



3.5 Analyzing Level of Cognitive Demand

Instructions: Use the levels of cognitive demand to evaluate a task or lesson. Review the descriptors and highlight those that match the task you have selected.

Low-Level Cognitive Demand

Memorization Tasks

- Involve either memorizing or producing previously learned facts, rules, formulae, or definitions
- Are routine, involving exact reproduction of previously learned procedure
- Have no connection to related concepts

Procedures Without Connections Tasks

- Specifically call for use of the procedure
- Are straightforward, with little ambiguity about what needs to be done and how to do it
- Have no connection to related concepts
- Focus on producing correct answers, rather than on developing mathematical understanding
- Require no explanations, but focus on the procedure only

High-Level Cognitive Demand

Procedures With Connections Tasks

- Focus students' attention on the use of procedures for the purpose of developing deeper levels of understanding of mathematical concepts and ideas
- Suggest general procedures that have close connections to underlying conceptual ideas
- Are usually represented in multiple ways (e.g., visuals, manipulatives, symbols, problem situations)
- Require that students engage with the conceptual ideas that underlie the procedures in order to successfully complete the task

Doing Mathematics Tasks

- Require complex and non-algorithmic thinking (i.e., nonroutine—there is not a predictable, known approach)
- Require students to explore and to understand the nature of mathematical concepts, processes, or relationships
- Demand self-monitoring or self-regulation of cognitive processes
- Require students to access relevant knowledge in working through the task
- Require students to analyze the task and actively examine task constraints that may limit possible solution strategies and solutions
- Require considerable cognitive effort

Source: Adapted from Smith, M. S., and Stein, M. K. (1998). "Selecting and Creating Mathematical Tasks: From Research to Practice." *Mathematics Teaching in the Middle School*, 3(5): 344–350. Previously published by Bay-Williams, J., McGatha, M., Kobett, B., & Wray, J. (2014) *Mathematics Coaching: Resources and Tools for Coaches and Leaders, K–12*. New York, NY: Pearson Education, Inc.

1. Describe your overall evaluation of whether this task/lesson has the potential to engage students in higher-level thinking.
2. What adaptations can you make to the task or lesson to increase its higher-level thinking potential?

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