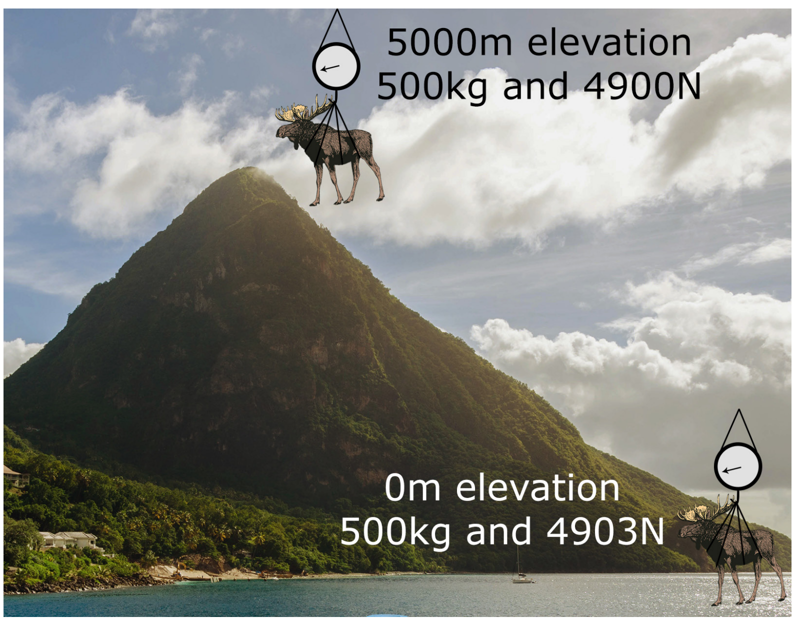
The direct relationship between weight and mass is seen in the example above. If we divide the moose's weight by his mass, 4903 ÷ 500, and if we divide the dog's weight by his mass, 245 ÷ 25, we get the same number, 9.8. It turns out this "magical" 9.8 number reflects a property of earth's gravity, so it is constant wherever you go on earth. Earth's gravity always pulls down on an object's mass by a factor of 9.8 to equal its weight in newtons. I have 100kg of mass, so my weight is 980N. A 1kg chemical sample's weight is 9.8N. A 35,000kg truck weighs 343,000N. This relationship is constant wherever you are on earth and is why it is OK to weigh objects with a scale but report the results in mass units instead of weight units. It's because of that constant factor—no matter how much mass an object has, its weight is always 9.8 times its mass.

"Wait a minute! The strength of earth's gravity pull is dependent upon how far away from the center of the earth you are. The farther away you get from the center of an object, the weaker its gravity pull becomes," you might be thinking. And, you are right! The farther away from the center of the earth you get, the weaker earth's gravity pull is, so how is it possible that earth's gravity pull stays at that same 9.8 factor from sea level all the way up to the mountains? Well, this is where the difference between technicality and practicality comes into play. Let's see how.

Practically, how much difference is there between measuring weight at sea level and 5,000m, the highest-elevation inhabited city and the farthest we can practically get away from the center of earth and still be on earth? Let's weigh our 500kg moose friend at both elevations and find out. Of course, the amount of matter that he has doesn't change. He has 500kg of moose mass at sea level and at 5,000m. 500kg of matter is 500kg of matter.



We can see that his weight isn't *exactly* the same—4903N at sea level and 4900N at 5,000m. Technically, it isn't the same, exact value, but practically, it isn't much different. The two measurements only differ by a 0.06% variation in the moose's weight. That's not much, but if we report the "weight" in kilograms instead of newtons, it isn't *exactly* the same value. If we "weigh" the moose using mass units instead of newtons, he would "weigh" 500kg at sea level and 499.7kg at 5,000m. Again, *practically*, that is not much of a difference, but technically it is a difference. A 500kg moose has 500kg of mass wherever he is, not 500kg at sea level and 499.7kg at 5,000m, so the purists want weights measured in newtons and mass in kilograms (we will see a very clear example of why in **Figure 6.5.3**). However, practically, that difference is negligible and so this is why it is OK to report weights in kilograms.