GRAVITATIONAL POTENTIAL ENERGY: Units 10 & 11, Dr. John P. Cise,

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'It Was Like a Zoo': Death on an Unruly, Overcrowded Everest

By Kai Schultz, Jeffrey Gettleman, Mujib Mashal and Bhadra Sharma , NY Times May 26, 2019

NEW DELHI — Ed Dohring, a doctor from Arizona, had dreamed his whole life of reaching the top of Mount Everest. But when he summited a few days ago, he was shocked by what he saw. were pushing and shoving to take selfies. **The flat part of the summit, which he estimated at about the size of two Ping-Pong tables, was packed with 15 or 20 people.** To get up there, he had to wait hours in a line, chest to chest, one puffy jacket after the next, on an icy, rocky ridge with a several-thousand foot drop.
He **even had to step around the body of a woman who had just died.** "It was scary," he said by telephone from Kathmandu, Nepal, where he was resting in a hotel room. "It was like a zoo." This has been one of the deadliest climbing seasons on Everest, with at least **11 deaths**. And at least some seem to have been avoidable. The problem hasn't been avalanches, blizzards or high winds. Veteran climbers and industry leaders blame having too many people on the mountain, in general, and too many inexperienced climbers, in particular. Fly-by-night adventure companies are taking up untrained climbers who pose a risk to everyone on the mountain. And the Nepalese government, hungry for every climbing dollar it can get, has issued more permits than Everest can safely handle, some experienced mountaineers say. Add to that Everest's inimitable appeal to a growing body of thrill-seekers the world over. And the fact that **" Nepal, one of Asia's poorest nations and the site of most Everest climbs, has a long record of shoddy regulations, mismanagement and corruption."**

Fee to climb to Nepal Government = $11,000

A long line of climbers waiting to summit Mount Everest on May 22.

INTRODUCTION: Gravitational potential energy(U) near surface of earth is mgh(eq. 1} where g = acceleration of gravity. h = height above earth surface, **m = mass of object**. But, as a object gets higher above earth's surface g decreases, $g = G M_e/R^2$ (eq. 2) where $R = h + R_e$, **R_e = earth radius. = 6.371 X 10^6 meters. R = distance from center of earth. M_e = earth mass = 5.972 X 10^{24} kg. , G = gravitational constant = 6.67 X 10^{-11} N $m^2/kg.^2$**.Thus, a better function to measure gravitational potential energy Is **$U = -GM_em/R$** (eq. 3).
The actual exact height(h) of Mt Everest is 29,029 ft. (8,848 m.)
From eq. 3.....**$dU = GM_em[-1/R + 1/R_e]$ eq. 4**

QUESTIONS: (a) Using equation 1 find U of a typical 160 lb.(72.64 kg.) climber of Mt. Everest?, (b)Supper X credit Not needed to be done, but interesting. Using the better Function for changes in dU (eq.4), find dU from surface of earth (R_e) to $R = h + R_e$?. **NOTE: Show all calculations with units clearly.**

The result is a crowded, unruly scene reminiscent of "Lord of the Flies" — at 29,000 feet. At that altitude, there is no room for error and altruism is put to the test. To reach the summit, climbers shed every pound of gear they can and take with them just enough canisters of compressed oxygen to make it to the top and back down. It is hard to think straight that high up, climbers say, and a delay of even an hour or two can mean life or death. According to Sherpas and climbers, some of the deaths this year were caused by people getting held up in the long lines on the last 1,000 feet or so of the climb, unable to get up and down fast enough to replenish their oxygen supply. Others were simply not fit enough to be on the mountain in the first place**. Some climbers did not even know how to put on a pair of crampons, clip-on spikes that increase traction on ice,** Sherpas said. Nepal has no strict rules about who can climb Everest, and veteran climbers say that is a recipe for disaster.
"You have to qualify to do the Ironman," said Alan Arnette, a prominent Everest chronicler and climber. "But you don't have to qualify to climb the highest mountain in the world? What's wrong with this picture?"

HINTS: $1/R = 1/[6,379,848] = 0.000000156743546$, $1/R_e = 1/6,371,000 = 0.000000156961231$
$(-1/R + 1/R_e) = 21.7685 \times 10^{-11}\ m^{-1}$, NOTE: Show all calculations with units clearly.

ANSWERS: (a) 6.298 X 10^6 J, (b) XX credit: 6.2936 X 10^6 J , Comment: Either eq. 1 or eq. 4 compares well close to earth surface