04-06

Computing Weight and Friction

Computing weight

- Weight is a force measured in Newtons
- Like any force, F = ma
- If mass is on earth, a = g, so weight = mg
- Non-earth example: If mass is on mars, then $a_{mars} = 3.7\ m/s^2$
- If your mass is 60 kg (about 132 lb equivalent), how much do you weigh in SI units?
  - ❑588 N
- How much would you weigh on mars?
  - ❑222 N

What is friction?

- A force that resists motion as two objects slide by each other
- It always acts opposite the motion (not necessarily opposite the net force, example?)
- Coefficient of friction: materials property, how easily TWO materials slide by each other (symbol: μ)
  - $\mu = F_f/F_n$, no units!
  - μ comes in two flavors: static and kinetic (dynamic, sliding)
  - Static friction $\geq$ kinetic friction: *more force to start it moving than to continue its motion*
- Which μ's are high, low, etc.?
  - Wet ice
  - Rubber
  - Plastic on ice
  - Rubber on concrete

Friction questions to ponder

- You push on your table with a tiny ½ lb force and it doesn't move. What kind of force stops the table from accelerating and how big is it?
- You push on your table with a moderate 5 lb force and it doesn't move. What kind of force stops the table from accelerating and how big is it?
- Does this prove one kind of friction is "variable"?
- You slide a box along the floor at constant speed of 3 mph. There is not net force.
  - Do you have to push?
  - What kind of friction resists your push?
  - Would you have to push harder to keep it moving at a constant 10 mph?