4.1.1: Introduction

In this exercise, force and pressure are examined through direct observation in a qualitative manner. Force may be computed by multiplying the mass of an object by acceleration:

$$f = ma$$

If the mass is measured in kilograms and the acceleration in meters per second squared, the resulting unit of force is kilogram meters per second squared, or *newtons* (N). For comparison, one pound of force is equivalent to approximately 4.45 N. A mass sitting on the Earth is affected by Earth's gravitational acceleration, 9.8 m/s^2, so the force acting on it at rest (i.e., its weight) is the mass in kg times 9.8 m/s^2.

Pressure is defined as force per unit area:

$$p = f/area$$

Given a force in Newtons and an area in square meters, the resulting unit (Newtons per square meter) is called a *Pascal* (Pa). Note that pressure can be increased by either increasing the force or by decreasing the area. Even a modest force can produce extremely high pressure if it is applied over an exceedingly small area.