NGSS/CCSS-M Sample Classroom Assessments Tasks

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1. Purpose and Overview

Within the past few years, two new sets of education standards have been developed to clearly state what all K–12 students should know and be able to do in mathematics, science, and engineering in preparation for success in college and in their careers. Since 2010, most US states have adopted the K–12 Common Core State Standards for Mathematics (CCSS-M). Similarly, the Next Generation Science Standards (NGSS) for K–12 science and engineering were developed through a state-led process that started in the summer of 2011 and included two rounds of public comment. The NGSS were released in their final form in 2013, and have been adopted by multiple states. With many states and districts across the country planning for classroom implementation of the CCSS and the NGSS, models and tools for ways to effectively and strategically achieve full implementation of the standards are needed. There is a need for resources that show how the multi-dimensional learning of practices, disciplinary content, and crosscutting concepts articulated by these new standards will affect classroom assessment. Also, because instruction and assessment of science that is aligned to the NGSS requires the use of mathematics, it could be possible to both teach and assess science and math standards in a coordinated way. Classroom-embedded assessments based on these new standards have the potential to become important components of assessment systems that are designed to evaluate both what students should know and what they should be able to do following instruction (NRC, 2014).

To provide examples of what integration of NGSS and CCSS-M might look like in classroom assessment, teams of experienced science, math, and engineering education professionals developed sample classroom assessment tasks that are aligned with both sets of standards. The sample classroom assessment tasks are each focused on a specific context or storyline with components that work together to partially or fully assess a group of related standards. The tasks explain how assessment of CCSS-M and NGSS standards are integrated in the task components (individual assessment questions or student prompts that are designed to be used together, forming the full assessment task) to enhance the rigor of the assessment. In integrating the NGSS and the CCSS-M, the tasks intend to do more than simply include science, engineering, and mathematics as separate components within the same task. Instead, the sample classroom assessment tasks showcase a spectrum of opportunities to integrate these disciplines through a set of contextualized task components.

This document describes the format and development process for the sample classroom assessment tasks. The development process used by the writing teams to produce these tasks is intended to be used as a tool to demonstrate how other integrated tasks can be developed. The sample tasks themselves are meant to provide examples of assessment that could be used in the classroom and that successfully integrate NGSS and CCSS-M standards to enhance assessment of all components. However, the tasks should not be considered "final." The writers encourage educators to use the tasks and would welcome feedback to help improve the tasks. Over time, as these draft tasks are used and improved upon by teachers throughout the country, iterative versions of the tasks will be published to share the feedback results. Additional tasks, including tasks for the elementary grades, will also be published online as a resource as they are drafted.

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2. Integration of the Common Core State Standards for Mathematics and the Next Generation Science Standards

The CCSS-M and NGSS have components that overlap such that content and skills required of one set of standards make use of the content and skills of the other set of standards. In fact, one of the eight NGSS practices is Using Mathematics and Computational Thinking. In addition, mathematics and data analysis requirements are embedded in specific NGSS performance expectations throughout the standards in grades K–12. Because of this, the CCSS-M and NGSS can be supported in an integrated way through both instruction and assessment, as is the case with these sample classroom assessment tasks. Research indicates that building toward these standards in an integrated way can lead to greater depth of understanding for mathematics, science, and engineering because it provides students opportunities to apply skills and content from one set of standards in the context of the other set of standards. This cross-disciplinary approach allows students to engage with content material in practical and novel contexts and through authentic learning opportunities (e.g., NRC, 2012b).

A detailed description of the connections between the NGSS and the CCSS-M are included in the NGSS (NGSS Lead States, 2013, Vol I, pp.131–162, 293–324) and are outlined in Appendix L (NGSS Lead States, 2013, Vol II,, pp. 137–157). Based on the National Research Council's *A Framework for K–12 Science Education: Practices, Crosscutting Concepts, and Core Ideas* (NRC, 2012a), the NGSS are composed of three dimensions: disciplinary core ideas, crosscutting concepts, and science and engineering practices. The

NGSS performance expectations—statements of what students should know and be able to do following instruction—require the application of a science and engineering practice(s) to disciplinary core ideas and the incorporation of crosscutting concepts for a deeper understanding of all three dimensions. Because of the integration of these three dimensions in the standards, student understanding of mathematics is necessary for demonstrating proficiency in the NGSS and promotes deep understanding of the disciplinary core ideas in science.

