

# KINEMATICS

Unit 4 & 5 , Dr. John P. Cise, Professor of Physics, Austin Com. College, Austin, Texas, USA

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## NASA's Parker Solar Probe Is Named for Him. 60 Years Ago, No One Believed His Ideas About the Sun.



Eugene N. Parker, second right, visiting the Johns Hopkins Applied Physics Laboratory in October in Laurel, Md., where NASA's Parker Solar Probe was being assembled.

Eugene N. Parker predicted the existence of solar wind in 1958. The NASA spacecraft is the first named for a living person.

**INTRODUCTION:** Goal here is to verify sun is about 93,000,000 miles from earth using the last two lines in article below. Use kinematic ideas.

**QUESTION:** Answer question in the introduction above. Show your calculations clearly.

**HINTS:**  $X = v t$

**ANSWER:**  $x = 90,000,000$  miles , close

CHICAGO — It was 1958. Sputnik had launched only a year earlier, the first human-made object to circle the planet. But the beach ball-size spacecraft had no instruments to measure anything in space. The study of what was up there was largely limited to what scientists could observe from the ground. It certainly looked like the vast expanses between planets were empty. And that is what most scientists believed. But not Eugene N. Parker, then a 31-year-old, no-name professor at the University of Chicago. In a foundational paper published in *The Astrophysical Journal*, Dr. Parker described how charged particles streamed continuously from the sun, like the flow of water spreading outward from a circular fountain. Almost no one believed him. “The prevailing view among some people was that space was absolutely clean, nothing in it, total vacuum,” Dr. Parker recalled during an interview at his home. The scientists who had reviewed the paper rejected his idea as ludicrous. Dr. Parker appealed to the journal’s editor, Subrahmanyan Chandrasekhar, a prominent astrophysicist also at Chicago, arguing that the reviewers had not pointed out any errors, just that they did not like the premise. Dr. Chandrasekhar overruled the reviewers. Four years later, Dr. Parker was vindicated when *Mariner 2*, a NASA spacecraft en route to Venus, measured energetic particles streaming through interplanetary space — exactly what Dr. Parker had predicted. Scientists now call that stream of particles the solar wind. Video NASA’s Parker Solar Probe will fly through the punishing heat of the sun’s outer atmosphere. Published On Aug. 10, 2018 Sixty years after Dr. Parker’s paper, NASA is about to launch a spacecraft that is to dive into outer wisps of the sun’s atmosphere and gather information about how our star generates the solar wind. It is the Parker Solar Probe. His apartment here, overlooking the Museum of Science and Industry, is decorated with some of his intricate wood carvings. He still gets around. Last October, he traveled to the Johns Hopkins Applied Physics Laboratory, where the spacecraft was built, for a “Parker, meet Parker!” encounter. Dr. Parker rejected the notion that space was a clean, empty vacuum, positing that charged particles were constantly emanating from the sun. There’s a lot we don’t know about the sun and its power, and this mission will help to fill in the blanks in the years to come. A second launch attempt on Sunday is possible.



Left, the probe being encapsulated for delivery to the Delta IV Heavy rocket, right, at Cape Canaveral, which will take it into space.

Dr. Parker said. Since the 1800s, scientists did know that at least sometimes explosions from the surface of the sun affected Earth. That included one on Aug. 29, 1859. That day, two English amateur astronomers, Richard Carrington and Richard Hodgson, independently observed a “white light flare” emanating from the surface of the sun. Less than a day later, Earth’s magnetic field was knocked away. Across America and Europe, telegraph wires sparked and failed. Fewer than 18 hours(t) elapsed between the flare and the geomagnetic storm on Earth. That meant whatever had exploded off the sun must have traveled at more than 5 million miles per hour(v).