

# Mathematics K-2

<http://www.education-world.com/standards/national/math/index.shtml>

| Problems |   |   |   |   |   |   |
|----------|---|---|---|---|---|---|
| Primary  | 1 | 2 | 3 | 4 | 5 |   |
| X        | X | X | X | X | X | <b>ALGEBRA</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Use concrete, pictorial, and verbal representations to develop an understanding of invented and conventional symbolic notations;</li> <li>• Describe qualitative change, such as a student's growing taller</li> <li>• Describe quantitative change, such as a student's growing two inches in one year.</li> </ul>  |
| X        | X | X | X | X | X | <b>GEOMETRY</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Relate ideas in geometry to ideas in number and measurement</li> <li>• Recognize geometric shapes and structures in the environment and specify their location</li> </ul>   |
| X        | X | X | X | X | X | <b>MEASUREMENT</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Understand how to measure using nonstandard and standard units</li> <li>• select an appropriate unit and tool for the attribute being measured</li> <li>• Use tools to measure.</li> </ul>   |
| X        | X | X | X | X | X | <b>DATA ANALYSIS AND PROBABILITY</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Pose questions and gather data about themselves and their surroundings.</li> </ul>   |
| X        | X | X | X | X | X | <b>PROBLEM SOLVING</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Build new mathematical knowledge through problem solving</li> <li>• Solve problems that arise in mathematics and in other contexts</li> <li>• Apply and adapt a variety of appropriate strategies to solve problems</li> <li>• Monitor and reflect on the process of mathematical problem solving</li> </ul>   |
| X        | X | X | X | X | X | <b>REASONING AND PROOF</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Recognize reasoning and proof as fundamental aspects of mathematics</li> <li>• Make and investigate mathematical conjectures</li> <li>• Develop and evaluate mathematical arguments and proofs</li> <li>• Select and use various types of reasoning and methods of proof</li> </ul>  |
| X        | X | X | X | X | X | <b>COMMUNICATION</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Organize and consolidate their mathematical thinking through communication</li> <li>• Communicate their mathematical thinking coherently and clearly to peers, teachers, and others</li> <li>• Analyze and evaluate the mathematical thinking and strategies of others</li> <li>• Use the language of mathematics to express mathematical ideas precisely</li> </ul> |
| X        | X | X | X | X | X | <b>CONNECTION</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Recognize and use connections among mathematical ideas; • understand how mathematical ideas interconnect and build on one another to produce a coherent whole;</li> <li>• Recognize and apply mathematics in contexts outside of mathematics</li> </ul>   |
| X        | X | X | X | X | X | <b>REPRESENTATION</b> <span style="float: right;"><b>In grades K-2 all students should:</b></span> <ul style="list-style-type: none"> <li>• Create and use representations to organize, record, and communicate mathematical ideas</li> <li>• Select, apply, and translate among mathematical representations to solve problems</li> <li>• Use representations to model and interpret physical, social, and mathematical phenomena</li> </ul>   |

