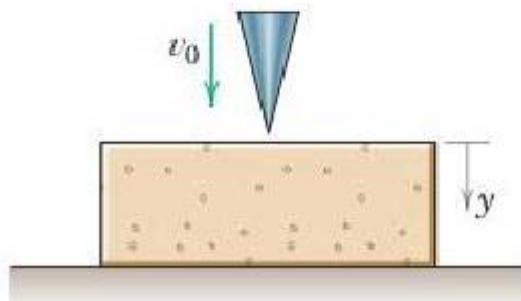


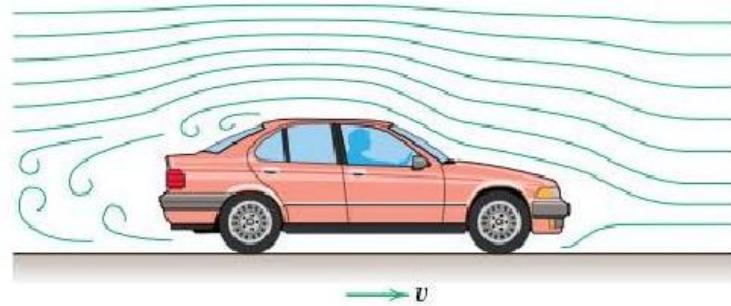
PROBLEM 2/45

The cone falling with a speed v_0 strikes and penetrates the block of packing material. The acceleration of the cone after impact is $a = g - cy^2$, where c is a positive constant and y is the penetration distance. If the maximum penetration depth is observed to be y_m , determine the constant c .



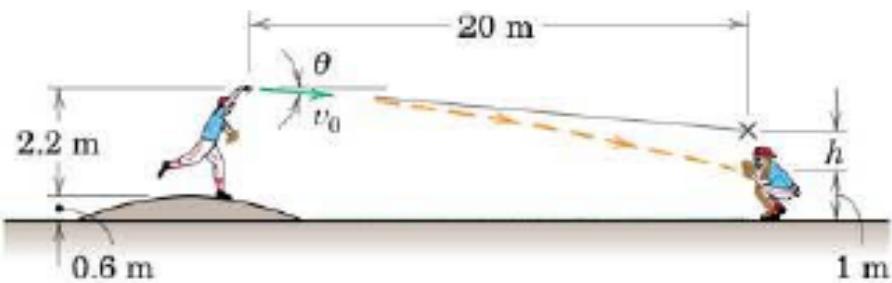
PROBLEM 2/47

The aerodynamic resistance to motion of a car is nearly proportional to the square of its velocity. Additional frictional resistance is constant, so that the acceleration of the car when coasting may be written $a = -C_1 - C_2v^2$, where C_1 and C_2 are constants which depend on the mechanical configuration of the car. If the car has an initial velocity v_0 when the engine is disengaged, derive an expression for the distance D required for the car to coast to a stop.



PROBLEM 2/89

Determine the location h of the spot toward which the pitcher must throw if the ball is to hit the catcher's mitt. The ball is released with a speed of 40 m/s.



PROBLEM 2/95

A projectile is launched with speed v_0 from point A. Determine the launch angle θ which results in the maximum range R up the incline of angle α (where $0 \leq \alpha \leq 90^\circ$). Evaluate your results for $\alpha = 0, 30^\circ$, and 45° .

