

Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Guided Learning: Evaluating Scientific Explanations (Part 1)

### Learning goals

After completing this activity, you will be able to ...

- Explain what makes an explanation plausible and reliable.
- Evaluate explanations based on those two criteria.

**Vocabulary:** Ockham's razor, principle of parsimony

In the *Science and Testability* Unit, you investigated the basic requirement for an explanation to be scientific: it must be testable. While working through those lessons, you found certain explanations can be tested more thoroughly than others. An explanation is considered *reliable* or *sound* when it has been satisfactorily tested in different contexts. In particular, the most reliable explanations have three properties:

- They make clear predictions rather than merely explaining data after the fact.
- They make predictions for a wide range of contexts so they can be tested in many different ways.
- Their predictions have been confirmed as accurate.

Reliability is one of three factors used to evaluate the quality of an explanation. In this unit you will learn about another factor scientists use to judge explanations: *plausibility*.



An explanation is considered plausible if it is deemed reasonable and likely. You frequently judge the plausibility of ideas as part of everyday life. Below are three scenarios to consider, which you will later discuss as a class.

1. You visit a cousin, and she shows you something interesting. She drops a small rock into a glass of ice water. The water clouds up nearly immediately. You ask her why, and she says her brother told her that this particular rock changes from solid to gas when it gets cold. So when you put it in ice water, it turns into vapor and clouds the water.

Do you think this explanation is plausible? Why or why not? Use complete sentences.

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2. Imagine it is January 2, the first day back to school from winter break. A schoolmate, Katrina Richards, does not show up at school. When the teacher asks if anyone knows why she is absent, a student answers “She has a grandmother in Chicago. Maybe her parents went there for Christmas and their return flight got delayed.”



Do you think of this explanation is the most likely reason for Katrina’s absence? Why or why not? Use complete sentences.

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3. You are taking your dog for a walk one winter night when you notice a denim jacket lying on the ground. You pick it up. While doing so, your hand grazes the zipper. You notice it feels much colder than the rest of the jacket. You think about why the metal felt colder than the denim. You reason that the zipper was the same temperature as the rest of the jacket, but it felt much colder because metal is a conductor of heat, so heat left your body much more quickly where it touched the metal than it did where it touched the denim.

You tell your mother your explanation. She responds, “I’m not sure about that. For example, I can put a pizza in the oven on a sheet of aluminum foil and, 10 minutes later, tug on the foil without burning myself. Based on your explanation, wouldn’t you expect the foil to burn me because heat would rush from the foil into my fingers?”

What do you think of your mother’s remark? Does it mean your explanation is wrong? Explain using complete sentences

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