STEM CURRICULUM REVIEW RUBRIC

Reviewer Name:	Date:
NASA Product ID:	Activity Title:
	Activity URL:
NGSS Code(s):	

***ALIGNMENT TO STANDARDS: NGSS**

Criteria	0 Criterion is absent in the task/lesson. Please provide suggestions for how the lesson/task can be modified to meaningfully address the criterion.	1 Criterion is present in the lesson/task but not adequately or in a superficial manner. Please explain why you think the criterion is inadequately or superficially addressed and provide suggestions for how the lesson/task can be modified to meaningfully address the criterion.	2 Criterion is meaningfully and adequately addressed in the task/lesson. Please provide a brief explanation/justification for this.	General Comments and Observations	Suggestions for Improvement (if applicable)
A. Integrates grade appropriate elements of the three dimensions of the NGSS Framework: science and engineering practice(s), disciplinary core idea(s), and crosscutting concept(s).					
☐ i. Provides opportunities to develop and use specific elements of the practice(s) to make					

sense of phenomena and/or to design solutions to problems.					
☐ ii. Provides opportunities to develop and use specific elements of the disciplinary core idea(s) to make sense of phenomena and/or to design solutions to problems.					
☐ iii. The three dimensions work together to support students to make sense of phenomena and/or to design solutions to the problems.					
☐ B. Lessons fit together coherently targeting a set of performance expectations. (For multi-lesson sequences.)					
☐ C. Where appropriate, disciplinary core ideas from different science and engineering disciplines are used together to explain phenomena.					
☐ D. Where appropriate, crosscutting concepts are used in the explanation of phenomena from a variety of disciplines.					
☐ E. Provides grade appropriate connection(s) to the Common Core State					

Standards in Mathematics and/or English language arts, and provides grade appropriate connection(s) to literacy in history/social studies, science, and technical subjects.					

**Modified from NGSS EQuIP Rubric*

****ALIGNMENT TO STANDARDS: Common Core State Standards in Mathematics**

Criteria	0 Criterion is absent in the task/lesson. Please provide suggestions for how the lesson/task can be modified to meaningfully address the criterion.	1 Criterion is present in the lesson/task but not adequately or in a superficial manner. Please explain why you think the criterion is inadequately or superficially addressed and provide suggestions	2 Criterion is meaningfully and adequately addressed in the task/lesson. Please provide a brief explanation/justification for this.	General Comments and Observations	Suggestions for Improvement (if applicable)

		for how the lesson/task can be modified to meaningfully address the criterion.			
A. Lesson is aligned with the eight Standards for Mathematical Practice:					
☐ i. Makes sense of problems and persevere in solving them.					
☐ ii. Reasons abstractly and quantitatively.					
☐ iii. Constructs viable arguments and critique the reasoning of others.					
☐ iv. Models with mathematics.					
☐ v. Uses appropriate tools strategically.					
☐ vi. Attends to precision.					
☐ vii. Looks for and make use of structure.					
☐ viii. Looks for and express regularity in repeated reasoning.					
☐ B. Lessons are aligned with grade-appropriate Standards for Mathematical Content					
☐ C. Connects the Standards for Mathematical Practices to the Standards for Mathematical Content for					

a deeper conceptual understanding.					

***Adopted from Common Core State Standards Initiative.*

INSTRUCTIONAL STRATEGIES: Learning Environment

The lesson/unit is responsive to varied student learning needs:

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A. **Differentiate**s and individualize learning. (Sotomayor, K., 2013)					
☐ i. Customizes learning to fit each student's individual level and pace, and provides immediate feedback and assessment.					
☐ ii Uses mixed modalities.					
☐iii. Incorporates student choice.					
B. Lesson includes elements of collaboration / cooperation (Duschl et al.					

2007; Huang et al. 2008; Morrison et al. 2008).					
☐ i. Designed around student discussion.					
☐ ii. Students are encouraged to seek input from all collaborators / sources.					
C. Lesson design / teacher materials includes affective domain considerations.					
☐ i. Attention to intellectual safety and creating a sense of belonging (Morrison et al. 2008).					
☐ ii. Provides instructions to the teacher on how to address affective issues on potentially controversial topics.					