For example, consider NGSS performance expectations under the core idea of "Energy". The middle school performance expectation MS-PS3-1 (NGSS Lead States, 2013, Vol I., pp. 61-62) expects students to "analyze and interpret data" (NGSS Practice 4; NGSS Lead States, 2013, Vol II,, pp. 56-57) and the high school performance expectation of HS-PS3-2 (NGSS Lead States, 2013, Vol I., pp. 97-99) expects students to "develop and use models" (NGSS Practice 2; NGSS Lead States, 2013, Vol II,, pp. 52-53) in reference to a disciplinary core idea of "Energy". These practices could involve a mathematical description in the model (e.g., CCSS-M: MP.4, p. 7; & HSN-Q.A.2, p. 60), such as a basic equation that describes a relationship, and the application of the mathematics in the model using real data (e.g., CCSS-M: MP.2, p. 6; 6.RP.A.1-2, p. 42; 8.F.A.3, p. 55). In this instance, the students demonstrate a deep understanding of the disciplinary core idea (PS3.A: Definitions of Energy) through the development of the mathematical components and relationships of the model, and they demonstrate understanding and use of the crosscutting concept of "Scale, Proportion, and Quantity" through the application of real data.

Conversely, science and engineering content can provide the examples and context through which competency in mathematical practice and understanding can be assessed. In the example above, the application of mathematics in the context of the disciplinary core idea of "Energy" helps the students build a deeper understanding of the structure of an equation, the mathematical operations to solve the equation using data, and the use of units and measures in context of the data, which meet CCSS-M standards and practices MP.2; MP.4; 6.RP.A.1-2; 7.RP.A.2; 8.EE.A.1-2; and 8.F.A.3 (CCSS-M: p. 6; p. 42; p. 42; p. 48; p. 54; p. 55).

Similar connections can be made among the NGSS, CCSS-M, and the Common Core State Standards for English Language Arts and Literacy (CCSS-ELA/Literacy). For example, a standard that expects a student to "engage in argument from evidence" (NGSS Practice 7, NGSS Lead States, 2013, Vol II,, pp. 62-63) can represent both a written or oral argument, may involve discourse in a classroom discussion, and may involve researching and evaluating written sources, consistent with the reading, writing, and speaking and listening anchors of the CCSS-ELA/Literacy (CCSS-ELA/Literacy; e.g., RST.6-8.1, p. 62; WHST.6-8.1, p. 64). While the classroom sample assessment tasks described in this document were designed to include a full integration of only the NGSS and CCSS-M standards in assessment, it became clear through the development process that CCSS-ELA/Literacy could be added to the standards bundle to highlight opportunities for assessment on those standards as well. More information about the ELA/Literacy connections can be found in Appendix A.

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3. How to Read and Use the Sample Classroom Assessment Tasks

The sample classroom assessment tasks detail the activities and questions that assess a specific set of standards from the NGSS and the CCSS-M. The format of the tasks was designed to show the connections between the standards and the task components (formatted as activities or question prompts), and to describe exactly how successful performance reflects proficiency on the chosen standards. The tasks each have multiple components (as recommended by NRC, 2014) that ask students to respond in a variety of formats in order to demonstrate performance on different parts or dimensions of the standards (e.g., students may practice engineering design, perform calculations, and engage in oral or written discourse that requires them to clearly articulate understanding of disciplinary ideas in both math and science). No one task will be able to assess all the standards in a given grade level or instructional unit. In fact, to effectively assess the multiple dimensions of any one particular NGSS and/or CCSS-M standard, more than one task (or multiple task components within a single task, in the case of these samples) may be needed.

In the "Information for Classroom Use" section of each sample classroom assessment task, the writers have provided suggestions of ways the task components could be used—for example, as formative assessments used periodically throughout a unit of instruction, or used all together after the end of instruction. However, the sample tasks are meant solely as examples that can and should be modified to match the needs of the teacher or class. The sample tasks are intended to guide the development of multiple and varied classroom assessment opportunities. When customizing the tasks, it is important to keep in mind that the idea of coherence for instruction and assessment is paramount in the NGSS and CCSS. The individual components of each sample classroom assessment task were carefully designed to work together and build on one another to assess all or part of the standards bundle. When any significant modifications are made to these sample tasks, users should reevaluate the alignment with the standards and the coherence of the assessment.

The sample classroom assessment tasks are not meant to be used as instructional materials or instructional sequences. Although the distinctions between instructional activities and classroom-based assessments (e.g., those that engage students in discussions or group activities) may be blurred (NRC, 2014), these sample assessment tasks do not provide guidance on how to teach particular concepts, time estimates for instruction, or comprehensive explanations of instructional content that will be assessed by tasks. The tasks also do not currently provide guidance on next steps in instruction, but future versions of the tasks will include rubrics (following additional usage in classrooms) that could help identify different levels of student performance and areas for improvement. The task writers did, however, include specific suggestions for timing and use of the task components as assessments within a classroom.

