



Make Your Own Awesome Asteroid

Old rubble pile or frozen melt?

Activity Overview

Participants create their own special asteroid with simple materials.

Introduction and Background

Asteroids are leftover rocky parts of the solar system. Some have not changed very much in 4.5 billion years and some have partly melted. Others have completely melted and formed iron-nickel core with rocky material on top. All asteroids exhibit craters that record

collisions between asteroids – big and small. They tell us about the formation and history of the Solar System. Some have loose particles on their surfaces while others are bare rock.



Materials Needed

- Clay in different colors – black and gray are good realistic colors
- Sand – different colors
- Rocks
- Marble or metal ball bearings
- Measuring spoons or other objects with a rounded profile to make craters

Activity Instructions

- Each person selects clay as desired and adds “silicates” (rocks and/or sand) to make an awesome, one-of-a-kind asteroid.
- For a rubble pile asteroid gently combine different clay and rocks to form a loose conglomeration of materials. Leave some space between the fragments.
- For an asteroid that has melted, start with a metal ball bearing and layer different colored clays over it. The outer portion might look rocky or have sand that didn’t melt. The metal is the iron-nickel core.
- Add some craters – big and small. Overlap a few of them where asteroids collided in the same area at different times.



Discussion Questions:

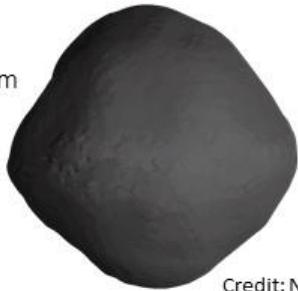
- Is your asteroid strong enough to withstand a collision with another asteroid?
- Why or why not?
- How would your asteroid reflect sunlight as it spins?



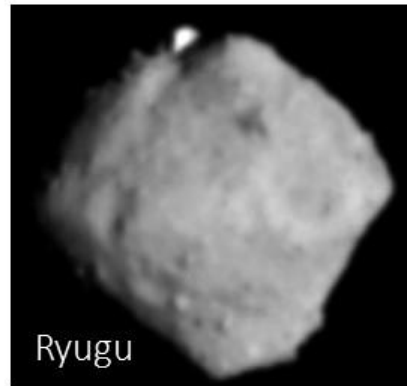
- Can you reproduce real asteroid shapes seen here?

REAL ASTEROID SHAPES FOR COMPARISON

Bennu
shape model
determined from
Earth-based
telescopes

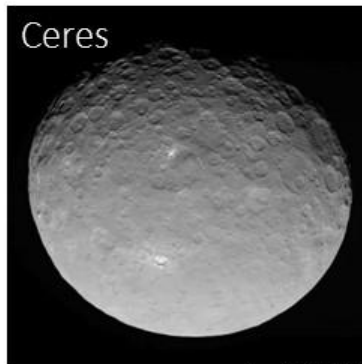


Credit: NASA



Ryugu

Credit: JAXA/Hayabusa2



Ceres

Credit: NASA



Vesta

Credit: NASA



Lutetia

Credit: ESA/NASA



Eros

Credit: NASA



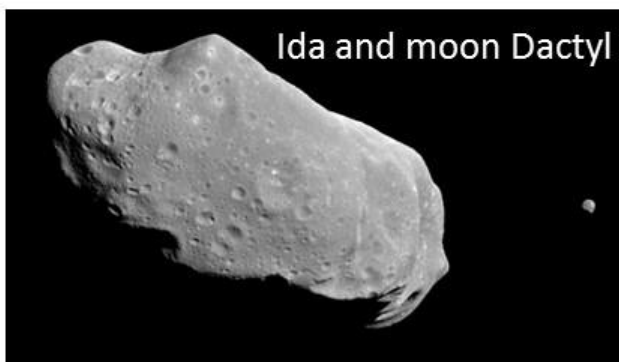
Gaspra

Credit: NASA



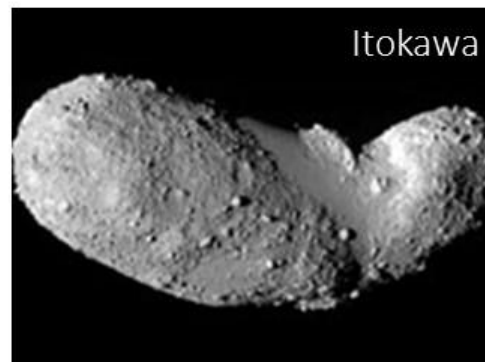
Mathilde

Credit: NASA



Ida and moon Dactyl

Credit: NASA



Itokawa

Credit: JAXA

For More Information

Scientists predicted the existence of rubble pile asteroids that barely hold together in space. They are thought to be old fragments of asteroids that gently collided with each other to make a larger asteroid (process is called accretion). Then rubble pile asteroid 2008 TC3 collided with Earth and fell apart! The meteorite pieces recovered afterwards were many different types – confirming the idea that rubble pile asteroids exist.

Melted asteroids were hot enough for molten rocks to separate and allow heavy iron-nickel to sink to the core. These are known as “differentiated” asteroids. Earth is a differentiated planet because it, too, has a core, mantle and a crust.