STEM TEACHING TOOL #30

Integrating Science Practices Into Assessment Tasks

The Next Generation Science Standards call for the development of "three-dimensional science proficiency," that is, students' integrated understanding of disciplinary core ideas, science and engineering practices, and crosscutting concepts. Assess three-dimensional science proficiency requires *multicomponent tasks* (National Research Council, 2014). These are a set of prompts linked by a common scenario, phenomenon, or engineering design challenge.

Developing three-dimensional science assessments is challenging. Most current assessments focus on testing students' knowledge of science facts. Few focus on having students apply their understanding of disciplinary core ideas in the context of engaging in a science or engineering practice. Fewer still make connections to crosscutting concepts.

The "task format" templates included in this document are tools to help teachers and district leaders design three-dimensional assessment tasks. They are based on the language of *A Framework for K-12 Science Education* and the NGSS Evidence Statements, focusing on all eight science practices and two engineering practices. These task formats represent different ways that assessment tasks can be written to engage students in science practice. They do not specify precisely which disciplinary core ideas are to be integrated into tasks, which would be determined by the team designing the assessments.

The different formats get at different aspects of a given science and engineering practice. Some formats are likely to be more demanding cognitively for students than others. The idea of presenting multiple formats is to give task developers a sense of the range of tasks that can be written. A good "test" of a student's grasp of a particular practice, in the context of a disciplinary core idea and crosscutting concept, would be comprised of multiple tasks and draw on multiple formats.

How to Read a Template Task

Scenario presented to students

Format	Task Requirements for Students
1	Present students with a textual description of an investigation of an observable phenomenon, *then* Ask students to formulate a scientific question relevant to Investigating that phenomenon.

Task(s) for students to complete

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Potential Task Formats: Developing and Using Models (Science)

Format	Task Requirements for Students
1	Present students with a scenario that describes a phenomenon using text, images, video, and/or data, *then* Ask student to develop a model that represents amounts, relationships, scales, or patterns in the natural world, *or* Ask students to a simple model based on evidence from the scenario to represent an object or tool.
2	Present students with a scenario that describes a phenomenon using text, images, video, and/or data, and with two different models for that phenomenon, *then* Ask students to compare the two models to identify common features and differences *and* Ask students to revise one of the models and justify their revisions with disciplinary core ideas.
3	Present students with a scenario that describes a phenomenon using text, images, video, and/or data and a question or problem related to the phenomenon, *then* Ask students to develop a model with components, interactions, and mechanisms that answers the question or demonstrates a solution to the problem, *and/or* Asks students to develop a version of their model that shows what will happen if a variable or component changes, *and/or* Ask students to write an explanation for the phenomenon or the problem, using the model as supporting evidence.
4	Present students with a scenario that describes a phenomenon using text, images, video, and/or data, and includes an illustration or drawing of a scientific process, *then* Ask students to label the components, interactions, and mechanisms in the model, *and* Write a description of what is shown in the drawing.
5	Present students with a scenario that describes a phenomenon using text, images, video, and/or data and a question or problem related to the phenomenon, *then* Ask students to develop a model that generates data, *and* Ask students to write an explanation or explain a solution using data generated from the model.
6	Present students with a scenario that describes a phenomenon using text, images, video, and/or data and a question or problem related to the phenomenon, *then* Ask students to develop at least two types of models, *and* Ask students to write an explanation or explain a solution using evidence generated from more than one type of model.
7	Present students with a scenario that describes a phenomenon using text, images, video, and/or data and a model to describe or predict something related to the phenomenon *then* Ask students to develop a test to understand the reliability of the model, *and* Revise the model to improve its reliability.