

1. Mark your confusion.
2. Show evidence of a close reading.
3. Write a 1+ page reflection.

Bam! NASA Spacecraft Crashes into Asteroid in Defense Test

Source: Marcia Dunn, Associated Press, September 26, 2022

CAPE CANAVERAL, Fla. (AP) — A NASA spacecraft rammed an asteroid at blistering speed Monday in an unprecedented dress rehearsal for the day a killer rock menaces Earth.

The galactic slam occurred at a harmless asteroid 7 million miles (11.3 million kilometers) away, with the spacecraft named Dart plowing into the space rock at 14,000 mph (22,500 kph). Scientists expected the impact to carve out a crater, hurl streams of rocks and dirt into space and, most importantly, alter the asteroid's orbit.

"We have impact!" Mission Control's Elena Adams announced, jumping up and down and thrusting her arms skyward.

Telescopes around the world and in space aimed at the same point in the sky to capture the spectacle. Though the impact was immediately obvious — Dart's radio signal abruptly ceased — it will take as long as a couple of months to determine how much the asteroid's path was changed.

The \$325 million mission was the first attempt to shift the position of an asteroid or any other natural object in space.

"As far as we can tell, our first planetary defense test was a success," Adams later told a news conference, the room filling with applause. "I think Earthlings should sleep better. Definitely, I will."

NASA Administrator Bill Nelson reminded people earlier in the day via Twitter that, "No, this is not a movie plot." He added in a prerecorded video: "We've all seen it on movies like *Armageddon*, but the real-life stakes are high."

Monday's target: a 525-foot (160-meter) asteroid named Dimorphos. It's a moonlet of Didymos, Greek for twin, a fast-spinning asteroid five times bigger that flung off the material that formed the junior partner.

The pair have been orbiting the sun for eons without threatening Earth, making them ideal save-the-world test candidates.

Launched last November, the vending machine-size Dart — short for Double Asteroid Redirection Test — navigated to its target using new technology developed by Johns Hopkins University's Applied Physics Laboratory, the spacecraft builder and mission manager.

Dart's on-board camera, a key part of this smart navigation system, caught sight of Dimorphos barely an hour before impact. "Woo hoo!" exclaimed Adams, a mission systems engineer at Johns Hopkins.

With an image beaming back to Earth every second, Adams and other ground controllers in Laurel, Maryland, watched with growing excitement as Dimorphos loomed larger and larger in the field of view alongside its bigger companion. Within minutes, Dimorphos was alone in the pictures; it looked like a giant gray lemon, but with boulders and rubble on the surface. The last image froze on the screen as the radio transmission ended.

Flight controllers cheered, hugged one another and exchanged high fives. Their mission complete, the Dart team went straight into celebration mode. There was little sorrow over the spacecraft's demise.

"Normally, losing signal from a spacecraft is a very bad thing. But in this case, it was the ideal outcome," said NASA program scientist Tom Statler.

Johns Hopkins scientist Carolyn Ernst said the spacecraft was definitely “kaput,” with remnants possibly in the fresh crater or cascading into space with the asteroid’s ejected material.

Scientists insisted Dart would not shatter Dimorphos. The spacecraft packed a scant 1,260 pounds (570 kilograms), compared with the asteroid’s 11 billion pounds (5 billion kilograms). But that should be plenty to shrink its 11-hour, 55-minute orbit around Didymos.

The impact should pare 10 minutes off that. The anticipated orbital shift of 1% might not sound like much, scientists noted. But they stressed it would amount to a significant change over years.

“Now is when the science starts,” said NASA’s Lori Glaze, planetary science division director. “Now we’re going to see for real how effective we were.”

Planetary defense experts prefer nudging a threatening asteroid or comet out of the way, given enough lead time, rather than blowing it up and creating multiple pieces that could rain down on Earth. Multiple impactors might be needed for big space rocks or a combination of impactors and so-called gravity tractors, not-yet-invented devices that would use their own gravity to pull an asteroid into a safer orbit.

“The dinosaurs didn’t have a space program to help them know what was coming, but we do,” NASA’s senior climate adviser Katherine Calvin said, referring to the mass extinction 66 million years ago believed to have been caused by a major asteroid impact, volcanic eruptions or both.

The non-profit B612 Foundation, dedicated to protecting Earth from asteroid strikes, has been pushing for impact tests like Dart since its founding by astronauts and physicists 20 years ago. Monday’s feat aside, the world must do a better job of identifying the countless space rocks lurking out there, warned the foundation’s executive director, Ed Lu, a former astronaut.

Significantly less than half of the estimated 25,000 near-Earth objects in the deadly 460-foot (140-meter) range have been discovered, according to NASA. And fewer than 1% of the millions of smaller asteroids, capable of widespread injuries, are known.

The Vera Rubin Observatory, nearing completion in Chile by the National Science Foundation and U.S. Energy Department, promises to revolutionize the field of asteroid discovery, Lu noted.

Finding and tracking asteroids, “That’s still the name of the game here. That’s the thing that has to happen in order to protect the Earth,” he said.

Possible Response Questions

- What are your thoughts about this practice attempt to save the Earth? Explain.
- Did something in the article surprise you? Discuss.
- Pick a word/line/passage from the article and respond to it.
- Discuss a “move” made by the writer in this piece that you think is good/interesting. Explain.