Standards for Mathematical Practice

MP #1 Make sense of problems and persevere in solving them.

Student behavior
- Make sense of the problem.
- Break the problem down.
- Be able to analyze problems.
- Puzzler’s disp. where to start.
- Own tool kit.

Teacher behavior
- Provide encouragement.
- Teach/reinforce skill needed to solve problems.
- Provide problem without a numeric.
- Think time and provide more encouragement.

Example:
- Eva had 36 green pepper seedlings. She planted 48 of them. How many more does she have to plant?

MP #2 Reason abstractly and quantitatively.

Mary has 3 bears, Kelly gave her 1 more bear. How many bears does Mary have now?

Student Actions
- Students understand what the numbers in a problem represent.
- Students symbolically represent (abstract) the number sentence or quantities.
- Students use different representations to show their thinking.
- Explain thinking.

Teacher Actions
- Need to give students contextual tasks (all of the different story problem formats).
- Teachers ask probing questions to push students to explain what the quantities represent.
- Teachers encourage sharing of different representations.
- Teachers encourage precise language. i.e. 3 pencils.
### Student Behaviors
- Show as well as tell using concrete representations
- Develop academic language
- Unique ways to solve
- No strategy to strategy
- Do a lot of practice

### Teacher Behaviors
- Non-routine questions with multiple answers
- Make use of curiosity to make students more aware and interested in tasks
- Teamwork for solving difficult problems
- Teach academic language

### Classroom Activity
Give naked math problem—they create story problem with representation.

### MP4 Model w/ Mathematics

<table>
<thead>
<tr>
<th>Student Behaviors</th>
<th>Teacher Actions</th>
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<tbody>
<tr>
<td>Curiosity</td>
<td>Provide opportunities to estimate/reason</td>
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<tr>
<td>Approximating and simplifying assumptions</td>
<td>Model story problems</td>
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<tr>
<td>Finding reasonable answers and evaluating their answers</td>
<td>Modeling of explaining thought process</td>
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Examples: How many ways to show 10? (without using 5s)
How can you make 28¢ without dimes or quarters?
### #5: Use Appropriate Tools Strategically

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<thead>
<tr>
<th>Student Behaviors</th>
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<tbody>
<tr>
<td>Choose the correct tool to use for different problems/strategies.</td>
<td>Give students numerous opportunities and practice using the tools.</td>
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<tr>
<td>Know limitations and advantages.</td>
<td>Keep math tools in reach of students.</td>
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<tr>
<td>Students can use “pencil and paper” to explain their thinking.</td>
<td>Teach mental models. Examples: number line, area models.</td>
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<tr>
<td>Extend the use of tools. Example: Number line. 63-28 = 30 + 63.</td>
<td>Use an open number line to teach multi-digit subtraction.</td>
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### #6: Attend To Precision

<table>
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<th>Student Behaviors:</th>
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<tbody>
<tr>
<td>Using precise vocabulary, measurements.</td>
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<tr>
<td>Notice irregularities.</td>
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<tr>
<td>Ability to express their ideas and reasoning.</td>
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<td>Checking work.</td>
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<table>
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<th>Teacher Actions:</th>
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<tr>
<td>Modeling, practice, and expose students to math vocabulary.</td>
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<tr>
<td>Use clear language that is grade level appropriate.</td>
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**Lesson Idea:** Measurement (using rulers/tools)

- Focus on tool use, identifying the tool, accuracy in practice.
Standard #7

Student:
- Look for patterns/structures
- Break #s into subparts
- 3+2 = 5, 5x1 + 3x7
- 4+1 = 5, = 8x7
- Apply generalizations to areas in math
- Put off solving until pattern/structure is apparent.

Teachers:
- Part to whole relationships
- Opportunities to see relationship between size/shape
- Look for patterns in # relationships
- Less drilling - more number sense
- Teaching structures to students

Activity
Number Talks - Getting to 10
9+5 → 10+4
8+5 = 10+3

#8
- Look for and express regularity in repeated reasoning

Student:
- Look for patterns/regularity
- Look for strategies
- Generalize & apply to other tasks
- Time to play/explore
- Self-evaluation

Teacher:
- Offers vocab at developmentally appropriate times
- Provide opportunities for discovery
- Asking progressively deeper probing questions
- Give kids lots of time to talk and discuss their thinking