

# RUBRIC – IMPLEMENTING STANDARDS FOR MATHEMATICAL PRACTICE

## Using the Rubric:

Review each row corresponding to a mathematical practice. Use the boxes to mark the appropriate description for your task or teacher action. The task descriptors can be used primarily **as** you develop your lesson to make sure your classroom tasks help cultivate the mathematical practices. The teacher descriptors, however, can be used **during** or **after** the lesson to evaluate how the task was carried out. The column titled “proficient” describes the expected norm for task and teacher action while the column titled “exemplary” includes all features of the proficient column and more. A teacher who is exemplary is meeting criteria in **both** the proficient and exemplary columns.

PRACTICE	NEEDS IMPROVEMENT	EMERGING (teacher does thinking)	PROFICIENT (teacher mostly models)	EXEMPLARY (students take ownership)
<p>Make sense of problems and persevere in solving them.</p>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is strictly procedural.</li> <li><input type="checkbox"/> Does not require students to check solutions for errors.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not allow for wait time; asks leading questions to rush through task.</li> <li><input type="checkbox"/> Does not encourage students to individually process the tasks.</li> <li><input type="checkbox"/> Is focused solely on answers rather than processes and reasoning.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is overly scaffolded or procedurally “obvious”.</li> <li><input type="checkbox"/> Requires students to check answers by plugging in numbers.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Allots too much or too little time to complete task.</li> <li><input type="checkbox"/> Encourages students to individually complete tasks, but does not ask them to evaluate the processes used.</li> <li><input type="checkbox"/> Explains the reasons behind procedural steps.</li> <li><input type="checkbox"/> Does not check errors publicly.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is cognitively demanding.</li> <li><input type="checkbox"/> Has more than one entry point.</li> <li><input type="checkbox"/> Requires a balance of procedural fluency and conceptual understanding.</li> <li><input type="checkbox"/> Requires students to check solutions for errors using one other solution path.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Allows ample time for all students to struggle with task.</li> <li><input type="checkbox"/> Expects students to evaluate processes implicitly.</li> <li><input type="checkbox"/> Models making sense of the task (given situation) and the proposed solution.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Allows for multiple entry points and solution paths.</li> <li><input type="checkbox"/> Requires students to defend and justify their solution by comparing multiple solution paths.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Differentiates to keep advanced students challenged during work time.</li> <li><input type="checkbox"/> Integrates time for explicit meta-cognition.</li> <li><input type="checkbox"/> Expects students to make sense of the task and the proposed solution.</li> </ul>

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Reason abstractly and quantitatively.	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lacks context.</li> <li><input type="checkbox"/> Does not make use of multiple representations or solution paths.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not expect students to interpret representations.</li> <li><input type="checkbox"/> Expects students to memorize procedures with no connection to meaning.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is embedded in a contrived context.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Expects students to model and interpret tasks using a single representation.</li> <li><input type="checkbox"/> Explains connections between procedures and meaning.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Has realistic context.</li> <li><input type="checkbox"/> Requires students to frame solutions in a context.</li> <li><input type="checkbox"/> Has solutions that can be expressed with multiple representations.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Expects students to interpret and model using multiple representations.</li> <li><input type="checkbox"/> Provides structure for students to connect algebraic procedures to contextual meaning.</li> <li><input type="checkbox"/> Links mathematical solution with a question's answer.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Has relevant realistic context.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Expects students to interpret, model, and connect multiple representations.</li> <li><input type="checkbox"/> Prompts students to articulate connections between algebraic procedures and contextual meaning.</li> </ul>
Construct viable arguments and critique the reasoning of others.	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is either ambiguously stated.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not ask students to present arguments or solutions.</li> <li><input type="checkbox"/> Expects students to follow a given solution path without opportunities to make conjectures.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is not at the appropriate level.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not help students differentiate between assumptions and logical conjectures.</li> <li><input type="checkbox"/> Asks students to present arguments but not to evaluate them.</li> <li><input type="checkbox"/> Allows students to make conjectures without justification.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Avoids single steps or routine algorithms.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identifies students' assumptions.</li> <li><input type="checkbox"/> Models evaluation of student arguments.</li> <li><input type="checkbox"/> Asks students to explain their conjectures.</li> </ul>	<p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Helps students differentiate between assumptions and logical conjectures.</li> <li><input type="checkbox"/> Prompts students to evaluate peer arguments.</li> <li><input type="checkbox"/> Expects students to formally justify the validity of their conjectures.</li> </ul>

