----- Problem 1 ----- The terminal speed of an object falling through a medium is the speed at which $m\vec{g}$ and the drag force add together vectorially to give $\vec{F}_{net} = 0$.

- Work out an expression for $v_{\text{terminal}}$ in terms of the parameters that appear in the quadratic model for air drag, $m$, and $g$.

----- Problem 2 ----- Skydiver $A$ in a particular orientation has a terminal speed of 60 m/s. Skydiver $B$ is identical to skydiver $A$ in all respects except one: their masses differ.

- If $B$’s mass is twice that of $A$’s, what is the terminal speed of skydiver $B$?
- How do the masses of $B$ and $A$ compare if $B$’s terminal speed is twice that of $A$’s?

----- Problem 3 ----- A car is attempting to round an icy unbanked turn that lies in the horizontal plane. The radius of the turn is 21 m and the coefficient of static friction between the tire’s rubber and the ice on the road is 0.15.

- What is the safest maximum speed around this turn?

----- Problem 4 ----- A tetherball of mass $m$ is observed to circulate around a pole. The cord is of length $L$ and it makes an $\theta$ with respect to the vertical pole.

- Find the speed of the ball and the tension in the cord in terms of $m$, $L$, $\theta$, and $g$. 