MP.1: Make sense of problems and persevere in solving them. (problem solving)

The Math Task:The Student:The Teacher:• Is an interesting problem • Has more than one solution path which may be unpredictable• Analyzes information given • Looks for different ways to solve the problem (i.e. situation vs. solution)• Promotes visible thinking using pictures and equations• 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• Nalyzes information given • Analyzes information given • Looks for different ways to solve the problem (i.e. situation vs. solution)• 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 manipulative • Uses explicit and precise and words • Makes connection to the way they solved the problem and how others solved the problem • Uses basic fact fluency or fact strategies• 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 • Uses explicit and precise and words • Uses basic fact fluency or fact strategies	(problem solving)		
 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 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 Explicitly asks for justification or explanation Makes connection to the way they solved the problem and how others solved the problem Uses basic fact fluency or fact Looks for different ways to solve the problem and how others solved the problem Uses basic fact fluency or fact 	The Math Task:	The Student:	The Teacher:
Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) metacognition • Models problem situation, not	 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 	 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 	 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

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

The Math Task:The Student:The Teacher:• Is an interesting problem • Has more than one solution path which may be unpredictable• Makes sense of quantities and their relationship in problem situations• Promotes visible thinking using pictures and equations• Creates discussion • Creates discussion • Requires cognitive effort • 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• Uses numbers and words to make sense of a problem • Uses numbers and knows which operation to the meaning of the numbers and knows which 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• He Teacher:• InterventionThe Teacher:• Promotes visible thinking using pictures and equations • Uses physical representations (manipulatives, drawings) • Uses physical representations • Uses the totanges and • Uses submers and words to make sense of a problem • Connects numbers, symbols or • Uses explicit and precise • Justifies solutions • Makes connections to how <br< th=""></br<>
 Has more than one solution path which may be unpredictable Creates discussion 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 (from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) their relationship in problem situations their relationship in problem situations their relationship in problem situations Recognizes that quantities on 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 Buids student thinking,



MP.3: Construct viable arguments and critique the reasoning of others. (math talk)

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The Math Task:	The Student:	The Teacher:
 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 (from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) 	 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 	 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
o , ,		students and content standard

MP.4: Model with mathematics.

(representations and graphs)

The Math Task:	The Student:	The Teacher:
 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 (from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) 	 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) 	 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:
 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 (from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) 	 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 	 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
	MP.6: Attend to precision. (vocabulary, labeling, answers)	
The Math Task:	The Student:	The Teacher:
 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 (from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) 	 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 	 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



MP.7: Look for and make use of structure. (how numbers and shapes are organized)		
The Math Task:	The Student:	The Teacher:
 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 (from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) 	 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 	 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:
 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 (from: Implementing Standards-Based Mathematics Instruction; Stein, Smith Henningsen & Silver, 1998) 	 Notices number patterns Notices if calculations are repeated Applies more efficient computation strategies using number patterns Looks both for general methods and for shortcuts 	 Encourages students to connect task to prior concepts taught Helps make connections between pattern, equation, student thinking, and content standard

