MATHEMATICAL PRACTICES OBSERVATION TOOL

PMI·ŏúńôŝ	NEEDS IMPROVEMENT	EMERGING	PROFICIENT	EXEMPLARY
MAKE SENSE OF PROBLEMS AND PERSEVERE IN SOLVING THEM.	**Task:** □ Is strictly procedural. □ Does not require students to check solutions for errors. **Teacher:** □ Does not allow for wait time; asks leading questions to rush through task. □ Does not encourage students to individually process the tasks. □ Is focused solely on answers rather than processes and reasoning.	**Task:** □ Is overly scaffolded or procedurally "obvious". □ Requires students to check answers by plugging in numbers. **Teacher:** □ Allots too much or too little time to complete task. □ Encourages students to individually complete tasks, but does not ask them to evaluate the processes used. □ Explains the reasons behind procedural steps.	**Task:** □ Is cognitively demanding. □ Has more than one entry point. □ Requires a balance of procedural fluency and conceptual understanding. **Teacher:** □ Allows ample time for all students to struggle with task. □ Expects students to evaluate processes implicitly. □ Models making sense of the task (given situation) and the proposed solution.	**Task:** □ Allows for multiple entry points and solution paths. □ Requires students to defend and justify their solution by comparing multiple solution paths. **Teacher:** □ Differentiates to keep advanced students challenged during work time. □ Integrates time for explicit meta-cognition. □ Expects students to make sense of the task and the proposed solution.
REASON ABSTRACTLY AND QUANTITATIVELY.	**Task:** □ Lacks context. □ Does not make use of multiple representations or solution paths. **Teacher:** □ Does not expect students to interpret representations. □ Expects students to memorize procedures with no connection to meaning.	**Task:** □ Is embedded in a contrived context. **Teacher:** □ Expects students to model and interpret tasks using a single representation. □ Explains connections between procedures and meaning.	**Task:** □ Has realistic context. □ Requires students to frame solutions in a context. □ Has solutions that can be expressed with multiple representations. **Teacher:** □ Expects students to interpret and model using multiple representations. □ Provides structure for students to connect algebraic procedures to contextual meaning. □ Links mathematical solution with a question's answer.	**Task:** □ Has relevant, realistic context. **Teacher:** □ Expects students to interpret, model, and connect multiple representations. □ Prompts students to articulate connections between algebraic procedures and contextual meaning.
CONSTRUCT VIABLE ARGUMENTS AND CRITIQUE THE REASONING OF OTHERS.	**Task:** □ Is ambiguously stated. **Teacher:** □ Does not ask students to present arguments or solutions. □ Expects students to follow a given solution path without opportunities to make conjectures.	**Task:** □ Is not at the appropriate level. **Teacher:** □ Does not help students differentiate between assumptions and logical conjectures. □ Asks students to present arguments but not to evaluate them. □ Allows students to make conjectures without justification.	**Task:** □ Avoids single steps or routine algorithms. **Teacher:** □ Identifies students' assumptions. □ Models evaluation of student arguments. □ Asks students to explain their conjectures.	**Task:** □ Allows for multiple solution paths or solutions that create the need for mathematical discourse. **Teacher:** □ Helps students differentiate between assumptions and logical conjectures. □ Prompts students to evaluate peer arguments. □ Expects students to formally justify the validity of their conjectures.
MODEL WITH MATHEMATICS.	**Task:** □ Encourages students to identify variables and to perform necessary computations. **Teacher:** □ Identifies appropriate variables and procedures for students. □ Does not discuss appropriateness of their model.	**Task:** □ Encourages students to identify variables, perform computations, and interpret results. **Teacher:** □ Verifies that students have identified appropriate variables and procedures. □ Explains the appropriateness of their model.	**Task:** □ Encourages students to identify variables, compute and interpret results, and report findings using a mixture of representations. □ Illustrates the relevance of the mathematics involved. □ Requires students to identify extraneous or missing information. **Teacher:** □ Asks questions to help students identify appropriate variables and procedures. □ Facilitates discussions in evaluating the appropriateness of their model.	**Task:** □ Encourages students to identify variables, compute and interpret results, report findings, and justify the reasonableness of their results and procedures within context of the task. **Teacher:** □ Expects students to justify their choice of variables and procedures. □ Gives students opportunities to evaluate the appropriateness of their model.

