

Chapter C12 Practice: Power

Physics I

College of the Atlantic

1. If you climb up a 400 meter mountain, what is the minimum amount of food calories you need for this task?
2. In a workout you sweat and evaporate half a kilogram of water. What is the minimum amount of food calories you must have “burned”?
3. A typical person might consume 2500 food calories a day. What power does this correspond to? (Answer in Watts.)
4. What is the minimum cost of bringing 1 kettle of cold tap water to a boil with an electric heater?
5. A small motor is used to power a lift that raises a 50 kg crate of tofu to a height of 5 meters in 10 seconds. What is the minimum power that the motor must provide?
6. A 60 kg person bikes up Cadillac mountain in 20 minutes. What is the minimum power they must exert? Express your answer in Watts and horsepower.
7. A one-foot length of pipe with a radius of 1 cm freezes in your basement. You plan on melting the ice in the pipe by heating it with a 1500W hair dryer. What is the minimum amount of time it will take to melt the ice?
8. You prop open the door of your refrigerator. Will the room get cold, get hot, or stay the same temperature?
9. A 1000 kg car drives up a 10 % incline at 20 m/s. (A 10 percent grade means that for every 10 meter traveled horizontally the gain in elevation is 1 meter.) What is the minimum horsepower needed for the car to do this, given that the car is about 15 % efficient?
10. What power is needed for a typical Maine home. (To calculate this, assume that the home draws energy at an equal rate all month.)
11. What area of solar cells would be needed to provide enough energy for a typical Maine home?
12. Estimate how much it costs to heat the water for a typical shower, assuming that you have an electric hot water heater. Assuming you shower daily, how much would this cost per month?