Student Work Rubric Optional Dimensions for NGSS Science Integration - Grades 9-12

Use one or more of these as your "Disciplinary Content Understanding" dimension in the Grades 9-12 Argumentation or Informational/Explanatory Student Work Rubrics.

	Emerging		Approaches Expectations		Meets Expectations		Advanced
	1	1.5	2	2.5	3	3.5	4
Integration of NGSS Strands: *How well does the student integrate disciplinary core ideas, crosscutting concepts, and science/engineering practices?*							
Use this row to holistically rate the student's integration of the NGSS strands.	*Uses science/engineering practice(s) to demonstrate and apply content OR makes connections to the crosscutting concepts with major errors or omissions.*		*Uses science/engineering practice(s) to demonstrate and apply content while making connections to the crosscutting concepts with minor errors.*		*Uses science/engineering practice(s) to demonstrate and apply accurate content and makes connections to the crosscutting concepts.*		*Uses science/engineering practice(s) to demonstrate and apply accurate content and explains the connections (relationships) to the cross-cutting concepts.*
Disciplinary Core Ideas *[SELECT SPECIFIC CONTENT STANDARD(S) HERE.]*	Identifies or otherwise applies irrelevant content OR relevant content with major errors or omissions.		Identifies or otherwise applies relevant content with minor errors or omissions.		Explains or otherwise applies relevant and accurate content.		Explains and applies relevant and accurate content.
Crosscutting Concepts *[SELECT SPECIFIC CROSSCUTTING CONCEPT(S).]* *	Identifies or makes connection to irrelevant crosscutting concept(s) OR to relevant crosscutting		Identifies or makes connection(s) to relevant crosscutting		Explains OR makes accurate connections to relevant crosscutting concept(s).		Explains and makes accurate connections to relevant crosscutting concept(s).

* Patterns; Cause & Effect; Scale, Proportion, and Quantity; Systems & System Models; Energy & Matter; Structure & Function; Stability & Change

	Emerging		Approaches Expectations		Meets Expectations		Advanced
	1	1.5	2	2.5	3	3.5	4
Science and Engineering Practices *[SELECT SPECIFIC PRACTICE(S) RELEVANT TO THE TEACHING TASK.]*							
ASK QUESTIONS	• Asks general, imprecise questions that require greater specificity to be testable. • Identifies dependent and independent variables with unclear predicted relationships. • Identifies inappropriate control(s) (if applicable) and/or inappropriate model(s).		• Asks testable questions that require sufficient and relevant evidence to answer. • Identifies predicted relationships between dependent and independent variables with minor errors. • Identifies control(s) (if applicable) OR relationships in the relevant model(s) with minor errors or omissions.		• Asks precise, testable questions that require sufficient and relevant evidence to answer. • Discusses predicted relationships between dependent and independent variables. • Identifies appropriate control(s) (if applicable) OR relationships in the relevant model(s)		• Asks precise, testable questions that require sufficient and relevant evidence to answer and evaluates the testability of the questions. • Discusses predicted relationships, including quantitative relationships, between dependent and independent variables and appropriate controls (if applicable).

							● Thoroughly explains the predicted relationships in the relevant model(s).
DEFINE PROBLEMS	Defines a problem or design statement that partially matches the intent of the problem or the constraints.		Defines a problem or design statement that matches the intent of the problem and identifies the constraints.		Defines a problem and explains specific design elements necessary for a suitable design (e.g., fit to the problem, addresses the constraints, etc.).		Defines a problem precisely and thoroughly explains why specific design elements are necessary for a suitable design (e.g., fit to the problem, addresses the constraints, etc.).
DEVELOP MODEL	Designs and explains a model that generates data to support explanations, predict phenomena, analyze systems, and/or solve problems. Design or explanation of the model includes major errors or omissions.		Designs and explains a model that generates data to support explanations, predict phenomena, analyze systems, and/or solve problems. Design or explanation of the model includes minor errors or omissions.		Designs and explains a model that generates data to support explanations, predict phenomena, analyze systems, and/or solve problems.		Designs, explains, and evaluates a model to generate data to support explanations, predict phenomena, analyze systems, and/or solve problems.
USE MODEL	● Uses or tests the model and identifies the limitations OR accuracy of the model (with minor errors or omissions) to support explanations, predict phenomena, analyze systems, or solve problems. ● Explanation or evaluation of the model includes major errors or omissions.		● Uses or tests the model and evaluates the accuracy and limitations of the model to support explanations, predict phenomena, analyze systems, or solve problems. ● Explanation or evaluation of model includes minor errors or omissions.		● Uses or tests the model and evaluates the accuracy and limitations of the model to support explanations, predict phenomena, analyze systems, or solve problems. ● Makes recommendations to revise the model.		● Uses or tests two different models of the same proposed tool, process, mechanism or system. ● Evaluates the accuracy and limitations of the two different models in order to select a model that best fits the evidence or design criteria.
PLAN THE INVESTIGATION	● Designs an investigation that will produce relevant data but with minimal detail about the variables ● Includes incomplete description of data collection procedures that impede replication ● Describes general evidence to be used to answer the question(s) with minimal detail.		● Designs an investigation identifying variables (dependent, independent, and controls). ● Includes data collection procedures that are mostly replicable. ● Identifies tools/instrument and type of measurements that will produce relevant data and/or evidence to answer the question(s).		● Designs an investigation identifying and explaining the variables (dependent, independent, and controls). ● Includes sufficiently detailed description of replicable data collection procedures. ● Describes tools/instrument and type of measurements that will produce relevant data and/or evidence to answer the question(s).		● Designs and evaluates an investigation identifying and explaining the variables (dependent, independent, and controls) ● Identifies possible confounding variables. ● Includes thorough description of replicable data collection procedures. ● Justifies the selection of the tools/instrument and type of measurements that will produce

