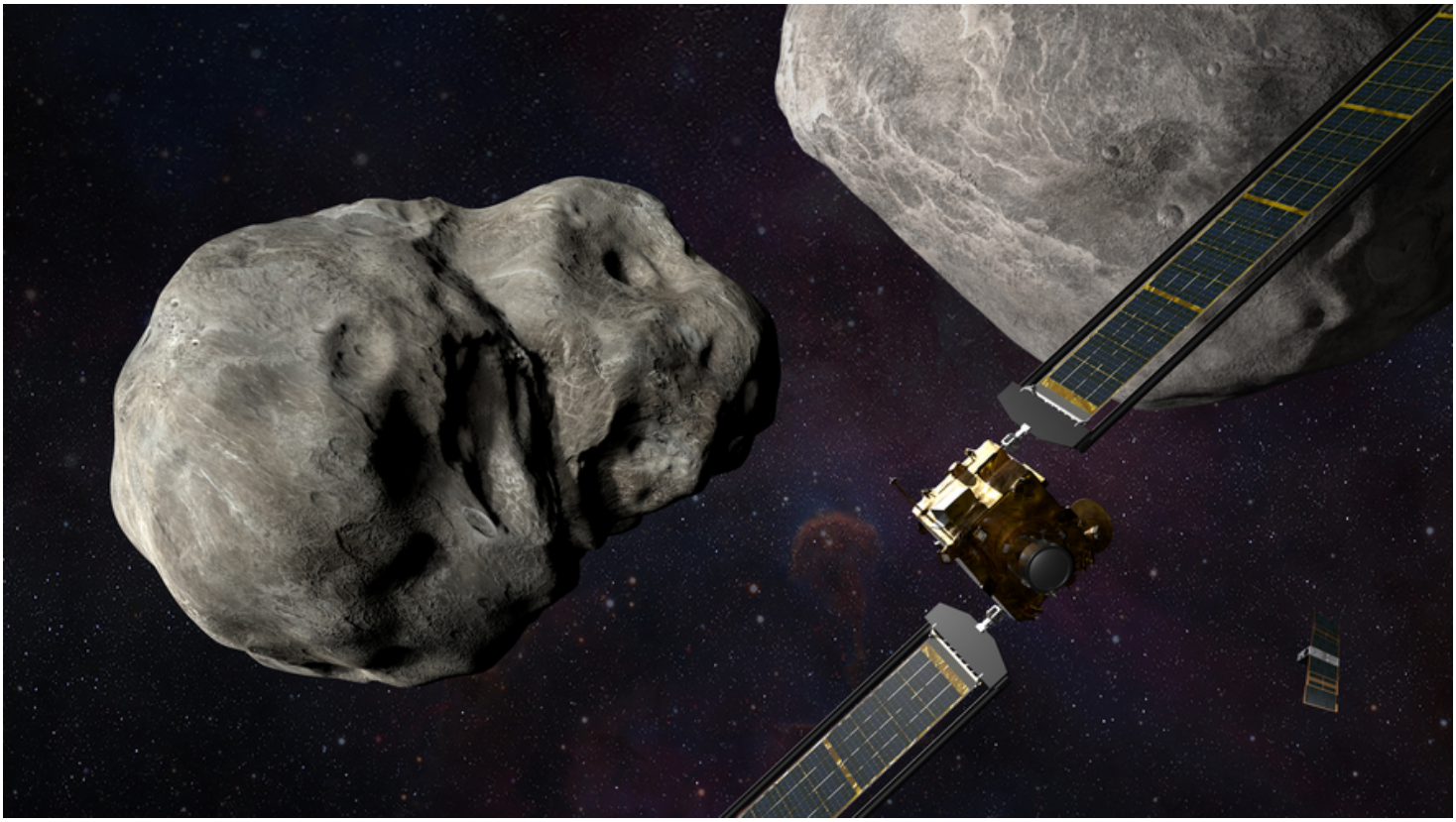
NASA wants to smash a spacecraft into an asteroid, but don't worry — Earth isn't at risk

