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Introduction essay Questions and responses

1. A scientific theory is an explanation for some aspect of the natural world that has been repeatedly verified by observation and experiment. It is essential that a scientific theory can make reliable predictions and can withstand attempts to disprove it. The most accurate and reliable explanations of natural phenomena are scientific theories. Deductive reasoning and inductive reasoning are two different approaches to problem-solving and making conclusions. To reach a logically certain conclusion, deductive reasoning begins with a general principle or theory and applies it to a specific situation. The conclusion is connected to the premise, and if the premise is true, the conclusion must also be true. An example of this is: All men are mortal. Donald Trump is a man. Therefore, Donald Trump is a man. By contrast, inductive reasoning begins with a specific observation and moves from there to a general conclusion. The conclusions reached through inductive reasoning are only probable, not certain. The conclusions drawn from inductive reasoning are solely based on the evidence at hand. An example of this is: whenever I see birds flying, they flap their wings. Based on that evidence, I conclude that birds fly by flapping their wings. Inductive conclusions are reached based on specific observations, whereas deductive reasoning reaches conclusions with general laws. Propositions are statements that can be

true or false, which are the basis for logical inferences. Hypotheses, on the other hand, are educated guesses or explanations for phenomena. The relationship between propositions and hypotheses is that a hypothesis is a type of proposition that is used as a basis for further investigation and testing. Hypotheses are questions that can be tested and if proven false, rejected. Propositions deal with concepts that aren't testable.

8. In short, control groups are used in the experimental method to isolate the effect of the independent variable on the dependent variable and to rule out alternative explanations for the results. By using control groups, investigators can increase the validity and reliability of their results and draw stronger conclusions about causal relationships.

11. The replication of scientific studies is crucial to the world of science for a multitude of reasons. Replicating an experiment or observation can increase confidence in the findings. Having more than one person test a conclusion is often proof enough of its validity. Being able to trust one's own findings rather than an unknown scholar often enhances trust in the learned conclusion. Repeating a study can also help find any errors or problems in the previously thought findings. As more and more eyes wander over the project the higher the likelihood that one may find a mistake. This leads to more accurate results and polished designs. Another reason for replication is it supports scientific progress. As more scientists work on a project more evidence will be created surrounding the given phenomenon. In conclusion, repeating something only adds to its credibility.

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