

SUBDOMAIN 114.1 - SCIENTIFIC CONCEPTS, THEORIES, & INQUIRY

Competency 114.1.2: Fundamentals of Natural Science - The graduate examines fundamental concepts and theories in the natural sciences.

Introduction:

The body of scientific knowledge and understanding constantly undergoes change and refinement. Scientific discoveries and historical events have the capacity to alter our understanding of scientific concepts and the natural world.

Scientific discovery is based on observation, study, and experimentation, which in turn leads to new understanding. Theories such as the big bang are examples of a concept or phenomena in science about which what we know has changed over time based on new knowledge, understanding, and research.

Historical events, such as major natural disasters, have often led to new discoveries about our natural world, especially due to their unique capacity to yield real world data that can be further studied in the lab and field using models, simulations, smaller scale studies, etc.

In this task, you will explore specific examples of how our scientific understanding has changed over time based on research and new discoveries on (1) a concept in science, and (2) as a result of a historical event in our natural world.

Task:

- A. Create a multimedia presentation (e.g. PowerPoint, Keynote) (*suggested length of 8–10 slides*) in which you do the following:
 1. Identify a specific scientific concept or phenomenon for which our understanding has changed over time (e.g., the nature and structure of the atom, genetics, plate tectonics, evolution, the solar system, big bang, biogeography).
 - a. Explain how scientific discoveries have changed our understanding of that scientific concept or phenomenon over time.
 - b. Include **three** specific, sequential examples that support your explanation of how your chosen concept has changed over time based on new knowledge and understanding.
 2. Identify a specific historical event that has changed our scientific understanding of an aspect of the natural world (e.g., the eruption of Mount St. Helens, the tsunami in Indonesia, the moon landing, Chernobyl disaster, Exxon Valdez oil spill, major floods, earthquakes, tornadoes).
 - a. Discuss the social or historical context in which the event occurred.
 - b. Discuss the impact that your chosen historical event has had upon our scientific understanding of an aspect of the natural world.
 - c. Include **two** specific examples that support your analysis of how this event added to or changed our understanding of science in the natural world.
- B. When you use sources, include all in-text citations and references in APA format.

Note: When bulleted points are present in the task prompt, the level of detail or support called for in the rubric refers to those bulleted points.

Note: For definitions of terms commonly used in the rubric, see the Rubric Terms web

link included in the Evaluation Procedures section.

Note: When using sources to support ideas and elements in a paper or project, the submission MUST include APA formatted in-text citations with a corresponding reference list for any direct quotes or paraphrasing. It is not necessary to list sources that were consulted if they have not been quoted or paraphrased in the text of the paper or project.

Note: No more than a combined total of 30% of a submission can be directly quoted or closely paraphrased from sources, even if cited correctly. For tips on using APA style, please refer to the APA Handout web link included in the APA Guidelines section.

DHT Task 1

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	value: 0.00	value: 1.00	value: 2.00	Score/Level
Articulation of Response (clarity, organization, mechanics)	The candidate provides unsatisfactory articulation of response.	The candidate provides weak articulation of response.	The candidate provides adequate articulation of response.	
A1. Scientific Concept or Phenomenon	The candidate does not identify a specific scientific concept or phenomenon for which understanding has changed over time.	Not applicable.	The candidate identifies a specific scientific concept or phenomenon for which understanding has changed over time.	
A1a. Understanding	The candidate does not provide a logical explanation of how scientific discoveries have changed understanding of the scientific concept or phenomenon over time.	The candidate provides a logical explanation, with insufficient support, of how scientific discoveries have changed understanding of the scientific concept or phenomenon over time.	The candidate provides a logical explanation, with sufficient support, of how scientific discoveries have changed understanding of the scientific concept or phenomenon over time.	
A1b. Examples	The candidate includes 0–1 appropriate examples that support the explanation.	The candidate includes 2 appropriate examples that support the explanation.	The candidate includes 3 appropriate examples that support the explanation.	
A2. Historical Event	The candidate does not identify a specific historical event that has changed our scientific understanding of an aspect of the natural world.	Not applicable.	The candidate identifies a specific historical event that has changed our scientific understanding of an aspect of the natural world.	
A2a. Social and Historical Context of Event	The candidate does not provide a logical discussion of the social or historical context in which the event occurred.	The candidate provides a logical discussion, with insufficient detail, of the social or historical context in which the event occurred.	The candidate provides a logical discussion, with sufficient detail, of the social or historical context in which the event occurred.	
A2b. Impact of Historical Event	The candidate does not provide a logical discussion of the impact that the historical event has had upon scientific understanding of an aspect of the natural world.	The candidate provides a logical discussion, with insufficient support, of the impact that the historical event has had upon our scientific understanding of an	The candidate provides a logical discussion, with sufficient support, of the impact that the historical event has had upon our scientific understanding of an aspect of the	

