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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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 |
| 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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