CLASSROOM ACTIVITY

Messenger Mission to Mercury

The MESSENGER orbiter's January 2008 flyby of the planet Mercury was historic. The last time a spacecraft visited was 1975, and it only mapped half the planet. MESSENGER is now sending back a complete picture of Mercury, shedding light on its geological history. But the ongoing mission will return much more than images. Its data on the planet's core, magnetic field, composition, and other attributes will help scientists answer pressing questions about the evolution of the terrestrial planets and even the Solar System itself. In the feature video, watch the MESSENGER science team react as the orbiter's first images of Mercury roll in.

RESEARCH ACTIVITY

Establish Prior Knowledge

Explain to students that the Mercury MESSENGER is a spacecraft that was launched in 2004 and has taken a 2 billion mile journey to Mercury. MESSENGER is sending back data that will help scientists begin to formulate hypotheses about this terrestrial planet. Before watching the video discuss with students the various methods scientists use to formulate hypotheses with data obtained by: observation —collecting observational data in the field; experimentation — designing and conducting a controlled experiment, and then collecting data from the experiment; and modeling —constructing and running/implementing a computer model using known information and physical laws, and then collecting data by running the model.

Exploration

Ask students to take notes while they are watching the video. Ask them to identify some of the questions scientists are exploring about Mercury, and the techniques they are using to gather data. Then have students read the synopsis and watch the video. After watching the video, have students break up into smaller groups. Provide each group with one of these questions to research.

- Why is Mercury so dense?
  http://messenger.jhuapl.edu/why_mercury/index.html
  http://willgater.com/2008/02/06/why-is-mercury-so-dense/

- What is the geologic history of Mercury?
  http://messenger.jhuapl.edu/why_mercury/index.html
  http://www.solarviews.com/eng/mercury1.htm
  http://www.astronomy.com/asy/default.aspx?c=a&id=6536

- What is the nature of Mercury's magnetic field?
  http://messenger.jhuapl.edu/why_mercury/index.html
  http://www.solarviews.com/eng/mercury1.htm
  http://www.astronomy.com/asy/default.aspx?c=a&id=6536

The Scientific Method

Research scientists use the Scientific Method (see page three) to investigate the natural world. You can use *Messenger Mission to Mercury* shows how scientists are collecting data about Mercury that will help them to evaluate hypotheses about the nature of the planet.

CLASSROOM ACTIVITY

Messenger Mission to Mercury (continued)

- What is the structure of Mercury's core?
  http://messenger.jhuapl.edu/why_mercury/index.html
  http://www.msnbc.msn.com/id/18473759/

- What are the unusual materials at Mercury's poles?
  http://messenger.jhuapl.edu/why_mercury/index.html
  http://nssdc.gsfc.nasa.gov/planetary/ice/ice_mercury.html

- What volatiles are important at Mercury?
  http://messenger.jhuapl.edu/why_mercury/index.html
  http://science.nasa.gov/headlines/y2008/30jan_mercurysurprise.htm

Wrap-Up
When groups have finished have them present the results of their research. Ask them to describe the hypothesis scientists.

Scientific Process

The Scientific Method is a dynamic and open-ended process that scientists use when they investigate a question they have. It is not a series of prescribed steps that scientists follow to prove a hypothesis. Rather, it's a general plan that helps guide their investigation. And while all scientists use the Scientific Method, they might not use all the steps, or they may complete the steps in a different order. For example, a scientist might make observations and collect data about a subject that interests him or her for years before formulating a hypothesis.

DEFINING A QUESTION TO INVESTIGATE

As scientists conduct their research, they make observations and collect data. The observations and data often lead them to ask why something is the way it is. Scientists pursue answers to these questions in order to continue with their research. Once scientists have a good question to investigate, they begin to think of ways to answer it.

FORMING A HYPOTHESIS

A hypothesis is a possible answer to a question. It is based on: observations scientists make, existing theories, and information they gather from other sources. Once they have a hypothesis, scientists can begin to think about how to test it.

TESTING A HYPOTHESIS

Evidence is needed to support or disprove the hypothesis. There are several strategies for collecting evidence. Scientists can gather their data by observing the natural world, performing an experiment in a laboratory, or by running a model. Scientists decide what strategy to use, often combining strategies. Then they plan a procedure and gather their data. They make sure the procedure can be repeated, so that other scientists can evaluate their findings.

ANALYZING THE DATA

Scientists organize their data in tables, graphs, diagrams, and even photographs. If possible, they check the data by comparing it to data from other sources. They are looking for patterns that show connections between important variables in the hypothesis they are testing.

DRAWING CONCLUSIONS

Scientists must decide whether the data clearly support or do not support the hypothesis. If the results are not clear, they must rethink their procedure. If the results are clear, scientists write up their findings and results to share with others. The conclusions they draw usually present new questions for them to pursue.