Work Energy and Power Worksheet #2

Do all problems on a separate sheet of paper. Solve problems using the Problem Solving Methodology for homework credit.

Kinetic Energy Problems

1. Calculate the kinetic energy of:
    a. A car with a mass of 1500 kg moving at a velocity of 11m/s (about 40 km/hr).
    b. A 7.4 kg bowling ball moving at 3.0 m/s
    c. A baseball (mass = 0.145 kg) thrown at 40.2 m/s (90 mph).

2. Two bullets have masses of 3.0 g and 6.0 g respectively. Both are fired with a speed of 40.0 m/s.
    a. What is the kinetic energy of each?
    b. What is the ratio of their kinetic energies?

3. Two 3.0 g bullets are fired with speeds of 40.0 m/s and 80.0 m/s, respectively.
    a. What is the kinetic energy of each?
    b. What is the ratio of their kinetic energies?

Net Work=ΔKinetic Energy Problems

4. Starting from rest, a student (mass = 57.0 kg) wearing in-line skates is pushed by a friend with a constant horizontal force of 42.0 N. She is pushed for a distance of 16.0 m. Ignore friction.
    a. What is her final kinetic energy?
    b. What is her velocity?

5. A 1250 kg car accelerates from rest. Two forces act on the car. One is a forward force of 1140 N provided by the traction between the wheels and the road. The second is a 425 N force due to various friction forces.
    a. What is the net force acting to change the car's velocity?
    b. If the car accelerates for a distance of 25 m, what is its velocity?

6. When a 0.045 kg golf ball takes off after being hit, its speed is 41 m/s.
    a. How much work is done on the ball by the club?
    b. Assume that the force of the club acts in the direction of the ball and the club is in contact with the ball for a distance of 0.010 m, determine the average force applied to the ball by the club.

7. How large a force is required to accelerate a 1300 kg car from rest to a speed of 20.0 m/s in a distance of 90.0 m?

8. a.) Calculate the stopping distance of a car with a mass of 1100 kg going 22.4 m/s (about 50 miles/hr), assuming the force of friction between the road and the tires is 7500 N (this corresponds to a coefficient of friction of about 0.7 - what you would expect on a dry road).

    b.) Now increase the speed to 31.7 m/s (about 70 miles/hr) and calculate the stopping distance again.

    c.) How do the stopping distances compare? How does the kinetic energy of the car going 22.4 m/s compare with the car going 31.7 m/s?

    d.) Write the equation relating work and ΔKE. How is stopping distance of a car related to the car's velocity?