By Chelsea Gohd, Future plc on 01.04.22
Word Count **943**
Level **MAX**



An artist's depiction of the DART spacecraft approaching the Didymos system. Illustration: Steve Gribben/NASA/Johns Hopkins APL
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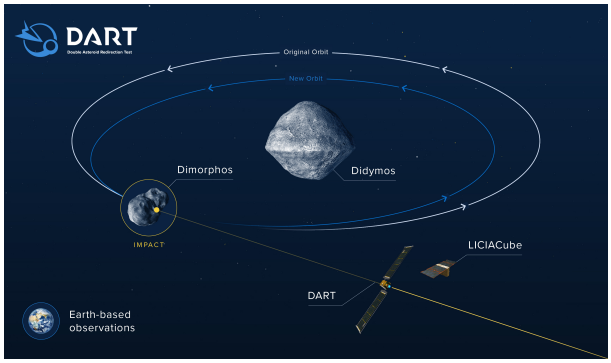
On November 23, NASA launched a mission to smack an asteroid into a new orbit to prepare for the possibility that an asteroid in the future might threaten Earth. But don't worry —experts agree that there is no possibility that (even if it goes awry) this asteroid-smashing could threaten Earth.

NASA's Double Asteroid Redirection Test mission, or DART, will essentially practice what the agency might do if a relatively large asteroid were on a trajectory to collide with Earth. The mission will attempt to hit a space rock nearly head-on, smashing into it and tweaking its orbit.

DART launched from Vandenberg Space Force Base in California aboard a SpaceX Falcon 9 rocket. If all goes well, it will crash into its asteroid target in late 2022.

However, even if the test doesn't go exactly according to plan, DART's target "has no chance of impacting the Earth whatsoever," astronomer Amy Mainzer, who is the principal investigator of NASA's Near-Earth Object Wide-field Infrared Survey Explorer (NEOWISE) mission and who specializes in characterizing populations of asteroids and comets, told Space.com.

DART will target the miniature asteroid moon Dimorphos that orbits around Didymos, the larger space rock in the system. Mission personnel chose this system specifically for a number of reasons, but importantly because it is far away from Earth.



"As of today, the distance to Didymos from Earth is 483.6 million kilometers [300 million miles]. But as Earth and Didymos pursue their orbits around the sun this distance varies between 10 and 493 million km [6 and 306 million miles]," astrophysicist and satellite tracker Jonathan McDowell of the Harvard-Smithsonian Center for Astrophysics in Massachusetts told Space.com.

McDowell echoed Mainzer's evaluation and, when asked whether (even if things don't go according to plan) the DART mission posed any risk of setting any chunks of asteroid on a trajectory toward Earth, he responded, "no, not at all."

DART is just a practice run in the possible event that there was a hunk of space rock hurtling towards our home planet. If this test proves successful, NASA could use this same type of technology to essentially push that threatening rock out of Earth's way.

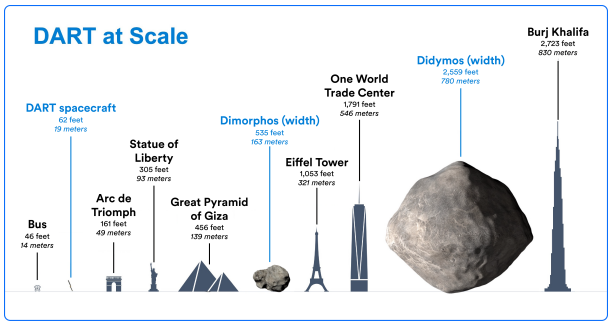
But just how likely is it that such an event could take place? Is there really a possibility that an asteroid could threaten life on Earth as it has in the past with famous events like the Chicxulub impact that wiped out Earth's large dinosaurs?

"Good news is that's an incredibly unlikely scenario," Mainzer said. "Really large global events must be incredibly rare, or we human beings would not be here. I mean, if global extinction events were common, there's no way that you would have human life."

