

**Mathematical Processes Standard  
Grades K - 12**

<b>Ohio Benchmarks Grades K - 2</b>	<b>Ohio Benchmarks Grades 3 - 4</b>	<b>Ohio Benchmarks Grades 5-7</b>	<b>Ohio Benchmarks Grades 8-10</b>	<b>Ohio Benchmarks Grade 11-12</b>
<p><b>A.</b> Use a variety of strategies to understand problem situations; e.g., discussing with peers, stating problems in own words, modeling problems with diagrams or physical materials, identifying a pattern.</p>	<p><b>A.</b> Apply and justify the use of a variety of problem-solving strategies; e.g., make an organized list, guess and check.</p>	<p><b>A.</b> Clarify problem-solving situation and identify potential solution processes; e.g., consider different strategies and approaches to a problem, restate problem from various perspectives.</p>	<p><b>A.</b> Formulate a problem or mathematical model in response to a specific need or situation, determine information required to solve the problem, choose method for obtaining this information, and set limits</p>	<p><b>A.</b> Construct algorithms for multi-step and non-routine problems.</p>
<p><b>B.</b> Identify and restate in own words the question or problem and the information needed to solve the problem.</p>	<p><b>B.</b> Use an organized approach and appropriate strategies to solve multi-step problems.</p>	<p><b>B.</b> Apply and adapt problem-solving strategies to solve a variety of problems, including unfamiliar and non-routine problem situations.</p>	<p><b>B.</b> Apply mathematical knowledge and skills routinely in other content areas and practical situations,</p>	<p><b>B.</b> Construct logical verifications or counter-examples to test conjectures and to justify or refute algorithms and solutions to problems.</p>
<p><b>C.</b> Generate alternative strategies to solve problems.</p>	<p><b>C.</b> Interpret results in the context of the problem being solved; e.g., the solution must be a whole number of buses when determining the number of buses necessary to transport students.</p>	<p><b>C.</b> Use more than one strategy to solve a problem, and recognize there are advantages associated with various methods.</p>	<p><b>C.</b> Recognize and use connections between equivalent representations and related procedures for a mathematical concept; e.g., zero of a function and the x-intercept of the graph of the function, apply proportional thinking when</p>	<p><b>C.</b> Assess the adequacy and reliability of information available to solve a problem.</p>

**Mathematical Processes Standard  
Grades K - 12**

<b>Ohio Benchmarks Grades K - 2</b>	<b>Ohio Benchmarks Grades 3 - 4</b>	<b>Ohio Benchmarks Grades 5-7</b>	<b>Ohio Benchmarks Grades 8-10</b>	<b>Ohio Benchmarks Grade 11-12</b>
<p><b>D.</b> Evaluate the reasonableness of predictions, estimations and solutions.</p>	<p><b>D.</b> Use mathematical strategies to solve problems that relate to other curriculum areas and the real world; e.g., use a timeline to sequence events; use symmetry in artwork.</p>	<p><b>D.</b> Recognize whether an estimate or an exact solution is appropriate for a given problem situation.</p>	<p><b>D.</b> Apply reasoning processes and skills to construct logical verifications or counter-examples to test conjectures and to justify and defend algorithms and solutions.</p>	<p><b>D.</b> Select and use various types of reasoning and methods of proof.</p>
<p><b>E.</b> Explain to others how a problem was solved.</p>	<p><b>E.</b> Link concepts to procedures and to symbolic notation; e.g., model <math>3 \times 4</math> with a geometric array, represent one-third by dividing an object into three equal parts.</p>	<p><b>E.</b> Use deductive thinking to construct informal arguments to support reasoning and to justify solutions to problems.</p>	<p><b>E.</b> Use a variety of mathematical representations flexibly and appropriately to organize, record and communicate mathematical ideas.</p>	<p><b>E.</b> Evaluate a mathematical argument and use reasoning and logic to judge its validity.</p>
<p><b>F.</b> Draw pictures and use physical models to represent problem situations and solutions.</p>	<p><b>F.</b> Recognize relationships among different topics within mathematics; e.g., the length of an object can be represented by a number.</p>	<p><b>F.</b> Use inductive thinking to generalize a pattern of observations for particular cases, make conjectures, and provide supporting arguments for conjectures.</p>	<p><b>F.</b> Use Precise mathematical language and notations to represent problem situations and mathematical ideas.</p>	<p><b>F.</b> Present complete and convincing arguments and justifications, using inductive and deductive reasoning, adapted to be effective for various audiences.</p>

**Mathematical Processes Standard  
Grades K - 12**

<b>Ohio Benchmarks Grades K - 2</b>	<b>Ohio Benchmarks Grades 3 - 4</b>	<b>Ohio Benchmarks Grades 5-7</b>	<b>Ohio Benchmarks Grades 8-10</b>	<b>Ohio Benchmarks Grade 11-12</b>
<p><b>G.</b> Use invented and conventional symbols and common language to describe a problem situation and solution.</p>	<p><b>G.</b> Use reasoning skills to determine and explain the reasonableness of a solution with respect to the problem situation.</p>	<p><b>G.</b> Relate mathematical ideas to one another and to other content areas; e.g., use area models for adding fractions, interpret graphs in reading, science and social studies</p>	<p><b>G.</b> Write clearly and coherently about mathematical thinking and ideas.</p>	<p><b>G.</b> Understand the difference between a statement that is verified by mathematical proof, such as a theorem, and one that is verified empirically using examples or data.</p>
<p><b>H.</b> Recognize the mathematical meaning of common words and phrases, and relate everyday language to mathematical language and symbols.</p>	<p><b>H.</b> Recognize basic valid and invalid arguments, and use examples and counter examples, models, number relationships, and logic to support or refute.</p>	<p><b>H.</b> Use representations to organize and communicate mathematical thinking and problem solutions.</p>	<p><b>H.</b> Locate and interpret mathematical information accurately, and communicate ideas, processes and solutions in a complete and easily understood manner.</p>	<p><b>H.</b> Use formal mathematical language and notation to represent ideas, to demonstrate relationships within and among representation systems, and to formulate generalizations.</p>
<p><b>I.</b> Communicate mathematical thinking by using everyday language and appropriate mathematical language.</p>	<p><b>I.</b> Represent problem situations in a variety of forms (physical model, diagram, in words or symbols), and recognize when some ways of representing a problem may be more helpful than others.</p>	<p><b>I.</b> Select, apply, and translate among mathematical representations to solve problems; e.g., representing a number as a fraction, decimal or percent as appropriate for a problem.</p>		<p><b>I.</b> Communicate mathematical ideas orally and in writing with a clear purpose and appropriate for a specific audience.</p>

**Mathematical Processes Standard  
Grades K - 12**

<b>Ohio Benchmarks Grades K - 2</b>	<b>Ohio Benchmarks Grades 3 - 4</b>	<b>Ohio Benchmarks Grades 5-7</b>	<b>Ohio Benchmarks Grades 8-10</b>	<b>Ohio Benchmarks Grade 11-12</b>
	<p><b>J.</b> Read, interpret, discuss, and write about mathematical ideas and concepts using both everyday and mathematical language.</p>	<p><b>J.</b> Communicate mathematical thinking to others and analyze the mathematical thinking and strategies of others.</p>		<p><b>J.</b> Apply mathematical modeling to workplace and consumer situations, including problem formulation, identification of a mathematical model, interpretation of solution within the model, and validation to original problem situations.</p>
	<p><b>K.</b> Use mathematical language to explain and justify mathematical ideas, strategies and solutions.</p>	<p><b>K.</b> Recognize and use mathematical language and symbols when reading, writing and conversing with others.</p>		