



Guidelines for Writing Constructed-Response Math Items

- 1. The item measures the knowledge, skills, and proficiencies characterized by the standards within the identified cluster.**
- 2. The focus of the problem or topic should be stated clearly and concisely.**
The item should be meaningful, address important knowledge and skills, and focus on key concepts.
- 3. Include problems that come from a real-world context or problems that make use of multiple representations.**
When using real-world problems, use formulas and equations that are real-world (*e.g.*, *the kinetic energy of an object with mass, m , and velocity, V is $k = \frac{1}{2} mv^2$*). Use real-world statistics whenever possible.
- 4. The item should be written with terminology, vocabulary and sentence structure kept as simple as possible. The item should be free of irrelevant or unnecessary detail.**
The important elements should generally appear early in the item, with qualifications and explanations following. Present only the information needed to make the context/scenario clear.
- 5. The item should not contain extraneous clues to the correct answer.**
The item should not provide unintended clues that allow a student to obtain credit without the appropriate knowledge or skill.
- 6. The item should require students to demonstrate depth of understanding and higher-order thinking skills through written expression, numerical evidence, and/or diagrams.**
An open-ended item should require more than an either/or answer or any variation such as yes/no, decrease/increase, and faster/slower. Often either/or items can be improved by asking for an explanation.
- 7. The item should require work rather than just recall.**
Students need to show their mathematical thinking in symbols or words.
- 8. The stimulus should provide information/data that is mathematically accurate.**
Examples of stimuli include, but are not limited to, art, data tables, and diagrams. It is best to use actual data whenever possible. Hypothetical data, if used, should be plausible and clearly identified as hypothetical.

9. The item should be written so that the student does not have to identify units of measurement in the answer, unless the question is testing dimensional analysis.

For example, consider the question: "A circle has a radius of length 4 centimeters. Find the number of centimeters in the length of the arc intercepted by a central angle measuring 2 radians." Students would receive credit for an answer of "8" and would not be penalized for writing "8 cm."

10. The item should be written to require a specific form of answer.

Phrases like "in terms of π ," "to the nearest tenth," and "in simplest radical form" may simplify the writing of the rubric for these types of items.

11. Items that require students to explain in words are encouraged.

One of the emphases of the Common Core standards is to foster student ability to communicate mathematical thinking. An example is to have students construct viable arguments such as to make conjectures, analyze situations or justify conclusions. These items would require students to demonstrate precision of knowledge in their responses.

12. Items may be broken into multiple parts that may be labeled *a, b, c*, etc.

Clear division of the parts of the problems may simplify the writing of the rubric for these types of items.

13. Notation and symbols as presented on Common Core examinations should be used consistently.

For example, AB means the length of line segment AB , \overline{AB} means line segment AB , $m\angle A$ means the number of degrees in the measure of angle A , etc.