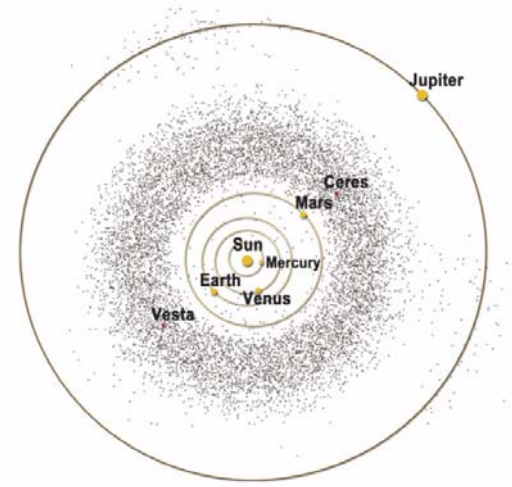
EXPLORER GUIDE: MODELING ASTEROID VESTA
A CHANCE TO BE A SCULPTOR… AND CARTOONIST… …AS WELL AS A SCIENTIST!

INTRODUCTION:

Dawn is traveling through the Solar System at this very moment, spiraling around the Sun toward the spacecraft's first destination, Vesta. Vesta is one of the biggest and brightest bodies in the asteroid belt, located in a wide swath of solar debris and accretions located between the orbits of Mars and Jupiter. We have two explorations to help you understand more about Vesta.

Look at models of the Solar System (you can find them **big** at:
http://solarsystem.nasa.gov/planets/index.cfm and
http://dawn.jpl.nasa.gov/multimedia/images/aster_belt_300.jpg).
What are three things you notice when you trace the Asteroid Belt with your finger.



Scientists believe that the Asteroid Belt would have pulled together into a planet during the early formation of our Solar System, billions of years ago, but the tug of Jupiter's gravity on one side and the Sun's gravity on the other kept the solar debris from **accreting**.

Whoa – **to accrete**, or **accretion** – big vocabulary words! They are scientific terms, the verb and the noun that basically mean to gather together, the process of getting larger by a gradual build up of… in this case, solar stuff…

Vesta is big for an asteroid, 458 to 578 kilometers in diameter, depending on where you measure it (Vesta is shaped sort of like a real ripe peach with a chomp out of it), about the size of the state of Arizona. Still, at 257 million kilometers away, Vesta was no more than a tiny smudge of light in the night sky until less than a couple of decades ago. We can only see Vesta if we know where to look.

There are many ways scientists can **"see"** and understand Vesta using information gathered by loads of cool instruments. What Hubble Telescope gave us was a set of real snapshots that brought Vesta into clearer visual focus.

In many places it's harder to see Vesta with the naked (eek!) eye in the 21st century than ever before – how come? What has changed since our ancestors gazed at the night sky? Where do you guess is a particularly good place to get a long look at the night sky with the naked (eek!) eye? Please explain!

Looking through the **Earth's atmosphere** to outer space is sort of like looking through cloudy water in a pond on a sunny day, trying to see the bottom. The water **refracts** (bends) and scatters the sunlight …

Or, for another way to think about it, looking though the atmosphere is like driving through shifting fog at night (for those of you who live where fog is common), when it thickens and thins and scatters your headlight beams, bouncing light every which way…

Hubble Space Telescope helped change all that. Even on a cloudless night, the Earth's atmosphere distorts the light travelling through it. That limits the ability of land (scientists prefer to call them ground-based) telescopes to see objects in outer space with clarity, including Vesta. In 1990, the Hubble was carried by the Space Shuttle Discovery beyond the Earth's atmosphere.

Hubble Space Telescope was launched into orbit around Earth where it cruises 569 km above the planet's surface. Looking through Hubble's lenses was like giving humankind's glasses a new prescription. Suddenly we were able to zoom in on small bodies like Vesta and see some detail. We could gather images of Vesta over time, as the asteroid rotated on its axis, spinning like a top, similar to the way Earth does.

If Hubble's new views were a giant step up a mountainside toward helping us understand Vesta, sending the Dawn spacecraft to Vesta is like climbing Mt. Everest…, we will learn so much more! Let's look through Hubble's not-so-rose colored lenses and see what the astronomers see.

In each activity, you will be working with a set of Hubble's images of Vesta, the best we will have until Dawn reaches Vesta in 2011. They were taken in a series, over time. Color was added to enhance our perception of changes in brightness. In our experience, printing them in black and white is **just** as effective as printing them in color!

A couple of last thoughts before the action starts….
You can do your explorations solo (by yourself),
but it makes more sense if you do it with friends.

- **For the 3D model in clay, you and your friends work together to make one cool model of Vesta.**
- **For the flipbook, each of you should make your own animation, while paying attention to each other's creations: the good, the bad, the ugly…! ;]**