PRACTICE 5D

Conservation of mechanical energy

1. A bird is flying with a speed of 18.0 m/s over water when it accidentally drops a 2.00 kg fish. Assuming the altitude of the bird is 5.40 m, and disregarding friction, what is the speed of the fish when it hits the water?

2. A 755 N diver drops from a board 10.0 m above the water's surface.
   a. Find the diver's speed 5.00 m above the water's surface.
   b. Find the diver's speed just before striking the water.

3. If the diver in item 2 leaves the board with an initial downward speed of 2.00 m/s, find the diver's speed when striking the water.

4. An Olympic high jumper leaps over a horizontal bar. The jumper's center of mass is raised 0.25 m during the jump. Calculate the minimum speed with which the athlete must leave the ground to perform this feat.

5. A pendulum 2.0 m long is released from rest when the support string is at an angle of 25.0° with the vertical. What is the speed of the bob at the bottom of the swing?