

## Our Place in Space



Our position on Earth is pretty well defined, at least in terms of where we are with respect to such familiar guideposts as the equator, the Prime Meridian, the International Dateline, and the poles. Using a gridlike system of intersecting lines known as latitude and longitude, we can identify a particular location, or global address, with a great deal of accuracy. By including country, city, and street information, this location becomes quite specific. But we live at more than a street address on the “third rock from the Sun.” To find out more about our place in the universe, let’s take a field trip through space with help from the Internet.

Our home, Earth, is part of a much larger and more complex system, the Solar System—a collection of satellites held in orbit by the gravitational force of a medium-size, yellow-orange star called Sol. The Solar System itself is part of a larger collection of millions and millions of stars forming the Milky Way galaxy. The Milky Way is one of about three to four dozen galaxies collectively referred to as the Local Group, a galactic metropolis of sorts, which in turn belongs to a larger cluster of local groups of galaxies. The pattern continues as a group of galaxies belongs to a much larger collection, which in turn belongs to an even larger cluster of groups of galaxies.

### Look and learn

Show your students a picture of the Earth or the earthrise picture, taken by Apollo astronauts (download it from <ftp://ftp.cribx1.u-bordeaux.fr/astro/space/earthr2.gif>), and ask them to imagine that they are visitors from outside our solar system. This picture is perhaps the view such visitors would have. What is the main color they would see? What do you suppose they would think of our planet? Is it a water world? Where do you suppose an extraterrestrial would look for life on this planet?

You can also show your students a picture of the Andromeda galaxy (M31), a spiral-shaped galaxy (viewable at [www.seds.org/hst/m31c/html](http://www.seds.org/hst/m31c/html)). It is one of the members of the Local Group of galaxies. M31 is approximately 2,500,000 light-years away and is several times the size of the Milky Way. This picture was taken with the Hubble telescope, but M31 is also within the range of small telescopes.

We live along one of the Milky Way’s curving, spiral arms known as the Orion arm. All the celestial objects we can see with the naked eye (except for a few, such as M31) are a part of the Milky Way. Other objects such as M81, a spiral-shaped galaxy within the constellation Ursa Major (the Big Dipper, or the Great Bear), are tremendous distances from us. M81 is a member of another cluster of galaxies that are an estimated 6 to 10 million light-years away.

Trying to describe our own galaxy from our home on Earth is a lot like trying to describe the outside of your house while sitting in the living room. However, just as we can look through the windows at other houses, we can imagine what our

own galaxy looks like by studying other galaxies and using them as models for comparison.

### Anyone out there?

During the 1970s, two spacecraft were launched from Earth to explore the outer planets of our solar system. The spacecraft Pioneer 10 and Pio-



40,000 light years

Ground view of Andromeda

neer 11 carried scientific instruments for studying features of the outer planets as well as for sending data back to scientists on Earth. Although not a part of the mission, each spacecraft had a small plaque attached to it. (View the plaque at [spaceprojects.arc.nasa.gov/Space\\_Projects/pioneer/PNings/Plaque.gif](http://spaceprojects.arc.nasa.gov/Space_Projects/pioneer/PNings/Plaque.gif).)

Inscribed on the plaque is information about our planet and its inhabitants in the hope that it might eventually be recovered by another life form. Each Pioneer plaque includes a schematic diagram of our solar system and the path the spacecraft followed as it left its “home port.” Binary-coded distances between the planets were placed near each planet symbol.

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The man and woman on the plaques were drawn to the scale of the spacecraft silhouette shown in the background to show our size. The male is holding his right hand up in a gesture of peace. Other information on the Pioneer plaque includes a model of the hydrogen molecule and the position of our Sun relative to several pulsars and the center of the Milky Way galaxy.

