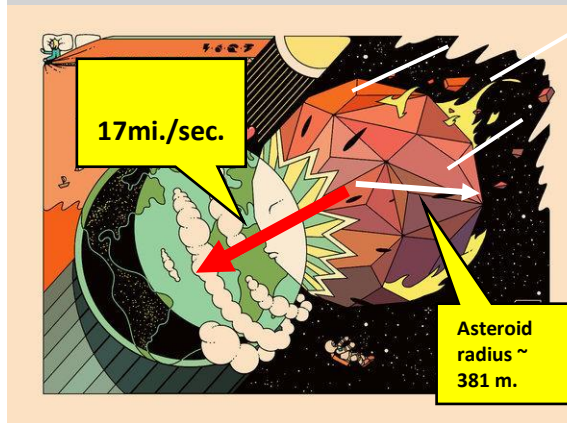


ENERGY

Units 10 & 11 , Dr. John P. Cise, Professor of Physics, Austin Com. College, Austin Texas USA

jpcise@austincc.edu & New York Times , June 23, 2018 by Erica Berry. Dedicated to Fr. Lucia, HS math teacher, Roger Bacon HS.

Letter of Recommendation: Asteroid Day



INTRODUCTION & QUESTIONS: Application goal is to confirm this asteroid 2002 NT7 energy of earth impact would be about 30 million Hiroshima atomic bombs (**1 bomb = $\sim 68 \times 10^{12}$ J of energy**). Data from Los Alamos Lab web site. (a) Find volume V of NT7 asteroid in m^3 ?, (b) Find approximate mass m of NT7 asteroid?, (c) Convert 17 mi./s. to ft./s.?, (d) Find kinetic energy of NT7 if it hit earth at 17 mi./s.? (e) Compute the energy in Joules of 30 million Hiroshima atomic bombs?, (f) How well does (d) compare to (e)?

HINTS: $V_{\text{SPHERE}} = 4/3 \pi r^3$, mass = [density][volume] = ρV , $\rho(\text{asteroids}) = \sim 2000$ kg./m., 5280 ft./mi., $KE = \frac{1}{2} m v^2$,

ANSWERS: (a) $V = \sim 2.32 \times 10^8 m^3$, (b) $m = 4.64 \times 10^{11}$ kg., (c) $v = 8.98 \times 10^4$ ft./s., (d) $KE = \sim 18.7 \times 10^{20}$ J, (e) 18.9×10^{20} J, (f) Ans. (d) & (e) close, thus $K = 1/2mv^2$

Every few weeks, I wake up clammy from a dream in which I have failed to prepare myself for calamity. A frequent one has me flying down the freeway on cruise control when, out of nowhere, I decide to crawl into the back seat to grab something. I realize my mistake only as I feel the car begin to drift toward the median, but when I try to return to the front seat, my legs go limp. I always wake up before the crash. These nightmares, I've come to believe, stem from my fear of that which I cannot control: earthquakes, drunken drivers, antibiotic-resistant superbugs. In my waking life, I fixate on what I *can* control, even when that means courting absurd fantasies: If I memorize the flight attendant's safety demonstration, I tell myself, I can survive if the plane goes down. So, a few years ago, when I learned about International Asteroid Day — a holiday on June 30 meant to teach humans about the hazards of planet-destroying space rocks — I felt a flame of dread in my gut. I had always thought that fearing asteroids was a bit like fearing serial killers: They exist, sure, but the odds of encountering one are so low. But they're not zero; far from it. Reading around, I learned that the chances of being killed by a meteorite — a fragment of an asteroid — are lower than being killed by lightning, but higher than being killed by a shark. NASA says it knows of no asteroids that pose a serious risk to Earth in the next 100 years, though there is a one in 714 chance of an impact in 2185. There is also a conspiracy theory circulating online that NASA is covering up a likely collision in 2019, apparently in an effort to stop global panic. NASA says the closest that rock, 2002 NT7, will come to Earth is about 38 million miles. But were it to **hit Earth, it would supposedly do so at a ((speed of 17 miles per second and with a force 30 million times that of Little Boy))), the bomb dropped on Hiroshima.** It's nearly impossible to fathom figures so large, but the geological record offers a way of wrapping your mind around them. The asteroid that ended the dinosaurs struck like a pebble in a pond, landing with such force that it essentially liquefied the surface of the Earth at the point of impact. Within seconds, it had torn a hole more than 100 miles wide. The spewed rock climbed to a height as tall as Mount Everest before coming to rest. In 1908, an asteroid the size of a modest office building released the energy of hundreds of Little Boys over central Siberia, in what would come to be known as the Tunguska Event. The impact incinerated 800 square miles of forest and the reindeer within it and left enough dust in the atmosphere that, for several nights afterward, people in Europe could read newspapers until midnight. If this sounds like the stuff of science fiction, well, it often is. The director Grigoriy Richters was finishing "51 Degrees North," a film about a fictional asteroid hitting London, when he recruited the astrophysicist and Queen guitarist Brian May to compose the score. Their conversations around real-life fears led them to join forces with Danica Remy and the astronaut Rusty Schweickart, who are each board members at B612, an asteroid-defense nonprofit, to create **Asteroid Day, which is observed on the anniversary of the Tunguska Event. Asteroid Day is a nascent holiday, but already it offers a wide range of ways to ponder the capriciousness of the cosmos. Last year, there were 1,300 self-organized events in 200 countries.** The organizers of Asteroid Day want humanity to band together to create better asteroid-tracking technology, but I relish it mostly as a chance to reckon, for at least one day of the year, with my own feelings of terror and awe.