

Teaching Mathematics through Problem Solving in the Common Core State Standards Classroom

Connecting CCSS Mathematical Practices and NCTM Process Standards

<i>CCSS Standards for Mathematical Practice</i>	<i>NCTM Process Standards</i>	<i>Examples</i>
<p>1. Make sense of problems and persevere in solving them</p> <ul style="list-style-type: none"> • explain to themselves the meaning of a problem • look for entry points to a problem solution • monitor and evaluate progress and change course if necessary • use concrete objects or pictures to conceptualize and solve a problem • check answers to problems using a different method • ask themselves, “Does this make sense?” • understand approaches of others • identify correspondences between different approaches 	<p>Problem Solving Standard</p> <ul style="list-style-type: none"> • build new mathematical knowledge through problem solving • solve problems that arise in mathematics and in other context • apply and adapt a variety of appropriate strategies to solve problems • monitor and reflect on the process of mathematical problem solving 	

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<p>2. Reason abstractly and quantitatively</p> <ul style="list-style-type: none"> • make sense of quantities and their relationships in problem situations • decontextualize – abstract a given situation and represent it symbolically • contextualize – probe into the referents for the symbols involved • create a coherent representation of the problem • attend to the meaning of quantities, not just how to compute them • flexibly use different properties of operations and objects 	<p>Representation Standard</p> <ul style="list-style-type: none"> • create and use representations to organize, record, and communicate mathematical ideas • select, apply and translate among mathematical representations to solve problems <p>Connections Standard</p> <ul style="list-style-type: none"> • recognize and use connections among mathematical ideas 	
<p>3. Construct viable arguments and critique the reasoning of others</p> <ul style="list-style-type: none"> • understand and use stated assumptions, definitions and previously established results in constructing arguments • justify conclusions, communicate to others, and respond to the arguments of others • construct arguments using concrete referents such as objects, drawing, diagrams and actions • listen or read arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments 	<p>Reasoning and Proof Standard</p> <ul style="list-style-type: none"> • make and investigate mathematical conjectures • develop and evaluate mathematical arguments and proofs • select and use various types of reasoning and methods of proof <p>Communication Standard</p> <ul style="list-style-type: none"> • communicate their mathematical thinking coherently and clearly to peers, teachers and others • analyze and evaluate the mathematical thinking and strategies of others 	

<i>CCSS Standards for Mathematical Practice</i>	<i>NCTM Process Standards</i>	<i>Example #2</i>
<p>4. Model with mathematics</p> <ul style="list-style-type: none"> • solve problems arising in everyday life, society, and the workplace • identify important quantities in a practical situation • interpret mathematical results in the context of the situation • reflect on whether the results make sense 	<p>Problem Solving Standard</p> <ul style="list-style-type: none"> • solve problems that arise in mathematics and in other contexts • monitor and reflect on the process of mathematical problem solving <p>Connections Standard</p> <ul style="list-style-type: none"> • recognize and use connections among mathematical ideas • recognize and apply mathematics in contexts outside of mathematics 	
<p>5. Use appropriate tools strategically</p> <ul style="list-style-type: none"> • be familiar with tools appropriate for their grade • make sound decisions about when each tool might be helpful • recognize insight to be gained and limitations of different tools 	<p>Representation Standard</p> <ul style="list-style-type: none"> • create and use representation to organize, record, and communicate mathematical ideas • select, apply, and translate among mathematical representations to solve problems • use representations to model and interpret physical, social, and mathematical phenomena 	

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<p>6. Attend to precision</p> <ul style="list-style-type: none"> • try to communicate precisely to others • state meaning of the symbols they use • calculate accurately and efficiently • give carefully formulated explanations to each other 	<p>Communication Standard</p> <ul style="list-style-type: none"> • communicate their mathematical thinking coherently and clearly to peers, teachers, and others • use the language of mathematics to express mathematical ideas precisely <p>Reasoning and Proof Standard</p> <ul style="list-style-type: none"> • develop and evaluate mathematical arguments and proofs 	

This table addresses only 6 of the 8 Standards for Mathematical Practice. Even though all 8 standards are addressed the in the primary grades to some extent, these first six standards are the most relevant for younger students.