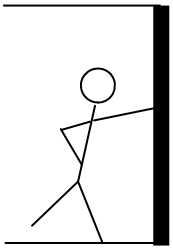
A-Day: Due Tues., Oct 28 (Assigned: 10/24)
B-Day: Due Wed., Oct 29 (Assigned: 10/27)

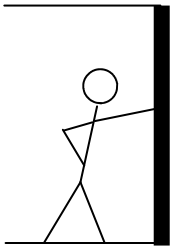
2008 Forces 3

1. I'm not a very good artist, so let's meet "Slim Jim". Jim is going to help us with normal force. Thanks, Jim! Anyway… in each of the following pictures, draw and label all of the normal forces acting on Jim.

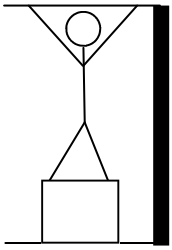
A. Jim leaning against the wall with one foot up.



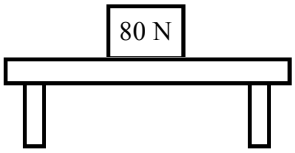
B. Jim leaning against the wall, both feet on the ground.



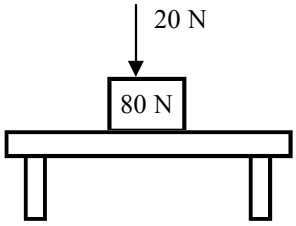
C. Jim standing on a table and pushing on the ceiling.



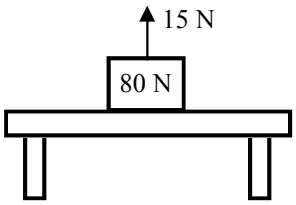
The normal force is a supporting force. Think of normal force this way: if the object was put on your hand, Fn is how hard you have to push up to keep the object from falling. (How heavy it feels. Its weight is pulling it down and you are pushing it up. The heavier it feels the more normal force you have to use .)



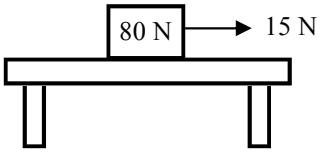
2. An 80 N object is placed on a table.
   A. How much normal force must the table provide?



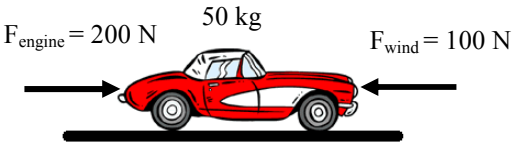
B. If a force pushes down on the object with 20 N, how much normal force is exerted by the table?



C. If the force is changed to pull up with 15 N, how much normal force does the table provide?



D. The 15 N force is changed so that it is horizontal. What is the normal force on the object (from the table)?

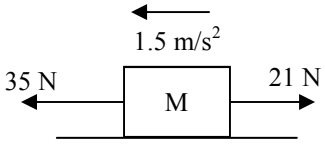


Our equation for this chapter is: ΣF = ma, where ΣF means "add together all of the forces keeping track of positives and negatives"; m is the mass in kg.

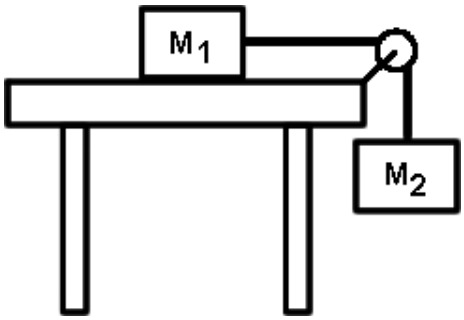
3. Notice the arrows on the car at the left.
   A. What is the negative force?
   B. What is the positive force?
   C. What is the mass of the object?
   D. Put all of this into the equation at the right and solve for the acceleration.

$$\Sigma F = ma$$

4. The object at the right experiences an acceleration to the left.
   A. Is the acceleration + or −?
   B. Put all of the information you know into ΣF = ma and calculate the mass of the object.



5. Use the diagram at the left to answer the following.
   A. How much friction keeps the mass gripping the ground?
   B. How much friction would try to stop the mass from sliding?
   C. With the given force pulling to the left, will the object start to slide?
   D. If it were already sliding, would it slow down or speed up to the left?



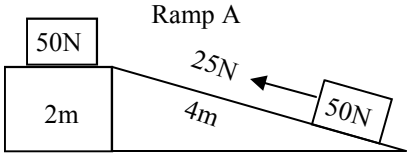
6. A. Draw and label all of the forces acting on the two objects if there IS friction on the table.
   B. For M_1 ONLY, put these forces into the appropriate equations below.

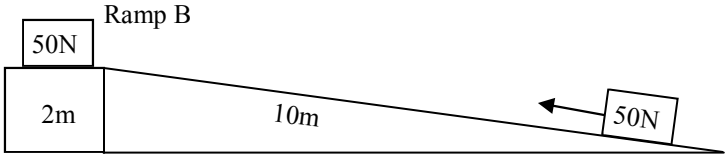
$\Sigma F_X = ma_X$ $\Sigma F_Y = ma_Y$

A 

B 

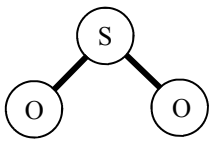
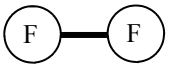
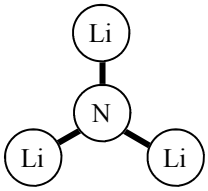
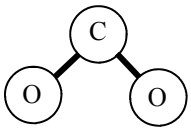
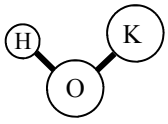
7. A. Mark the fulcrum of lever A above.
   B. Which of the two levers at the increases your force the most (makes it very easy to lift the object)?





8. A. Which ramp makes it easiest to pull the object up to the top of the 2m tall table?
   B. How far up do you lift both object against gravity (straight up)?
   C. Because the ramp A is twice as long as you lift against gravity, it takes half the force. How much force would it take to pull the object up Ramp B?

9. Fill in the following table.

 *Atoms:* ___ *Elements:* ___ *Molecules:* ___ *Compounds:* ___	 *Atoms:* ____ *Elements:* ____ *Molecules:* ____ *Compounds:* ___	 *Atoms:* ____ *Elements:* ____ *Molecules:* ____ *Compounds:* ___	 *Atoms:* ____ *Elements:* ____ *Molecules:* ____ *Compounds:* ____	 *Atoms:* ____ *Elements:* ____ *Molecules:* ____ *Compounds:* ____