

Using the Science Rubric

If the science rubric for the high school improvement program is to be a “target” that all students in Maryland will be using to answer constructed response questions on the high school assessment, they should have many opportunities to use the rubric during the course of classroom instruction and formative assessment. Many strategies are available and teachers should select those most appropriate for their students. However, there are two main aspects which must be addressed.

First, introduce the **criteria of the rubric**. These criteria are: use of analysis, synthesis of information, providing supporting evidence, use of accurate terminology and application of scientific concepts. Students may need further explanation about the meaning of these criteria. Some cues to guide their thinking are listed below.

- **What is meant by “analysis”?** When we analyze a problem, we break it down into its components and make sure we understand what it is asking and what approach we need to take to solve it. A strategy you can use to analyze a problem is to write down what the question is asking you to do and what you could do to answer the question. If you are still having trouble, try writing down what information you are given and what you need to find. Ask yourself, did you look at this question from as many different aspects as possible?
- **What is meant by “providing supporting evidence”?** Scientific evidence may be in the form of tables, charts, graphs or factual anecdotes that give data to support or refute information presented in the item.
- **What is meant by “use of accurate terminology”?** Did you communicate the answer to the question and how you arrived at that answer? Would others understand your thoughts by reading your response? Were the words used in your response appropriate to the question being asked?
- **What is meant by “synthesis of information”?** Synthesis involves the formation of a concept or idea from separate elements. Does your response demonstrate that you have formed a coherent thought or explanation based on information appropriate to the concept?
- **What is meant by “application of scientific concepts”?** Did the question ask you to apply or extend your ideas? If so, did you provide appropriate examples that showed an understanding of how your answer could be related to a “real world” situation? Could a connection be made in your answer to a similar situation that you encountered in the laboratory or from a reading?

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Second, provide students with **sample responses** that illustrate the different score levels and the criteria for each. Anchor papers from well written items (see *Item Writing Guidelines*, pp. 6-11 and *Biology Prototype Items*, www.mdk12.org) can be a good source of these illustrations (see 5th bullet). Some additional strategies to use when working with students are listed below.

1. Critique and revise anonymous student responses using the entire class. Students can use colored pencils to underline where in the response they find analysis, synthesis, supporting evidence, accurate terminology, and application of concepts.
2. Provide opportunities for students to review peer responses. It is most effective to allow students to revise another students' work rather than their own. Working in pairs allows students to move incrementally toward improvement.
3. Develop a rubric feedback form to use when scoring student responses. Initially, focus on one criteria of the rubric, such as supporting evidence, and gradually move to incorporate all features.
4. The use of a graphic organizer (see example) can be helpful to students. Each section of the organizer focuses on a different aspect of the written response.
5. Provide a point of focus display in the classroom to illustrate the different score point responses from students on selected items. A continuum may be used on a bulletin board using examples of level 2, 3, and 4 responses. Student papers should be presented in a positive way, showing the progress which has been made and highlighting exemplary aspects of each response. Students should be active participants in moving from one level to the next.