INSTRUCTIONAL STRATEGIES: Best Practices in Science and Engineering Teaching

Criteria	0 Criterion is absent in the task/lesson. Please provide suggestions for how the lesson/task can be modified to meaningfully address the criterion.	1 Criterion is present in the lesson/task but not adequately or in a superficial manner. Please explain why you think the criterion is inadequately or superficially addressed	2 Criterion is meaningfully and adequately addressed in the task/lesson. Please provide a brief explanation/justification for this.	General Comments and Observations	Suggestions for Improvement (if applicable)

		and provide suggestions for how the lesson/task can be modified to meaningfully address the criterion.			
A. Students are actively constructing meaning using one or more of the following instructional strategies (NRC 2011):					
☐ i. Experiments (please specify level): student designed / teacher designed with multiple pathways / “cookbook”.					
☐ ii. Investigations (exploring, looking for patterns, making conjectures, inferring, generalizing)					
☐ iii. Problem-Based (short-term, problem-oriented lessons that do not focus on a product).					
☐ iv. Project-Based (lessons that are part of a larger long-term unit that focus on student-generated products).					
☐ v. Other meaning-making strategies (please specify)____________					
B. Lesson plan incorporates learning progressions and connections (Duschl et al. 2007).					
☐ i. Lesson explicitly identifies learning					

progressions for the main concepts and provides teachers with ideas for moving students towards the scientific understanding.					
☐ ii. Lesson sequences instruction in a way that takes into consideration learning progressions.					
☐ iii. Lesson assessments promote teacher understanding of students' progress towards scientific understanding.					
C. Emphasizes scientific argumentation (Frey et al, 2015)					
☐ i. Students generate data or use existing data sets; evaluate scientific evidence.					
☐ ii. Students use evidence to support claims. Students make their chain of reasoning explicit.					
☐ iii. Students identify the reasoning that led to a claim, and judge the quality of the reasoning.					
☐ iv. Students rebut others' ideas and/or provide counterarguments					
☐ v. Argumentation fosters students' understanding of scientific concepts (i.e. not argument for argument's sake).					

☐ vi. Argumentation enhances students' understanding of how personal and scientific knowledge are constructed.					
D. Lesson makes learning and content relevant and contextual (Duschl et al. 2007; NRC 2011; Huang et al. 2008)					
☐ i. Lesson capitalizes on student's interests and experiences (NRC 2011; Ginns and Norton 2005; Kaser 2010).					
☐ ii. The activities are embedded in some greater context that makes the work have a purpose.					
☐ iii. The activities make STEM instruction a necessary means to designing an effective product or process.					

+INSTRUCTIONAL STRATEGIES: Mathematics Teaching Practices

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		can be modified to meaningfully address the criterion.			
☐ A. Establishes mathematics goals to focus learning.					
☐ B. Implements tasks that promote reasoning and problem solving.					
☐ C. Uses and connects mathematical representations.					
☐ D. Facilitates meaningful mathematical discourse.					
☐ E. Poses purposeful questions.					
☐ F. Builds procedural fluency from conceptual understanding.					
☐ G. Supports productive struggle in learning mathematics.					
☐ H. Elicit and use evidence of student thinking.					

+Adopted from Principles to Actions by the National Council of Teachers in Mathematics.

