**Phys 2010 (NSCC), Fall 2005**
Problem Set #8

1. A 300-kg car moves under down a level highway under the actions of two forces: a 1000-N forward force exerted on the drive wheels by the road and a 950-N resistive force. Use the work–energy theorem to find the speed of the car after it has moved a distance of 20 m.

2. A 2.0-m long pendulum is released from rest when the support string is at an angle of 25° from the vertical. What is the speed of the bob at the bottom of the swing?

25°
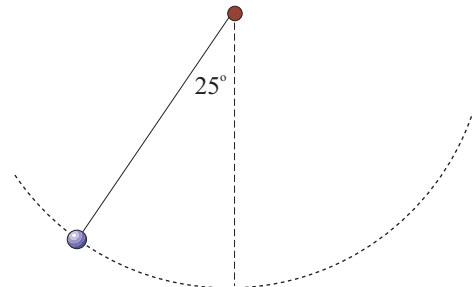
3. Tarzan swings on a 30.0-m-long vine initially inclined at an angle of 37° with the vertical. What is his speed at the bottom of the swing if he pushes off with a speed of 4.00 $\frac{m}{s}$?

37°

4 m/s
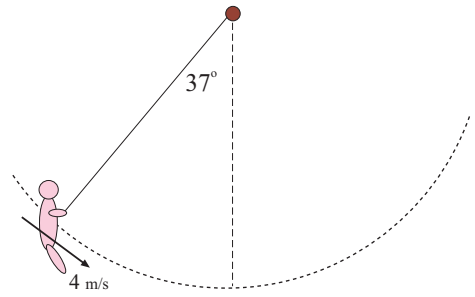
4. A 70-kg diver steps off a 10-m tower and drops from rest straight down into the water. If he comes to rest 5.0 m beneath the surface, determine: (a) The work done on him by the resistive force of the water, and (b) the average resistive force exerted on him by the water.

10 m

5 m
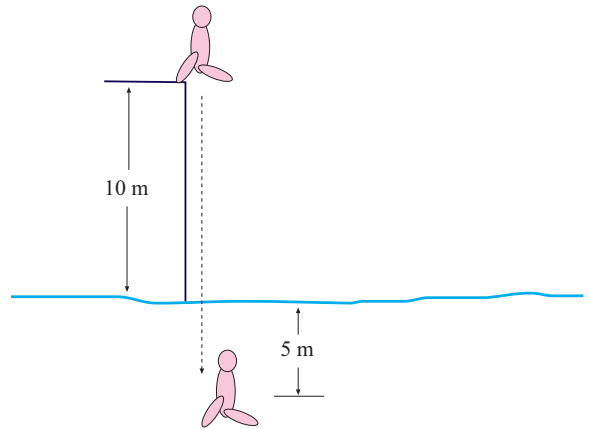
5. The electric motor of a model train accelerates the train from rest to $0.620 \frac{\text{m}}{\text{s}}$ in 21.0 ms. The total mass of the train is 875 g. Find the work done on the train in the given time.

6. For the accelerating train in problem 5, find the average power delivered to the train during the acceleration.

7. A skier of mass 70 kg is pulled up a slope by a motor-driven cable. How much work is required to pull him 60 m up a 30° slope (assumed frictionless) at a constant speed of 2.0 $\frac{m}{s}$?

8. How much power must a motor have to perform this task?