

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

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

## Guided Learning: Science and Testability (Part 2)

### Thinking about... indirect testing

In science, most explanations involve some aspect of nature we cannot measure directly. It is either invisible, like gravitational force, or it involves data that is difficult to obtain. For this reason, scientists use indirect testing to evaluate explanations. They cannot see gravitational force, but they can calculate how a planet should move according to Newton's theory for gravity.

Scientific explanations must be based on observations, and any aspect that relies on information that cannot be observed directly must be indirectly testable.

The *plausibility* (reasonableness) of almost any explanation can be investigated, but even a plausible explanation may not be testable. Also, one part of an explanation may be testable while others are not. In Samoa's case, for example, you could research canine learning patterns to determine if explanation IV (Samoa learned her weekly pattern from her mother) is plausible and you could test certain aspects of that explanation, but the full explanation is not scientifically testable even if you found it plausible.

You could test whether Samoa's behavior depends on your schedule, but if you found that Samoa acted differently on Mondays and Thursdays regardless of your actions, it is unlikely you could test whether this was because she learned the behavior as a pup. Even if you discovered that her previous owner did go on walks with Samoa's mother on those two days, it would only make that explanation more plausible, you would still not be able to satisfactorily test whether this behavior made an impression on Samoa that is causing her current behavior.



Imagine marching band season ends. You start leaving school at the same time every day. You go home by the same route every day, so you always get back by 3:30 P.M. Two months later, you note that Samoa greets you with about the same frequency no matter which day it is.

1. An observation refutes an explanation if it does not match what one expects to find if the explanation were true. Which explanation is refuted by the observation that Samoa now greets you with about the same frequency no matter the day? Explain your reasoning.

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2. An observation supports an explanation if it matches what one expects to find if the explanation were true. Which explanations does the observation support?

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