## APPLICATIONS OF NEWTON'S 2ND LAW

Instructions: Answer the following questions in your journal. Make sure to draw a FBD for each situation and show all of your work completely. Please indicate net force next to your FBD.

1. A persistent coyote is trying to drop a wrecking ball on a pesky roadrunner! If the mass of the wrecking ball is 500. kg and it is hung from a spring scale **what does the scale read when the wrecking ball:**

    a. ... is at rest

    b. ... is accelerating downwards at 2.00 $^m/_{s^2}$

    c. ... is accelerating upwards at 2.00 $^m/_{s^2}$

    d. ... is being lifted at a constant rate of 1.00 $^m/_s$

   e. ... is being lowered at a constant rate of 1.00 $^m/_s$
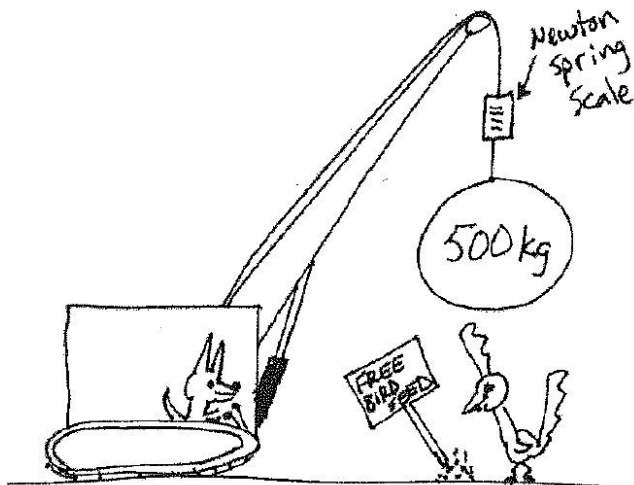
2. A 20.0 kg rock is sitting on a bathroom scale in an elevator. **Fill in the blanks** for the following statements, but be sure to show all of your work completely!

    a. The scale reads _____ N to cause an upward acceleration* 2.00 $^m/_{s^2}$

    b. The scale reads _____ N to cause an downward acceleration* 2.00 $^m/_{s^2}$

   *doesn't indicate the direction of movement of the elevator!
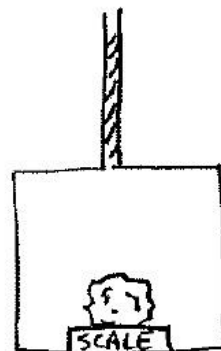
3. Jack and Jill have identical cars. Both have a mass of 60.0 kg and both are driving at 20.0 $^m/_s$ when they collide with identical brick walls.
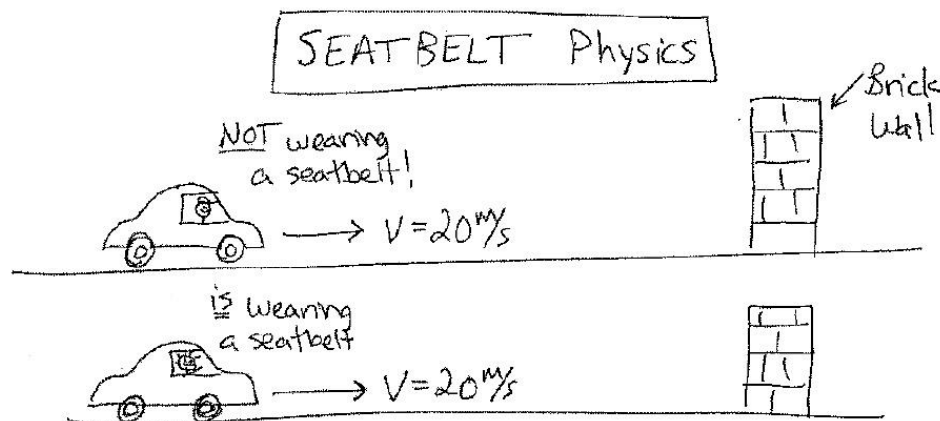
Jack is not wearing a seatbelt, but Jill is. If it takes Jill 0.10 seconds to stop during the crash, but it only takes Jack 0.010 seconds, **compare the forces of impact** they experience.