While research suggests that providing guidance for future instruction will be an important element of assessment tasks based on the new standards (NRC, 2014), the goal of this project was focused on providing a spectrum of examples of how the NGSS and CCSS-M could be assessed in classrooms in integrated and authentic ways. Future versions of these sample tasks will likely include sections that provide guidance for teachers in how to use students' performance on the tasks to improve instruction. However, in this first iteration, the current sample assessment tasks are only intended to serve as examples of evaluations of student understanding within a classroom setting and do not contain any guidance for instruction. As these sample classroom assessment tasks are piloted in the classroom and used by teachers, they will be revised, improved, and made available in future versions.

Note: In this initial publication, only tasks for middle school and high school are included. In future updates, tasks for elementary grade levels as well as additional middle and high school tasks will be included.

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The Classroom Sample Assessment Task by Section: What Each Section Has to Offer

Introduction
This section includes a short "abstract" describing the task background information and the unifying theme/question for the task. This section also includes reference to the materials from which the assessment task was developed.
Standards Bundle
Standards Bundle: *This section lists the Next Generation Science Standards (performance expectations), CCSS-M practices and grade level standards, and CCSS-ELA/Literacy standards that are partially or fully assessed by the task components. Standards completely highlighted in bold are fully assessed by the task, including an integration of the dimensions from the foundation boxes associated with each NGSS performance expectation as reflected in the evidence statements and as outlined in the standards alignment and connections section below.*
Information for Classroom Use
Connections to Instruction: *This section provides recommendations for how this assessment task might be used in the classroom, including type of class and where within the instructional unit it might be used, whether it could be used as a formative or summative assessment, and suggestions for how it might be subdivided.* **Approximate Duration for the Assessment Task:** *This section will provide information on the amount of time needed to complete the assessment task and how it might be broken up to fit within limited-time class periods at different points in time over the course of an instructional unit. Note that this section does not include instructional time leading up to each task component(s).Many reviewers commented that these time estimates are probably too long. It is possible that as additional feedback is received on the tasks, these timing estimates could change. However, it is important to note that fully assessing such a large bundle of standards in three different subjects (math, ELA, and science) will take some time.* **Assumptions:** *A description of the foundational knowledge and abilities required of the teacher and/or students in order to use this assessment task.* **Materials Needed:** *A description of the resources needed to complete the task components.* **Supplementary Resources:** *A list of information and reference materials that the teacher or student might use to prepare for or complete the task components.*
Assessment Task
This section represents the portion of the task that could be given to students. **Context:** *An introduction to the task that defines the setting of the task or that gives the task components a unifying theme or question.* **Task Components:** *All of the activities and questions that make up the assessment task, divided into specific components. The task components often contain background information that could be removed by the teacher before giving to students, depending on how the task is used.*
Alignment and Connections of Task Components to the Standards Bundle

This section describes how each task component specifically would assess proficiency of part of the standards bundle, including all-related standards and parts of standards (since most individual task components don't assess a full standard) and how they integrate math, science, and engineering aspects of the task. This section also includes a statement describing which task component(s) together fully assess an NGSS performance expectation, including an integration of the associated dimensions. *When parts of individual NGSS dimensions (e.g., practices, DCIs, or CCCs) are assessed in the task components, they are also mentioned in this section even if they are not the specific practice, DCI, or CCC associated with the targeted NGSS PE(s). It is important to note that the alignment notes for the NGSS all relate to a specific part, or "bullet" of a practice or CCC, rather than to the entire category of practice or CCC for a given grade band. All of the bullets for each practice and CCC can be found in the NGSS Appendices F and G, respectively.*
Evidence Statements
This section includes a list of statements that specifically and clearly state the evidence for student proficiency on a task component as it meets the requirements of all dimensions of the associated standards included in the standards bundle and the intent for assessment. Note that proficient student performance is assumed to be accurate or correct (to a level appropriate for the grade level), so each statement does not individually specify that the answer must be correct.
Rubrics *(coming soon)*
In future versions of these classroom sample assessment tasks, this section will provide example scoring guidelines for the task components that reflect levels of student performance as below basic, basic, proficient, and advanced.

