Standards and Scoring Criteria for Science Tasks

General Rules

The main point here is to estimate the extent to which successful completion of the task requires the kind of cognitive work indicated by each of the three standards: Construction of Knowledge, Elaborated Written Communication, and Connections to Students' Lives. Each standard will be scored according to different rules, but the following apply to all three standards.

- If a task has different parts that imply different expectations (e.g., worksheet/short answer questions and a question asking for explanations of some conclusions), the score should reflect the teacher's apparent dominant or overall expectations. Overall expectations are indicated by the proportion of time or effort spent on different parts of the task and criteria for evaluation, if stated by the teacher.
- Take into account what students can reasonably be expected to do at the grade level.
- When it is difficult to decide between two scores, give the higher score only when a persuasive case can be made that the task meets minimal criteria for the higher score.
- If the specific wording of the criteria is not helpful in making judgments, base the score on the general intent or spirit of the standard described in the introductory paragraphs of the standard.

	Construction of Knowledge	Disciplinary Concepts	Elaborated Written Communication	Connection to Students' Lives
4	N/A	N/A	Analysis / Persuasion / Theory. Explicit call for generalization AND support. The task requires the student to show his/her solution path, AND to explain the solution path with evidence such as models or examples.	N/A
3	The task's dominant expectation is for students to interpret, analyze, synthesize, or evaluate information, rather than merely to reproduce information.	The task clearly requires the understanding of concepts, ideas or theories central to science.	Report / Summary. Call for generalization OR support. The task asks students, using narrative or expository writing, either to draw conclusions or make generalizations or arguments, OR to offer examples, summaries, illustrations, details, or reasons, but not both.	The question, issue, or problem clearly resembles one that students have encountered or are likely to encounter in their lives. The task asks students to connect the topic to experiences, observations, feelings, or situations significant in their lives.
2	There is some expectation for students to interpret, analyze, synthesize, or evaluate information, rather than merely to reproduce information.	The task seems to require understanding of concepts ideas or theories central to science, but the task does not make these very explicit.	Short-answer exercises. The task or its parts can be answered with only one or two sentences, clauses, or phrasal fragments that complete a thought. Students may be asked to show some work or give some examples, but this is not emphasized and not much detail is requested.	The question, issue, or problem bears some resemblance to one that students have encountered or are likely to encounter in their lives, but the connections are not immediately apparent. The task offers the opportunity for students to connect the topic to experiences, observations, feelings, or situations significant in their lives, but does not explicitly call for them to do so.
1	There is very little or no expectation for students to interpret, analyze, synthesize, or evaluate information. Its dominant expectation is for students to retrieve or reproduce fragments of knowledge or to repeatedly apply previously learned information and procedures.	The task can be achieved with a very superficial (or even without) understanding of concepts, ideas, or theories central to science.	Fill-in-the-blank or multiple choice exercises. The task requires no extended writing, only giving mathematical answers or definitions.	The problem has virtually no resemblance to questions, issues, or problems that students have encountered or are likely to encounter in their lives. The task offers very minimal or no opportunity for students to connect the topic to experiences, observations, feelings, or situations significant in their lives.

Adapted from material developed by Quest HS, Humble, TX, in collaboration with Fred Newmann, University of Wisconsin

Tips for Scoring Construction of Knowledge

The task asks students to organize and interpret information in addressing a scientific concept, problem, or issue.

- Consider the extent to which the task asks the student to organize and interpret information, rather than to retrieve or to reproduce fragments of knowledge or to repeatedly apply previously learned information and procedures.
- Possible indicators of scientific organization are tasks that ask students to chart and graph data or to solve multi-step problems.
- Possible indicators of scientific interpretation are tasks that ask students to consider alternative solutions or strategies, to create their own scientific problems, to develop scientific hypotheses, or to invent their own solution methods.
- These indicators can be inferred either through explicit instructions from the teacher or through a task that cannot be successfully completed without students doing these things.

Scoring Disciplinary Concepts

Student performance demonstrates an understanding of ideas, concepts, theories, and principles from the science disciplines by using them to interpret and explain specific, concrete information and phenomena.

- The standard is intended to assess the extent to which students use important ideas and concepts of the sciences to make concrete information and phenomena more meaningful. The main idea is the extent to which the student has used substantive science ideas and concepts to organize, explain, interpret, summarize, and extend the meaning and significance of otherwise discrete pieces of information.
- Science concepts may be used even though they might not be stated explicitly, and this might vary with grade level. For example, a 9th grade student's discussion of dynamic equilibrium might indicate use and understanding of the concept, without stating the specific words.
- If the topic of the task is itself a substantive idea (e.g., homeostasis), students should get full credit for one successful use of it. Give credit for ideas that are used appropriately in the context of the assignment. No credit should be given for serious errors or interpretation. The phrase "science concepts" means a minimum of once science concept.

Tips for Scoring Elaborated Written Communication

The task asks students to elaborate on their understanding, explanations, or conclusions through extended writing.

- Consider the extent to which the task requires students to elaborate on their ideas and conclusions through extended writing in science.
- Possible indicators of extended writing are tasks that ask students to generate prose (e.g., write a paragraph), graphs, tables, equations, diagrams, or sketches.

Tips for Scoring Connection to Students' Lives

The task asks students to address a concept, problem or issue that is similar to one that they have encountered or are likely to encounter outside of school.

- Consider the extent to which the task presents students with a scientific question, issue, or problem that they have actually encountered or are likely to encounter in their daily lives. Developing hypotheses about a local environmental problem would qualify as a real world problem but diagramming a molecule would not.
- Certain kinds of school knowledge may be considered valuable in social, civic, or vocational situations beyond the classroom (e.g., knowing the water cycle). However, task demands for "basic" knowledge will not be counted here unless the task requires applying such knowledge to a specific scientific problem likely to be encountered beyond the classroom.

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