

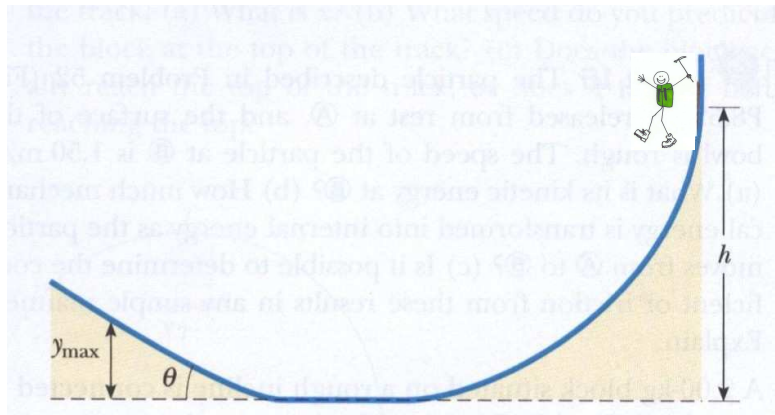
These are the type of questions that you will be asked to solve on the upcoming exam. Don't give up too soon. Take your time and be organized.

1. A proton collides elastically with another proton that is initially at rest. The incoming proton has an initial speed of 3.50×10^5 m/s and makes a glancing collision with the second proton. (In this collision, the protons exert a repulsive electrostatic force on each other.) After the collision, one proton moves off at an angle of 37.0° to the original direction of its motion, and the second proton deflects at an angle Φ to the same axis. Find the final speeds of the two protons and the angle Φ .

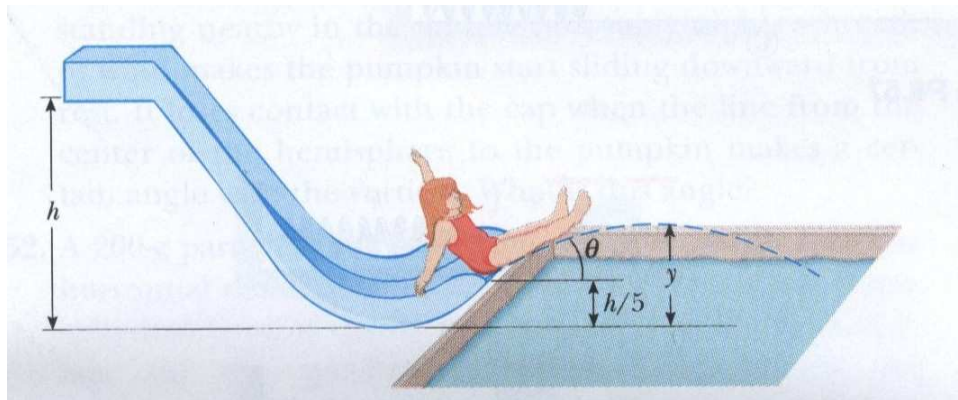
ANSWER: $\Phi = 53^\circ$ and $v_{1f} = 2.8 \times 10^5$ m/s and $v_{2f} = 2.12 \times 10^5$ m/s

2. Quang slides down a curved frictionless track and then up an inclined plane as shown below. The coefficient of kinetic friction between David and the incline is μ_k . Use energy methods to show that the maximum height reached by David is

$$y_{\max} = \frac{h}{1 + \mu_k \cot \theta}$$



3. Sarah slides without friction from a height h along a curved water slide. She is launched from a height $h/5$ into the pool. Determine her maximum airborne height y in terms of h and θ .



Answer:

$$y = \frac{h}{5} (4 \sin^2 \theta + 1)$$

4. A glider of mass $m_1 = 1.60$ kg initially moving to the right with a speed of 4.00 m/s on a frictionless horizontal air-track collides elastically with a spring attached to a second glider of mass $m_2 = 2.10$ kg initially moving to the left with a speed of 2.50 m/s.

Find the velocities of the two gliders after the collision. **Answer:** $v_{1f} = -3.38$ m/s $v_{2f} = 3.12$ m/s