

Phys107 HW#04

Gladden

Solutions to Chapter 4 Exercises

7. Sliding down at constant velocity means acceleration is zero and the net force is zero. This can occur if friction equals the bear's weight, which is 4000 N. Friction = bear's weight = $mg = (400 \text{ kg})(10 \text{ m/s}^2) = 4000 \text{ N}$.
11. A massive cleaver is more effective in chopping vegetables because its greater mass contributes to greater tendency to keep moving as the cleaver chops.
20. The second law states the relationship between force and acceleration. If there is no net force, there is no acceleration which is what Newton's first law states. So Newton's first law is consistent with the second law, and can be considered to be a consequence of the second law.
27. Note that 30 N pulls 3 blocks. To pull 2 blocks then requires a 20-N pull, which is the tension in the rope between the second and third block. Tension in the rope that pulls only the third block is therefore 10 N. (Note that the net force on the first block, $30 \text{ N} - 20 \text{ N} = 10 \text{ N}$, is the force needed to accelerate that block, having one-third of the total mass.)
32. The force you exert on the ground is greater. The ground must push up on you with a force greater than the downward force of gravity to produce a resulting net force that is upward and that will accelerate you upward.
37. When you drive at constant velocity, the zero net force on the car is the resultant of the driving force that your engine supplies against the friction drag force. You continue to apply a driving force to offset the drag force that otherwise would slow the car.