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.

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| ***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
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| **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
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| ***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
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| **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
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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?

*Source: Previously published by Bay-Williams, J., McGatha, M., Kobett, B., and Wray, J. (2014).* Mathematics Coaching: Resources and Tools for Coaches and Leaders, K–12*. New York, NY: Pearson Education, Inc.*

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