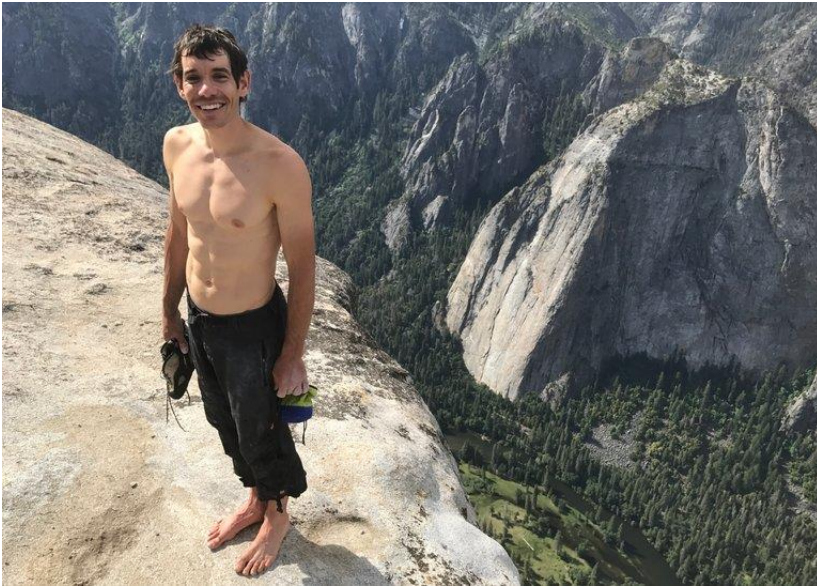


# WORK, ENERGY, POWER

Units 10 & 11, Dr. John P. Cise, Prof. of

Physics, Austin Com. College, Northridge Campus, Austin Tx., jpcise@austinctc.edu, New York Times, June 6, 2017 by Mike McPhate.

## California Today: An 'Incomprehensible' Climb in Yosemite



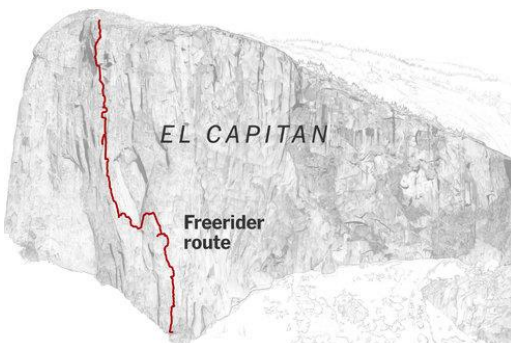
**INTRODUCTION:** Goal with this application is to compute the power of this climber (**Alex Honnold weight 160 lb.**) as he climbs 3000 ft. vertical height in 3 hrs. 56 min.

**QUESTION:** (a) Find 3 hrs. + 56 min. in units of seconds?, (b) Find HP he was doing in those 3 hrs + 56 min. . Get HP in units of ft. lb./s., (c) Convert HP in ft. lb./s. to HP units ?. (e) How does your result compare with Amer. Alpine Club (see below)?

**HINTS:** 3600 s. = 1 hr., Power = Work/time = (gain in gravitational potential energy)/time =  $m g h/t$ , 550 ft. lb./s. = 1 HP, 60 s. = 1 min.

**ANSWERS:** (a)  $t = 14,160$  s., (b)  $P = 33.9$  ft. lb./s. (c)  $P = 0.062$  HP, (d) Actually, Honnold has a harder job going up vertically (thus slower than Typical mountain climbers which go up mountains at some angle lower than 90 degrees). But, with a computed HP of 0.062 HP, it is just a bit lower than traditional alpine HP of 0.07 HP as seen below.

Alex Honnold after completing his free solo climb of El Capitan on Saturday. Alex Honnold is considered a near mythic figure in the rock climbing world. He is part of a tiny class of elite practitioners who will sometimes **climb free solo, meaning with no rope.** But Mr. Honnold, a Sacramento native, is also known for climbing harder, longer and faster than anyone. On Saturday, he pulled off what is being called his greatest feat yet, free-soloing **nearly 3,000 feet up El Capitan**, Yosemite's iconic granite wall. The route, known as Freerider, involves a complex system of cracks and a notoriously hard section about two-thirds of the way up with holds the width of a pencil. Guides say to allow four days to do the climb. **Mr. Honnold did it under four hours( 3 hrs, 56 min.)**



**AmerAlpineClub STATES:**

**The work capacity on the summit of Mount Everest is very small, being about 0.07 horsepower** or 50 watts. This means that a climber of average body weight (including clothing and minimal equipment) would take about 2 minutes to climb up a slope of 10 meters vertical height. This low maximum flow and therefore the pressure of oxygen in the air is greatly reduced below the sea level value. The body just cannot transfer oxygen rapidly enough into the exercising

OPEN INTERACTIVE FEATURE

Climbing professionals called it "incomprehensible" and "generation defining."