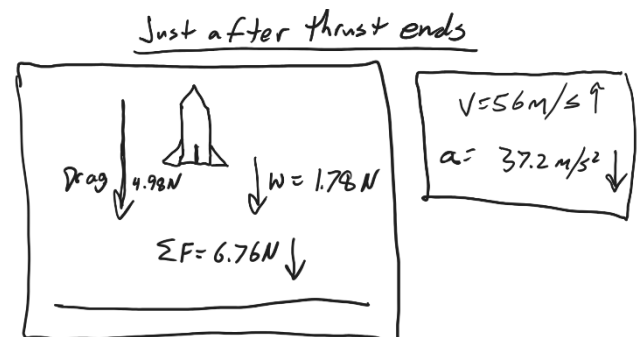
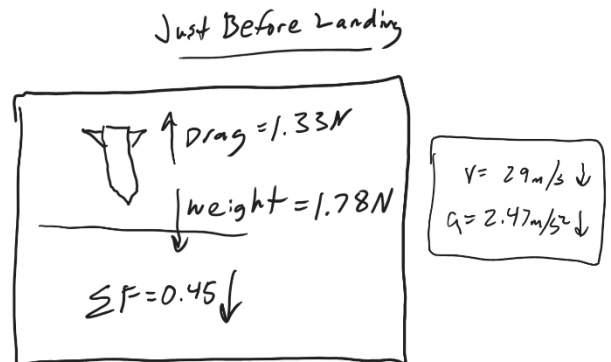


1. Suppose a rocket's thrust lasts for **0.055s**. Immediately after thrust ends, the rocket is **2.4m** above the ground. Its velocity is **56m/s**, upward. Its mass (now that the water is gone) is **0.182kg**. The rocket's drag coefficient is **0.25**, and its cross-sectional area is **0.01m²**. The density of the air surrounding the rocket is **1.27kg/m³**. The rocket does not have a parachute, and its characteristics (drag coefficient and Area) do not change during flight.

- Find the rocket's total time aloft **8.065s**
- Find the rocket's maximum height **78.9m**
- For the moment just before the rocket lands (just before the time you gave as an answer to part a, sketch a diagram showing...
 - the rocket
 - all of the individual forces (and the net force) acting on the rocket
 - the net force acting on the rocket
 - the rocket's acceleration
 - the rocket's velocity
- For the moment just after thrust ends ($t=0.055s$), sketch a diagram showing...
 - all of the individual forces (and the net force) acting on the rocket
 - the net force acting on the rocket
 - the rocket's acceleration
 - the rocket's velocity



2. [The numbers provided here are estimates, but use them as if they were precise measurements.] Wiffle®

ball has a mass of about **19g** and a diameter of about **7cm**. A baseball has a mass of about **145g** and a diameter of about **7.4cm**. Suppose someone throws each of them directly upward at a speed of **30mph**. Let's assume that they are released from a height of **1.4m**. Let's also assume that they each have a drag coefficient of **0.5**, and that the density of the air surrounding each of them is **1.27kg/m³**...

- For the baseball, find...
 - It's cross-sectional area **0.0043008m²**
 - Maximum height reached. **9.903m**
 - Total time aloft. **2.745s**
 - Terminal Velocity **-32.25m/s**
 - Maximum drag force (ignore sign) **-0.24493N**
 - Find the crashdown speed (speed just before landing)? **13.35m/s**
- For the Wiffle ball, find...
 - It's cross-sectional area **0.0038485m²**
 - Maximum height reached. **7.48m**
 - Total time aloft. **2.375s**
 - Terminal Velocity **-12.3m/s**
 - Maximum drag force (ignore sign) **-0.2192N**
 - Find the crashdown speed (speed just before landing)? **9.7m/s**