ENGAGING ALL LEARNERS IN WORTHWHILE MATHEMATICS TASKS

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AIMS

• **Identify** the different levels of cognitive demand in mathematics tasks
• **Analyze** tasks and determine their level of cognitive demand
• **Consider** who should have access to cognitively demanding mathematics tasks
COMPARE

• Complete these two tasks

• What do you notice?
  • Are they the same level of cognitive demand?
  • What makes you think that?
  • Can you identify specific features of each task that make them more or less cognitively demanding?
WHAT DOES IT MEAN TO HAVE MATHEMATICAL COMPETENCE?

• Procedural Fluency
• Conceptual Understanding
• Strategic Competence
• Adaptive Reasoning
• Productive Disposition

National Research Council (2001)
FOUR CATEGORIES OF MATHEMATICAL TASKS

• Memorization
• Procedures without connections to concepts or meaning
• Procedures with connections to concepts or meaning
• Doing mathematics
WHAT MAKES A TASK WORTHWHILE?

• **Elicits**: mathematical thinking vs “doing mathematics”
  • e.g. justifying, conjecturing, or interpreting
• **Features**: high-level cognitive activity
• **Considers**: mathematical understanding, sense making, and reasoning
• **Encourages**: multiple solution strategies, multiple representations, and mathematical communication

Henningsen & Stein (1997)
WHY USE THEM?

• “Worthwhile tasks are important vehicles for building student capacity for thinking and reasoning.” (Stein et al. 1996)

• “[…] the nature of the tasks to which students are exposed determines what students learn.” (NCTM as cited in Smith & Stein, 1998)
WHO ARE THESE TASKS FOR?

• We argue that all students are capable of meaningfully participating in worthwhile and rigorous mathematics tasks.
  • What are the current barriers to students accessing these types of tasks?
  • What are some challenges you might face?
MAKING ADJUSTMENTS AND ALTERATIONS

• Step 1: **Identify** the cognitive demand of your task
• Step 2: Recall **what** makes a task worthwhile
• Step 3: Work with colleagues and **alter** the task
• Step 4: **Try** it out! Make adjustments as needed then … try again!
Using the edge of a triangle pattern block as the unit of measure, determine the perimeter of the following pattern-block trains.
RESOURCES

- Each other!
- Elementary and Middle School Mathematics: Teaching Developmentally, 8th Edition (2013)
- Check out [this website](#) from NCTM about how to choose a worthwhile tasks
THANK YOU!

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