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Pre-lab #5 - Experimental setup

- You will use this simulation to study the static friction force acting on an object on a horizontal surface. Take time to understand how the software works. Read the lab handout for the details on the types of measurements which will be performed and the settings you'll use.

1 a) Choose the 100kg garbage can as your object. Start pushing the object, slowly increasing the force applied on it. Record the minimum value of applied force needed for the can to start moving.

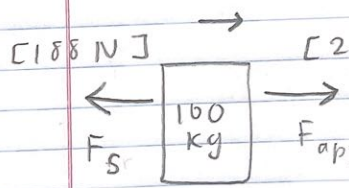
- Minimum applied force : **251 N**

1 b) Calculate the static friction coefficient between the garbage can and the horizontal surface. Show work.

$F_{app} - F_{fr} = 0$

$F_{app} = u_s F_n$

$u_s = \frac{F_{app}}{F_n}$, where $F_n = mg$



$u_s = \frac{250\ N}{(100kg)(9.8 m/s^2)}$

$u_s = 0.26$

- 251 N is when it starts moving
- Use "250 N" for static friction coefficient calculation

2a) Choose "Force Graphs" tab. Choose "Small Crate" as your object. Set ramp angle to 30 degrees and the object's position to 8.9 m (top of the ramp). Choose "Wood" as the "Friction" setting. Follow the instructions in your lab handout (Part 3) and measure the time it takes for the object to reach the bottom of the incline. Report the value here.

[Used small crate:

- 100 kg; $\mu_k = 0.3$; $\mu_s = 0.5$;
object position = 8.9 m; angle = 30°]

- Time to reach bottom of incline:

Around 2.8 seconds