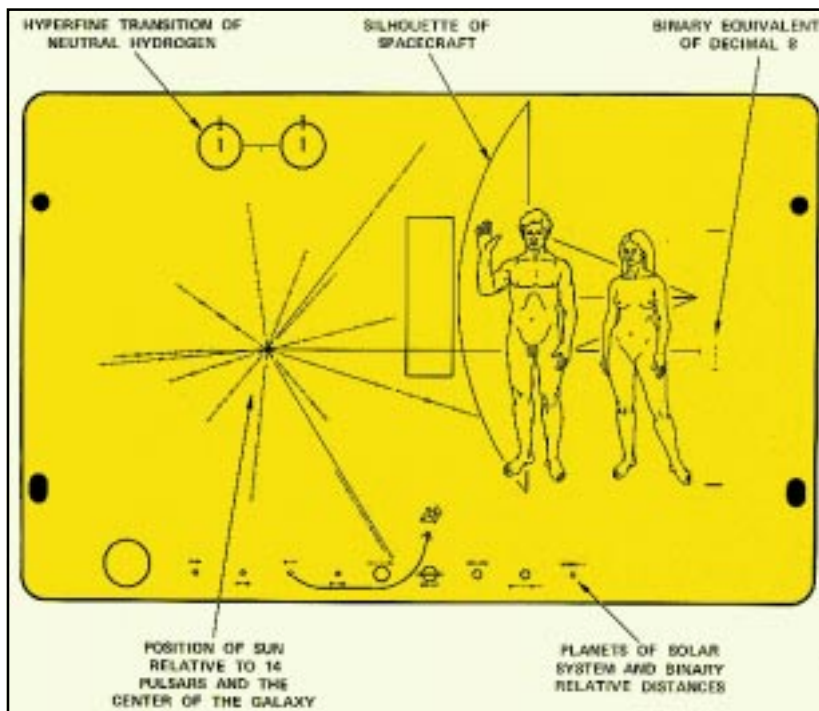
### Writing a universal address

Students can write their own “universal address” by answering the address questionnaire (in the activity, or on my homepage, [www.currentsky.com](http://www.currentsky.com)) and following the procedures that follow.

Resources such as astronomy maps and images available locally, from the library, government agencies, and the Internet can help your students gain a better understanding of “our place in space.” Use the resources to construct a bulletin-board display using pictures and drawings, or have students search for, retrieve, and use the resources as part of a student research and writing project.

### Resources

- Riddle, B. 1988. E.T., Call Nome ... or Phoenix, or Burbank. *Science and Children* 25(4):50–53.
- Avis Galaxy: [www.avis.com/maps/](http://www.avis.com/maps/)
- CIA World Fact Book: [www.odci.gov/cia/publications/factbook/info-frame.html](http://www.odci.gov/cia/publications/factbook/info-frame.html)
- ExInEd (Exploration in Education): [www.stsci.edu/exined/](http://www.stsci.edu/exined/)
- The Great Globe Gallery: [hum.amu.edu.pl/~zbzw/glob/glob1.htm](http://hum.amu.edu.pl/~zbzw/glob/glob1.htm)
- Infoseek Guide street maps: [www.infoseek.com/Facts?pg=maps.html](http://www.infoseek.com/Facts?pg=maps.html)
- Imaging Radar home page: [southport.jpl.nasa.gov/](http://southport.jpl.nasa.gov/)
- L'Atlas National Sur Le Rescol Canadien: [www.nais.ccm.emr.ca/schoolnet/](http://www.nais.ccm.emr.ca/schoolnet/)
- MapBlast Blastoff: [www.mapblast.com](http://www.mapblast.com)
- Perry-Castaneda Library Map Collection: [www.lib.utexas.edu/Libs/PCL/Map\\_collection/Map\\_collection.html](http://www.lib.utexas.edu/Libs/PCL/Map_collection/Map_collection.html)
- Planetary Image Finders: [www.arc.nasa.gov:80/ic/projects/bayes-group/Atlas/](http://www.arc.nasa.gov:80/ic/projects/bayes-group/Atlas/)
- U.S. Gazetteer: [www.census.gov/cgi-bin/gazetteer/](http://www.census.gov/cgi-bin/gazetteer/)



## My universal address

My name is \_\_\_\_\_ . I live at \_\_\_\_\_ ,  
 which is in the city of \_\_\_\_\_ in the state of \_\_\_\_\_  
 in the country of \_\_\_\_\_ , on the planet named \_\_\_\_\_ ,  
 which is the \_\_\_\_\_ planet in orbit around a star called \_\_\_\_\_ .  
 It is located in a solar system of \_\_\_\_\_ planets within the  
 \_\_\_\_\_ galaxy.

### Procedure

1. Complete the address questionnaire.
2. Have students locate their home on a city street map.
3. An aerial map may be used to show the relationship of the city or town to a nearby metropolitan area.
4. Have students locate their city on a state map.
5. Have students locate their state and, if possible, their city, on a map of the country.
6. Place a world map next to the country map and have students locate the continent their country is part of.
7. Using a poster or illustration of the solar system, have students locate the planet Earth.
8. Use a picture of a spiral-shaped galaxy to show what astronomers believe is the shape of the Milky Way galaxy. Then use a Hubble Space Telescope image of a galaxy cluster to illustrate what our local cluster of galaxies may look like.