# Mathematics 3-5

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| Problems |   |   |   |   |   |   |
|----------|---|---|---|---|---|---|
| Primary  | 1 | 2 | 3 | 4 | 5 |   |
|          | X | Y | X | X | X | <b>GEOMETRY</b> <b>In grades 3-5 all students should:</b>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Build and draw geometric objects</li> <li>Create and describe mental images of objects, patterns, and paths</li> <li>Identify and build a three-dimensional object from two-dimensional representations of that object</li> <li>Identify and draw a two-dimensional representation of a three-dimensional object</li> <li>Use geometric models to solve problems in other areas of mathematics, such as number and measurement</li> <li>Recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life</li> </ul> |
|          | X | Y | X | X | X | <b>MEASUREMENT</b> <b>In grades 3-5 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles</li> </ul>  |
|          | X | Y | X | X | X | <b>DATA ANALYSIS AND PROBABILITY</b> <b>In grades 3-5 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Design investigations to address a question and consider how data-collection methods affect the nature of the data set</li> <li>Collect data using observations, surveys, and experiments</li> <li>Propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions</li> </ul>  |
|          | X | Y | X | X | X | <b>PROBLEM SOLVING</b> <b>In grades 3-5 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Build new mathematical knowledge through problem solving</li> <li>Solve problems that arise in mathematics and in other contexts</li> <li>Apply and adapt a variety of appropriate strategies to solve problems</li> </ul>   |
|          | X | Y | X | X | X | <b>REASONING AND PROOF</b> <b>In grades 3-5 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Recognize reasoning and proof as fundamental aspects of mathematics</li> <li>Make and investigate mathematical conjectures</li> <li>Develop and evaluate mathematical arguments and proof</li> <li>Select and use various types of reasoning and methods of proof</li> </ul>   |
|          | X | Y | X | X | X | <b>COMMUNICATION</b> <b>In grades 3-5 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Organize and consolidate their mathematical thinking through communication</li> <li>Communicate their mathematical thinking coherently and clearly to peers, teachers, and others</li> <li>Analyze and evaluate the mathematical thinking and strategies of others</li> </ul>  |
|          | X | Y | X | X | X | <b>CONNECTION</b> <b>In grades 3-5 all students should:</b>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Recognize and use connections among mathematical ideas</li> <li>Understand how mathematical ideas interconnect and build on one another to produce a coherent whole</li> <li>Recognize and apply mathematics in contexts outside of mathematics.</li> </ul>  |
|          | X | Y | X | X | X | <b>REPRESENTATION</b> <b>In grades 3-5 all students should:</b>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Create and use representations to organize, record, and communicate mathematical ideas</li> <li>Select, apply, and translate among mathematical representations to solve problems</li> <li>Use representations to model and interpret physical, social, and mathematical phenomena</li> </ul>  |

## Mathematics 6-8

<http://www.education-world.com/standards/national/math/index.shtml>

| Problems |   |   |   |   |   |   |
|----------|---|---|---|---|---|---|
| Primary  | 1 | 2 | 3 | 4 | 5 |   |
|          | X | X | X | X | X | <b>NUMBER AND OPERATIONS</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers</li> <li>Select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected method</li> <li>Develop, analyze, and explain methods for solving problems involving proportions, such as scaling and finding equivalent ratios</li> </ul>  |
|          |   |   |   |   |   | <b>ALGEBRA</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>   |
|          | X | X | X | X | X | <ul style="list-style-type: none"> <li>Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules</li> <li>Relate and compare different forms of representation for a relationship</li> </ul>  |
|          | X | X | X | X | X | <b>GEOMETRY</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Draw geometric objects with specified properties, such as side lengths or angle measures</li> <li>Use two-dimensional representations of three-dimensional objects to visualize and solve problems such as those involving surface area and volume</li> <li>Use visual tools such as networks to represent and solve problems</li> <li>Use geometric models to represent and explain numerical and algebraic relationships</li> </ul> <p>Recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life</p> |
|          | X | X | X | X | X | <b>MEASUREMENT</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume</li> <li>Use common benchmarks to select appropriate methods for estimating measurements; Select and apply techniques and tools to accurately find length, area, volume, and angle measures to appropriate levels of precision</li> </ul>  |
|          |   |   |   |   |   | <b>DATA ANALYSIS AND PROBABILITY</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>   |
|          | X | X |   | X |   | <ul style="list-style-type: none"> <li>Use conjectures to formulate new questions and plan new studies to answer them</li> <li>Use proportionality and a basic understanding of probability to make and test conjectures about the results of experiments and simulations</li> </ul>  |
|          | X | X | X | X | X | <b>PROBLEM SOLVING</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Build new mathematical knowledge through problem solving</li> <li>Solve problems that arise in mathematics and in other contexts</li> <li>Apply and adapt a variety of appropriate strategies to solve problems</li> <li>Monitor and reflect on the process of mathematical problem solving</li> </ul>   |
|          | X | X | X | X | X | <b>REASONING AND PROOF</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Make and investigate mathematical conjectures</li> <li>Develop and evaluate mathematical arguments and proofs</li> <li>Select and use various types of reasoning and methods of proof</li> </ul>   |
|          | X | X | X | X | X | <b>COMMUNICATION</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Organize and consolidate their mathematical thinking through communication</li> <li>Communicate their mathematical thinking coherently and clearly to peers, teachers, and others</li> <li>Analyze and evaluate the mathematical thinking and strategies of others</li> <li>Use the language of mathematics to express mathematical ideas precisely</li> </ul>   |
|          | X | X | X | X | X | <b>CONNECTION</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Recognize and use connections among mathematical ideas</li> <li>Recognize and apply mathematics in contexts outside of mathematics</li> </ul>  |
|          | X | X | X | X | X | <b>REPRESENTATION</b> <span style="float: right;"><b>In grades 6-8 all students should:</b></span>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Create and use representations to organize, record, and communicate mathematical ideas</li> <li>Select, apply, and translate among mathematical representations to solve problems</li> <li>Use representations to model and interpret physical, social, and mathematical phenomena</li> </ul>  |

