

# Chapter N1: Newton's Laws

## Physics I

College of the Atlantic

1. A 1500 kg car accelerates from 0 to 30 m/s in 10 seconds. What is the average force exerted on the car during this time interval?
2. An 80,000 kg airplane cruises at 10,000 feet at a constant speed of 500 m/s.
  - (a) Draw a free-body diagram for the plane.
  - (b) What is the force due to gravity acting on the plane (magnitude and direction)?
  - (c) What is the lift force acting on the plane (magnitude and direction)?
3. A 50 kg box of tofu is suspended from a rope.
  - (a) Draw a free body diagram for the box.
  - (b) What is the tension in the rope?
4. I give a book on a table a shove. It slides for a while and then stops. Draw the free-body diagram for the book while it's sliding after I've shoved it.
5. I push a book against the wall, pinning it so it does not fall. Draw a free-body diagram for the book.
6. A rock on the end of a string is whirled in a horizontal circle. Draw the free-body diagram for the rock.
7. A 50 kg skydiver jumps out of an airplane and after accelerating for a while reaches a constant velocity of 120 m/s.
  - (a) Draw a free-body diagram for the skydiver once she's reached 120 m/s.
  - (b) What is the net force acting on the skydiver?
  - (c) What is the force due to gravity acting on the skydiver (magnitude and direction)?
  - (d) What is the force due to friction acting on the skydiver (magnitude and direction)?
8. I throw a .5 kg ball at 3 m/s against a wall. The ball bounces back to me at essentially the same speed. The ball is in contact with the wall for .05 seconds. What is the average force exerted by the wall on the ball?