

SCIENTIFIC REASONING RUBRIC¹

<u>DIMENSIONS</u>	<u>Superior - 4</u>	<u>Competent - 3</u>	<u>Developing - 2</u>	<u>Novice - 1</u>	<u>Insufficient - 0</u>
Generates or states a research question and/or experimental objective that can be investigated using scientific methods/scientific reasoning	The research question or experimental objective is exemplary and/or stated clearly and concisely and can be clearly investigated using scientific methods/scientific reasoning.	The research question or experimental objective is well-developed or well-stated and can be clearly investigated using scientific methods/scientific reasoning.	The research question or experimental objective is adequately developed or stated and can be investigated using scientific methods/scientific reasoning.	The research question or experimental objective is inadequately developed or stated and cannot be investigated using scientific methods/scientific reasoning.	Does not generate or state a research question or experimental objective.
Uses scientific methods/scientific reasoning to devise a hypothesis or thesis statement and/or writes an introduction for the experiment	Uses scientific methods/scientific reasoning to devise an exemplary hypothesis or thesis statement based on a comprehensive review of relevant research studies and/or observations and/or writes an exemplary laboratory introduction.	Uses scientific methods/scientific reasoning to devise a well-developed hypothesis or thesis statement based on a comprehensive review of relevant research studies and/or observations and/or writes a well-developed laboratory introduction.	Uses scientific methods/scientific reasoning to devise a hypothesis or thesis statement based on a review of a few relevant research studies and/or observations and/or writes an adequate laboratory introduction.	Uses scientific methods/scientific reasoning to devise a hypothesis or thesis statement based on an inadequate review of a few relevant research studies and/or observations and/or writes an inadequate laboratory introduction.	Does not devise a hypothesis /thesis statement or include a laboratory introduction using scientific methods/scientific reasoning.

<u>DIMENSIONS</u>	<u>Superior - 4</u>	<u>Competent - 3</u>	<u>Developing - 2</u>	<u>Novice - 1</u>	<u>Insufficient - 0</u>
Gathers evidence/data to test the hypothesis or thesis statement	Data gathered is comprehensive and presented professionally.	Data gathered is good and presented well.	Data gathered is adequate and presented satisfactorily.	Data gathered is insufficient and presented poorly.	Does not gather any evidence/data.
Analyzes or synthesizes evidence/data to evaluate the hypothesis	The analysis of the evidence/data is thorough, appropriate, complete, and correct.	The analysis of the evidence/data is appropriate and correct.	The analysis of the evidence/data is appropriate but contains minor errors or omissions.	An attempt is made to analyze the evidence/data, but it is either seriously flawed or inappropriate.	Does not analyze or synthesize evidence/data to evaluate the hypothesis.
Uses scientific reasoning to draw conclusion(s) based on the analysis of the evidence/data	Applies scientific reasoning to draw comprehensive and logical conclusion(s) based on all the evidence/data.	Applies scientific reasoning to draw adequate and logical conclusion(s) based on most of the evidence/data.	Applies scientific reasoning to draw inadequate conclusion(s) based on some of the evidence/data.	Applies scientific reasoning but conclusion(s) are inaccurate and not based on evidence/data.	Does not apply scientific reasoning or use evidence/data and does not develop any conclusion(s).

02/01/2022

¹Categories/scales in the fourth dimension are based on and slightly modified from the Scientific Abilities Assessment Rubrics (SAAR) by Etkina, E., VanHeuvelen, A., White-Brahmia, S., Brookes, D. T., Gentile, M., Murthy, S., ... & Warren, A. (2006). *Scientific abilities and their assessment. Physical Review special topics-physics education research*. 2(2), 020103.