	value: 0.00	value: 1.00	value: 2.00	Score/Level
		aspect of the natural world.	natural world.	
A2c. Analysis Support	The candidate includes 0 appropriate examples that support the analysis.	The candidate includes 1 appropriate example that supports the analysis.	The candidate includes 2 appropriate examples that support the analysis.	
B. Sources	When the candidate uses sources, the candidate does not provide in-text citations and references for each source used.	When the candidate uses sources, the candidate provides appropriate in-text citations and references with major deviations from APA style.	When the candidate uses sources, the candidate provides appropriate in-text citations and references accurately or with only minor deviations from APA style, OR the candidate does not use sources.	

SUBDOMAIN 114.2 - SYSTEMS OF NATURAL SCIENCE

Competency 114.2.3: Ecosystems - *The graduate analyzes the components, organization, interactions, and processes of ecosystems.*

Introduction:

"An ecosystem consists of all the organisms living in a community as well as all the abiotic factors with which they interact" (Campbell & Reece, 2005). There are many different types of ecosystems all over the world. Humans can have a great impact on these ecosystems.

In this task, you will choose a specific ecosystem to research and analyze the impact of humans on that ecosystem. Be specific in your selection. (For example, instead of choosing "desert ecosystem," select a specific desert ecosystem such as the Mojave Desert.)

Some examples of specific ecosystems are the mangrove swamps of Borneo, the old-growth forests of the Pacific Northwest, the Florida Everglades, the Sonoran Desert in Arizona, the Costa Rican rainforest, the ephemeral pools in Canyonlands National Park, a particular lake or forest, etc.

Task:

A. Create a multimedia presentation (e.g. PowerPoint, Keynote) (*suggested length of 6–8 slides*) that introduces and describes your chosen ecosystem, analyzes the impact of human activity on the ecosystem, and provides guidelines to help preserve your chosen ecosystem. Do the following in your presentation:

1. Describe the specific ecosystem that you have selected by doing the following:
 - a. Identify the specific geographic location of the ecosystem.

Note: You can use maps, written description of location, and latitude/longitude to provide the location of the ecosystem.

- b. Explain the major biotic and abiotic components of the ecosystem.
 2. Discuss the impact that humans currently have on the specified ecosystem.
 3. Predict the effect of future human impact on the specified ecosystem.
 4. Provide guidelines regarding human activities that will aid in preserving the specified ecosystem.

B. When you use sources, include all in-text citations and references in APA format.

Note: When bulleted points are present in the task prompt, the level of detail or support called for in the rubric refers to those bulleted points.

Note: For definitions of terms commonly used in the rubric, see the Rubric Terms web link included in the Evaluation Procedures section.

Note: When using sources to support ideas and elements in a paper or project, the

submission MUST include APA formatted in-text citations with a corresponding reference list for any direct quotes or paraphrasing. It is not necessary to list sources that were consulted if they have not been quoted or paraphrased in the text of the paper or project.

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Reference List:

Note: This reference list refers only to direct citations in the task above and may be different from those you need to complete the task. Consult your Course of Study for a list of suggested learning resources.

Campbell, N.A. & Reece, J.B. (2005). *Biology*, 7/e. San Francisco, CA: Benjamin Cummings.