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4. Creating a Task that will Assess the Common Core State Standards for Mathematics and the Next Generation Science Standards

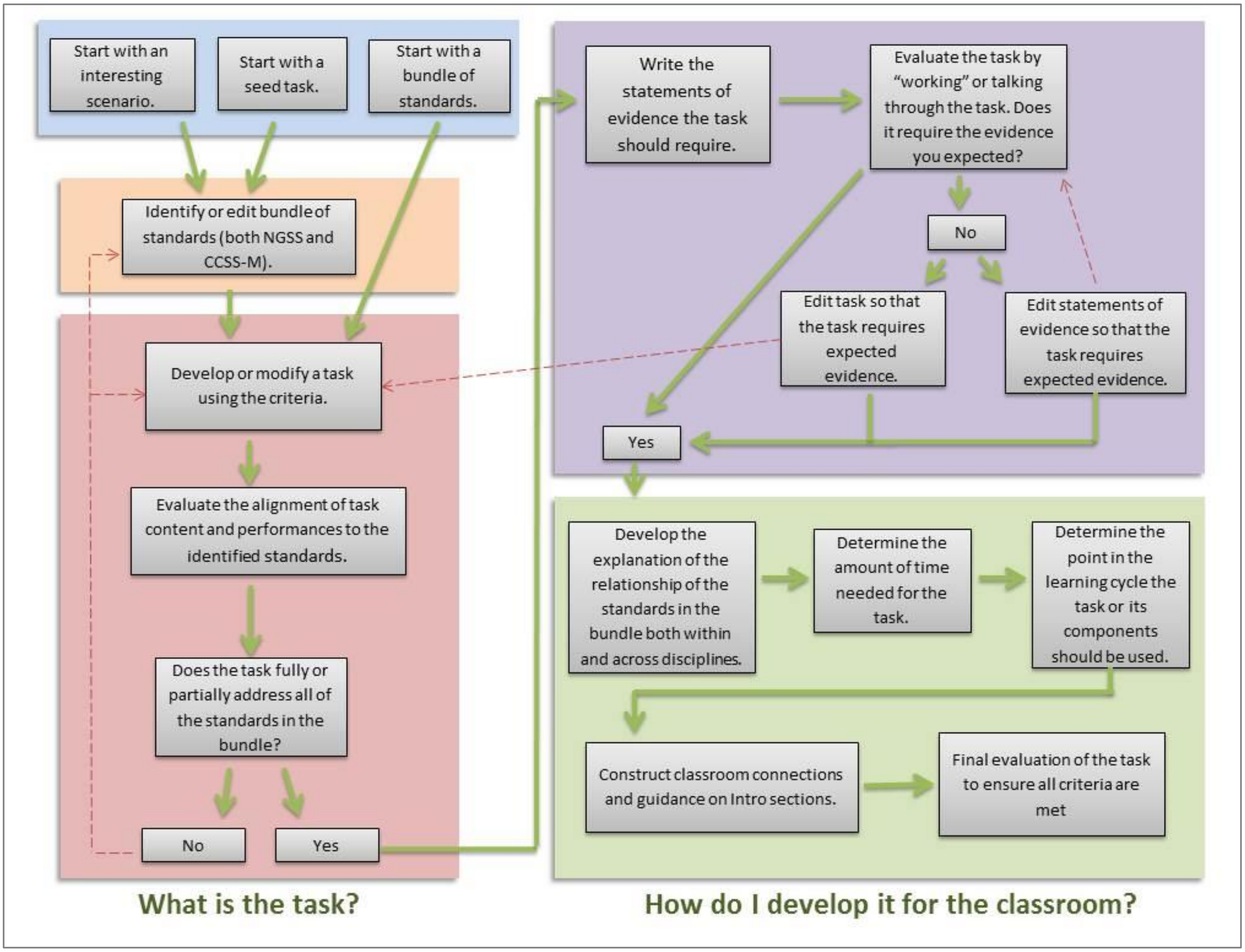
The development of the sample assessment tasks was a collaborative, iterative effort. Science, math, and engineering education professionals, including classroom teachers as well as administrators, worked in writing teams to draft and refine the tasks. In a process coordinated by Achieve, the writing teams met once in person and then continued their work through phone calls and web meetings to draft iterative versions of the tasks.

Following the creation of the classroom assessment task drafts, the documents were reviewed by teams of external experts that included a variety of math, science, and engineering education professionals, along with experts on assessment, equity, and diverse student groups. These experts read and reviewed the assessment tasks and made recommendations based on the tasks' alignment with the standards bundles, the engagement of the tasks for students, any potential biases in the tasks, and on all of the same evaluation criteria the writers used in the first stage of development (see section 5 below). This external peer-review played an important role in the continued development of the assessment tasks, which were revised based on the feedback prior to final publication.

The final products of this process were 1) the assessment task documents described above and 2) a framework for how they developed the sample assessment tasks. This section outlines the development process so that it might be used to guide others who wish to develop their own integrated assessment tasks.

The Task Development Process

In developing the assessment tasks, the writers found that the process was iterative in nature, in that there were many stages where the assessment task draft was evaluated, edited, and then reevaluated. The stage descriptions below are distilled from what was a dynamic, collaborative process, with general categories of the process laid out in the flow chart below.



