



## Standards for Mathematical Practice Implementation Rubric

### What to Look for in the Mathematics Classroom

This rubric was developed to assist teachers and instructional leaders in effectively implementing the Standards for Mathematical Practice to build mathematical proficiency while students are learning math content (concepts and skills). It is intended to serve as a guide to assist administrators, coaches, and classroom teachers in understanding key instructional elements that must be in place to support high student achievement. This rubric is not designed to be used for teacher evaluation; rather, it is a continuous improvement document that should be used for reflection, support, and growth.

This rubric is based on the Standards for Mathematical Practice. These eight standards are required to be integrated and universally included throughout all K–12 instruction. The Standards for Mathematical Practice (SMPs) are intended to be outcomes from learning math concepts and skills, and practices to be used as methodology when learning concepts and skills. Becoming proficient with the SMPs should be a developmental process that occurs through instruction that is focused on the content standards. In general, the SMPs are not grade-level or content specific. Therefore, they provide a measure of math instruction that can be applied to most, if not all, lessons. However, how each practice standard applies and is revealed in each grade level and/or through different areas of content focus will differ.

This rubric is not intended to be a guide for everything that should occur in a good math lesson. For example, nothing is stated about providing clear objectives, including formative assessment throughout the lesson, assessing for mastery, increasing student engagement, or adjusting instruction based on data. These are all important elements of a good lesson that should still be addressed.

The rubric is most effective when used as a tool for goal setting and focusing on improving instruction. As such, instructional leaders and teachers should find area(s) of focus by agreeing on which SMP and which indicators in the SMP will be targeted for work on improving instruction in that particular teacher's or group of teachers' classroom(s). Pick out a few key points, a few bullets within one of the SMPs, and target those for improvement. Plan for these in instruction, look for these in observations, and reflect on these in post lesson discussions.

The rubric identifies key aspects of what teachers do, and what students do to maximize effective growth through the SMPs. Ultimately, the SMPs are about what students do. Therefore, the actions of teachers are to lead to the end result of students doing the SMPs. While many times the rubric calls for teachers to model aspects of the SMPs for students, it is important that this is the beginning of the process that evolves and is intertwined with guiding, facilitating, questioning and challenging students in ways that promote their independence with the SMPs.

## **Overview of Rating System in the Rubric**

The rubric is organized into two sets of lookfors, one for teacher actions and one for student actions for each Standard for Mathematical Practice (SMP). Each page is dedicated to one SMP. Horizontally across each page is a “rating” for each lookfor. Moving from left to right across the page the ratings progress along a general continuum from rarely if ever used or seen to usually used or seen in almost all lessons.

This continuum is divided into the following four categories:

### **1. Emerging**

- Lookfor is rarely or never seen.

### **2. Developing**

- Lookfor is sometimes seen but not on a regular basis.

### **3. Proficient**

- Lookfor is often seen but still with many missed opportunities.

### **4. Exemplary**

- Lookfor is seen in almost all lessons (SMPs 1, 2, 3 & 6)-or in an ample number of lessons (SMPs 4, 5, 7 & 8) - enough to address well what is called for in the SMP.