DHT Task 2

☐ Export to Word

	value: 0.00	value: 1.00	value: 2.00	Score/Level
Articulation of Response (clarity, organization, mechanics)	The candidate provides unsatisfactory articulation of response.	The candidate provides weak articulation of response.	The candidate provides adequate articulation of response.	
A1a. Geographic Location	The candidate does not accurately identify the geographic location of the specified ecosystem.	Not applicable.	The candidate accurately identifies the geographic location of the specified ecosystem.	
A1b. Biotic and Abiotic Components	The candidate does not provide a logical explanation of the major biotic and abiotic components of the specified ecosystem.	The candidate provides a logical explanation, with insufficient detail, of the major biotic and abiotic components of the specified ecosystem.	The candidate provides a logical explanation, with sufficient detail, of the major biotic and abiotic components of the specified ecosystem.	
A2. Impact of Human Activity	The candidate does not provide a logical discussion of the impact that humans currently have on the specified ecosystem.	The candidate provides a logical discussion, with insufficient detail, of the impact that humans currently have on the specified ecosystem.	The candidate provides a logical discussion, with sufficient detail, of the impact that humans currently have on the specified ecosystem.	
A3. Future Human Impact	The candidate does not provide a logical prediction of the effect of future human impact on the specified ecosystem.	The candidate provides a logical prediction, with insufficient support, of the effect of future human impact on the specified ecosystem.	The candidate provides a logical prediction, with sufficient support, of the effect of future human impact on the specified ecosystem.	
A4. Guidelines	The candidate does not provide logical guidelines regarding human activities that will aid in preserving the specified ecosystem.	The candidate provides logical guidelines, with insufficient support, regarding human activities that will aid in preserving the specified ecosystem.	The candidate provides logical guidelines, with sufficient support, regarding human activities that will aid in preserving the specified ecosystem.	
B. Sources	When the candidate uses sources, the candidate does not provide in-text citations and references for each source used.	When the candidate uses sources, the candidate provides appropriate in-text citations and references with major deviations from APA style.	When the candidate uses sources, the candidate provides appropriate in-text citations and references accurately or with only minor deviations from APA style, OR the	

	value: 0.00	value: 1.00	value: 2.00	Score/Level
			candidate does not use sources.	

SUBDOMAIN 114.1 - SCIENTIFIC CONCEPTS, THEORIES, & INQUIRY

Competency 114.1.1: Scientific Concepts and Methodologies - The graduate recognizes and analyzes various natural phenomena and applies natural science methods and approaches to these natural phenomena.

Introduction:

Scientific inquiry is a process used to investigate the physical world. The experimental scientific method provides an organized approach for answering testable questions and confirming hypotheses.

Appropriate experimental questions investigate a causal link between the independent and dependent variables. For example, How does the amount of fertilizer affect the growth in height (cm) of plants?

In this task you will use the experimental scientific method to investigate a relevant, testable problem and communicate your findings in an organized written report.

Task:

IMPORTANT NOTE: You may not use living vertebrate animals as subjects in your experiment. Vertebrate animals are animals with a backbone. Fish, amphibians, reptiles, birds, and mammals are all vertebrate animals. Examples of Vertebrate animals include frogs, lizards, snakes, dogs, cats, and humans. Your experiment for Task 3 **may not** involve experimenting on living vertebrate animals. If you are not sure whether your experiment topic is acceptable, please contact a course instructor BEFORE you conduct your experiment. Experiments that use living vertebrate animals will not be accepted for Task 3.

Design and carry out a scientific experiment that investigates a topic from either the life, earth or physical sciences and uses appropriate methods, tools, technologies, and quantitative measurement units. For a list of possible science experiment topic ideas refer to the "Topic List" attachment.

Complete a written report (*suggested length of 4–8 pages*) in which you do the following:

Note: All parts under "A" can be completed before your experiment is conducted, and all parts under "B," "C," and "D," can be completed after your experiment has been conducted and your data has been collected. You will turn in all parts A–E together in one file when all work is complete and ready to submit.

A. Explain the significance of the given factors in your project design plan:

- Problem statement
- Relevance of your testable question

A1. Literature Review: In a literature review, summarize information from at least **two** sources. These sources should relate to your topic and experiment design, hypothesis formation, or data analysis (published works or works by other students) and/or provide the foundation for this experiment.

A2. In an experimental design, do the following:

A2a. Experimental Design Steps: Describe the steps in the experimental procedure.

Note: The level of detail should be such that someone else would be able to reasonably replicate your experiment from your description.

A2b. Reasoning: Discuss your reasoning for choosing this particular experimental design plan.

A2c. Sequence of Events: Explain the sequence of events you will use to collect quantitative data.

