

Honors Physics - Chapter 5 Practice Problems

- 1) A hummingbird has a mass of about 1.7 grams. Suppose a hummingbird does 0.15 J of work against gravity, so that it ascends straight up with a net acceleration of 1.2 m/s^2 . How far up does it move?
- 2) The largest turtle ever caught in the United States had a mass of over 800 kg. Suppose this turtle were raised 5.45 m onto the deck of a research ship. If it takes $4.60 \times 10^4 \text{ J}$ of work to lift the turtle this distance at a constant velocity, what is the turtle's weight?
- 3) The longest shish kebab ever made was 881.0 m long. Suppose the meat and vegetables need to be delivered in a cart from one end of this kebab's skewer to the other end. A cook pulls the cart by applying a force of 40.00 N at an angle of 45.00° above the horizontal. If the force of friction acting on the cart is 28.00 N, what is the net work done on the cart and its contents during the delivery?
- 4) Dan Jansen of the United States won a speed-skating competition at the 1994 Winter Olympics in Lillehammer, Norway. He did this by skating 500 m with an average speed of 50.3 km/h. If his kinetic energy was $6.54 \times 10^3 \text{ J}$, what was his mass?
- 5) The tops of the towers of the Golden Gate Bridge, in San Francisco, are 227 m above the water. Suppose a worker drops a 655 g wrench from the top of a tower. If the average force of air resistance is 2.20 percent of the force of free fall, what will the kinetic energy of the wrench be when it hits the water?
- 6) At the 1984 Winter Olympics, William Johnson of the United States reached a speed of 104.5 km/h in the downhill skiing competition. Suppose Johnson left the slope at that speed and then slid freely along a horizontal surface. If the coefficient of kinetic friction between the skis and the snow was 0.120 and his final speed was half of his initial speed, find the distance William traveled.
- 7) A pogo stick contains a spring with a force constant of $1.5 \times 10^4 \text{ N/m}$. Suppose the elastic potential energy stored in the spring as it is pushed downward is 120 J. How far is the spring compressed?
- 8) A 5.0 kg stone is slid up a frictionless ramp that has an incline of 25.0° . How long is the ramp if the gravitational potential energy associated with the stone is $2.4 \times 10^2 \text{ J}$?
- 9) One species of eucalyptus tree grows to heights similar to those attained by California redwoods. Suppose a bird sitting on top of one specimen of eucalyptus tree drops a nut. If the speed of the falling nut at the moment it is 50.0 m above the ground is 42.7 m/s, how tall is the tree? Do you need to know the mass of the nut to solve this problem? Disregard air resistance.
- 10) The world's tallest lighthouse is in Japan and is 106 m tall. A winch that provides $3.00 \times 10^2 \text{ W}$ of power is used to raise 14.0 kg of equipment to the lighthouse top at a constant velocity. How long does it take the equipment to reach the lighthouse top?