

KINEMATICS

Units 4 & 5 Dr. John P. Cise, Professor of Physics, Austin Com. College, Austin Texas., & New York Times , August 10, 2017 , by Andy Webster

Review: A True-Life Journey Into Interstellar Space in ‘The Farthest’



	Voyager 1	Voyager 2
Launch Date	Mon, 05 Sept 1977 12:56:00 UTC	Sat, 20 Aug 1977 14:29:00 UTC
Mission Elapsed Time	39 : 11 : 05 : 15 : 54 YRS MOS DAYS HRS MINS : 12 SECS	39 : 11 : 21 : 14 : 21 YRS MOS DAYS HRS MINS : 12 SECS
Distance from Earth	12,922,416,221 mi 139.01681453 AU	10,632,445,861 mi 114.38176337 AU
Distance from Sun	12,958,265,517 mi 139.40247421 AU	10,699,540,788 mi 115.10355740 AU
Velocity with respect to the Sun (estimated)	38,026.77 mph	34,390.98 mph
One-Way Light Time	19:16:10 (hh:mm:ss)	15:51:17 (hh:mm:ss)
Cosmic Ray Data		

Voyager 2 at Cape Kennedy in 1977, as seen in “The Farthest.”

For any believer in humankind’s instinct to transcend boundaries, the [Voyager 1 and Voyager 2 space probes](#), and

the [NASA](#) team that produced them, inspire awe. **“The Farthest,”** a dazzling [documentary](#) written and directed by Emer Reynolds, illustrates why. **(((Consider: In 1977, the pair were launched (two,**

to increase the odds of success); in 1979 Voyager 1 began [relaying information from Jupiter](#), and **in 1980 approached Saturn and its moon Titan, nearly a billion miles from Earth**))) In 1986, Voyager 2

reached Uranus, and three years later Neptune. In 2012, Voyager 1 became the first man-made object to exit our solar system and enter interstellar space, from which it still sends signals. (Voyager 2 is en route.) The accounts of scientists, whose enthusiasm still glows, is as wondrous as the technology seen here. Linda Morabito, a navigation engineer, recalls discovering gas plumes on Jupiter’s moon Io. “I had the first evidence of active volcanism beyond Earth,” she says, beaming. Time-lapse Voyager-eye views of planets as they get nearer convey a sense of the epiphanies experienced in mission control.

INTRODUCTION: Two objectives with this application: (a) Confirm speed of Voyager’s spacecraft as stated by NASA as ~38,000 mph. (b) Confirm speed of light as 186,000 mi./s. with the NASA data in table above.

QUESTIONS: (a) In the article it is stated the voyager spacecraft went Billion miles from 1977 to 1980 (3 years). Find the spacecraft’s speed in mph?, (b) In the data table above on the Voyager: The distance from earth is listed as 12.922×10^9 miles and time for a signal (electromagnetic wave) to reach the earth from the spacecraft is 19 hrs, 16 minutes. Confirm speed of light is 186,000 mi./s.?

HINTS: 365 days/year, 24 hrs./day, 3600 s./hr., 60 s./min., $x = v t$

ANSWERS: (a) ~38,0052 mi./hr., close to what NASA web site says the speed of voyager is., (b) ~186,300 mi./s. Speed of electromagnetic waves(light) is stated by NASA as ~ 186,000 mi./s.....works fine.