A2d. Tools, Technologies & Measurement Units: Describe the tools, technologies, and measurement units that will be used to collect quantitative data.

A3. Variables: Explain and identify the dependent, independent, and controlled variables for your study.

A4. Threat Reduction to Internal Validity: Explain what you will do to reduce the threats to internal validity.

A5. Hypothesis: In the hypothesis section, explain how you came up with your hypothesis.

- Include a clear statement of your hypothesis in your explanation.

B. Process of Data Collection: Explain the process of data collection (completed **after** the investigation is conducted)

- **Use appropriate photographs, tables, or diagrams to clearly show the data collection process.**

B1. Appropriate Methods: Discuss your use of appropriate methods, tools, and technologies to collect quantitative data.

- Use appropriate measurement units to collect quantitative data.

C. Results: Explain the results of your experiment (completed after the investigation is conducted), **including graphical representations (e.g., bar graph, line graph, pie chart, etc.) of the data collected.**

- Include appropriate measurement units in the graphical representations.

D. Conclusion: Provide a conclusion derived from your interpretation of the data. Include the following in your conclusion:

D1. Confirmation of Hypothesis: Discuss whether your results confirm or refute your hypothesis.

D2. Experimental Design as Key Factor: Explain why experimental design is a key factor in the success of the scientific inquiry.

D3. Replication: Explain how your investigation can be replicated by someone else.

D3a. Evaluation of Validity: Discuss how the replication of an experiment is an evaluation of validity.

E. When you use sources, include all in-text citations and references in APA format.

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Note: For definitions of terms commonly used in the rubric, see the Rubric Terms web link included in the Evaluation Procedures section.

Note: When using sources to support ideas and elements in a paper or project, the

submission MUST include APA formatted in-text citations with a corresponding reference list for any direct quotes or paraphrasing. It is not necessary to list sources that were consulted if they have not been quoted or paraphrased in the text of the paper or project.

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File Attachments:

[Topic List](#)

Science Experiment Topic Ideas List

Below are some topic ideas for the science experiment task. You do not have to choose one of the below topics (you can if you would like); these topic ideas (below) are here to help with ideas for this task.

Remember when planning your science experiment, formulating your specific testable question, and laying out variables (as in section A3 of the task), you must have quantitative data (data in numbers) as opposed to qualitative/descriptive/subjective data. For this task, your dependent variable (what you measure) must be quantitative (numeric) in nature.

NOTE: If you choose to do a life science experiment involving an organism (living thing), the experiment must not involve any vertebrate organism; (Vertebrates are animals with a backbone- this includes: mammals-such as humans, dogs, cats, horses, mice; vertebrates also include: birds; fish; reptiles; amphibians).

Science Experiment Topic Ideas:

- Seed germination
- Plant growth
- Activity of ants
- Food preference of insects
- Habitat preference of invertebrates
- Habitat use of invertebrates—ie pollinators in the garden
- Movement of earthworms-- ie preference light vs dark
- Movement of insects, ie distance or time – ie beetles, dragonflies, moths, etc
- Flower color preference for butterflies
- Growth rates of insects- such as mealworms
- Microorganisms in water samples
- Microorganisms in varying yogurt brands
- Effectiveness of antimicrobial disinfectants
- Bread mold
- Decomposition rates
- Acid rain and plant growth
- Oil and plant growth
- Reaction rates
- Product testing- such as testing different brands of batteries
- Paper airplane design
- Bounce height of different balls

- Increasing gas mileage
- Catapulting objects
- Parachutes
- Magnet strength
- Insulators
- Sound
- Heat conduction
- Conducting electricity
- Friction
- Paper towel absorbency
- Air pressure in tires
- Evaporation rates
- Solvents
- Microwave popcorn
- Freezing liquids
- Density
- Drying time of paint
- Heating types of water
- Wind speed in different environments
- Melting ice
- Erosion
- pH studies