4. A 2009 Mazda CX-7 and a 1970 Ford Galaxie 500 collide with a wall with an initial velocity of 20. $^m/_s$. The 2500 kg CX-7 has a crumple distance of 1.0 m during the crash. The 2500 kg Ford has a crumple distance of 0.20 m. **Compare the force of impact** on both cars during the crash.
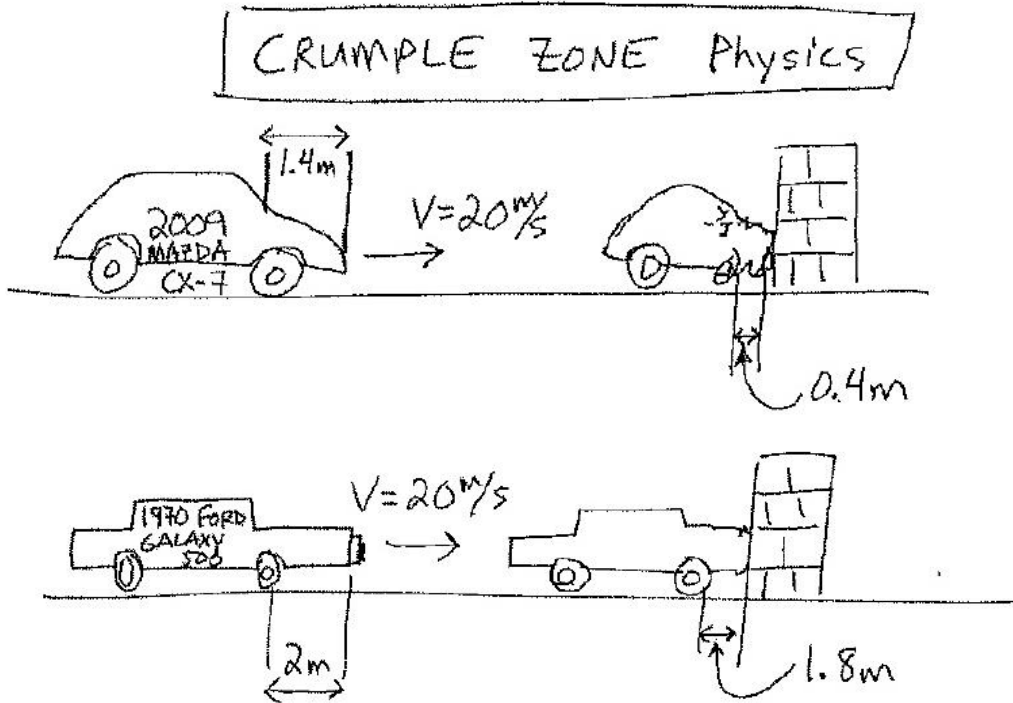
5. A 0.50 g leaf falls to the ground at a constant downward velocity of 1.00 $^m/_s$.
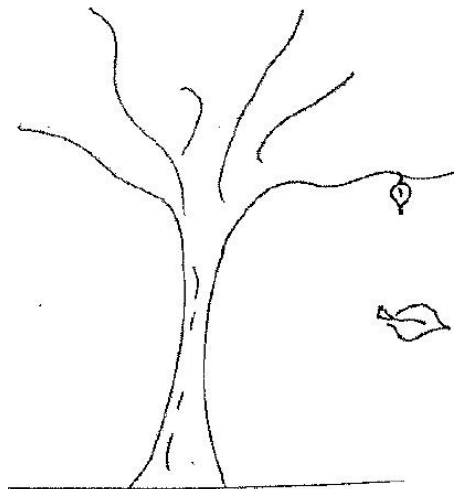
    a. Calculate the upward **force of air drag** acting on the leaf.
    b. Draw a **quantitative FBD** of the leaf.