# Physical Science, Dr. Gladden
# HW#06 Solutions

## Solutions to Chapter 7 Exercises

7. Work done by each is the same, for they reach the same height. The one who climbs in 30 s uses more power because work is done in a shorter time.

11. When a rifle with a long barrel is fired, more work is done as the bullet is pushed through the longer distance. A greater KE is the result of the greater work, so of course, the bullet emerges with a greater velocity. (It might be mentioned that the force acting on the bullet is not constant, but decreases with increasing distance inside the barrel.)

20. If the ball is given an initial KE, it will return to its starting position with that KE (moving in the other direction!) and hit the instructor. (The usual classroom procedure is to release the ball from the nose at rest. Then when it returns it will have no KE and will stop short of bumping the nose.)

34. Both will have the same speed. This is easier to see here because both balls convert the same PE to KE.

37. Yes, a car burns more gasoline when its lights are on. The overall consumption of gasoline does not depend on whether or not the engine is running. Lights and other devices run off the battery, which "run down" the battery. The energy used to recharge the battery ultimately comes from the gasoline.

58. Net momentum before the lumps collide is zero and is zero after collision. Momentum is indeed conserved. Kinetic energy after is zero, but was greater than zero before collision. The lumps are warmer after colliding because the initial kinetic energy of the lumps transforms into thermal energy. Momentum has only one form. There is no way to "transform" momentum from one form to another, so it is conserved. But energy comes in various forms and can easily be transformed. No single form of energy such as KE need be conserved.

# Chapter 7 Problem Solutions

3. The work done by 10 N over a distance of 5 m = 50 J. That by 20 N over 2 m = 40 J. So the **10-N force over 5 m** does more work and could produce a greater change in KE.

4. At three times the speed, it has 9 times ($3^2$) the KE and will skid 9 times as far—**135 m**. Since the frictional force is about the same in both cases, the distance has to be 9 times as great for 9 times as much work done by the pavement on the car.

5. $(F \times d)_{in} = (F \times d)_{out}$
   $50\ N \times 1.2\ m = W \times 0.2\ m$
   $W = [(50\ N)(1.2\ m)]/0.2\ m =$ **300 N**.

6. $(F \times d)_{in} = (F \times d)_{out}$
   $F \times 2\ m = 5000\ N \times 0.2\ m$
   $F = [(5000\ N)(0.2\ m)]/2\ m =$ **500 N**.