

Student directions *Ramp: Force and Motion* activity 2: Calculating Net force on an incline

<http://phet.colorado.edu> 30 minutes

Learning Goal: Students will be able to calculate the net force on an object on an incline

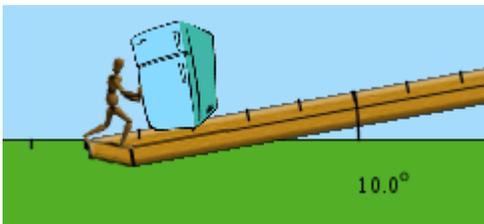
1. Joe is moving his refrigerator to take to college and he begins by pushing it across the wooden kitchen floor.

On a flat surface like the floor, how do you calculate how hard he needs to push? Draw a free body diagram to help explain your answer and use the simulation ***Ramp: Force and Motion*** to check your ideas. Record the minimum force Joe would have to use to move the refrigerator on the kitchen floor.

2. Later, Joe is ready to load his refrigerator onto the moving truck.

a. Explain how he would calculate how much force to use to lift the refrigerator straight up into a truck.

b. Joe starts thinking about easier ways to get it in the truck and remembers he has some wood that he could use to make a ramp. How could he calculate the minimum force needed to push it up the ramp?



c. Use the simulation to check your ideas by running experiments with different objects at several angles. Make a data table including several trials with the calculations.

Ramp angle	Weight (F_g)	F_{gravity}	F_{friction}	F_{applied}	Resulting motion (stationary, down ramp or up ramp)	Possible calculations to explain
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