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PRACTICE	NEEDS IMPROVEMENT	EMERGING (teacher does thinking)	PROFICIENT (teacher mostly models)	EXEMPLARY (students take ownership)
<p>Model with mathematics.</p>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to identify variables and to perform necessary computations.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identifies appropriate variables and procedures for students.</li> <li><input type="checkbox"/> Does not discuss appropriateness of model.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to identify variables and to compute and interpret results.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Verifies that students have identified appropriate variables and procedures.</li> <li><input type="checkbox"/> Explains the appropriateness of model.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to identify variables, compute and interpret results, and report findings using a mixture of representations.</li> <li><input type="checkbox"/> Illustrates the relevance of the mathematics involved.</li> <li><input type="checkbox"/> Requires students to identify extraneous or missing information.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Asks questions to help students identify appropriate variables and procedures.</li> <li><input type="checkbox"/> Facilitates discussions in evaluating the appropriateness of model.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to identify variables, compute and interpret results, report findings, and justify the reasonableness of their results and procedures within context of the task.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Expects students to justify their choice of variables and procedures.</li> <li><input type="checkbox"/> Gives students opportunity to evaluate the appropriateness of model.</li> </ul>
<p>Use appropriate tools strategically.</p>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not incorporate additional learning tools.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not incorporate additional learning tools.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lends itself to one learning tool.</li> <li><input type="checkbox"/> Does not involve mental computations or estimation.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Demonstrates use of appropriate learning tool.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Lends itself to multiple learning tools.</li> <li><input type="checkbox"/> Gives students opportunity to develop fluency in mental computations.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Chooses appropriate learning tools for student use.</li> <li><input type="checkbox"/> Models error checking by estimation.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires multiple learning tools (i.e., graph paper, calculator, manipulatives).</li> <li><input type="checkbox"/> Requires students to demonstrate fluency in mental computations.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Allows students to choose appropriate learning tools.</li> <li><input type="checkbox"/> Creatively finds appropriate alternatives where tools are not available.</li> </ul>

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Attend to precision.	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gives imprecise instructions.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not intervene when students are being imprecise.</li> <li><input type="checkbox"/> Does not point out instances when students fail to address the question completely or directly.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Has overly detailed or wordy instructions.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Inconsistently intervenes when students are imprecise.</li> <li><input type="checkbox"/> Identifies incomplete responses but does not require student to formulate further response.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Has precise instructions.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Consistently demands precision in communication and in mathematical solutions.</li> <li><input type="checkbox"/> Identifies incomplete responses and asks student to revise their response.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Includes assessment criteria for communication of ideas.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Demands and models precision in communication and in mathematical solutions.</li> <li><input type="checkbox"/> Encourages students to identify when others are not addressing the question completely.</li> </ul>
Look for and make use of structure.	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to automatically apply an algorithm to a task without evaluating its appropriateness.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not recognize students for developing efficient approaches to the task.</li> <li><input type="checkbox"/> Requires students to apply the same algorithm to a task although there may be other approaches.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to analyze a task before automatically applying an algorithm.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Identifies individual students' efficient approaches, but does not expand understanding to the rest of the class.</li> <li><input type="checkbox"/> Demonstrates the same algorithm to all related tasks although there may be other more effective approaches.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to analyze a task and identify more than one approach to the problem.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Facilitates all students in developing reasonable and efficient ways to accurately perform basic operations.</li> <li><input type="checkbox"/> Continuously questions students about the reasonableness of their intermediate results.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Requires students to identify the most efficient solution to the task.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Prompts students to identify mathematical structure of the task in order to identify the most effective solution path.</li> <li><input type="checkbox"/> Encourages students to justify their choice of algorithm or solution path.</li> </ul>

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<p>Look for and express regularity in repeated reasoning.</p>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is disconnected from prior and future concepts.</li> <li><input type="checkbox"/> Has no logical progression that leads to pattern recognition.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Does not show evidence of understanding the hierarchy within concepts.</li> <li><input type="checkbox"/> Presents or examines task in isolation.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Is overly repetitive or has gaps that do not allow for development of a pattern.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Hides or does not draw connections to prior or future concepts.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Reviews prior knowledge and requires cumulative understanding.</li> <li><input type="checkbox"/> Lends itself to developing a pattern or structure.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Connects concept to prior and future concepts to help students develop an understanding of procedural shortcuts.</li> <li><input type="checkbox"/> Demonstrates connections between tasks.</li> </ul>	<p><u>Task:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Addresses and connects to prior knowledge in a non-routine way.</li> <li><input type="checkbox"/> Requires recognition of pattern or structure to be completed.</li> </ul> <p><u>Teacher:</u></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Encourages students to connect task to prior concepts and tasks.</li> <li><input type="checkbox"/> Prompts students to generate exploratory questions based on current task.</li> <li><input type="checkbox"/> Encourages students to monitor each other's intermediate results.</li> </ul>