Supporting The Standards for Mathematical Practice

**Bedtime Math:** [**http://bedtimemath.org/**](http://bedtimemath.org/)

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|  | **Mathematics Practices** | **Students:** | **Teachers:** | **Parents** |
| **Overarching habits of mind of a productive math thinker.** | **1. Make sense of problems and persevere in solving.** | * Use multiple paths to solution * Recognize meaning of a problem. Does this make sense? Reasonable? * Find a starting point * Recognize given information as well as unknown information * Use problem-solving strategies. Develop a plan, set and evaluate goals, able to alter plan | * Good questioning to lead students into process such as: What information is given? What information do you need to know? What are you trying to figure out? * Quad D lessons with performance events * Open ended * Multiple paths to solve * Allow students to struggle * Model process * Repeat quiz/test/problem * Give copy of a problem and highlighter | * Ask students to explain why * Encourage different approaches * Allow kids to struggle * Question child to get him/her to think about the problem * Reassure and build confidence |
| **6. Attend to Precision** | * Use precise mathematical language * Use appropriate labels, units to measure etc. * Check calculations and simple mistakes * Calculate accurately and efficiently * Explicit use of definitions | * Model precise math language * Hold students accountable for more detailed and exact answers * Require written language * Check and make sure students have properly used labels, equal signs, units of measure, etc. * Remind students to check calculations for any type of silly mistakes in process | * Hold high expectations for proficient and precise work. * Use math language with your child * Vocabulary exercises with student * Have child communicate their thinking * Use resources and know where to find * Ask, “Do you have labels” to help get him/her thinking. |
| **Reasoning and Explaining** | **2. Reason abstractly and quantitatively.** | * Bring abstract and factual skill to problem solving situations * Create a formula using formulas * Draw a model of a word problem * Students talk with each other and to the teacher * Know the meaning of quantities * Give life to their work | * Ask more open ended questions * Create situations where students give life to their work * Provide think time * Model it | * Ask child for another strategy to work through same situation * Ask questions about the numbers in the problem * Ask questions about the situation * Know where to find resources |
| **3. Construct viable arguments and critique the reasoning of others.** | * Make conjectures and build logical steps for a situation. * Question each other’s arguments * Share and compare arguments * Provide suggestions to modify arguments (PQP – praise, question, polish) * Justify their conclusions * Communicate and respond to others questions/conclusions * Compare the effectiveness of two plausible arguments | * Open ended questioning * Allow time for student questioning/responding * Facilitate conversation between students about process and reason * Ask “why” questions * Allow, encourage students to live in uncertainty | * Ask child to explain thinking * Ask child for another strategy for same situation * Ask “why” * Expect child to defend and/or justify their solution * Know where to find information. |
| **Modeling and Using Tools** | **4. Model with mathematics.** | * Read/interpret/apply mathematics in everyday life, society, and the workplace * Analyze drawings/information * Draw conclusions * Draw diagrams, two-way tables, graphs, flowcharts and formulas * Identify important quantities/qualities * Make assumptions and approximations * Reflect/do my answers make sense? Are improvements needed? | * Present real-world situations * Build background * Model all types of given drawings * Provide practice of reading and interpreting real-life situations * Provide prepared drawings for students to investigate to draw their own conclusions * Allow for various answers * Provide time for reflection in various ways * Differentiate instruction * Design a list of on-line resources | * Provide necessary materials & know where to find them * Reinforce real-world uses of math at home * Encourage “word-problems” in a positive manner * Create a comparison chart of items on their own shopping list * Spend time with students working on problems – students coach parents * Check out “Bedtime” math:   <http://bedtimemath.org/> |
| **5. Use appropriate tools strategically.** | * Choose appropriate tools for tasks (paper/pencil, concrete models, ruler, protractor, calculator, spreadsheet, computer algebra system, statistical package, dynamic geometry software, digital content (on-line), graphing calculator) * Understand what they can gain from using each tool * Understand their own personal limits of provided tools * Use tools appropriately and effectively * Use technology to explore and deepen understanding * Visualize and analyze results * Detect errors * Explore consequences * Compare predictions with data | * Present tasks that require use of tools * Teach instruction and proper use of tools * Allow for differentiation * Model use of tools * Provide descriptive feedback to students | * Support child’s efforts * Purchase appropriate tools (pencil, calculator, protractor) * Provide opportunity to utilize tools and on-line resources (home, library) * Encourage child to choose tools that help deepen understanding (different problems require different tools) |
| **Seeing structure and generalizing.** | **7.Look for and make use of structure.** | * Discern a pattern or structure * Making math easier by breaking numbers down * See complicated things as being composed of several pieces. * Step back – “zoom out” * Shift perspective * Investigate/look closely—“zoom in” * Use strategies – think aloud | * Model and think out loud. Show their own thinking as they do mathematical computations * Encourage number sense * Teach multiple strategies | * Show their children how they use math everyday -- relevance * Have kids verbalize their thinking * Ask questions about relationships in the numbers, operations, etc. * Encourage the use of different strategies * Have child generalize or summarize their thinking |
| **8. Look for express regularity in repeated reasoning.** | * Looking for patterns and creating shortcuts * Look for general methods * Notice regularity in the way terms cancel may lead to a formula for a geometric series * Paying attention to detail * Keep question in mind * Look for repetition and using this to solve | * Have students evaluate the reasonableness of their results * Teach strategies * Model use of properties for making problems easier | * Ask children to look for patterns * Help child use the patterns to think about the problem * Have child use what they know to solve the problem * Have child use patterns to create shortcuts |