

Momentum: Skate-Board Exhibition

You are helping your friend prepare for his skate-board clowning stunt. For his program, he plans to take a running start, then jump onto a gigantic 7kg stationary skateboard. He and the skateboard will glide in a straight line along a short, level section of track, then up a sloped concrete wall. He has measured his maximum running speed to jump safely on the skateboard at 6 m/s, and he wants to know how high above ground level he will make as he rolls up the slope. He tells you his weight is 70 kg.

The first part of the problem is an inelastic collision; your moving friend collides with and sticks to a skateboard. Using conservation of momentum, you can find the speed that your friend will move with while on the skateboard. The second part of the problem uses energy conservation. The kinetic energy your friend has with his skateboard becomes gravitational potential energy as he moves up the incline. You can find the height that he reaches by equating the gravitational potential energy at the highest point, where the skateboard has ceased motion, to the kinetic energy of your friend on the board when he is on the level section of the track. You should obtain a height of 1.52 m.

