

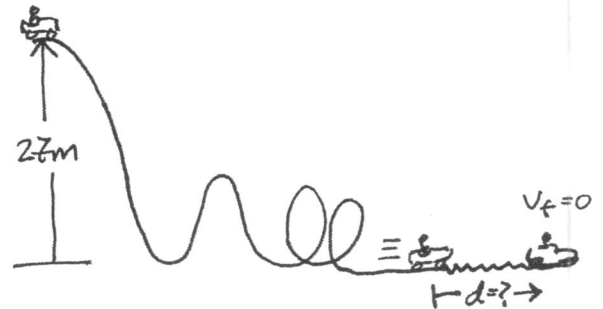
Energy Problem Set IV

Do all work in your journal. Be sure to list givens and unknowns, write a generic and specific energy equation, and solve in the appropriate format.

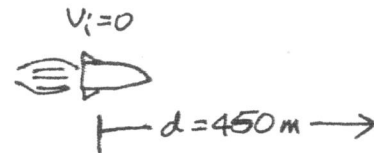
1. A 650 kg roller coaster car rolls down a hill from a height of 27 meters. It then travels through a perfectly frictionless ride.

a) How fast is it going at the end of the ride?

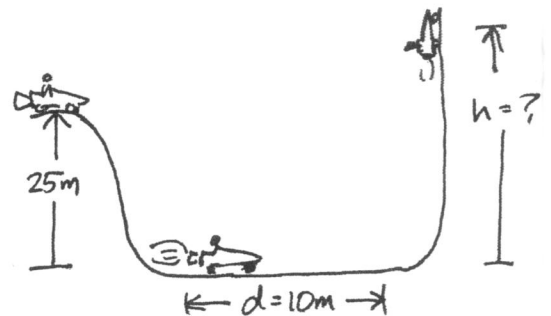
b) If the force of friction of the brakes at the end of the ride is 16000 N, how far will it skid before coming to a halt?



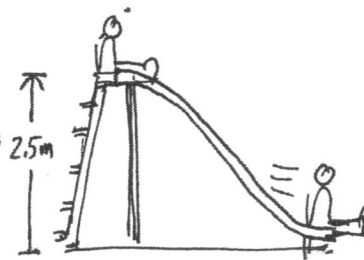
2. A rocket in weightless space fires its engines which exert a force of 12,000 N through a distance of 450 meters. If the rocket has a mass of 4400 kg, how fast will it be going after the rockets fire?



3. A 300 kg roller coaster drops from a height of 25 meters, has a rocket push it with a force of 2000 N for a distance of 10 meters. How high will it go up the next hill before falling back down?



4. A 25 kg child slides down a playground slide from a height of 2.5 meters. If she's going 8 m/s when she gets to the bottom, how much heat was generated by friction on the way down?



5. A toy rocket with a mass of 3.5 kg lifts off from rest. The engines fire with a force of 95 N. How fast is it going when it passes the top of a tree that is 26 meters high?



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 $m = 650 \text{ kg}$

a) $V_i = 0$

$h_i = 27 \text{ m}$

$V_f = ?$

$$PE_i = KE_f$$

b) $F_f = 16000 \text{ N}$

$d = ?$

$$PE_i = \text{Heat}$$

② $F = 12000 \text{ N}$

$d = 450 \text{ m}$

$m = 4400 \text{ kg}$

$V_f = ?$

$$W = KE_f$$

③ $m = 300 \text{ kg}$

$h_i = 25 \text{ m}$

$F = 2000 \text{ N}$

$d = 10 \text{ m}$

$h_f = ?$

$$W + PE_i = PE_f$$

④ $m = 25 \text{ kg}$

$h_i = 2.5 \text{ m}$

$V_f = 8 \frac{\text{m}}{\text{s}}$

$\text{Heat} = ?$

$$PE_i = KE_f + \text{Heat}$$

⑤ $m = 3.5 \text{ kg}$

$V_i = 0$

$F = 95 \text{ N}$

$h_f = 26 \text{ m}$

$V_f = ?$

$$W = KE_f + PE_f$$