						relevant data and/or evidence to answer the question(s).
PLAN THE DESIGN	Proposes a design plan and description that misses one or more important aspects of the criteria, constraints, OR intent of the problem.		Proposes a design plan and provides a general description that addresses the criteria, constraints, or intent of the problem.		Proposes a design plan with detailed explanation that completely addresses the criteria, constraints, and intent of the problem.	Proposes a design plan and evaluates the suitability of the design to address the criteria, constraints, AND intent of the problem.
CONDUCT INVESTIGATION OR TEST DESIGN	Uses appropriate scientific methods and collects multiple trials (if appropriate) of relevant data but the data is not consistent within a reasonable range.		Uses appropriate scientific methods and collects multiple trials (if appropriate) of relevant data consistent within a reasonable range.		● Uses appropriate scientific methods and systematically collects multiple trials (if appropriate) of relevant data consistent within a reasonable range ● Evaluates the consistency (precision) of the data.	● Uses appropriate scientific methods and systematically collects multiple trials (if appropriate) of relevant data consistent within a narrow range. ● Evaluates the consistency (precision) of the data as well as the appropriateness of the data collection procedures.
ANALYZE & INTERPRET DATA	Attempts to analyze data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make scientific claims, or to determine an optimal design solution. Analysis or explanation includes major errors or omissions.		Analyzes and explains data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make reasonable scientific claims, or to determine an optimal design solution. Analysis or explanation includes minor errors or omissions.		Analyzes and explains data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make reasonable and supported scientific claims, or to determine an optimal design solution.	Analyzes and evaluates data using tools, technologies, and/or models (e.g., computational, mathematical) in order to identify patterns, to make reasonable and well-supported scientific claims, or to determine an optimal design solution.
EVALUATE DATA ANALYSIS	Identifies the limitations of the data analysis (e.g., measurement error, sample selection) with incomplete or inaccurate elements		Identifies the limitations of the data analysis (e.g., measurement error, sample selection).		Evaluates the limitations of the data analysis (e.g., measurement error, sample selection) and identifies some implications for the findings.	Thoroughly evaluates the limitations of data analysis (e.g., measurement error, sample selection) and provides a detailed explanation of the implications on the findings.
USE MATHEMATICS AND COMPUTATIONAL THINKING	Identifies mathematical concepts or methods (e.g., ratio, rate, percent, basic operations, algebra, and functions) relevant to scientific questions or engineering problems, but applies them with major errors or omissions.		Applies appropriate mathematical concepts or methods (e.g., ratio, rate, percent, basic operations, algebra, and functions) relevant to scientific questions or engineering problems, but applies them with minor errors or omissions.		Accurately applies appropriate mathematical concepts and methods (e.g., ratio, rate, percent, basic operations, algebra, and functions) to answer scientific questions or engineering problems.	Accurately applies appropriate mathematical concepts and methods (e.g., ratio, rate, percent, basic operations, algebra, and functions) to represent and solve scientific questions or engineering problems and explains whether the answer "makes sense".
DESIGN SOLUTIONS	Uses inaccurate or irrelevant evidence (data or scientific knowledge) to explain how the design addresses the problem/constraints OR identifies an impractical		Uses minimal relevant evidence (data or scientific knowledge) to explain how the design addresses the problem/constraints OR identifies a potential redesign		Uses relevant and adequate amounts of evidence (data or scientific knowledge) to explain how the design addresses the problem/constraints AND uses the evidence to explain an appropriate	Uses detailed and multiple sources of evidence (data or scientific knowledge) to evaluate how well the design addresses the problem as well as constraints AND provides a detailed rationale with supporting

	redesign without explanation or supporting evidence.		with limited explanation and supporting evidence.		redesign of the original model or prototype		data for the appropriate redesign of the original model or prototype.
OBTAIN, EVALUATE, AND COMMUNICATE INFORMATION	When conducting independent research, relies on one or two relevant sources without evaluating their credibility.		When conducting independent research, selects a limited number of relevant scientific sources and evaluates their credibility minimally.		When conducting independent research, selects multiple relevant scientific sources, and evaluates the evidence and credibility of each source.		When conducting independent research, selects multiple relevant, high-quality scientific sources representing a variety of viewpoints, and thoroughly evaluates the evidence and credibility of each source.

Note: Two science practices, *1) Construct Explanations* and *2) Engage in Arguments from Evidence*, have been purposely excluded from the menu because they are already addressed by the LDC rubrics for Argumentation and Informational/Explanatory writing.