Friction

Read from **Lessons 3** of the **Newton's Laws** chapter at **The Physics Classroom**:

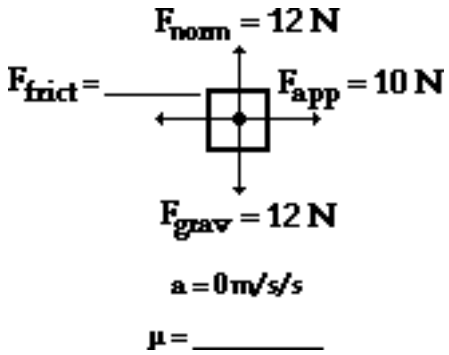
http://www.physicsclassroom.com/Class/newtlaws/u2l3c.html
http://www.physicsclassroom.com/Class/newtlaws/u2l3d.html

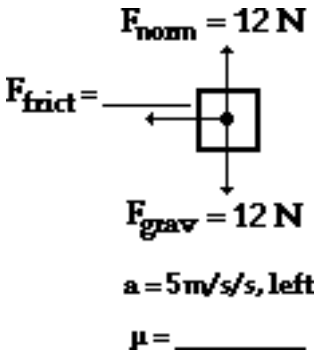
1. A classroom desk supported by long legs is stationary in the room. A teacher comes around and pushes upon the desk in an effort to start it into a state of motion. The desk does not *budge*. The desk remains at rest because _____.
   a. there is a force of static friction opposing its motion
   b. there is a force of kinetic or sliding friction opposing its motion
   c. there is a force of rolling friction opposing its motion

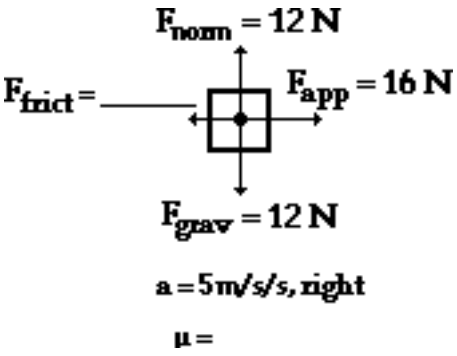
2. A classroom desk supported by long legs is stationary in the room. A teacher comes around and pushes upon the desk in an effort to start it into a state of motion. The desk is finally accelerated from rest and then moves at a constant speed of 0.5 m/s. The desk maintains this constant speed because _____.
   a. there is a force of static friction balancing the teacher's forward push
   b. there is a force of kinetic or sliding friction balancing the teacher's forward push
   c. there is a force of rolling friction balancing the teacher's forward push
   d. the teacher must have stopped pushing

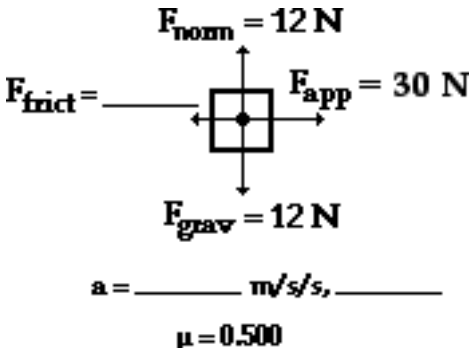
3. The symbol μ stands for the _____
   a. coefficient of friction b. force of friction c. normal force

4. Use the friction equation and $F_{net} = m \bullet a$ to fill in the blanks in the following situations.





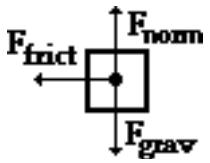




5. A 5.0-kg mass is pushed with a horizontal force of 72 N. The coefficient of friction is 0.31. Sketch a free-body diagram; label the forces according to type. Then, determine the net force and the acceleration of the mass. Use an **FBD** and **PSYW**.

6. Justin Time is driving his 1225-kg car at a speed of 22.0 m/s when he slams on the brakes and skids to a stop. The coefficient of friction between the car and the road is 0.850. Determine the acceleration. (Neglect air resistance.) Use an **FBD** and **PSYW**.

7. Algebraically show that $a = \mu \bullet g$ for the situation at the right where an object is skidding to a stop under the influence of friction.



8. Baseball all-star Willie Makeit (m=87.0 kg) approaches third base at a speed of 9.20 m/s. He dives head-first, landing a distance of 1.8 m from the base. If the coefficient of friction between Willie's uniform and the infield dirt is 0.760, with what speed will he be sliding when he reaches the base?

9. Kent Holditnomoor is racing across the bleachers at the B-Ball game when he accidentally kicks Anna Litical's 1.10-kg physics book (which she had brought to the game for a little half-time pleasure). The book begins sliding with a speed of 2.50 m/s and a distance of 0.600-meters from the bleacher's edge. If the book encounters a leftward force of friction, then with what speed will it leave the bleachers? (The coefficient of friction between book and bleachers is 0.20.)