1. **Start with an Activity, Idea, or Bundle of Standards** *(Blue flow chart box)*
   In most cases, the writers started with either an existing activity (a seed task) or an idea that could be developed into a task, such as building from an informative article or video that would be interesting to students. A few writers also chose a targeted set of standards based on the disciplinary content match between the intended task and the standards (both for math and

science) and then directly built the assessment task to match that "bundle" of standards (stage three below).

2. **Match the Standards to the Task** *(Orange flow chart box)*
The writers made an initial determination of which CCSS-M standards as well as performance expectations and associated practices, core ideas, and crosscutting concepts from the NGSS the seed task or idea could assess. This group of standards and parts of standards became the standards "bundle" for the task. The process of forming the standards bundle was influenced by a construct-centered assessment design approach (NRC, 2014). By anchoring the activity or idea to a standards bundle at the outset (and iteratively checking on the alignment of the task to the bundle, see step 4), the writers intended the task components to clearly elicit the knowledge and abilities required by the standards. It should be noted that although the writers had the CCSS-M connections in the NGSS (e.g., Appendix L- NGSS Lead States, 2013, Vol II, pp. 137-157) in mind as they were starting the development of the assessment task, the ultimate choice of standards was determined by the context of the task components.

3. **Build or Modify the Task to Bring it into Alignment with the Chosen Standards Bundle** *(Red flow chart box)*
With the standards bundle as a guide, the writers either built the idea or modified the seed task into an assessment task so that it would assess the standards chosen. They also used specific evaluation criteria (provided below) to help them to evaluate the degree to which the assessment task aligned with the standards bundle and the degree to which the math, science, and engineering components worked together to enhance the assessment. This part of the process was highly iterative, and in many cases led the writers back to modify the standards chosen in the second stage.

4. **Re-Evaluate Alignment of the Task Using Evidence Statements** *(Purple flow chart box)*
The writers developed evidence statements of what student proficiency in regards to meeting the NGSS and CCSS-M standards should require for the each component of the task. After working through the task themselves, the writers then used these evidence statements to re-evaluate the assessment task, either modifying the evidence statements to better match the task or changing the task itself. This part of the process was also highly iterative and, in some cases, led the writers back to modify the standards chosen in the second stage and the structure of the task in the third stage.

5. **Add in Details Regarding In-Class Usage** *(Green flow chart box)*
Once the writers were confident that the assessment task components and the evidence statements matched and that both were aligned with the chosen standards bundle (as outlined in the Alignment and Connections of Task Components to the Standards Bundle section), they made recommendations for how teachers might use these assessment tasks in the classroom (e.g., whether summative or formative), on what information and materials students and teachers might need to complete the assessment task, on the type of class in which these assessments might be used, on time estimates for completing each assessment component, and, in future versions, for rubrics to help teachers evaluate proficiency.

A Narrative from a Writer on the Development of a Classroom Sample Assessment Task

"I started by looking through the middle school NGSS performance expectations and considered which standards are related or connected, such as which performance expectations shared a disciplinary core idea. Both MS-PS4-1 *and* MS-PS4-2 *are connected to* PS4.A: Wave Properties, *so the task was initially focused on waves. The next question was "What type of waves should the task focus on: light waves, sound waves, another type of mechanical wave, etc.?" Two types of mechanical waves came to mind: ocean waves and seismic waves. What was it about the waves that the task should assess?* MS-PS4-1 *and* MS-PS4-2 *each have a different focus, one involves how waves travel through media and the other is about the structure and energy of the waves. Because* MS-PS4-2 *has an emphasis on light waves through the inclusion of* PS4.B: Electromagnetic Radiation *and because ocean and seismic waves are mechanical waves, I decided to focus the task on the theme of the energy of waves and the relationship between energy and amplitude following* MS-PS4-1.

Considering both ocean waves and seismic waves, I followed each as the focus of the task separately to see which one had better potential to make a relevant task, not only for the assessment of the performance expectation but also for students to identify with. I asked myself, in what ways do scientists measure the energy of ocean waves? The energy of seismic waves is measured in part using the seismograph, and students could clearly see the structure of the wave in the seismograph. The energy of ocean waves is linked to the amount of coastal erosion but also to alternative energy production. Both of these types of waves had real data and observations to base the task on, so which should be used? Ultimately, I decided to go with ocean waves because wave energy generation involves the engineering design process and is a very relevant design problem in human society.

