Power

1. A 60 kg box is lifted a distance of 10 meters straight up at a constant speed using a rope. How much average power is required to complete this task in 5 seconds?
2. Harry and Bob are tow workers being considered for a job at the UPS loading dock. Harry boasts that he can lift a 100 kg box 2 meters vertically, in 3 seconds. Bob counters with his claim of lifting a 200 kg box, 5 meters vertically, in 20 seconds. Which worker has the greater average power rating?
3. A 1994 Mustang is driving down a road with a constant speed f 30 m/s. The engine must exert a 5000N force (on average) to maintain that speed.
4. What is the power rating of the engine?
5. How does this compare to a 220 horsepower dodge stealth? (1 hp = 746 W)
6. An 82 kg hiker climbs Mt. Humphrey. During a two hour period, the hiker’s vertical elevation increases by 540 meters.
7. Calculate the climber’s change in gravitational potential energy.
8. Find the average power generated during this increase in gravitational potential energy.
9. How long would it take a 7.5 kW motor to raise a 500 kg piano to an apartment window 10 meters above the ground?
10. A fire truck requires a pump that can move 10 kg of water vertically 10 meters each second. Does a 1.25 hp pump have enough power to do the job? Why or why not? If not, what would be necessary?