DHT Task 3

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Articulation of Response (clarity, organization, mechanics)	The candidate provides unsatisfactory articulation of response.	The candidate provides weak articulation of response.	The candidate provides limited articulation of response.	The candidate provides adequate articulation of response.	The candidate provides substantial articulation of response.	
A. Project Design Plan	The candidate does not provide an explanation of the significance of the given factors in the project design plan.	The candidate provides an explanation of the given factors in the project design plan with no detail.	The candidate provides an explanation of the given factors in the project design plan with limited detail.	The candidate provides an explanation of the given factors in the project design plan with adequate detail.	The candidate provides an explanation of the given factors in the project design plan with substantial detail.	
A1. Literature Review	The candidate does not provide a logical summary of information from at least 2 sources that relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.	The candidate provides a logical summary with no detail of information from at least 2 sources that relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.	The candidate provides a logical summary with limited detail of information from at least 2 sources that relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.	The candidate provides a logical summary with adequate detail of information from at least 2 sources that relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.	The candidate provides a logical summary with substantial detail of information from at least 2 sources that relate to the candidate's topic and experiment design, hypothesis formation, or data analysis, and/or provide the foundation for the experiment.	
A2a. Experimental Design Steps	The candidate does not provide a reasonable description of the steps in the experimental procedure.	The candidate provides a reasonable description with no detail of the steps in the experimental procedure.	The candidate provides a reasonable description with limited detail of the steps in the experimental	The candidate provides a reasonable description with adequate detail of the steps in the experimental	The candidate provides a reasonable description with substantial detail of the steps in the experimental	

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			procedure.	procedure.	procedure.	
A2b. Reasoning	The candidate does not provide a logical discussion of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with no support, of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with limited support, of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with adequate support, of the reasoning for choosing the experimental design plan.	The candidate provides a logical discussion, with substantial support, of the reasoning for choosing the experimental design plan.	
A2c. Sequence of Events	The candidate does not provide a logical explanation of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with no detail of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with limited detail of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with adequate detail of the sequence of events that will be used to collect quantitative data.	The candidate provides a logical explanation with substantial detail of the sequence of events that will be used to collect quantitative data.	
A2d. Tools, Technologies, and Measurement Units	The candidate does not provide a reasonable description of the tools, technologies, and measurement units that will be used to collect quantitative data.	The candidate provides a reasonable description with no detail of the tools, technologies, and measurement units that will be used to collect quantitative data.	The candidate provides a reasonable description with limited detail of the tools, technologies, and measurement units that will be used to collect quantitative data.	The candidate provides a reasonable description with adequate detail of the tools, technologies, and measurement units that will be used to collect quantitative data.	The candidate provides a reasonable description with substantial detail of the tools, technologies, and measurement units that will be used to collect quantitative data.	
A3. Variables	The candidate does not provide a logical explanation of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with no detail of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with limited detail of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with adequate detail of what the dependent, independent, and controlled variables are in the investigation.	The candidate provides a logical explanation with substantial detail of what the dependent, independent, and controlled variables are in the investigation.	
A4. Threat Reduction to	The candidate does not provide a logical	The candidate provides a logical	The candidate provides a logical	The candidate provides a logical	The candidate provides a logical	

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Internal Validity	explanation of what to do to reduce the threats to internal validity.	explanation, with no support, of what to do to reduce the threats to internal validity.	explanation, with limited support, of what to do to reduce the threats to internal validity.	explanation, with adequate support, of what to do to reduce the threats to internal validity.	explanation, with substantial support, of what to do to reduce the threats to internal validity.	
A5. Hypothesis	The candidate does not provide a logical explanation of the process of developing the hypothesis.	The candidate provides a logical explanation with no detail of the process of developing the hypothesis.	The candidate provides a logical explanation with limited detail of the process of developing the hypothesis.	The candidate provides a logical explanation with adequate detail of the process of developing the hypothesis.	The candidate provides a logical explanation with substantial detail of the process of developing the hypothesis.	
B. Process of Data Collection	The candidate does not provide a logical explanation of the process of data collection, including appropriate photographs, tables, or diagrams to clearly show the data collection process.	The candidate provides a logical explanation with no detail of the process of data collection, including appropriate photographs, tables, or diagrams to clearly show the data collection process.	The candidate provides a logical explanation with limited detail of the process of data collection, including appropriate photographs, tables, or diagrams to clearly show the data collection process.	The candidate provides a logical explanation with adequate detail of the process of data collection, including appropriate photographs, tables, or diagrams to clearly show the data collection process.	The candidate provides a logical explanation with substantial detail of the process of data collection, including appropriate photographs, tables, or diagrams to clearly show the data collection process.	
B1. Appropriate Methods	The candidate does not provide a logical discussion of the use of appropriate methods, tools, and technologies to collect quantitative data.	The candidate provides a logical discussion with no detail of the use of appropriate methods, tools, and technologies to collect quantitative data.	The candidate provides a logical discussion with limited detail of the use of appropriate methods, tools, and technologies to collect quantitative data.	The candidate provides a logical discussion with adequate detail of the use of appropriate methods, tools, and technologies to collect quantitative data.	The candidate provides a logical discussion with substantial detail of the use of appropriate methods, tools, and technologies to collect quantitative data.	
C. Results	The candidate does not provide a logical explanation of the results of the experiment, including graphical representations of	The candidate provides a logical explanation with no detail of the results of the experiment, including graphical representations of	The candidate provides a logical explanation with limited detail of the results of the experiment, including graphical	The candidate provides a logical explanation with adequate detail of the results of the experiment, including graphical	The candidate provides a logical explanation with substantial detail of the results of the experiment, including graphical	

