

# ENERGY

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Austin Tx. 78701, [jpcise@austincc.edu](mailto:jpcise@austincc.edu) & New York Times, February 7, 2017 by Kenneth Chang, Dedicated to John W. Cise. Engineer

## Meteor Puts on a Light Show Over Midwest, and for the Cameras



A fiery meteor streaked across the Midwest sky early Monday morning, seen as far west as Nebraska and as far east as New York. Unfortunately for scientists who would like to study where it came from and how it got here (although perhaps fortunately for people living in the vicinity), all of the surviving bits of rock plopped into Lake Michigan. The [American Meteor Society](#) has received more than 350 reports from witnesses of the green fireball, which occurred around 1:25 a.m. local time. William B. Cook, a NASA meteor expert, reported in a email to NASA headquarters that the fireball originated about 60 miles above West Bend, Wis., **(((moving about 33,000 miles an hour)))** toward the northeast before disintegrating about 21 miles above Lake Michigan. As the meteor fell apart, it emitted low-frequency sounds that were recorded in the Canadian province of Manitoba, about 600 miles away. **(((The blast released energy that was equal to at least 10 tons of TNT,)))** Dr. Cook said, suggesting that **(((the object that entered the atmosphere was at least 600 pounds and two feet in diameter)))**. Most of the reports came from Wisconsin and Illinois. Michael Hankey of the American Meteor Society said such fireballs happen every day somewhere, but only rarely — perhaps four a year — do they occur over populated areas of the United States where the light show can be captured by dashboard cameras, security cameras and night owls carrying cellphones. From the multitude of reports, scientists should be able to calculate the trajectory of the object, which most likely originated in the asteroid belt. (An asteroid is a rock orbiting in the inner solar system, usually between Mars and Jupiter. A meteor is the streak of light as an asteroid enters the atmosphere. A meteorite is an asteroid remnant that makes it to the ground.)

**INTRODUCTION:** This application is to verify this 600 lb. meteor traveling at 38,000 mph has a equivalent amount of kinetic energy of 10 tons of TNT.

**QUESTIONS:** (a) Convert 600 lb. to mass units of slugs ?, (b) Convert 38,000 mph to ft./s. ?, (c) Find kinetic energy (K) of meteor in ft. lb. units? , (d) Convert kinetic energy of meteor in ft. lb. to Joules ?, (e) Determine Joules of energy in 10 tons of TNT?, (f) How well does actual meteor measured determined kinetic energy compare with stated equivalency to 10 tons TNT?

**HINTS:** weight = m g , g = 32 ft./s.<sup>2</sup> , 88 ft./s. = 60 mph , 1 ft. lb. = 1.356 joules , 1 ton TNT = 4.186 X 10<sup>9</sup> J , KE = ½ m v<sup>2</sup>

**ANSWERS:** (a) m = 18.75 slugs , (b) v = 5.57 X 10<sup>4</sup> ft./s. , (c) K = ~ 2.909 X 10<sup>10</sup> ft. lb., (d) K = ~3.945 X 10<sup>10</sup> J ,(e) ~ 4.184 X 10<sup>10</sup> J (f) The kinetic energy of meteor compares quite well with energy in 10 tons of TNT. Happiness with physics measurements again. JC, Author of this application.