So with the theme of "the energy of ocean waves", an aim "to assess the relationship between wave energy and amplitude from MS-PS4-1*", and the practice for* MS-PS4-1 *of* Using Mathematics and Computational Thinking, *I looked around to see what data or observations were available that students could analyze and mathematically model to show the relationship between wave energy and amplitude. I looked into whether there could be a relationship between the amount of electrical energy ocean waves produce and the wave height as a way to show the energy-amplitude relationship. I also looked into the amount of sediment larger ocean waves can carry because higher energy waves carry more sediment than lower energy waves. I didn't know which of those two would yield data that the students could mathematically model. Through many internet searches, I found a couple of papers that would work for both: a paper measuring sediment content in the ocean during a storm and papers evaluating different wave energy converter designs.*

Using the CCSS-M connections as a starting point, a math teacher on the team and I worked together to build task components around the data. This was by far the most important and the most challenging part of the processes, and we were both quite surprised by how long and iterative this part was. We didn't have a specific model to use for what integration of math and science would actually look like in these assessment tasks, so we had to work it out for ourselves as we went along. Conversations with the other writers helped a lot, and we felt like we achieved better levels of integration with every iteration. We knew we were there when we realized that *the task wouldn't work if you tried to take just the math out or if you tried to just take the science out.*

We talked about how the data could be used to assess how well the students could identify the relationship between energy and wave height. We also talked about the amount of integration of the science and math parts: "How could the analysis of the data work to assess the CCSS-M standards?", "Were the analyses essential for building evidence for the description the student would be creating for assessment of MS-PS4-1*?", and "How did the scientific data give students opportunities to plot, model, and interpret data in ways that would not be available without the scientific setting?". We also talked about the integration of the three dimensions of the NGSS, "How were the task components assessing the material in all of the foundation boxes in such a way that all three of the dimensions are an essential part of the answers the students will produce?" We went back and forth with different drafts of the task components, with different examples of how the data could be plotted, analyzed, and modeled, and with different questions to assess the NGSS performance expectations and dimensions.*

While developing the task components, I went back to the science standards to see if there were any other standards assessed or that could be assessed by the draft task components. I found that MS-PS4-2 could be partially assessed by a task component involving modeling of a breakwater. MS-PS2-3 could also be partially assessed by asking questions about the electromagnetic generator of the energy wave converter. MS-ETS1-1 and MS-ETS1-3 could be partially assessed by including an evaluation of the wave energy converter design or defining criteria and considering tradeoffs. Including these standards required adding extra parts to the task components. There were other standards considered for addition to the bundle, such as a connection between storms and erosion through MS-ESS2-1, MS-ESS2-2, or MS-ESS3-2, but it would have been necessary to change the task components quite a lot in order to really assess these, so the extra standards were not added.

Once all of the task components had been written, the evidence statements were written and the alignment of the task components to the full standards bundle was reviewed. This led to some changes in the wording of many of the task components to make sure that the questions were clear and would produce responses and products from the students that would assess the standards as we intended."

The Importance of Collaboration and Feedback in the Development of the Classroom Sample Assessment Tasks

During task development, discussions between writers and recommendations from reviewers highlighted the role of collaboration and feedback in the development process of a classroom assessment task. Math, science, and engineering writers each brought their own expertise and perspectives to the process, constructing task components that were strong in each of their respective disciplines. However, it was through the discussions between writers of how, where, and why math, science, and engineering content and practices are assessed by the task that the expertise and perspectives were shared, making apparent opportunities for better integration. For example, during development of a task component or set of components that called for the analysis of data, the science teacher might have outlined why the data could be used as evidence to explain or support the content, therefore providing context for how that type of data is typically used and analyzed. Armed with that knowledge, the math teacher could then suggest new or additional ways of plotting, characterizing, describing, comparing, or mathematically modeling the data that would require the students to engage the data more fully and in the end achieve a deeper understanding of both the math and the science content. In this way, collaboration was an essential component to the development of the tasks. Furthermore, through review, experts with different perspectives on the content identified places where integration could be better achieved or where new components could be added to the task to further enhance the integration. In some cases, teachers were able to pilot a task in the classroom to gain on-the-ground insight into which parts of the task could be improved or which components were not being received by the students as originally intended.

As a result of this task writing process, the writers have recommendations for others who want to develop similar tasks. When developing new tasks that assess both math and science content, it is important to work together with colleagues from other disciplines to build a quality task that is well-integrated. When a new task draft is completed, it is helpful to ask fellow teachers for feedback and to field test the tasks to gain a practical perspective on the functionality of the tasks as assessment tools.

The next step for these sample classroom assessment tasks is continued peer-review and pilot testing in the classroom in order to identify places where improvements might be made. This task development process is still evolving, so it is important to share your experiences with others, including any recommendations you might have that would help others to develop their own assessment tasks in the future or to improve the assessment task development process. As these classroom sample assessment tasks are used, they will be improved and updated (including with the addition of the rubrics), and new versions will be made available in the future.

