Pre-AP Physics Problems: Work and Power

1. A weight lifter lifts a 200.0 kg barbell from the floor to a position directly over his head, a total distance of 2.50 m.

   a. How much work has the weight lifter done during the lift?

   b. If the lift took 0.85 s, what was the average power output of the lifter?

   c. The weight lifter then holds the weight overhead for 5.0 s. How much work is done during this 5 second time period?

2. A 45.5 kg wooden trunk is pushed at a constant speed across a level floor.
   a. If the coefficient of friction is 0.250 how much force must be applied to the trunk?

   b. How much work is done in pushing the trunk a distance of 9.75 m?

3. How much work is done when a sled is pulled 20.0 m across level ground at a constant speed by a force of 105 N exerted on a rope that makes an angle of 35.0° with the horizontal?

4. A 1.20×10^3 kg elevator moves 3.50 m from one floor to the one above it in 4.30 s.
   a. What is the average velocity of the elevator?

   b. What is the gravitational force on the elevator?

   c. What is the average power rating in kilowatts of the elevator motor?

5. A 1.50 kW motor moves a lawn tractor at a constant 1.2 m/s. What force is being applied to the tractor by its motor?

Work-kinetic energy theorem problems:

6. A 2.0×10^3 kg car accelerates from rest under the actions of two forces. One is a forward force of 1140 N provided by traction between the wheels and the road. The other is a 950 N resistive force due to various frictional forces. Determine how far the car must travel for its speed to reach 2.0 m/s.

7. A 75 kg bobsled is pushed along a horizontal surface by two athletes. After the bobsled is pushed a distance of 4.5 m (starting from rest) its speed is 6.0 m/s. Find the magnitude of the net force on the bobsled.