

## PRACTICE EXAMPLE – DO NOT DISTRIBUTE!

What grades would you assign to these two samples and why?

### SAMPLE #1

**Popper** – A philosopher of science who advocated falsificationism.

**Principle of sufficient reason** – Leibniz used this principle to argue God couldn't have a reason to create the universe.

**1. Explain the Quine-Duhem thesis. Explain how it pertains to falsificationism and related views (such as 'crucial experiments') about the relations between evidence and theories in science.**

The Quine-Duhem thesis is the idea that competing theories can never be completely disconfirmed. This is because theories are connected to a number of auxiliary hypotheses, and it's possible to reject them and keep the original theory. This shows that theories can never be true absolutely. Theories are connected to evidence. Evidence can be used to confirm a theory. It can also be used to disconfirm a theory, this happens when the theory predicts something that doesn't happen. For example, cold fusion theory made a number of false predictions, and these turned out to disconfirm the theory, though many scientists refused to give the theory up—which again illustrates why the Quine-Duhem thesis causes problems for science. Falsificationism is the idea that theories themselves aren't falsifiable. Instead, people have a certain attitude toward theories. For example, for the cold fusion theorists, their theory wasn't falsifiable, because they refused to give it up even though they had disconfirming evidence.

I think the Quine-Duhem theory is highly related to issues we face every day. People treat science almost like a religion, and use it to undermine the most cherished beliefs of other religions and personal philosophies, but because theories can't be proven, even scientists must rely on faith. This is a very humbling.

SAMPLE #2

**Popper** – A philosopher of science who held to falsificationism, the view that scientific theories must be falsifiable—i.e., it must be possible to disconfirm them.

**Principle of sufficient reason** – The principle, associated with Leibniz, according to which everything has an explanation.

**1. Explain the Quine-Duhem thesis. Explain how it pertains to falsificationism and related views (such as ‘crucial experiments’) about the relations between evidence and theories in science.**

According to an overly simplistic conception of science, theories are put forward to explain certain phenomena. These theories in turn make a number of predictions, which can be tested. Now, while these theories can never be proven with absolute certainty, they can be confirmed to a high degree. For example, when a theory makes a number of predictions, and a number of tests comport with these predictions, this is taken to be strong evidence that the theory is true. However, if this theory is in competition with some other theory, it should be possible to design a crucial experiment—a way of testing a prediction of both theories—that can definitively show one of the theories to be incorrect.

But this conception is overly simplistic for an important reason: it assumes that hypotheses are tested in isolation. The reality is that for any hypothesis, the hypothesis presupposes a number of “auxiliary hypotheses,” which are intimately connected to the predictions of the original hypothesis. And it is always possible to reject or revise one or more of these auxiliary hypotheses to retain the original hypothesis. This is the wisdom of the Quine-Duhem thesis, and it implies that, strictly speaking, there can be no crucial experiments.

This implies that the view of falsificationism—which maintains that scientific theories must be falsifiable—is naïve as well. For even if a prediction can be shown incorrect via some experiment, this does not on its own amount to the wholesale falsification of the theory itself. But what then could it be for a theory to be falsifiable, as falsificationism suggests that a scientific theory must be? The falsificationist owes an answer to this question, and it is hard to see what such an answer would look like, which is why the Quine-Duhem thesis is so troubling.