

### Activity: Friction Practice Problems

For each problem, (1) draw an FBD and then (2) solve. Show your work!!

1. What is the force of friction between a block of ice that weighs 930 N and the ground if  $\mu = .12$ ?  $F_f \approx 100\text{ N}$
2. What is the coefficient of static friction if it takes 34 N of force to move a box that weighs 67 N?  $\mu \approx 0.5$
3. A box takes 350 N to start moving when the coefficient of static friction is .35. What is the weight of the box?  $F_g \approx 1000\text{ N}$
4. A car has a mass of 1020 Kg and has a coefficient of friction between the ground and its tires of .85. What force of friction can it exert on the ground? What is the maximum acceleration of this car? In what minimum distance could it stop from 27 m/s?  $F_f \approx 9000\text{ N}$   $a \approx -9\text{ m/s}^2$   $\Delta x \approx 40\text{ m}$
5. Clarice moves a 800. gram set of weights by applying a force of 1.2 N. What is the coefficient of friction?  $\mu \approx 0.1$
6. A car has a coefficient of friction between the ground and its tires of .85. What is the mass of the car if it takes 9620 N of force to make it slide along the ground?  $m \approx 1100\text{ kg}$
7. A 5.0 Kg block has a coefficient of friction of .15 on a flat surface. What is its acceleration if you exert a force of 15 N sideways on it when it is at rest? (Find the friction force first)  $a \approx 1.5\text{ m/s}^2$
8. A 10. Kg block is at rest on a level surface. It accelerates from rest to 51.2 m/s in 8 seconds when you exert a force of +115 N on it sideways. What is the acceleration of the block? What is the force of friction between the surface and the block, and what is the coefficient of friction?  $a \approx 6\text{ m/s}^2$   $F_f \approx 55\text{ N}$   $\mu \approx 0.5$
9. A 120 Kg log sled accelerates at 1.4 m/s/s when a horse pulls on it. What force must the horse exert if the coefficient of friction between the ground and the sled is .28?  $F_{\text{pull}} \approx 540\text{ N}$  ( $F_f \approx 360\text{ N}$  &  $F_{\text{net}} \approx 180\text{ N}$ )
10. The 1835 kg Batmobile needs to stop from a speed of 48.2 m/s. Its tires have a coefficient of friction of .93 with the road, and Batman goes to full reverse thrusters on his jet engines. What would be his acceleration if he stopped in a distance of 50.0 m? What additional stopping force does he need to do this?  
 $a \approx -25\text{ m/s}^2$   $F_{\text{stopping force}} \approx 28,800\text{ N}$  ( $a \approx -25\text{ m/s}^2$   
 $F_f \approx -16,200\text{ N}$   
 $F_{\text{net}} \approx 45,000\text{ N}$ )