However, she added that "when you get to smaller sizes of impacts, ones that are not capable of causing necessarily global problems, but severe regional damage, there are a lot more of those objects out there, and those are potentially more frequent events." Mainzer did specify that when she says "frequent," she's talking in astronomical timescales, so frequent could mean hundreds of thousands of years or even longer.

That being said, Mainzer explained that our understanding of what exists "near," (near in astronomical terms, so it includes a fairly wide range) Earth. She added that she and others around the globe are continuing to work to fill in the gaps of understanding what objects exist near Earth. (Near-Earth objects include objects within 1.3 astronomical units, 120.9 million miles or 194.5 million km of Earth.)

She added that right now, we are aware of only about 30-40% of the large objects, or objects about 459 feet (140 meters) and larger, near our planet. "That's great, but it means we still have more work to do."



Mainzer, who explored the "what ifs" in her work as the science advisor on the comet-impact disaster dark comedy film "Don't Look Up" premiering in TK, is also working to fill in these knowledge gaps. "I am

leading a new project that has recently been put into its preliminary design phase by NASA. It's called the NEO, or Near-Earth Object, Surveyor mission. And the objective of the mission is pretty straightforward, it's basically to go out and raise that completeness for the 140-meter objects," she said.

But, as we continue to learn more and more about what's "close" to Earth, Mainzer added that DART is giving us the protective tools we need.

"The importance of DART is that it will help to vet the technology that is needed, should we ever find something that does require mitigation, in the unlikely event that we do find something," she said. "The idea is that the technology will have been demonstrated before and it will be easier to build the next spacecraft. Because as you can imagine, it takes a lot of time to get a spacecraft together."

And time, Mainzer stressed, is key when it comes to battling an asteroid.

"The key ingredient for all of these mitigation strategies is time," she said. "You have to have enough time to do it. You have to have enough time to build the spacecraft. And even more, you have to have enough time because the more time you have, the less energy it requires, in general, to push an object."

Quiz

1 Read the following sentence from the article.

> *But don't worry —experts agree that there is no possibility that (even if it goes awry) this asteroid-smashing could threaten Earth.*

Which sentence from the article BEST supports this idea?

(A) Mission personnel chose this system specifically for a number of reasons, but importantly because it is far away from Earth.

(B) But, as we continue to learn more and more about what's "close" to Earth, Mainzer added that DART is giving us the protective tools we need.

(C) NASA's Double Asteroid Redirection Test mission, or DART, will essentially practice what the agency might do if a relatively large asteroid were on a trajectory to collide with Earth.

(D) If this test proves successful, NASA could use this same type of technology to essentially push that threatening rock out of Earth's way.

2 Which claim does the author support the LEAST?

(A) There has been an extensive amount of work done to find asteroids like Dimorphos that orbit larger space rocks.

(B) There is a higher probability of small meteor impacts on Earth than there is of extremely large meteor impacts.

(C) DART’s primary purpose is to assess the feasibility of changing the trajectory of asteroids to protect Earth.

(D) Amy Mainzer is interested in identifying asteroids that are near Earth and pose potential threats.

3 What limitations does Image 1 have that the article DOES NOT?

(A) It does not show which object DART will eventually collide with.

(B) It does not indicate the distances between Earth, Dimorphos, and Didymos.

(C) It does not communicate that Dimorphos orbits around Didymos.

(D) It does not convey that DART will shift the orbit of Dimporhos.

4 How do the images enhance the reader's understanding of DART beyond what the article offers?

(A) They emphasize the extensive planning that went into launching DART aboard a SpaceX Falcon 9 rocket.

(B) They highlight that the primary purpose of the DART and NEO missions is to keep people on Earth safe.

(C) They illustrate the relative size and trajectory of DART in comparison with Dimorphos and Didymos.

(D) They stress that there is no risk of the DART mission sending any asteroids on a path toward Earth.