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5. Task Development and Evaluation Criteria

Below are questions that both guided the assessment task writers in developing the tasks and guided the peer-reviewers in evaluating drafts of the tasks.

1. What are the NGSS and CCSS-M standards that this task addresses, and are the entire standards assessed (if no, specifically which parts are assessed)?
2. Why do the chosen standards work together, and are connections among the standards clear and coherent?
3. Where do the standards overlap, and how do they complement or enhance each other?
4. Does the task include at least one component that requires students to use math and science together to explain phenomena or to solve a problem such that the use of mathematics provides a deeper understanding of the science content or vice versa?
5. How are specific component ideas (foundation box bullets) of the NGSS core ideas, crosscutting concepts, and practices addressed, and does the assessment task require evidence of the student's integrated use of all three dimensions?
6. Are multiple NGSS practices being assessed?

7. How are the NGSS practices and crosscutting concepts leveraged to evaluate if the students understand the concept(s)?
8. Does the task have an engineering component, through assessment of either an engineering practice or an NGSS-ETS1-related disciplinary core idea?
9. Is the task effective in assessing the listed standards bundle, including a deep understanding of the associated concepts?
10. Is the task appropriate for the grade-level and the listed standards (e.g., meeting the assessment boundaries)? If no, why not?
11. In what type of class is this task intended to be used, and is it likely to require collaboration between teachers of different disciplines?
12. What prerequisite understanding is required by the student for successful completion of the assessment task?
13. Where in the instructional unit might the assessment task be used? Would it be formative or summative, and how would this assessment strengthen or reinforce the lessons?
14. How long does the overall assessment task take to complete, and could the task be spread out over an instructional unit?
15. In what ways can the task be subdivided, when and how might each part be used, and how does the subdivision change which standards the component(s) address?
16. Are there any special requirements for use/timing for this task?
17. Do all the components of a task follow a common theme or work together to address a common question?
18. Is the task relevant and interesting to the student?
19. Do any of the task components seem forced, inauthentic, or "tacked on" in an effort to meet the standards?
20. Are students required to show their ability to translate data into evidence and to communicate their findings through written and/or oral presentation?
21. Does the task assess student proficiency using methods that are accessible, unbiased, and grade appropriate, including the use of grade-level language in student prompts?
22. Does the task include all components necessary for successful student completion of the assessment, such as data, data sources, and supplementary readings?
23. Do the evidence statements clearly describe the proficient level of student performance in each task component as they meet specific standards or parts of standards in the standards bundle?

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6. Terms to Know

- **Standard:** As applied to the assessment tasks, the performance expectations of the NGSS and the grade level standards and practices of the CCSS.
- **Standard Bundle:** All standards from the CCSS and NGSS that the task lists as being partially or fully assessed.
- **Task/Assessment Task:** A set of questions and activities that are linked by a common theme, unifying question, or scenario that requires students to demonstrate understanding as an assessment of performance of the stated standards.
- **Task Component:** Individual parts of the task that ask students to do a specific activity or address a specific question. Some single task components could serve as stand-alone assessments, but most fit only within the series of components that define the assessment task.
- **Evidence Statement:** A description of the observable and measurable features of the proficient level of student performance on each task component.
- **Proficiency:** A successful level of student performance on each task component, including "meeting" (not exceeding) the associated standards or parts of standards.
- **Instructional Unit**: A plan for instruction that includes a series of lessons that are designed to coherently build grade-level appropriate knowledge of core ideas using a bundle of standards as learning goals over a given period of time. The NGSS/CCSS sample classroom assessment tasks might be used at various points during an instructional unit as formative assessments, or the tasks may be used as a summative assessment at the end of an instructional unit.
- **Instructional Lessons**: A component of an instructional unit that is designed to build toward the performances identified in the instructional unit using multiple aspects of instruction. Components of the NGSS/CCSS assessment tasks can be used as a formative assessment throughout or at the end of such a lesson to gauge student learning.
- **Formative Assessment:** For the purposes of these sample assessment tasks, a formative assessment is a task that is used to monitor student learning by creating feedback for the teacher and/or student about the student's performance. This feedback can be used to improve further teaching and learning within an instructional unit.
- **Summative Assessment:** For the purposes of these sample assessment tasks, a summative assessment is a task that is used at the end of an instructional unit to measure student achievement and to evaluate the ultimate outcome of learning.
- **Alignment**: The assessment task is considered aligned when it assesses the grade level standards and practices of the CCSS, along with the performance expectations of the NGSS—including all dimensions from the foundation boxes—that are included in the standard bundle.
- **Rubric**: (*Coming Soon*) For the purposes of these sample assessment tasks, a rubric is a tool that that allows users to interpret evidence of student performance on each task component and on the multiple dimensions of the standards in each task component. Rubrics will be based on a continuum of performance with below basic, basic, proficient, and advanced levels of knowledge described. Rubrics are intended to help students and teachers understand what components students have learned, and therefore, on what standards students have demonstrated proficiency, and what areas need further attention.

