



The Scholars' Academy

Mission Statement: To Prepare for College and Careers of the 21st Century

"Technology Today, Smarter Tomorrow: Removing Time and Place from Teaching and Learning"

27Q323 is an Accelerated College Preparatory School for Grades 6-12

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Living Environment Summer Assignment Task Card

Focus: How does the scientific method lead to the validity of a science experiment?

The scientific method is a process for experimentation that is used to explore observations and answer questions. Scientists use the scientific method to search for cause and effect relationships in nature. In other words, they design an experiment so that changes to one item cause something else to vary in a predictable way. The scientific method will help you to focus your experiment, construct a hypothesis, design, execute, and evaluate your experiment.

<p>Task A – First, read and annotate the text below on Gregor Mendel and his work with genetics in order to identify the components of the scientific method. Identify all parts on a separate sheet of paper.</p>

The Father of Genetics

Mendel's beautifully designed experiments with pea plants were the first to focus on the numerical relationships among traits appearing in the progeny of hybrids. His interpretation for this phenomenon was that material and unchanging hereditary elements undergo segregation and independent assortment. These elements are then passed on unchanged (except in arrangement) to offspring thus yielding a very large, but finite number of possible variations.

Mendel often wondered how plants obtained atypical characteristics. On one of his frequent walks around the monastery, he found an atypical variety of an ornamental plant. He took it and planted it next to the typical variety. He grew their progeny side by side to see if there would be any approximation of the traits passed on to the next generation. This experiment was designed to support or to illustrate Lamarck's views concerning the influence of environment upon plants. He found that the plants' respective offspring retained the essential traits of the parents, and therefore were not influenced by the environment. This simple test gave birth to the idea of heredity.

Overshadowing the creative brilliance of Mendel's work is the fact that it was virtually ignored for 34 years. Only after the dramatic rediscovery of Mendel's work in 1900 (16 years after Mendel's death) was he rightfully recognized as the founder of genetics.

Components of the Scientific Method in a Controlled Experiment:

1. Problem/Question-
2. Background Research-
3. Hypothesis-
4. Experiment (Controlled)
 - Experimental group-
 - Control Group-
 - Independent Variable-
 - Dependent Variable-
 - Constants-
5. Materials & Methods (procedure)-
6. Collect data-
7. Analyze data-
8. Conclusion-

(On a separate sheet of paper)

Task B- Use the rubric below and your knowledge of the scientific method to design a “hypothetical” (you will *not* conduct it) Controlled Experiment that follows the Scientific Method. Be sure to identify the components above, including the experimental group, control group, independent variable, dependent variable, and constants. Make sure this experiment is realistic and practical. You will only need to complete steps 1-5 above since you are not actually conducting an experiment.

Common Core Standards:

RST 7.1 - Cite specific textual evidence to support analysis of science and technical texts.

RST-7.2 - Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

RST 7.3 - Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks

Rubric:

	1	2	3	4
Problem/Question	Problem is stated incorrectly	Problem is not clearly stated and is not in question format.	Problem is not clearly stated and may not be in question format.	Problem is clearly stated to accurately explain to the reader the focus of the experiment and is in question format.
Hypothesis	Hypothesis is vague or unrelated to the problem/question.	Hypothesis predicts the outcome of the experiment but is not reasonable and does not relate the independent and dependent variables.	Provides a statement that clearly predicts what the outcome of the experiment will be. Prediction is reasonable. Relates independent and dependent variables.	Clearly predicts what the outcome of the experiment will be. Prediction is reasonable and demonstrates insightful thinking. Relates independent and dependent variables.
Methods & Materials	Doesn't provide enough information to represent an experimental procedure. Materials missing.	Materials are mentioned but without amounts. Steps are vague but in paragraph form.	Materials are mentioned but without amounts. Steps are easy to follow and in paragraph form.	Materials and amounts are identified. Steps are easy to follow and in paragraph form.
Background Research	Most of the research and information collected does not relate to the hypothesis.	Some of the research and information collected relates to the hypothesis.	Most of the research and information collected relates to the hypothesis.	All of the research and information collected relates to the hypothesis.