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Ch 5.3 - Page 177 - Practice Problems E - 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. If the altitude of the bird is 5.40 m and friction is disregarded, 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. Find the diver’s speed 5.00 m above the water surface. The find the diver’s speed just before striking the water.
3. If the diver in item 2 leaves the board with the initial upward speed of 2.0 m/s, find the diver speed with striking the water.
4. An Olympic runner leaps over a hurdle. If the runner’s initial vertical speed is 2.2 m/s, how much will the runner’s center of mass be raised during the jump?
5. A pendulum bob is released from some initial height such that the speed of the bob at the bottom of the swing is 1.9 m/s. What is the initial height of the bob?
6. The staples inside a stapler are kept in place by a spring with a relaxed length of 0.115 m. If the spring constant is 51 N/m, how much elastic potential energy is stored in the spring when it length is 0.150 m?
7. A 40.0 kg child is in a swing that is attached to ropes 2.00 m long. Find the gravitational potential energy associated with the child relative to the child’s lowest position under the following conditions:
8. When the ropes are horizontal
9. When the ropes makes a 30.0° angle with the vertical
10. At the bottom of the circular arc