

WORKING TOGETHER

In *Asteroid Hunters*, we watch with anticipation as the fictional asteroid Ficta A3D appears on a crash course towards Earth. We stand with dozens of scientists and engineers, wondering as they try to deflect its path with a nuclear probe. Will they succeed?

Most asteroids that enter our atmosphere burn up before they ever come close to the ground, but scientists know that the real question is not IF an asteroid will hit Earth again but WHEN. That's why space-faring agencies around the globe are working to track, study, and measure asteroids that pose a threat to Earth's safety, and to devise and test systems that will protect us.

PART 1 TRACKING AND STUDYING

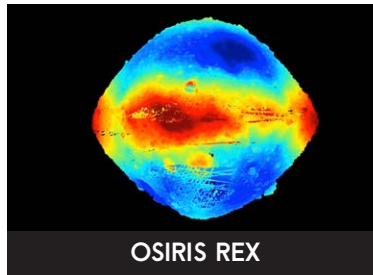
First, scientists need to know where the asteroids are and what they're made of. These profiles describe just a few of the programs NASA and partner agencies have launched to track asteroids and study their trajectories. Conduct research on Near-Earth Objects (NEOs) and planetary defense to learn more. Start with NASA's planetary defense website, nasa.gov/planetarydefense/neo. On the back of this sheet, write three facts you find interesting and share them with the class.



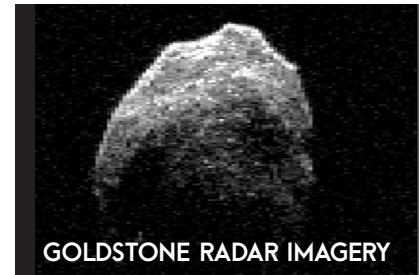
NEOWISE is part of a telescope that orbits Earth and uses infrared cameras to capture images of even very dark objects usually hidden by atmospheric haze. NEOWISE has scanned the skies 12 times, collecting information on the size and properties of asteroids, and offering a view into how NEOs orbit over time.



NASA can find bright asteroids from the ground using powerful telescopes, like Pan-STARRS1 in Hawaii, that capture and scan images taken every several minutes. An object that changes position in each image, relative to the stars around it, will be identified as an asteroid.



This spacecraft has been tasked with gathering data about Benu, an asteroid that scientists believe could pose a great threat to Earth in the next century. It will take samples of the rock for study and use laser rays to map the surface.



In the film, Marina Brozović from NASA's Jet Propulsion Laboratory explains that her team bounces radar signals off space objects, and uses the transmissions to model images of them.

Image Sources: Pan STARRS - <https://panstarrs.stsci.edu> | NEOWISE - <https://www.jpl.nasa.gov/missions/neowise/>
 OSIRIS REX - <https://www.nasa.gov/image-feature/goddard/2019/osiris-rex-captures-laser-3d-view-of-benu>
 Goldstone - <https://www.jpl.nasa.gov/spaceimages/details.php?id=PIA20043>

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PART 2 DEFLECTING

The more we learn about asteroids, the better prepared we can be. But just what can we do to stop them? The Asteroid Impact and Deflection Assessment (AIDA) mission is a program of NASA and the European Space Agency that is testing how kinetic energy can be used to change an asteroid's trajectory using a probe, similar to what we see in *Asteroid Hunters*. Below are some other suggested asteroid defense technologies. Research and describe each one, and explain what you think are the pros and cons of each method. Here is a link to get you started: neoshield.eu/mitigation-measures-kinetic-impactor-gravity/.

NUCLEAR PROBE:

Description: _____

Pros: _____

Cons: _____

GRAVITY TRACTOR:

Description: _____

Pros: _____

Cons: _____

KINETIC IMPACTOR:

Description: _____

Pros: _____

Cons: _____

SOLAR SAIL:

Description: _____

Pros: _____

Cons: _____

PART 3 CREATING A PLAN

Using what you've learned about existing ideas for studying and, if necessary, deflecting asteroids, come up with your own idea for protecting Earth from an asteroid collision. Keep in mind general science principles of gravity, energy, and motion, like Newton's laws. On the back of this sheet, write a brief description of your technology, and illustrate, collage, or construct a model of how you think it would work.