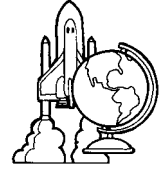

Hello, Is Anybody Out There?



Topic: Communicating with intelligent life beyond Earth

Objective: Students will design a message describing our planet and solar system to be sent into space to intelligent life beyond our solar system and galaxy.

Background: Recent searches have discovered a planetary system around a distant star. Most scientists believe that there are many other planetary systems in the universe. Some of these may have planets with intelligent life forms. The vast distances between our planetary system and others prevent our traveling there in present-day spacecraft. Radio waves traveling at the speed of light can be sent and received by radio telescopes. Earthbound scientists sent a message from Earth in 1974 via a gigantic radio telescope located in Puerto Rico. They also use radio telescopes to listen for any radio waves which may be sent by intelligent life. Thus far, no messages have been received. Even at the speed of light, these messages need to travel thousands of years to reach their destinations.

Another way of communicating to these distant locations is to attach messages in the form of pictures and sound to satellites launched to outlying planets in our solar system. Such messages have been sent aboard the *Voyagers 1* and *2* and *Pioneer 10* and *11* spacecraft that went to the outer planets. These satellites are now on their way out of the solar system and may, even thousands of years from now, encounter a life form which can “read” our messages.

Materials:

- Space Messages information sheet (page 20)
- **Optional:** video camera, tape recorder, computers
- drawings and books showing our solar system and planets (see Resources section)

Preparation:

Place pictures of our solar system on the bulletin board and books on display for easy access.

Procedure:

Divide the students into scientific teams and distribute Space Messages sheets to them.

For Discussion:

- Scientific teams should read and discuss the information sheet.
- Each team should develop a plan for creating their message. They should be encouraged to use electronic devices such as video cameras, tape recorders and computers.

Follow Up:

Let the scientific teams exchange data sheets and attempt to decipher another team’s message.

Hello, Is Anybody Out There? (cont.)



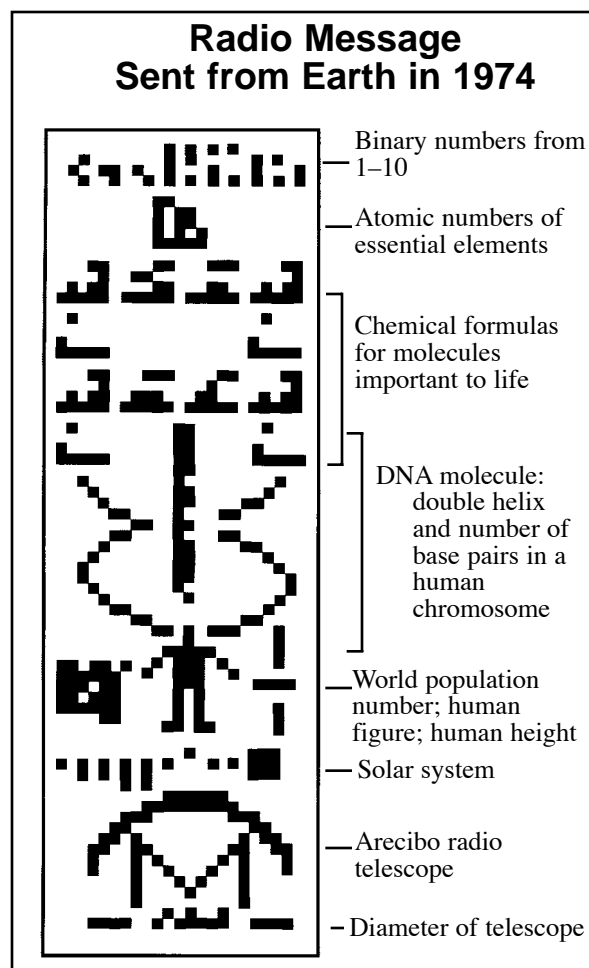
Space Messages

To the Students: Scientists believe there is a good possibility that there are other planets orbiting stars like our Sun, but they are too distant for us to see with today's telescopes. These planetary systems may have at least one planet with life on it and may even have intelligent life forms. Two ways to make contact with these intelligent life forms are to visit them in person or send messages. These planetary systems may be thousands of light years from us, so it is impossible to go there on today's spacecraft. However, it is possible to use waves that naturally travel through space at the speed of light for long-distance communications.

Energy in the form of radio waves is given off by stars and other sources in space. These waves travel out into space at the speed of light. Radio telescopes, using dish-shaped receivers, can pick up and send radio messages, much as optical telescopes can pick up light energy from stars and other objects in space. The largest of the radio telescopes is located in Arecibo, Puerto Rico, with a dish of 1,000 feet built in a natural bowl in the mountains. Scientists sent a message (right) from Earth into space in 1974, using this gigantic radio telescope aimed in the direction of a globular star cluster where there are likely to be planets. It will take the message 25,000 years to reach its destination!

The unmanned *Voyager* satellites, launched in 1977, passed by Jupiter, Saturn, Uranus, and Neptune before heading into deep space. *Voyager 1* is moving towards Polaris, the North Star. In about 40,000 years it will pass within 1.6 light years of a star. At about that same time, *Voyager 2* will pass within a similar distance of a star in the direction of the constellation Canis Major, the Great Dog. In about 300,000 years it will pass about four light years from Sirius, the Dog Star, in Canis Major.

On board the Voyagers is a 12" (30 cm) record called "Sounds of Earth." It contains greetings from Earth people in many languages, samples of music from different cultures and eras, and sounds such as laughter, crying, heartbeats, wind, and thunder. This record was the idea of astronomer Carl Sagan. A picture on the metal jacket of the record explains how it can be played and shows the position of Earth in the solar system.



Challenge: You are part of a scientific team hired to develop a way of communicating information about your planet to intelligent life forms in deep space. Remember, they will not know our language so you will need to be creative in how you describe this planet and its life forms without depending upon speaking or writing.