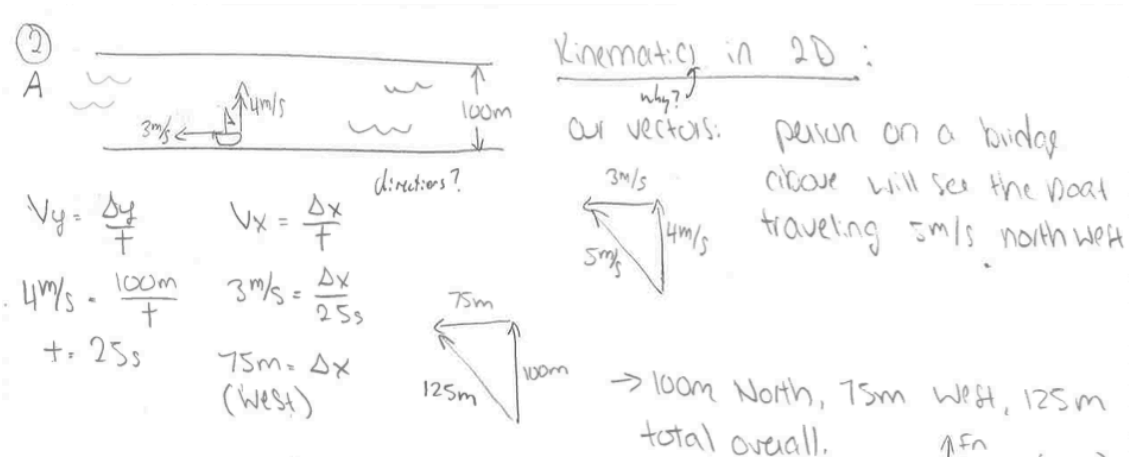
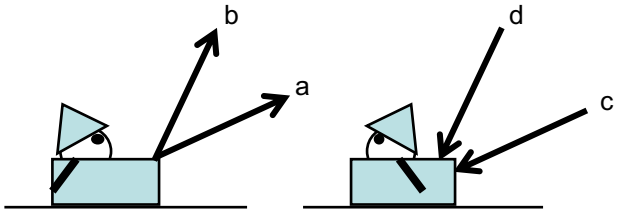
PS# Solutions

