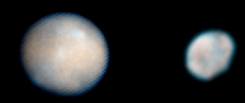
Ceres and the Asteroid Belt

Ceres is the largest object in the asteroid belt, which lies mainly between Mars and Jupiter. Asteroids are made of various combinations of rocks, metals and carbon compounds that have never been captured by any planet's gravity. Asteroids have not changed much for billions of years, making them important records of the formation of the solar system. The solar system contains millions of asteroids ranging down to the size of large boulders, as well as smaller objects called meteoroids. The asteroid belt is too big to be crowded, though. No spacecraft has ever been damaged during a passage through the asteroid belt.

The best photos of Ceres (below left) and Vesta (below right) as of 2008, from the Hubble Space Telescope (courtesy NASA/ESA)



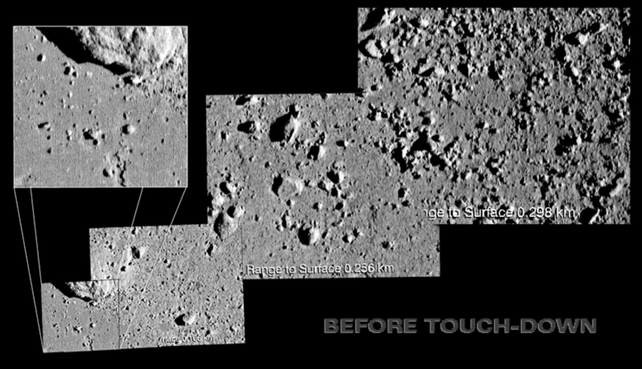
Ceres is much smaller than the Moon, which is shown below on the same scale as Ceres and Vesta above. Nonetheless, Ceres is sometimes referred to as a dwarf planet, along with Pluto and a growing list of other objects.

Moon image from NASA's Galileo spacecraft.

As of 2008, only the handful of asteroids shown here have had their pictures taken by spacecraft flying past them. If you're reading this panel after 2011, you've hopefully seen better photos of Vesta, the third-largest object in the asteroid belt, taken by the Dawn spacecraft. And if you're reading this panel after 2015, hopefully there are better photos of Ceres taken by the same spacecraft.

The gravity of a sufficiently massive asteroid will mold the asteroid into a roughly spherical shape over time. Most asteroids have such weak gravity that they can resist the tendency of their own gravity to make them spherical. Most asteroids therefore have a range of lopsided shapes reminiscent of potatoes.

If you put all asteroids and meteroids in the solar system together, the resulting object would be only half the diameter of the Moon. That hypothetical object is shown as the central dot below. Its size is correct relative to the Sun (the yellow circle) in this scale model.



The *NEAR (Near Earth Asteroid Rendezvous) Shoemaker* spacecraft landed on the asteroid Eros at the end of its mission. It sent back the photos at left as it descended to the surface of the asteroid. The frame at above left was taken from a distance of 128 meters. The smallest features seen in it are a few centimetres in size.
(NASA/JHUAPL image montage by Patrick Vantuyne)

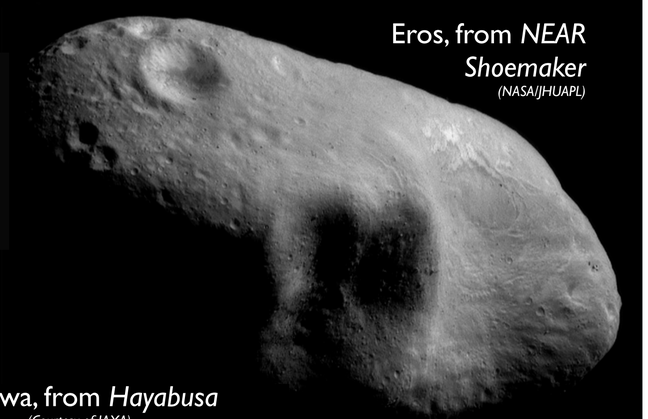
1 Cererian day = 9.1 Earth hours 1 Cererian year = 4.6 Earth years

Dactyl, the moon of Ida, is shown below in a close-up and at its true size relative to Ida. Dactyl was the first asteroid moon to be discovered.

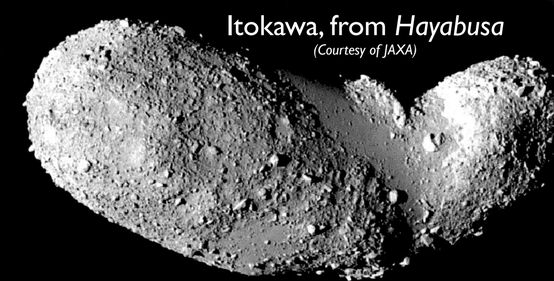
Ida and Dactyl, from NASA's *Galileo*

Steins, from ESA's *Rosetta*

Mathilde, from *NEAR Shoemaker*
(NASA/JHUAPL)



Eros, from *NEAR Shoemaker*
(NASA/JHUAPL)



Itokawa, from *Hayabusa*
(Courtesy of JAXA)

Gaspra, from NASA's *Galileo*

Annefrank, from NASA's *Stardust*