(H)

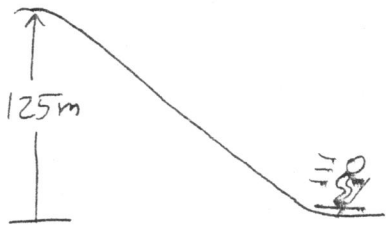
Energy Problem Set III

Do all work in your journal. Be sure to list givens and unknowns, draw an FBD, write an equation for net force, and solve in the appropriate format.

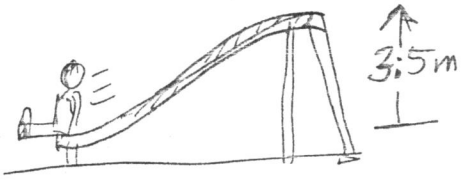
1. Movers push a 150 kg crate 12.3 meters across a rough floor at a constant speed. If the coefficient of friction is 0.7, how much work did they do?

2. At an accident scene on a level road, investigators measure a car's skid mark to be 88 meters long. It was a rainy day, and the coefficient of friction was 0.42. How fast was the car going when the driver locked on the brakes?

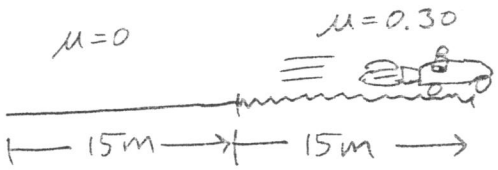
3. A novice skier, starting from rest, slides down a frictionless hill that is 125 meters high. How fast is she going when she reaches the bottom?



4. A 17 kg child descends a slide 3.5 meters high and reaches the bottom with a speed of 2.5 m/s. How much heat was generated by friction?



5. A 90 kg toy rocket sled, starting from rest, is pushed with a force of 350 N across 15 meters of frictionless ice. Then it gets pushed across another 15 meters, this time on *real* ice with a coefficient of friction of 0.30. How fast is it going at the end of the total 30 meters?



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Helpful Hints

Use ***only*** when you are stumped. Pay attention to when you need help so you can ask good questions in class when we go over this.

① $W = \text{Heat}$ $\quad \text{Work} = F_f \cdot d = (\mu F_N)d = (\mu F_g)d = (\mu mg)d$

② $KE_i = \text{Heat}$ $\quad \frac{1}{2}mv_i^2 = F_f \cdot d$

③ $PE_i = KE_f$ $\quad mgh_i = \frac{1}{2}mv_f^2$

④ $PE_i = KE_f + \text{Heat}$ $\quad \text{Heat} = mgh_i - \frac{1}{2}mv_f^2$

⑤ $W = KE_f + \text{Heat}$ $\quad F_A(30m) = \frac{1}{2}mv_f^2 + F_f \cdot (15m)$

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