1. MT #2. Please repeat the work of your midterm adding the small extra questions I put in.
2. 7.0 Exercise 1

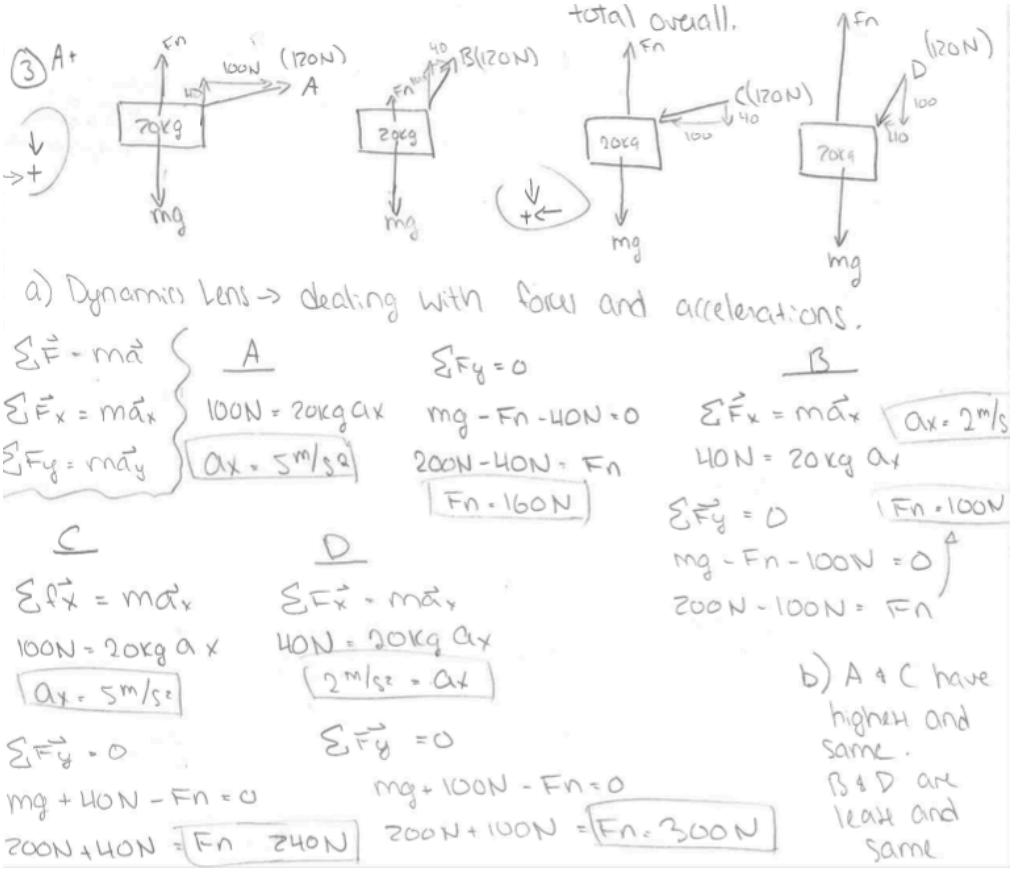


3. My daughter is sledding (total mass = 20 kg), and I am applying a force of 120 N to her sled. I have 4 different options (pushing and pulling at two different angles) and I try all of them.



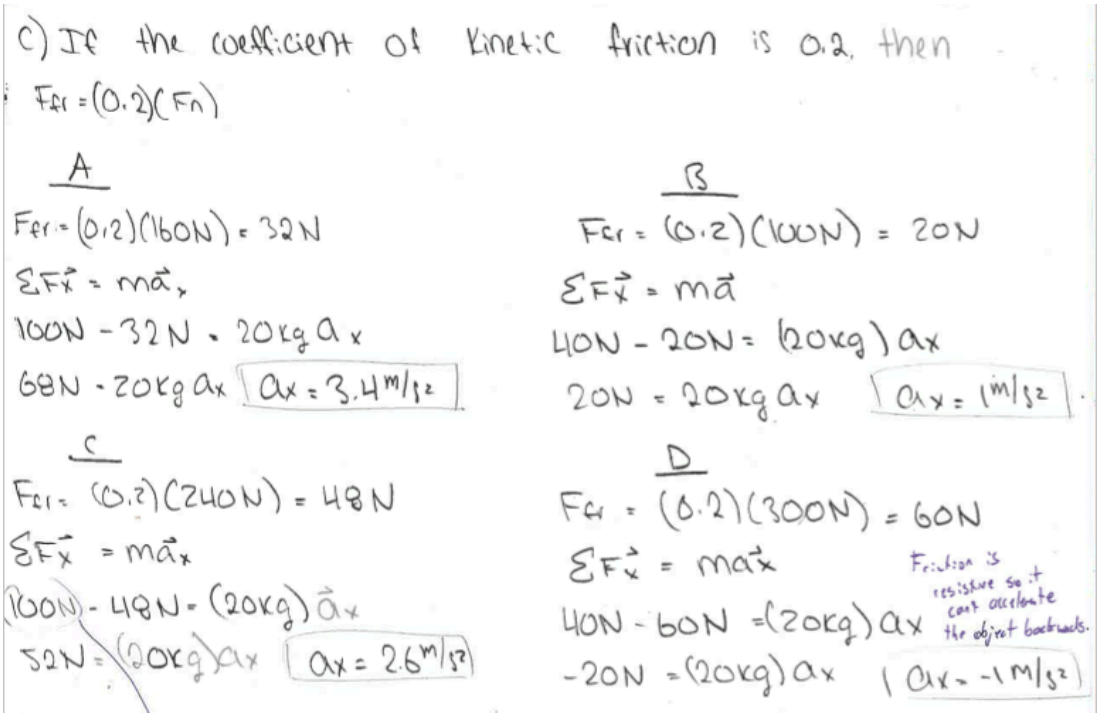
Make sure to pick a lens and do a good FBD indicating directions.

a) For each scenario, estimate both the acceleration of the sled and the normal force between the sled and the frictionless snow.



b) Now, please rank the different force scenarios in order of least acceleration to greatest acceleration. If some accelerations are the same, please indicate that.

c) Now, let's say that the coefficient of friction of the snow is *actually* 0.2. How does this change things? Please rank again the different force scenarios in order of least acceleration to greatest acceleration.



d) Have you ever pushed a lawn mower (or watched someone do it)… you are using force scenario d, pushing along the handle. When you run into some thick grass the "coefficient of friction" might be high enough to stop you cold. What scenario can you change to, and why does this work?

d) You can change to scenario C because you are applying less downward force and therefor there is a smaller Normal force and thus a smaller Friction too which increases the ΣF_x.

Yes, that idea is the first thing you will do… lower the handle to reduce the downward component of the pushing force…. but my guess is you have never mowed a thick lawn in Buffalo N.Y. when it's been raining a lot. Scenario "C" is not enough. Eventually, you would turn the lawn mower around and pull it in scenario "A".