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
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| **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.
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| **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
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| **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.
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| **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)
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| **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
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| **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
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