Proposed Sources of Cognitive Complexity in Items and Tasks: Mathematics (Summary)

The goals and uses of cognitive complexity are:

- Provide a systematic, replicable method of determining item cognitive complexity
- Provide measurement precision at all levels of the test score scales

**Sources of Cognitive Complexity**

**Content Complexity** (30% of score)
- Based on typical grade level expectations
- Larger shifts from previously learned content is more complex than small shifts
- Presence of certain mathematical objects and problem structures contribute

**Processing Complexity** (30% of score)
Combines these sources in equally weighted
- Stimulus Material
- Response Mode
- Processing Demands

**Practices Complexity** (40% of score)
- Based on what students are asked to do with the math content
- Influenced by prompting, level of integration, modeling, and explanations

**Stimulus Material**
- Low – single piece or no stimulus
- Moderate – two stimulus pieces or single stimulus and an online tool
- High – three stimulus pieces or two stimulus pieces and an online tool

**Response Mode**
- Low – selected response, drag and drop, hot spot, single numeric entry
- Moderate – multiple response modes in a single item, graphing tool, equation editor
- High – extended responses

**Processing Demands**
- Determined by linguistic demands and reading load
- Longer items create a higher reading load
- Linguistic demands should be construct relevant

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