Standard for Mathematical Practice 1	1: Emerging (Rarely)	2: Developing (Sometimes)	3: Proficient (Often)	4: Exemplary (Usually)
<p>Make Sense of Problems and Persevere in Solving Them</p> <p><b>Lookfors</b></p>	There are limited or no opportunities for students to participate in sense making through prompts or problems that promote reasoning about mathematics and to persevere in solving problems.	There are some opportunities for students to participate in mathematical sense making through prompts or problems that promote reasoning about mathematics and to persevere in solving problems.	There are many opportunities for students to participate in mathematical sense making through prompts or problems that promote reasoning about mathematics and to persevere in solving problems	There are opportunities within almost every lesson for students to participate in mathematical sense making through prompts and problems that promote reasoning about mathematics and for students to persevere in solving problems.
<p><b>Teachers</b></p> <p><input type="checkbox"/> Facilitate a high level of student engagement with tasks.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Facilitate discourse with students clarifying and connecting mathematical ideas.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Require students to defend and justify solutions.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Require students to reflect on both the process and product of their work (meta-cognition).</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Make clear the connections among ideas shared by students and by the teacher</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Provide explicit models of mathematical reasoning, demonstrate multiple approaches, and model checking if the answer makes sense</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Differentiate the task, process, or product to keep all students challenged.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Students</b></p> <p><input type="checkbox"/> Analyze constraints, create a plan, and check solutions using various methods.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Persevere in solving problems and working through several attempts.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Monitor one's own progress and adjust methods based on previous attempts.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Make sense of the task and verify that solutions make sense.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Make sense of and explain connections among mathematical ideas and among various representations.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Make sense of solutions presented by others.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>Standard for Mathematical Practice 2</b>	<b>1: Emerging (Rarely)</b>	<b>2: Developing (Sometimes)</b>	<b>3: Proficient (Often)</b>	<b>4: Exemplary (Usually)</b>
<p><b>Reason Abstractly and Quantitatively</b></p> <p><b>Lookfors</b></p>	There are limited or no opportunities for students to participate in mathematical reasoning, both abstractly and quantitatively.	There are some opportunities for students to participate in mathematical reasoning, both abstractly and quantitatively.	There are many opportunities for students to participate in mathematical reasoning, both abstractly and quantitatively.	There are opportunities within almost every lesson for students to participate in mathematical reasoning, both abstractly and quantitatively.
<b>Teachers</b>				
<input type="checkbox"/> Model representing contextual situations symbolically and connecting representations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Require and facilitate students to decontextualize a problem – to represent a problem with mathematical models (physical, visual, numerical/algebraic).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Require and facilitate students to connect models and solutions back to the context of the problem.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Students</b>				
<input type="checkbox"/> Make sense of quantities and relationships in problem situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Represent abstract situations symbolically and understand the meaning of quantities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Create a coherent representation of the problem at hand.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Consider the units involved.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Flexibly use properties of operations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Explain connections between mathematical procedures and the original context.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Standard for Mathematical Practice 4	1: Emerging (Rarely)	2: Developing (Sometimes)	3: Proficient (Often)	4: Exemplary (Usually)
<p style="text-align: center;">Model with Mathematics</p> <p style="text-align: center;"><b>Lookfors</b></p>	There are limited or no opportunities for students to solve real-world problems by creating mathematical models that identify and show the relationships among the essential features or variables in the problem and allow adjustments as needed.	There are some opportunities for students to solve real-world problems by creating mathematical models that identify and show the relationships among the essential features or variables in the problem and allow adjustments as needed.	There are many opportunities for students to solve real-world problems by creating mathematical models that identify and show the relationships among the essential features or variables in the problem and allow adjustments as needed.	There ample opportunities for students to solve real-world problems by creating mathematical models that identify and show the relationships among the essential features or variables in the problem and allow adjustments as needed.
<b>Teachers</b> <input type="checkbox"/> Demonstrate modeling and analyzing real-world problems using mathematical representations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Select problems that are challenging and reflect everyday situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Require students to use math to model and solve problem that are unique (not parallel to the problems they have already seen).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Guide students to evaluate the appropriateness of their models.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Require students to explain or justify their choices of variables, models, and solutions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Students</b> <input type="checkbox"/> Apply prior knowledge to independently model and solve real-world problems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Identify, analyze, and draw conclusions about quantities using tools such as diagrams, two-way tables, graphs, flowcharts, and formulas.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Use assumptions and approximations to make a problem simpler.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Check to see if an answer makes sense within the context of a situation and change a model when necessary.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Standard for Mathematical Practice 5	1: Emerging (Rarely)	2: Developing (Sometimes)	3: Proficient (Often)	4: Exemplary (Usually)
<p>Use Appropriate Tools Strategically</p> <p><b>Lookfors</b></p>	<p>There are limited or no opportunities for students to choose and use appropriate physical or technological tools to deepen their understanding of mathematical concepts.</p>	<p>There are some opportunities for students to choose and use appropriate physical or technological tools to deepen their understanding of mathematical concepts.</p>	<p>There are many opportunities for students to choose and use appropriate physical or technological tools to deepen their understanding of mathematical concepts.</p>	<p>There are ample opportunities for students to choose and use appropriate physical or technological tools to deepen their understanding of mathematical concepts.</p>
<p><b>Teachers</b></p> <p><input type="checkbox"/> Model the appropriate use of tools and the decision-making processes in choosing tools to efficiently solve problems.</p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>
<p><input type="checkbox"/> Consistently provide access to tools, and promote students choosing appropriate tools. Encourage students to find an appropriate alternative when a preferred tool is not available.</p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>
<p><input type="checkbox"/> Often require students to demonstrate fluency with mental computations or reasoning when students are using tools such as calculators.</p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>
<p><b>Students</b></p> <p><input type="checkbox"/> Make good decisions about which tools to use and how to use the tools in specific situations.</p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>
<p><input type="checkbox"/> Use technological tools to visualize, analyze, and help solve problems, and to deepen math knowledge.</p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>
<p><input type="checkbox"/> Identify and use external math resources.</p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>
<p><input type="checkbox"/> Check for errors using alternative mathematical methods including when using various tools.</p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>	<p><input type="checkbox"/></p>