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7. Acknowledgments

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Appendix A: ELA/Literacy Connections

While the classroom sample assessment tasks described in this document were initially intended to include a full integration of only the NGSS and CCSS-M standards in assessment, it became clear through the development process that performance indicators from the Common Core State Standards for English Language Arts and Literacy (CCSS-ELA) could be added to the standards bundles to highlight opportunities for assessment on those standards as well. Therefore, after the tasks were initially drafted based on their CCSS-M and NGSS alignments, alignments to CCSS-ELA standards were drafted.

The first drafts of the CCSS-ELA alignment lists were very long, as the writers saw a very large number of possible connections between the existing task components and the CCSS-ELA/Literacy standards. To allow a greater focus on only the most relevant standards, the writers pared down the initial lists of aligned standards. Although the resulting alignment lists still contain many CCSS-ELA standards in each task, the writers are confident that these are directly assessable through the task components. This overlap exemplifies the variety of opportunities available to coordinate instruction and assessment between math, ELA, and science.

Specific commentary relating to the ELA/Literacy standards in each grade band is below.

High School

While the ELA/Literacy standards build sequentially through grade levels and directly connect across disciplines, subtle but important differences exist between grades 9–10 and grades 11–12, as well as between ELA literacy standards and literacy standards in science and technical subjects. In the informational reading strands, these learning progressions and differences appear in the standards statements themselves. For example, ELA RI.-9-10.1 states, "Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text"; RI.11-12.1 states, "Cite strong and thorough textual evidence to support analysis of what the text says explicitly, as well as inferences drawn from the text, *including determining where the text leaves matters uncertain*" (emphasis added); and RST.9-10.1 states, "Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions."

Most writing standards, however, include standards statements followed by enumerated performance indicators, with the learning progressions and differences specified in these performance indicators. For example, the language of ELA.W.1 in grades 9 through 11 is identical: "Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence." But for W.9-10.1.a and W.11.12.1.a, the first performance indicators for the grade bands differ. In 9^{th} and 10^{th} grades, students are expected to "Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence; while in grades 11 and 12, students are expected to, "Introduce precise, *knowledgeable* claim(s), *establish the significance of the claim(s)*, distinguish the claim(s) from alternate or opposing claims, and create an organization that *logically sequences* claim(s), counterclaims, reasons, and evidence" (emphasis added). Connections and differences continue through performance indicators b. through f. for this writing standard.

Similarly, the language of WHST.W.1 is identical in grades 6 through 11: "Write arguments focused on *discipline specific content*," while WHST.9-10.1.a states, "Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence" and WHST.11-12.1.a, states, "Introduce precise, *knowledgeable* claim(s), *establish the significance of the claim(s)*, distinguish the claim(s) from alternate or opposing claims, and create an organization that *logically* sequences the claim(s), counterclaims, reasons, and evidence." Connections and differences continue through performance indicators b. through f in the WHST standards as well.

The "Information for Classroom Use" section for each high school task specifies an ELA/Literacy connection to a single grade band, either 9–10 or 11–12, and only the standards for this grade band are included in the CCSS-ELA/Literacy "Standards Bundle." Teachers using the tasks in other grades should refer to CCSS documents (http://www.corestandards.org/read-the-standards/) for the connections/differences in those grades.

Finally all writing involves complex processes. Writing instruction generally separates these processes into the most common types of writing: writing informative or explanatory texts, writing arguments, research, etc.; however, in actual practice authentic writing such as that required in these assessment tasks combines elements from multiple types of writing. Often, students will be asked to incorporate informational writing to describe data, and the writing of argument to make, support, and evaluate claims in different components of the same task. At times the distinctions among the types of writing may blur. When they do, it is most important to ensure that ideas are stated clearly, that evidence is presented to support these ideas, and that the connections between the evidence and the ideas are explained logically and thoroughly, regardless of whether the writing is informative or argumentative.

Elementary and Middle School

Elementary and middle school teachers should also refer to the CCSS documents for ELA if/when using an assessment task for a grade different from what is listed in the standards bundles; e.g., when the 7th grade standards are bundled with the task but a teacher is using the task in 8th grade.

Just as in high school, writing in elementary and middle grades also involves complex processes, and the distinctions among different types of writing may blur. In addition, teachers need to become familiar with the ELA-Literacy skill development progressions occurring as students progress through the elementary and middle school grades in order to guide their expectations for student writing in the science assessment tasks. For example, writing argument is not introduced in the ELA CCSS until 6th grade.