Chapter 14: Four Tips

14A Sufficient and Necessary Conditions

- When you think of necessity and sufficiency, think, respectively, in terms of what must be the case and what is enough. A necessary condition is what **must** obtain for something else to occur. Ask yourself if, for example, fire can occur **without** oxygen. If the answer is no, then there must be oxygen for there to be fire. Another way to say this is that oxygen is a necessary condition for fire to obtain.

  Now consider what we call a sufficient condition. This is what **guarantees** some state of affairs, or is **enough** for that state of affairs to obtain. Let's revisit the oxygen/fire example. Oxygen does not guarantee that fire occurs. So oxygen isn't sufficient for fire.

14B Causality

- At the heart of all scientific endeavors, including scientific reasoning, is the concept of causality. To connect two or more events by this concept is to claim an advance in knowledge. But what is causality? There are multiple theories of causality, some of the most important of which you are studying in Chapter 14. It is important that you bear this fact in mind as you proceed, as thinking about each theory as a way of understanding the concept of causality will help you better understand how scientific reasoning works.

14C Mill's Methods

- Mill's five methods of determining causality all assume that events can be understood by establishing a specific relationship between them. A further assumption is that this new understanding will bear on future, similar events. So, each of the five methods offers us a way of sifting through the complexities of events to isolate the condition or conditions that brought about a current state of affairs.

14E Theoretical and Experimental Science

- A hypothesis is an explanation of a known fact or set of facts, and it is also a way of testing that explanation for use in further discoveries. You might also think about it this way: a hypothesis is a way of thinking about a cause.