Standard for Mathematical Practice 6	1: Emerging (Rarely)	2: Developing (Sometimes)	3: Proficient (Often)	4: Exemplary (Usually)
<p style="text-align: center;"><b>Attend to Precision</b></p> <p style="text-align: center;"><b>Lookfors</b></p>	There are limited or no opportunities for students to demonstrate accuracy and efficiency when communicating, calculating, and problem solving.	There are some opportunities for students to demonstrate accuracy and efficiency when communicating, calculating, and problem solving.	There are many opportunities for students to demonstrate accuracy and efficiency when communicating, calculating, and problem solving.	There are opportunities within almost every lesson for students to demonstrate accuracy and efficiency when communicating, calculating, and problem solving.
<p><b>Teachers</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Model and expect the daily and appropriate use of mathematical language and vocabulary.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Provide content and academic supports to promote accurate use of language, labels, and units (e.g., word walls, anchor charts, choral response, error identification and correction, self and peer review, editing, and rewriting of work).</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Model specific labels, units, and answers within the context of problems.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Provide opportunities for students to reinforce, learn about and use mathematical language and symbols.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Students</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Use appropriate symbols, words, and labeling to effectively communicate mathematical ideas.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li><input type="checkbox"/> State the meaning of the symbols used, specify the units of measure, and provide accurate labels.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Calculate accurately and efficiently, and express answers to the appropriate degree of precision.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li><input type="checkbox"/> Provide carefully formulated explanations to other students.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>Standard for Mathematical Practice 7</b>	<b>1: Emerging (Rarely)</b>	<b>2: Developing (Sometimes)</b>	<b>3: Proficient (Often)</b>	<b>4: Exemplary (Usually)</b>
<p><b>Look for and Make Use of Structure</b></p> <p><b>Lookfors</b></p>	There are limited or no opportunities for students to look for patterns or structures, recognizing that quantities can be represented in different ways.	There are some opportunities for students to look for patterns or structures, recognizing that quantities can be represented in different ways.	There are many opportunities for students to look for patterns or structures, recognizing that quantities can be represented in different ways.	There are ample opportunities for students to look for patterns or structures, recognizing that quantities can be represented in different ways.
<p><b>Teachers</b></p> <p><input type="checkbox"/> Model and facilitate students looking for the structure within mathematics in order to solve problems (e.g., finding patterns, using repeated reasoning).</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Have students examine multiple representations for the same quantities in order to identify the best representation to use in a given situation.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Facilitate students using structure to simplify mathematical problems, such as, seeing an algebraic expression as a single object, or seeing individual well understood shapes within composite shapes.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Guide students to identify and evaluate efficient strategies for solving problems.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><b>Students</b></p> <p><input type="checkbox"/> Recognize patterns, structures, and relationships within quantities, processes, and expressions, and across topics.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Use properties and operations to make sense of problems.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Use patterns, structures, multiple representations and relationships to identify an effective and efficient solution path.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<p><input type="checkbox"/> Use patterns and repeated reasoning to solve complex problems.</p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>Standard for Mathematical Practice 8</b>	<b>1: Emerging (Rarely)</b>	<b>2: Developing (Sometimes)</b>	<b>3: Proficient (Often)</b>	<b>4: Exemplary (Usually)</b>
<p><b>Look for and Express Regularity in Repeated Reasoning</b></p> <p><b>Lookfors</b></p>	There are limited or no opportunities for students to look for repeated reasoning, connect to prior learning, and analyze structures to make and apply generalizations.	There are some opportunities for students to look for repeated reasoning, connect to prior learning, and analyze structures to make and apply generalizations.	There are many opportunities for students to look for repeated reasoning, connect to prior learning, and analyze structures to make and apply generalizations.	There are ample opportunities for students to look for repeated reasoning, connect to prior learning, and analyze structures to make and apply generalizations.
<b>Teachers</b>				
<input type="checkbox"/> Model looking for and identifying repeated reasoning in tasks and connecting to prior learning to make and apply generalizations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Ask, and scaffold as needed, questions that require students to look for and identify repeated reasoning, make generalizations, and describe connections.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Demonstrate and require students to evaluate the reasonableness of their results.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Guide students to recognize how repeated reasoning and generalization can lead to procedural shortcuts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Students</b>				
<input type="checkbox"/> Identify repeated reasoning in calculations or processes to make generalizations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Build on prior learning to make and apply generalizations to new situations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Use recognition of repeated reasoning to help identify and understand procedural shortcuts.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Continually evaluate the reasonableness of intermediate results, such as comparing results to estimates.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>