

Mathematical Practices Look-fors

MP.1: Make sense of problems and persevere in solving them. (problem solving)		
The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Analyzes information given • Looks for different ways to solve the problem (i.e. situation vs. solution) • Knows and uses different representations (i.e. equation vs. table or graph) and/or manipulative • Evaluates progress and changes plan if needed • Explains using both pictures and words • Makes connection to the way they solved the problem and how others solved the problem • Uses basic fact fluency or fact strategies 	<ul style="list-style-type: none"> • Promotes visible thinking using pictures and equations • Gives time for students to discuss with others or class • Encourages students to keep trying and builds supportive math community • Uses explicit and precise language when using representations and definitions and expects students to do the same in their discussions • Helps students make connections between representations, equations, and student thinking • Engages students in metacognition • Models problem situation, not problem solution.

MP.3: Construct viable arguments and critique the reasoning of others. (math talk)		
The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Communicates by using mathematical reasoning with objects, drawings, diagrams, equations ... • Justifies solutions • Makes connections between their own thinking and that of others • Demonstrates actively listening by asking questions of others • Makes statements to prove or disprove concepts or presented ideas • Students understand different forms of reasoning (ie. deductive reasoning) and when to apply them • Uses accurate vocabulary 	<ul style="list-style-type: none"> • Promotes math talk and the critiquing of presented solutions • Asks higher-order questions to facilitate discussion and presses for justification • Gives time for students to construct their own ideas before small or large group discussions • Expects students to be explicit and precise when using representations, definitions, and symbols • Builds a supportive math community • Helps make connections between the reasoning of students and content standard

Mathematical Practices Look-fors

MP.2: Reason abstractly and quantitatively. (number sense)

The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer Task explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Makes sense of quantities and their relationship in problem situations • Recognizes that quantities can be represented in different ways • Uses numbers and words to make sense of a problem • Gives attention to the meaning of the numbers and knows which operation to choose • Performs operations flexibly, accurately, and efficiently • Uses multiple representations • Connects numbers, symbols or units to quantities • Justifies solutions • Makes connections to how they solved a problem and how others solved the problem • Reasons with attributes of geometric figures 	<ul style="list-style-type: none"> • Promotes visible thinking using pictures and equations • Uses physical representations [manipulatives, drawings] to model what happens to a variable when it changes and how that effects the other variable • Gives time for students to discuss with others or class • Encourages students to keep trying • Uses explicit and precise language when using representations and definitions and expects students to be the same in their discussion • Builds a supportive math community • Helps make connections between representations, equations, student thinking, and content standard

MP.6: Attend to precision. (vocabulary, labeling, answers)

The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Uses appropriate math vocabulary • Uses clear definitions in discussion • Calculates accurately and efficiently • Explains their reasoning with accurate mathematical language • Uses proper unit labels with measuring • Uses appropriate labels when graphing and solving story problems • Determines when different levels of precision are needed and how precision affects results 	<ul style="list-style-type: none"> • Communicates precisely using clear definitions • Emphasizes the importance of precise communication • Emphasizes the importance of precision of measurement • Helps make connections between vocabulary, student thinking, unit labels, calculations, and content standard

Mathematical Practices Look-fors

MP.4: Model with mathematics. [representations and graphs]		
The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Identifies important elements and quantities needed for a model • Describes relationships of models and equation • Chooses a representation • Applies formulas/equations • Uses models to draw conclusion • Explains why it is a good model for the problem • Recognizes and uses parts of a graph (i.e. title, labels, symbols, key) 	<ul style="list-style-type: none"> • Expects students to justify their choice in models • Gives students opportunity to evaluate the appropriateness of their model and that of others • Helps make connections with the relationships between representation, equation, answer, student thinking, and content standard

MP.5: Use appropriate tools strategically. [calculators, rulers, manipulative]		
The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Uses mental computations fluently • Knows which tools are appropriate for the task • Knows when to use a tool • Understands and uses properties of operations • Uses estimation to find errors and check answer for reasonableness • Justifies tool selection 	<ul style="list-style-type: none"> • Allows students to choose appropriate learning tools • Uses appropriate tools to represent, explore and deepen student understanding • Models how different representations are tools • Uses technology tools to deepen students' understanding of a concept • Helps make connections between tool, equation, student thinking, and content standard

Mathematical Practices Look-fors

MP.7: Look for and make use of structure. (how numbers and shapes are organized)		
The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Recognizes that quantities can be represented in different ways • Uses properties of operations to make sense of problems • Recognizes how numbers and shapes are organized • Looks for patterns and structures in the number system • Justify strategy for basic facts • Uses models to prove equations • Recognize how symbols help represent relationships and can be applied to new situations 	<ul style="list-style-type: none"> • Gives students time to discuss connections • Brings students back to the rule or properties being used • Helps students look for patterns and structures in the number system • Helps make connections between the structure used, equation, student thinking, and content standard • Helps make connections to real world

MP #8: Look for and express regularity in repeated reasoning. (number pattern)		
The Math Task:	The Student:	The Teacher:
<ul style="list-style-type: none"> • Is an interesting problem • Has more than one solution path which may be unpredictable • Creates discussion • Requires cognitive effort • Connects to real world • Relates to grade level CCSS • Builds student understanding of grade level standard • Leads students to look back and reflect on answer • Explicitly asks for justification or explanation <p>[from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver,1998]</p>	<ul style="list-style-type: none"> • Notices number patterns • Notices if calculations are repeated • Applies more efficient computation strategies using number patterns • Looks both for general methods and for shortcuts 	<ul style="list-style-type: none"> • Encourages students to connect task to prior concepts taught • Helps make connections between pattern, equation, student thinking, and content standard