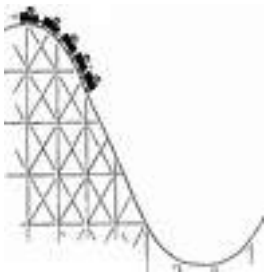
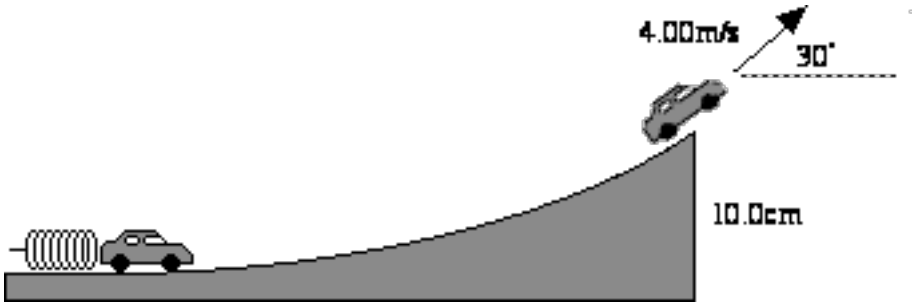
1. The roller coaster show at the right is filled with riders and has a total mass of 2000kg. At the top of the 40.0m high hill it is moving at 6.00m/s. At the bottom it has a speed of 22.0m/s. (a)Describe at least two non-conservative forces that might be acting on the roller coaster and (b)find the total work done by all non-conservative forces.



2. A child's toy shown below consists of a spring (k = 2000N/m) that when released from a compression of 3.00cm sends a 75g toy car up a 10.0cm high ramp and launches the car at 4.00m/s at an angle of 30° above horizontal. (a)Name at least two non-conservative forces that might be acting on the car between the time it leaves the spring and the time it leaves the ramp. (b)Find the total work done by all the non-conservative forces.



3. You may have noticed that when you use a pay-to-play pool table, the cue ball always returns but the other balls don't. Suppose the thing works because the other balls have a mass that is only 90% the mass of the cue ball. You fire the cue ball at the eight ball hoping to make the eight ball travel at 3.50m/s at a 45.0° angle to the initial direction of the cue ball. Find (a)the speed you need to launch the cue ball, (b)the angle the cue ball makes with its original direction, and (c)the speed of the cue ball after the collision. You may assume the collision is elastic.

4. A 5.00g bullet fired horizontally at a 1.00kg wooden block with a speed of 450m/s goes quickly and completely through the block. The block is attached to the ceiling with a long string and as a result of the collision, swings upward a vertical distance of 5.00mm. Find (a)the initial kinetic energy of the bullet, (b)the speed of the block just after the bullet leaves, (c)the speed of the bullet as it leaves the block, and (d)the final kinetic energy just after the collision. (e)Is this an elastic collision?