Mixed Energy Practice

    

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1. A 1.5 kg ball is thrown directly downward with an initial velocity of 18 m/s from a height of 25 m. If the velocity of the ball is 24 m/s at ground level, how much energy is lost due to air resistance?
2. A 40 kg sled is pulled across a horizontal surface a distance of 30 m by a 250 N force angled 37° above the horizontal. If the coefficient of kinetic friction between the sled and the surface is 0.15, what is the net work done to the sled?
3. How much work is being done by friction for a 2.5 kg block to slide 1.8 m down a 45° incline in 0.90 s after starting from rest?
4. A 50 kg circus performer dives from a height of 8.5 m into a bucket of water 0.75 m tall. What force must the water exert on the performer in order for her to stop before the bottom of the bucket?
5. A 3.6 kg block is pushed into a horizontal spring along a frictionless surface. If the spring constant of the horizontal spring is 150 N/m, and the block is pushed 0.75 m into the spring, to what height would the block travel up an incline when released from the spring?
6. A 100 kg washing machine is being placed into a second story apartment located 3.1 m above the ground.
   1. How much work is being done to raise it into the apartment at a constant velocity?
   2. How much work would be done if a frictionless 30° incline were used instead?
   3. Calculate the force required to push the washing machine up the incline in part b at a constant velocity.
7. Each second, 1200 m3 of water passes over a waterfall 100 m high. Three-fourths of the kinetic energy gained by the water in falling is transferred to electrical energy by a hydroelectric generator. How much power does the generator produce as electrical energy? (The mass of 1 m3 of water is 1000 kg.)
8. A 0.342 kg cart rolls down an inclined ramp. The initial height of the cart is 0.68 m above the surface of a table. If the speed of the cart is 2.6 m/s when it is 0.28 m above the surface of the table, how much energy has been lost to friction during the run?