CULTURAL RESPONSIVE TEACHING

Criteria	0 Criterion is absent in the task/lesson. Please provide suggestions for how the	1 Criterion is present in the lesson/task but not adequately or in a	2 Criterion is meaningfully and adequately addressed in the task/lesson. Please	General Comments and Observations	Suggestions for Improvement (if applicable)

	lesson/task can be modified to meaningfully address the criterion.	superficial manner. Please explain why you think the criterion is inadequately or superficially addressed and provide suggestions for how the lesson/task can be modified to meaningfully address the criterion.	provide a brief explanation/justification for this.		
A. Academic Language support for ELLs:					
☐ i. **Presents content and language /literacy objectives**: Without giving away what students will be discovering, both language and content objectives are presented to the students at the beginning of the lesson.					
☐ ii. **Builds Background:** Uses appropriate visuals, manipulatives, etc. to help students understand concepts.					
☐ iii. **Attends to multiple meanings:** Particular attention is given to the way language is used in and out of mathematics (e.g. Foot, yard, table, etc.) or science.					
☐ iv. **Honors use of native language:** Have students use their preferred language in small groups and classroom discussions.					
☐ v. **Encourages multiple modes of communication:**					

Code switching, gestures, synonyms, drawings, cognates or use of two languages (*translanguaging* which is the dynamic use of two languages and goes beyond code switching - Sorto et al 2014); utilize a multilingual glossary, etc.					
☐ vi. **Uses comprehensible input:** The linguistic demand of the task is not high: i.e. teachers do not use unnecessary words or phrases, especially in questions. Instructor's guide suggests use of short and clear sentences, gestures and motions, a variety of tools to help students visualize and understand what is verbalized. Appropriate pictures, real objects, and diagrams are used.					
☐ vii. **Explicitly teaches vocabulary:** Lesson plan identifies the terms related to the mathematics/science topic and the context of the task that may need explicit attention. The lesson is not frontloaded with key terms but these terms are discussed in the context of the task at hand as well as being provided as a lesson-specific listing.					
B. **Cognitive Demand:** The task or majority of the lesson includes task(s) that require close analysis of procedures and concepts, involves complex mathematical/scientific thinking,					

utilizes multiple representations AND requires explanation/justification.					
☐ i. Provides opportunities to analyze procedures and/or concepts. There is a balance between procedures and concepts.					
☐ ii. Provides opportunities for complex mathematical/scientific thinking.					
☐ iii. Provides opportunities to analyze (scientific) problems.					
☐ iv. Utilizes multiple representations.					
☐ v. Requires the justifying and/or explaining concepts or procedures.					
C. **Power and Participation:** The development of mathematical / scientific knowledge (see NGSS, CCSS) is seen as a collaborative effort between teacher and student.					
☐ i. Mathematical / scientific contributions are actively elicited by teacher and among students.					
☐ ii. All mathematical/scientific contributions are valued and respected by teacher and students.					
☐ iii. Multiple strategies to support a sense of status equity among students (and specific subgroups) are explicit and widespread throughout the lesson.					
D. **Incorporating students' identities and funds of**					

knowledge/culture/community: The creation and maintenance of collective understandings about mathematics that involves intricate connections to personal/community/cultural knowledge and permeates the entire lesson. This would include hook/intro, main activities, assessment, closure and homework.					
☐ i. Content relates to familiar aspects of students' lives and/or students are invited to share their experiences with the topic in the lesson.					
☐ ii. Students are asked to make connections between school mathematics/science and mathematics/science in their own lives: e.g. Students are asked to analyze the mathematics within the community context and how the mathematics helps them understand that context.					
☐ iii. Lesson/task includes activities that provide firsthand experiences with phenomena when practical or provide students with a vicarious sense of the phenomena when not practical.					
☐ iv. Prior knowledge is elicited/reviewed so that all students participate in the lesson.					

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☐ v. Students' interests are used to build interest and mathematical / scientific meaning.					
☐ vi. Multiple modes (e.g. visuals, explanations, models) to demonstrate knowledge are valued.					
☐ vii. Alternative approaches to doing mathematics (e.g. algorithms used in different countries) or science are valued.					
☐ viii. Students are given opportunities to apply learning to new and different problems in their lives and use the appropriate scientific method or mathematical model to solve the problem at hand.					
E. **Use of critical knowledge/social justice:** Mathematics/science is viewed as an analytical tool to understand an issue/context, formulate mathematically/scientifically-based arguments to address community/societal the issues, and provide substantive pathways to change/transform the issue.					

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