MATHEMATICAL PRACTICES OBSERVATION TOOL

P№Ï·ŎúńŎŜ	NEEDS IMPROVEMENT	EMERGING	PROFICIENT	EXEMPLARY
USE APPROPRIATE TOOLS STRATEGICALLY.	**Task:** □ Does not incorporate additional learning tools. **Teacher:** □ Does not incorporate additional learning tools.	**Task:** □ Lends itself to one learning tool. □ Does not involve mental computations or estimation. **Teacher:** □ Demonstrates use of appropriate learning tools.	**Task:** □ Lends itself to multiple learning tools. □ Gives students opportunity to develop fluency in mental computations. **Teacher:** □ Chooses appropriate learning tools for student use. □ Models error checking by estimation.	**Task:** □ Can be solved using a variety of learning tools (i.e., graph paper, calculator, manipulatives). □ Requires students to demonstrate fluency in mental computations. **Teacher:** □ Allows students to choose appropriate learning tools. □ Allows for student flexibility and creativity when using appropriate tools.
ATTEND TO PRECISION.	**Task:** □ Gives imprecise instructions. **Teacher:** □ Does not intervene when students are being imprecise. □ Does not point out instances when students fail to address the question completely or directly.	**Task:** □ Has overly detailed or wordy instructions. **Teacher:** □ Inconsistently intervenes when students are imprecise. □ Identifies incomplete responses but does not require student to formulate further response. □ Does not encourage students to check for errors.	**Task:** □ Has precise instructions. □ Encourages students to check solutions for errors using at least one other solution path. **Teacher:** □ Consistently demands precision in communication and in mathematical solutions. □ Identifies incomplete responses and asks student to revise their response.	**Task:** □ Includes assessment criteria for communication of ideas. **Teacher:** □ Expects and models precision in communication and in mathematical solutions. □ Encourages students to identify when others are not addressing the question completely.
LOOK FOR AND MAKE USE OF STRUCTURE.	**Task:** □ Requires students to automatically apply an algorithm to a task without evaluating its appropriateness. **Teacher:** □ Does not recognize students for developing efficient approaches to the task. □ Requires students to apply the same algorithm to a task although there may be other approaches.	**Task:** □ Engages students in a situation where they look for an underlying structure before (or instead of) automatically applying an algorithm. **Teacher:** □ Identifies efficient approaches presented by individual students, but does not encourage students to share their strategies with the rest of the class. □ Demonstrates the same algorithm to all related tasks although there may be other, more efficient approaches.	**Task:** □ Engages students in discussion emphasizing relationships between concepts. □ Encourages students to demonstrate their flexibility in representing mathematics in a number of ways. **Teacher:** □ Works with all students to develop reasonable and efficient ways to accurately perform basic operations. □ Continuously questions students about the reasonableness of their intermediate results.	**Task:** □ Encourages students to identify the most efficient solution path for the task. **Teacher:** □ Prompts students to identify mathematical structure of the task in order to identify the most effective solution path. □ Encourages students to justify their choice of algorithm or solution path.
LOOK FOR AND EXPRESS REGULARITY IN REPEATED REASONING.	**Task:** □ Is disconnected from prior and future concepts. □ Has no logical progression that leads to pattern recognition. **Teacher:** □ Does not show evidence of understanding the hierarchy within concepts. □ Presents or examines task in isolation.	**Task:** □ Is overly repetitive or has gaps that do not allow for development of a pattern. **Teacher:** □ Does not draw connections to prior or future concepts.	**Task:** □ Reviews prior knowledge and requires cumulative understanding. □ Lends itself to developing a pattern or structure. **Teacher:** □ Connects concept to prior and future concepts to help students develop an understanding of procedural shortcuts. □ Demonstrates connections between tasks.	**Task:** □ Addresses and connects to prior knowledge in a non-routine way. □ Requires recognition of pattern or structure to be completed. **Teacher:** □ Encourages students to connect task to prior concepts and tasks. □ Prompts students to generate exploratory questions based on the current task. □ Engages students in discussion related to repeated reasoning that may occur in a problem's solution.

TEACHER: _____ **DATE:** _____

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Adapted from *Institute for Advanced Study/Park City Mathematics Institute*