ENGAGING ALL LEARNERS IN WORTHWHILE MATHEMATICS TASKS

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AIMS

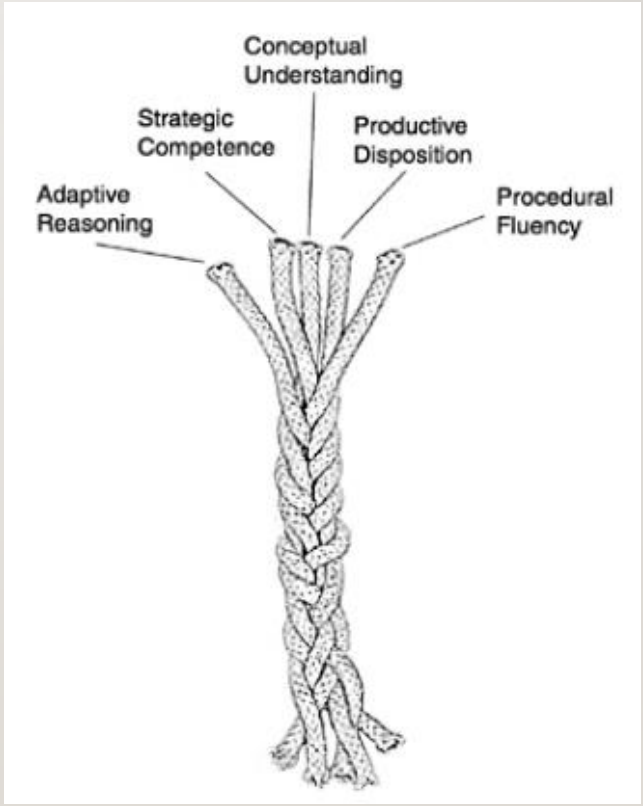
- Identify the different levels of cognitive demand in mathematics tasks
- Analyze tasks and determine their level of cognitive demand
- Consider who should have access to cognitively demanding mathematics tasks

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

Smith & Stein (1998)

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?

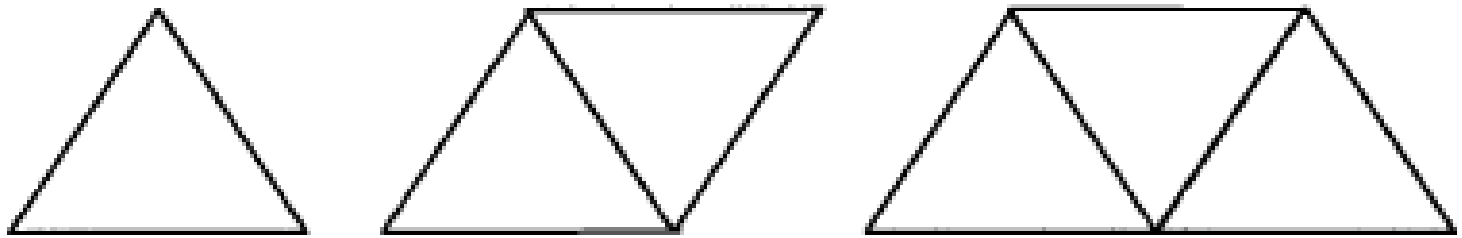
- We argue that all students are capable of meaningfully participating in worthwhile and rigorous mathematics tasks.
  - What are the current barriers to students accessing these types of tasks?
  - What are some challenges you might face?

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!

MAKING ADJUSTMENTS AND ALTERATIONS: LET'S PRACTICE!

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)
- Smith, M. S., & Stein, M. K. (1998). Selecting and creating mathematical tasks: From research to practice. *Mathematics Teaching in the Middle School, 3*, 344–350.
- Check out this website from NCTM about how to choose a worthwhile tasks

THANK YOU!

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