

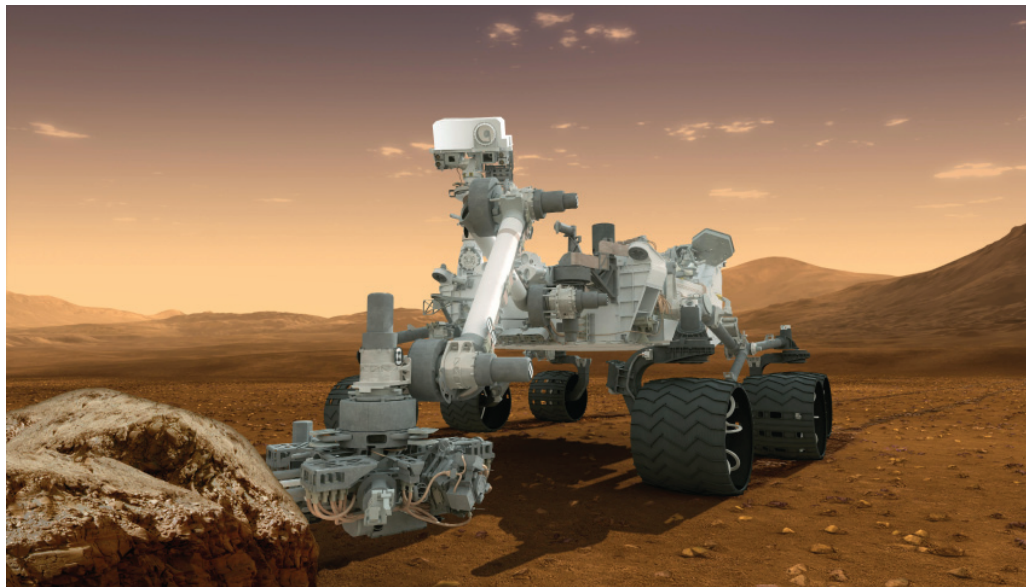


Sticking the Landing

In this case, the *first* time was a charm as the rover Curiosity flawlessly decelerated from 13,000 mph to zero in a span of seven minutes and landed safely on Mars. Although it was the only real landing for the rover, engineers had simulated the touchdown millions of times in advance by using mathematical models that incorporated vector analysis and systems of differential equations. The success rate of the simulations made the project team more than 95% sure that Curiosity would land, assuming that all important variables had been accounted for. It was the unknowns that made the mission risky, which is fitting since they are the inspiration for all exploration.

Of course, the real reason for the mission is to collect information and send it back to Earth. Anyone with any phone tag experience knows that the quality of the data could easily deteriorate between the two planets, so communication specialists employ error-correcting codes to guarantee the accuracy of what's received here. The codes can't overcome the great distance, though, which leaves the 14-minute delay between sending and receiving unchanged. Thus, the seven minutes of terror.

For More Information: "7 Minutes of Terror," by Eric Hand. *Nature*, August 2, 2012, pages 16–17.



NASA/JPL-Caltech



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