

## Coefficient Of Friction / "Over The Edge" vs. High Directional

- Materials used: Petzl Nylon 6mm cord, Sandstone, Petzl Mini Pulleys, 600 Lb. Electronic Scale, Universal Protractor, Scientific Calculator, 50 Lb. Kettlebell
- Coefficient of Friction and Examples 1 & 2 consist of the cord contacting the edge directly with no edge rollers or other friction reducing methods.
- Example 3 uses a high directional pulley so cord does not contact the rock.

### Coefficient of Friction:

Coefficient of friction (COF) was calculated by suspending a known weight on the cord and over the edge of the sandstone. Cord was anchored at one end with the electronic scale between the cord and the anchor. Measurements were taken at 90 degrees, 60 degrees and 45 degrees. A coefficient of friction could then be calculated from the ratio of holding force to known weight. The COF of Nylon 6mm cord on sandstone was determined to be .49.

### Example 1:

**Non-elevated anchor resulting in a 90-degree contact (1.570 radians) of the edge with the cord. (At 90 degrees the cord is basically laying on top of the rock)**

A 50-pound load hanging over the edge having 90 degrees of contact with the sandstone required 23 pounds of holding force on the cord to hold it in suspension. A 3:1 MAS was setup to raise the load. It required 40 pounds of input force pulling on a 3:1, which equates to a total of 120 pounds of force to move 50 pounds. **Force required to raise the load was 140% more than the load weight.**

### Example 2:

**Partially elevated anchor resulting in a 60-degree (1.047 radians) contact of the edge with the cord.**

A 50-pound load hanging over the sandstone edge having 60 degrees of contact with the sandstone required 30 pounds of holding force on the cord to hold it in suspension. A 3:1 MAS was setup to raise the load. It required 25 pounds of input force pulling on a 3:1, which equates to a total of 75 pounds of force to move 50 pounds. **Force required to raise the load was 50% more than the load weight.**

### Example 3:

A high directional was setup without any contact with the rock (illustrated example below), a 3:1 MAS required 19.5 pounds of input force to raise the 50-pound load, which equates to a total of 58.5 pounds of input force to move 50 pounds. **Force required to raise the load was 17% more than the load weight.**

95 Lb. on anchor

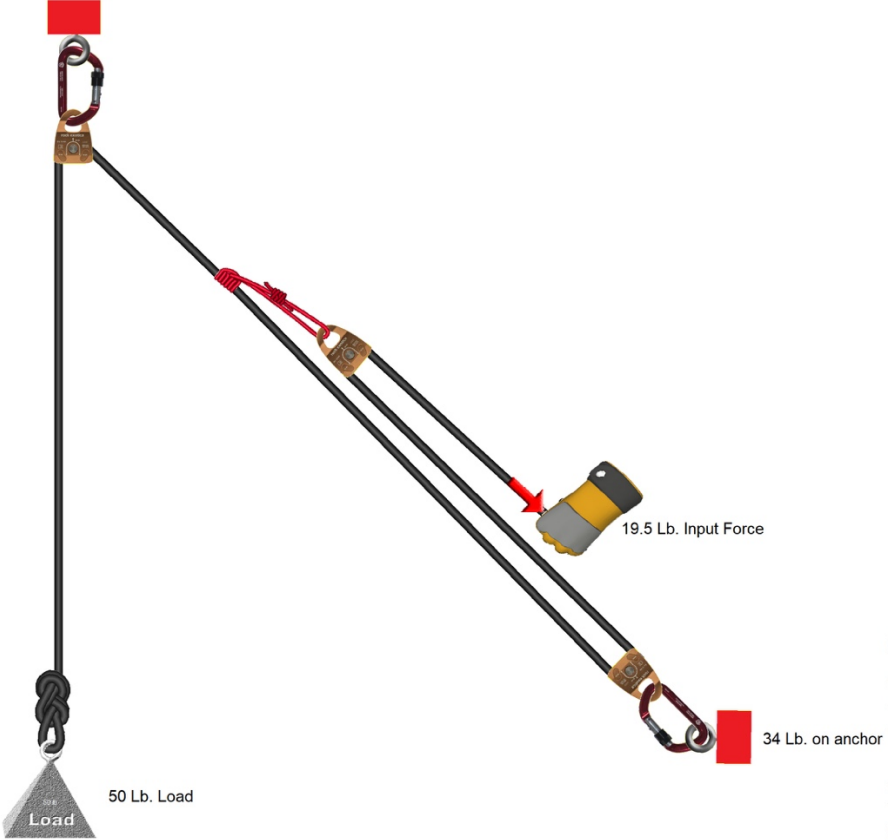


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