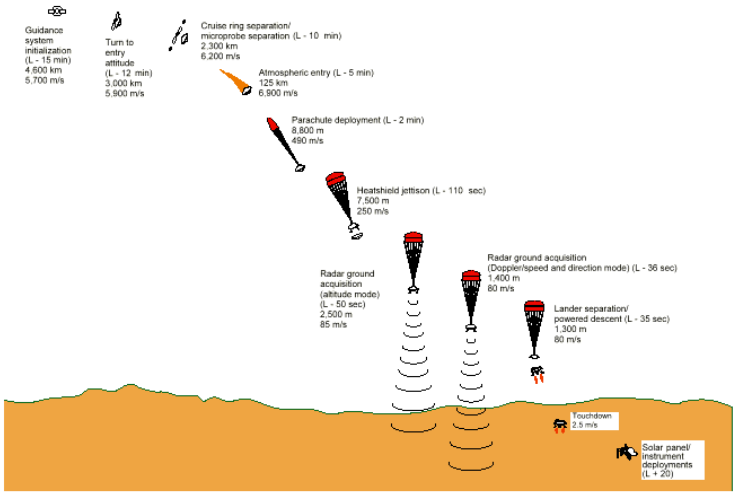
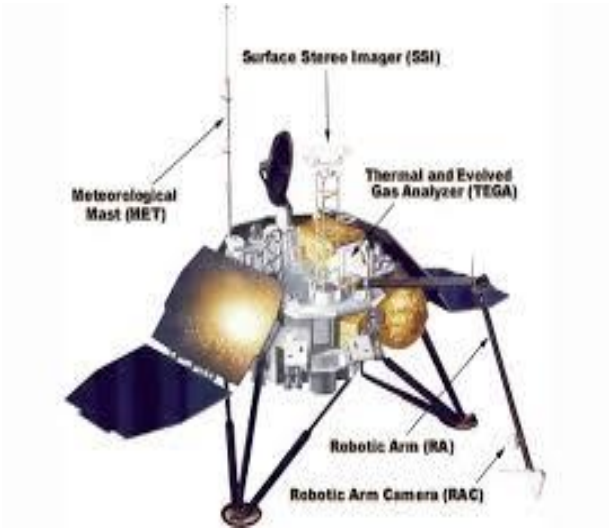
KINEMATICS

Units 4 & 5 Dr. John P. Cise , Professor of Physics, Austin Com. College, 1212 Rio Grande St. Austin Tx. 78701 jpcise@austincc.edu & NYTimes May 10, 2005 by Kenneth Chang

Remains of Failed Mars Lander May Have Been Found



Entry, descent and landing



Five and a half years after it descended into the Martian atmosphere and was never heard from again, the **Mars Polar Lander may have been found.** Photos taken from orbit by another **NASA spacecraft, the Mars Global Surveyor, show a white dot -- presumably the lander** -- within a dark gray oval apparently created by blast marks in the soil from the lander's rocket engine. **The photographs support the findings of an investigation panel that concluded that the deployment of the landing legs during descent had fooled the Polar Lander into thinking it had already touched the ground,(((leading it to shut off its engine while still about 130 feet in the air. In Mars' lighter gravity(38% of earth g), the resulting fall was equivalent to jumping off a four-story building on Earth))) -- enough force to break the spacecraft but still leave it largely intact.** The disappearance of the $165 million Polar Lander on Dec. 3, 1999, and of the $125 million Mars Climate Orbiter three months earlier, threw NASA's Mars program into disarray.

INTRODUCTION: Consider a building on earth to be approximately 11 ft./story. Purpose of this application is to confirm the article claim the 130 ft. fall of Mars Polar Lander was approximately equivalent to falling off a four story high building on earth.

QUESTIONS: (a) Find Mars gravity?, (b) Find height in feet of four story building on earth?, (c)Find speed of crash on Mars? (d) Find final speed of falling off a four story building on earth? (e) How do (c) & (d) compare?, (f) Find time to fall in each case? (g) Why is time to fall so much bigger on Mars?

HINTS: $g_{EARTH} = 32\ ft./s.^2$, $V^2 = V_o^2 + 2\,a\,X$, $X = V_o\,t + 1/2\,a\,t^2$

ANSWERS: (a) ~ 12.16 ft./s.^{2} , (b) 44 ft. , (c) ~ 56.23 ft./s. , (d) ~ 53.1 ft./s. (e) Plausible! , (f) t_{EARTH} = ~ 1.7 S.
(f continued) t_{MARS} = ~ 4.6 s. , (g) Understandable! Should take longer on Mars with lower g than earth.