

## **5 Military Rucking Rules Every Backpacker Should Know**

The military has spent years studying the best way to move under a load (aka “rucking”). Here are 5 military rucking rules that translate well to hikers.

“Rucking” is the military term for hiking under load. As you can imagine, this is a huge issue for the military, as soldiers must wear body armor and carry weapons, ammo, water, communications equipment, and other gear as they conduct patrols and missions. Rucking performance and injury prevention are hugely important for military operations and personnel.

Movement over ground under load is also a key for hiking and backpacking. In reviewing the research the military has already done on this subject, we discovered five rules. Read on to make sure you’re following these military rucking rules on your next backcountry adventure.

### **1. One pound on your feet equals five pounds on your back.**

This old backpacking thumb rule holds true, according to a 1984 study from the U.S. Army Research Institute. They tested how much more energy was expended with different footwear (boots and shoes) and concluded that it take 4.7 to 6.4 times as much energy to move at a given pace when weight is carried on the shoe versus on the torso.

In practical terms, this means you could carry half a gallon more of water (a little over 4 pounds) if you buy boots that are a pound lighter, which isn’t hard to do; and that’s a lot of water. Now imagine the energy savings of backpacking in light trail running shoes rather than heavy, leather backpacking boots over the course of 7-day backpacking trip.

### **2. One pound on your feet equals 5% more energy expended.**

Heavier footwear doesn’t just affect you because of its weight. Heavier boots are stiffer and less responsive as well. This reduces the efficiency of your body’s stretch reflex on hitting the ground.

Five percent doesn’t sound like much, though, so how does 5% translate to run times? Well, 5% would slow your mile pace time down by 30 seconds, depending on how long you’re running. But, the faster you attempt to run, the more that 5% will affect your performance.

### **3. Every 1% of your body weight in your pack makes you six seconds slower per mile.**

Carrying weight in your pack isn’t free of cost, though. Each 1% of your body weight carried in your pack makes you 6 seconds slower per mile. So, if you weigh 150 pounds, each 1.5 pounds of weight in your pack slows you by 6 seconds per mile. For a 150-pound hiker, on an extended trip, cutting your pack weight down from 40 to 30 pounds saves you 40 seconds per mile.

### **4. A 10% grade incline cuts your speed in half.**

Grade greatly affects speed. By “grade” we mean how much terrain incline or decline there is. At 10% grade, for example, for every 10 feet you travel forward, you’ll travel 1 foot up. In terms of angles, 10% equals 5.74 degrees. A 5.74 degree angle doesn’t seem like much until you’re humping up it mile after mile. You’ll know how hard it is because you’ll move twice as slowly over it than over flat ground with a given load.

That last little part—with a given load—is important. A 10% grade will cut your speed in half no matter if you’re carrying 45 lbs. or 80 lbs.

### **5. Going up slows you down twice as much as going down speeds you up.**

Don’t believe you’ll make time up on the other side of the hill. You won’t. You’ll only make half the time up. Why don’t you gain as much by running downhill as you lose running up? Braking forces. As you descend, you have to brake your speed with your quads to keep yourself under control. The steeper the downhill, the more braking. This added load on your muscles further affects your uphill performance if you have repeated bouts of up and down work.