Work and Kinetic Worksheet

1. When the speed of an object doubles, does its kinetic energy double? Explain your answer.

2. A 50 kg bicyclist on a 10 kg bicycle speeds up from 5.0 m/s to 10 m/s.
    (a) What was the total kinetic energy before accelerating?
    (b) What was the total kinetic energy after accelerating?
    (c) How much work was done to increase the kinetic energy of the bicyclist?
    (d) Is it more work to speed up from 0 to 5.0 m/s than from 5.0 to 10.0 m/s?

3. At the moment when a shotputter releases a 5.00 kg shot, the shot is 3.00 m above the ground and travelling at 15.0 m/s. It reaches a maximum height of 8.00 m above the ground and then falls to the ground. If air resistance is negligible,
    (a) What was the potential energy of the shot as it left the hand relative to the ground?
    (b) What was the kinetic energy of the shot as it left the hand?
    (c) What was the total energy of the shot as it left the hand?
    (d) What was the total energy of the shot as it reached its maximum height?
    (e) What was the potential energy of the shot at its maximum height?
    (f) What was the kinetic energy of the shot at its maximum height?
    (g) What was the kinetic energy of the shot just as it struck the ground?

4. A 6.0 kg metal ball moving at 4.0 m/s hits a 6.0 kg ball of putty at rest and sticks to it. The two go on at 2.0 m/s.
    (a) What is the kinetic energy of the metal ball before it hits?
    (b) What is the kinetic energy of the metal ball after it hits?
    (c) What is the kinetic energy of the putty ball after being hit?
    (d) How much energy does the metal ball lose in the collision?
    (e) How much kinetic energy does the putty ball gain in the collision?
    (f) What happened to the rest of the energy?

5. A 3.0 kg metal ball, at rest, is hit by a 1.0 kg metal ball moving at 4.0 m/s. The 3.0 kg ball moves forward at 2.0 m/s and the 1.0 kg ball bounces back at 2.0 m/s.
    (a) What is the total kinetic energy before the collision?
    (b) What is the total kinetic energy after the collision?
    (c) How much energy is transferred from the small ball to the large ball?

6. Two balls with the same mass, one of wood and the other a ping-pong ball partly filled with sand, are rolled along a desk. The wooden ball rolls along nicely, but the ping-pong ball stops in a few centimetres. What happened to its kinetic energy? Was the kinetic energy changed to heat energy by the force of friction between the ball and the desk? Explain your answer.