Standards for Mathematical Practice in Action

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| **Practice** | **Sample Student Evidence** | **Sample Teacher Actions** |
| 1. Make sense of problems and persevere in solving them | * Display sense-making behaviors
* Show patience and listen to others
* Turn and talk for first steps and/or generate solution plan
* Analyze information in problems
* Use and recall multiple strategies
* Self-evaluate and redirect
* Assess reasonableness of process and answer
 | * Provide open-ended problems
* Ask probing questions
* Probe student responses
* Promote and value discourse
* Promote collaboration
* Model and accept multiple approaches
 |
| 2. Reason abstractly and quantitatively | * Represent abstract and contextual situations symbolically
* Interpret problems logically in context
* Estimate for reasonableness
* Make connections including real life situations
* Create and use multiple representations
* Visualize problems
* Put symbolic problems into context
 | * Model context to symbol and symbol to context
* Create problems such as “what word problem will this equation solve?”
* Give real world situations
* Offer authentic performance tasks
* Place less emphasis on the answer
* Value invented strategies
* Think Aloud
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| 3. Construct viable arguments and critique the reasoning of others | * Questions others
* Use examples and non-examples
* Support beliefs and challenges with mathematical evidence
* Forms logical arguments with conjectures and counterexamples
* Use multiple representations for evidence
* Listen and respond to others well
* Uses precise mathematical vocabulary
 | * Create a safe and collaborative environment
* Model respectful discourse behaviors
* “Find the error” problems
* Promote student to student discourse (do not mediate discussion)
* Plan effective questions or Socratic formats
* Provide time and value discourse
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| 4. Model with mathematics | * Connect math (numbers and symbols) to real-life situations
* Symbolize real-world problems with math
* Make sense of mathematics
* Apply prior knowledge to solve problems
* Choose and apply representations, manipulatives and other models to solve problems
* Use strategies to make problems simpler
* Use estimation and logic to check reasonableness of an answer
 | * Model reasoning skills
* Provide meaningful, real world, authentic performance-based tasks
* Make appropriate tools available
* Model various modeling techniques
* Accept and value multiple approaches and representations
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| 5. Use appropriate tools strategically | * Choose appropriate tool(s) for a given problem
* Use technology to deepen understanding
* Identify and locate resources
* Defend mathematically choice of tool
 | * Provide a “toolbox” at all times with all available tools – students then choose as needed
* Model tool use, especially technology for understanding
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| 6. Attend to precision | * Communicate (oral and written) with precise vocabulary
* Carefully formulate questions and explanations (not retelling steps)
* Decode and interpret meaning of symbols
* Pay attention to units, labeling, scale, etc.
* Calculate accurately and effectively
* Express answers within context when appropriate
 | * Model problem solving strategies
* Give explicit and precise instruction
* Ask probing questions
* Use ELA strategies of decoding, comprehending, and text-to-self connections for interpretation of symbolic and contextual math problems
* Guided inquiry
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| 7. Look for and make use of structure | * Look for, identify, and interpret patterns and structures
* Make connections to skills and strategies previously learned to solve new problems and tasks
* Breakdown complex problems into simpler and more manageable chunks
* Use multiple representations for quantities
* View complicated quantities as both a single object or a composition of objects
 | * Let students explore and explain patterns
* Use open-ended questioning
* Prompt students to make connections and choose problems that foster connections
* Ask for multiple interpretations of quantities
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| 8. Look for and express regularity in repeated reasoning | * Design and state “shortcuts”
* Generate “rules” from repeated reasoning or practice (e.g. integer operations)
* Evaluate the reasonableness of intermediate steps
* Make generalizations
 | * Provide tasks that allow students to generalize
* Don’t teach steps or rules, but allow students to explore and generalize in order to discover and formalize
* Ask deliberate questions
* Create strategic and purposeful check-in points
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N. Smith, 2012

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