OBSERVATION AND INFERENCE

SUBJECTS: Science, social studies, language arts
SKILLS: Knowledge, comprehension, application, analysis, evaluation
STRATEGIES: Scientific inquiry, decision making, problem solving, writing
DURATION: 45 to 60 minutes
CLASS SIZE: Any; groups of 2 to 4

Objectives:
In their study of observation and inference the students will use worksheets and coins to:
1. Differentiate between observation and inference through a problem-solving approach.
2. Demonstrate their knowledge by analyzing an archaeological artifact and creating their own observation-inference statements.

Materials:
“Boy in the Water” activity sheet and master, and “An Ancient Coin” activity sheet for each student, and/or transparencies of each. A collection of foreign or U.S. coins (one per each student/team).

Vocabulary:
- hypothesis: a proposed explanation accounting for a set of facts that can be tested by further investigation.
- inference: a conclusion derived from observations.
- observation: recognizing or noting a fact or occurrence.

Background:
Science is based on observation and inference. Any phenomenon being studied must first be observed, whether it be from a satellite or through a microscope. An inference is a reason proposed to explain an observation. The hypothesis is a chosen inference that the scientist will attempt to confirm or disprove through testing.

Archaeologists use observation and inference to learn the story of past people. By making observations about objects (artifacts and sites) they infer the behavior of the people who used the objects. When archaeologists find the remains of a large village (observation), they could infer that the people were farmers. To test that inference (hypothesis), they would look for evidence of farming such as farming implements (like hoes), and food remains from crops (corn cobs and squash seeds). If they find these things, their hypothesis is verified. Archaeologists construct careful hypotheses when making inferences from archaeological data.

Setting the Stage:
1. Present students with a possible observation-inference scenario from their lives. Example: All the students in this classroom who ate in the cafeteria on Tuesday were ill on Wednesday (observation).
2. What many and varied reasons (proposed inferences) might there be for this illness? Examples: food poisoning, virus, a student uprising.
3. In what ways might one or more of these inferences (hypotheses) be tested in order to come to a conclusion about the cause of the illness? Examples: Send all the students to the school nurse for examination; test the food from Tuesday; obtain a medical history from the parents of each student.
Procedure:
1. "Boy in the Water"
   a. Project or distribute the master of the "Boy in the Water." Project or distribute the "Boy in the Water" activity sheet.
   b. Read each statement and ask students to decide if it is a statement of observation or of inference. Ask them to give reasons for their answers.
   c. How might one or more of the inferences (hypotheses) be tested?
   d. Assist students to create a definition for observation, inference, and hypothesis.

2. "An Ancient Coin"
   a. Project or distribute the activity sheet "An Ancient Coin" and explain that the coin was found by an archaeologist at a site.
   b. Which statements are observations and which are inferences? Which observation is each inference based on?
   c. Many different inferences are possible from one observation. What other inferences might be made from observing this coin?
   d. Choose one inference (hypothesis) and think of ways archaeologists might test it by looking at other evidence at the site (e.g., If people are peace loving, archaeologists would not expect to find a lot of weapons or protective gear).

Closure:
Ask the students to summarize what they learned about the importance of observation, inference, and hypothesis in archaeology.

Evaluation:
Be an archaeologist.
1. Give each student/team a foreign or U.S. coin and ask them to imagine they have found the coin at an archaeological site.
2. Ask them to create a list of observation statements and inference statements about the coin.
3. Have them choose one inference as their hypothesis and describe how they might test it.
4. Collect and correct their statements.

Links:
Section Two, Lesson 11: "Artifact Classification"
Section Two, Lesson 15: "Archaeology and Ethno­graphic Analogy: The Anasazi and the Hopi"

Boy in the Water Activity Sheet Answers

An Ancient Coin Activity Sheet Answers
Intrigue of the Past

Boy In The Water
Boy in the Water

Place an 'I' before the statements that are inferences, and an 'O' before the statements that are observations.

1. The boy is in the water. [I]
2. The weather is cold. [O]
3. The tree branch is broken. [I]
4. If the boy crawled out of the water the goat would butt him. [I]
5. The boy fell off the branch. [O]
6. A goat is standing by the pond. [O]
7. The branch will fall on the boy's head. [I]
8. The boy fell off the rocks. [O]
9. There is a sailboat in the water. [O]
10. The sailboat belongs to the boy. [O]
11. The goat will soon leave the pond. [O]
12. The tree by the pond has no leaves on it. [O]
13. There are three rocks in the pond. [O]
14. The tree by the pond is dead. [O]
15. If it rains leaves will grow on the tree. [I]
16. The goat butted the boy into the pond. [O]
Place an "I" before the statements that are inferences, and an "O" before the statements that are observations.

_ 1. There is a representation of a face on one side of the coin.
_ 2. The coin tells us that these were deeply religious people.
_ 3. The words "We Trust the Gods" are printed on the coin.
_ 4. On one side of the artifact is a drawing of leaves.
_ 5. We can tell from the artifact that these were peace-loving people.
_ 6. The face on the coin is a representation of the nation's king.