Ph201H/211H
F08   Homework – Due November 24, 2008

1. A 4.5-kg dog is standing on a floating flatboat so that he is 6.1 m from the shore. The dog walks a distance of 2.4 m along the boat toward the shore and then halts. The boat has a mass of 18.2 kg, and friction with the water can be neglected. How far is the dog then from the shore?

Answer: 4.2 m

2. A 55.0-kg jumper leaps vertically into the air from a crouching position in which her center of mass is 0.40 m above the ground. As her feet leave the floor her center of mass is 0.90 m above the ground and it rises to 1.20 m at the top of her leap. (a) What upward force, assumed constant, does the ground exert on her? (b) What maximum speed does she attain?

Answers: (a) 860 N (b) 2.4 m/s

3. A 110-kg ice hockey player skates at 3.0 m/s toward a railing at the edge of the ice and stops himself by grasping the railing with his outstretched arms. During this stopping process, his center of mass moves 0.30 m toward the railing. (a) Find the average force that he must exert on the railing. (b) By how much did his internal energy change?

Answers: (a) 1700 N (b) 495 J

4. The NTSB is testing the crashworthiness of a new car. The 2340-kg vehicle is driven at 3.50 m/s into an abutment. During impact the center of mass of the car moves forward by 0.64 m, and the abutment is compressed by 0.083 m. Ignore friction between the car and the road. (a) Find the force, assumed constant, exerted by the abutment on the car. (b) By how much does the internal energy of the car increase?

Answers: (a) 22,400 N (b) 12,500 J