

Quantitative Reasoning, Critical Thinking, and Information Literacy Assignment Guide

This guide is a tool teachers can use to critically examine and improve their assignment guidelines for the purpose of helping student produce better work. There is no expectation that an assignment explicitly address all questions posed in the guide. Rather, each guide poses questions to help teachers make their own decisions about what kinds of prompts to include -- or not to include -- in an assignment. There may be several different types of assignments that assess quantitative reasoning (QR), including the following:

- **Exam:** Questions on exam may be written to explicitly assess each category of quantitative reasoning or more than one category of quantitative reasoning. The original QR rubric categories may be sufficient to assess the proficiency of students on exam style assignments.
- **Creation:** Students must analyze raw data or develop original quantitative forms. In such assignments Calculation and Representation may feature as a large part of the assignment that does not end up in the final product (e.g., papers or presentations). In such cases, alternative methods of demonstration of these categories may be considered for submission in addition to the final product.
- **Synthesis:** Students must synthesize evidence collected by others (quantitative forms of information) from a variety of sources in support of an argument or purpose of work. In such cases, Calculation and Representation may not feature in the assignment prompts (though students may be asked to assess others' Calculations and Representations through the lens of the other categories of QR).

As you review the assignment guidelines, respond to the questions below (generated from the quantitative reasoning integrated rubric criteria). Revise assignment prompts if appropriate and helpful to students. Depending on course level and prerequisites, it may be reasonable for students to know how to respond without explicit prompting.

Issue/Problems

- Does the prompt define for students what is at issue, or should students define their own issue? If the latter, how explicitly does the prompt define for students the limitations on the appropriate range of issues?
 - How explicitly does the prompt define the urgency/need for response?
 - How explicitly and narrowly does the prompt ask students to define what is at issue in the task?
 - What information does the prompt offer in terms of the audience's background knowledge?
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Support

- What kind(s) of sources are called for explicitly in the prompt (e.g. peer-reviewed literature only; are newspapers, magazines, blogs, and other forms of popular media acceptable; etc.)?
- What guidance does the prompt offer in terms of quantity and diversity of sources?
- How does the prompt engage students in establishing or questioning the credibility of cited experts and other evidence?

Interpretation**

Ability to identify and describe information presented in a quantitative form (e.g., equations, graphs, diagrams, tables, words, timeline, scales, musical meters)

- What guidance does the prompt offer in terms of how students should translate information presented in quantitative forms in their own work? In others' works?

Representation**

Ability to convert, organize, summarize, or present relevant information (e.g., data, interviews, conversations, compositions, spreadsheet, etc.) into various quantitative forms (e.g., equations, graphs, diagrams, tables, words, perspective drawings, scale drawings, musical meters)

- What guidance does the prompt offer in terms of the purposes for presenting quantitative information as quantitative forms?
- What guidance does the prompt offer in terms of the criteria for selecting an appropriate form for that information?
- What guidance does the prompt offer in terms of how to display or present the quantitative form within the final product?

Synthesis**

Ability to make judgments and predictions, and to draw appropriate specific conclusions or inferences based on quantitative or qualitative information or forms, while recognizing the limits of this application

- What does the prompt ask students to do with the quantitative or qualitative information in their sources or from their own work? (E.g. Should they apply it to answer policy questions? Should they use it to evaluate solutions to problems? Should they develop a model?)
- How does the prompt engage students in establishing or questioning the limits of quantitative or qualitative evidence?

Assumptions**

Ability to use and evaluate important assumptions, theory, or bias in creation, development, or analysis of quantitative forms

- How does the assignment ask students to identify their own and others' assumptions? What different categories of assumptions are students asked to consider (e.g. empirical, value, normative)?
- What information are students given about the context in which they are composing? How does the prompt engage students in examining the assumptions relevant to that context?

Communication**

Ability to express quantitative evidence in support or refutation of the argument or purpose of the work (e.g., what evidence is used and how it is formatted, presented, and contextualized)**

- What relationship does the prompt call for in terms of the quantitative information and the argument or purpose of the work?
- What does the prompt explicitly define as the purpose of the evidence (e.g. provide background information, support multiple perspectives, test a hypothesis, etc.)?

- What information does the prompt provide in terms of appropriate vocabulary and norms of mathematical/statistical arguments?
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Audience and context

- What information does the prompt offer in terms of the audience for whom students are writing?
 - What information does the prompt offer in terms of the purpose for which students are composing?
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Academic integrity

- What guidance does the prompt offer in terms of ethical access and use of information? (e.g., personal data, clinical trials, animal trials)
 - What guidance does the prompt offer in terms of reference and citation style?
 - What guidance does the prompt offer regarding the balance of paraphrase, quotation, and summary?
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Reasonableness**

Ability to evaluate and justify whether a provided solution or inference makes sense in the context of the problem

- What criteria for evaluating reasonableness exist in the situation of the problem?
 - How explicitly are those criteria described (i.e., are they implied by the situation or explicitly described)?
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Calculation**

Ability to perform quantitative procedures necessary to solve a problem, or to convert data into information or results

- What guidance does the prompt offer in terms of the kinds of calculations students should perform?
 - What guidance does the prompt offer in terms of presenting those calculations (e.g. how much of their work they should show, the units involved)?
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Grammar and mechanics

- What guidance does the prompt offer in terms of expectations regarding grammatical correctness?