\text{in}}$  &  $W_{\text{out}}$ , then efficiency 😊)
9. Suppose (ideally) a hammer claw moves a distance of 0.10 meters to remove a nail. If a resistance force of 1500 N is exerted by the claw, and you move the handle of the hammer 0.5 meters, what is the effort force?
10. Suppose an **ideal** car jack has an input work of 2750 J. It lifts a car 0.35 meters in 8 seconds. (SEE INFO AT THE TOP OF THE PAGE ABOUT IDEAL MACHINES)
  - a. What is the output work ( $W_{\text{out}}$ ) of the jack?
  - b. How much power is required to lift the car?
  - c. What is the efficiency of the jack?