

## READING — SCIENTIFIC METHOD (Section 1.8)

What are the five major components of the inquiry process often referred to as the “scientific method?”

1. observations
2. questions
3. hypotheses
4. predictions
5. testing predictions (experimentally)

One of the QUESTIONS posed in the reading was “Why doesn’t the flashlight work?” What were the two HYPOTHESES suggested by the authors?

1. burned out bulb
2. dead batteries

What is a hypothesis? (check glossary)

A possible explanation for an observed phenomenon (can you say this in your own words???)

According to the reading, what are two important properties of a hypothesis?

1. must be testable
2. must be falsifiable

(what do these terms mean to you?)

PREDICTIONS often have the format: *if* (hypothesis is true), *then* (expected result of an EXPERIMENT or test). For example, *if* the flashlight isn’t working because its battery is dead, *then* replacing the batteries should fix the flashlight.

Using the “if ... then” format, write out a **prediction** for the experiment suggested in the reading to test the burned out bulb hypothesis:

*If* the flashlight isn’t working because its bulb is burned out, then replacing the bulb should fix the problem.

What test result would support the burned out bulb hypothesis?

The flashlight works when the bulb is replaced.

What test result would falsify the burned out bulb hypothesis?

The flashlight DOESN’T work when the bulb is replaced.

The authors tell us that scientists can never PROVE a hypothesis to be valid. They suggest that even if changing the bulb makes the flashlight work, we don’t know for certain that the problem wasn’t something else like a loose bulb that was also corrected when we changed the bulb.

Complete the following predictions for a follow up experiment.

If the flashlight wasn’t working because of a *loose* bulb, then when I put the old bulb back in, the flashlight will work fine as long as the bulb is in tightly.

If the flashlight wasn’t working because of a *dead* bulb, then when I put the old bulb back in, the flashlight won’t work even if the bulb is in tightly.

### PRACTICING YOUR UNDERSTANDING:

Suppose you go out to your car and you OBSERVE that it won't start. You ASK yourself, "Why isn't my car working?"

Name three possible HYPOTHESES.

1. **dead battery**
2. **out of gas**
3. **you are in the wrong car**

(MANY OTHER POSSIBILITIES ... loose battery cables, wrong key, dead alternator, dead starter, etc.)

Choose one of your hypotheses and PREDICT the outcome of two tests you could perform to test your hypothesis. Be sure to use the "if ... then" format.

(examples only)

If my car isn't working because of a dead battery, then when I turn the headlights on, they should not light.

If my car isn't working because of a dead battery, then the car should start with a "jump."

Suppose the results falsify this first hypothesis; choose a second of your hypotheses and predict the outcome of yet another test you could perform to test this hypothesis.

If my car isn't working because I am out of gas, then the gas gauge should be on E.