	value: 0.00	value: 1.00	value: 2.00	value: 3.00	value: 4.00	Score/Level
	the data collected.	the data collected.	representations of the data collected.	representations of the data collected.	representations of the data collected.	
D. Conclusion	The candidate does not provide a logical conclusion derived from the interpretation of the data.	The candidate provides a logical conclusion with no support derived from the interpretation of the data.	The candidate provides a logical conclusion with limited support derived from the interpretation of the data.	The candidate provides a logical conclusion with adequate support derived from the interpretation of the data.	The candidate provides a logical conclusion with substantial support derived from the interpretation of the data.	
D1. Confirmation of Hypothesis	The candidate does not provide a logical discussion of whether the results confirm or refute the hypothesis.	The candidate provides a logical discussion, with no support, of whether the results confirm or refute the hypothesis.	The candidate provides a logical discussion, with limited support, of whether the results confirm or refute the hypothesis.	The candidate provides a logical discussion, with adequate support, of whether the results confirm or refute the hypothesis.	The candidate provides a logical discussion, with substantial support, of whether the results confirm or refute the hypothesis.	
D2. Experimental Design as Key Factor	The candidate does not provide a logical explanation of why experimental design is a key factor in the success of the scientific inquiry.	The candidate provides a logical explanation, with no support, of why experimental design is a key factor in the success of the scientific inquiry.	The candidate provides a logical explanation, with limited support, of why experimental design is a key factor in the success of the scientific inquiry.	The candidate provides a logical explanation, with adequate support, of why experimental design is a key factor in the success of the scientific inquiry.	The candidate provides a logical explanation, with substantial support, of why experimental design is a key factor in the success of the scientific inquiry.	
D3. Replication	The candidate does not provide a logical explanation of how the investigation can be replicated by someone else.	The candidate provides a logical explanation, with no support, of how the investigation can be replicated by someone else.	The candidate provides a logical explanation, with limited support, of how the investigation can be replicated by someone else.	The candidate provides a logical explanation, with adequate support, of how the investigation can be replicated by someone else.	The candidate provides a logical explanation, with substantial support, of how the investigation can be replicated by someone else.	
D3a. Evaluation of Validity	The candidate does not provide a logical discussion of how the replication of an experiment is an evaluation of	The candidate provides a logical discussion, with no support, of how the replication of an experiment is an	The candidate provides a logical discussion, with limited support, of how the replication of an experiment is	The candidate provides a logical discussion, with adequate support, of how the replication of an	The candidate provides a logical discussion, with substantial support, of how the replication of an	

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	validity.	evaluation of validity.	an evaluation of validity.	experiment is an evaluation of validity.	experiment is an evaluation of validity.	
E. Sources	When the candidate uses sources, the candidate does not provide in-text citations and references.	When the candidate uses sources, the candidate provides only some in-text citations and references.	When the candidate uses sources, the candidate provides appropriate in-text citations and references with major deviations from APA style.	When the candidate uses sources, the candidate provides appropriate in-text citations and references with minor deviations from APA style.	When the candidate uses sources, the candidate provides appropriate in-text citations and references with no readily detectable deviations from APA style, OR the candidate does not use sources.	