# Mathematics 9-12

<http://www.education-world.com/standards/national/math/index.shtml>

| Problems |   |   |   |   |   |  |
|----------|---|---|---|---|---|--|
| Primary  | 1 | 2 | 3 | 4 | 5 |  |
|          | X | X | X | X | X | <b>NUMBER AND OPERATIONS</b> <b>In grades 9-12 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Develop fluency in operations with real numbers, vectors, and matrices, using mental computation or paper-and-pencil calculations for simple cases and technology for more-complicated cases</li> <li>Judge the reasonableness of numerical computations and their results</li> </ul>   |
|          | X | X | X | X | X | <b>ALGEBRA</b> <b>In grades 9-12 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology</li> <li>Draw reasonable conclusions about a situation being modeled</li> </ul>  |
|          | X | X | X | X | X | <b>GEOMETRY</b> <b>In grades 9-12 all students should:</b>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Establish the validity of geometric conjectures using deduction, prove theorems, and critique arguments made by others</li> <li>Draw and construct representations of two- and three-dimensional geometric objects using a variety of tools</li> <li>Visualize three-dimensional objects and spaces from different perspectives and analyze their cross sections</li> <li>Use geometric ideas to solve problems in, and gain insights into, other disciplines and other areas of interest such as art and architecture</li> </ul> |
|          | X | X | X | X | X | <b>MEASUREMENT</b> <b>In grades 9-12 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Make decisions about units and scales that are appropriate for problem situations involving measurement</li> <li>Understand and use formulas for the area, surface area, and volume of geometric figures, including cones, spheres, and cylinders</li> </ul>  |
|          | X | X | X | X | X | <b>PROBLEM SOLVING</b> <b>In grades 9-12 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Build new mathematical knowledge through problem solving</li> <li>Solve problems that arise in mathematics and in other contexts</li> <li>Apply and adapt a variety of appropriate strategies to solve problems</li> <li>Monitor and reflect on the process of mathematical problem solving</li> </ul>  |
|          | X | X | X | X | X | <b>REASONING AND PROOF</b> <b>In grades 9-12 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Make and investigate mathematical conjectures</li> <li>Develop and evaluate mathematical arguments and proof</li> <li>Select and use various types of reasoning and methods of proof</li> </ul>   |
|          | X | X | X | X | X | <b>COMMUNICATION</b> <b>In grades 9-12 all students should:</b>  |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Organize and consolidate their mathematical thinking through communication</li> <li>Communicate their mathematical thinking coherently and clearly to peers, teachers, and others</li> <li>Analyze and evaluate the mathematical thinking and strategies of others</li> <li>Use the language of mathematics to express mathematical ideas precisely</li> </ul>  |
|          | X | X | X | X | X | <b>CONNECTION</b> <b>In grades 9-12 all students should:</b>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Recognize and use connections among mathematical ideas</li> <li>Understand how mathematical ideas interconnect and build on one another to produce a coherent whole</li> <li>Recognize and apply mathematics in contexts outside of mathematics</li> </ul>  |
|          | X | X | X | X | X | <b>REPRESENTATION</b> <b>In grades 9-12 all students should:</b>   |
|          |   |   |   |   |   | <ul style="list-style-type: none"> <li>Create and use representations to organize, record, and communicate mathematical ideas</li> <li>Select, apply, and translate among mathematical representations to solve problems</li> <li>Use representations to model and interpret physical, social, and mathematical phenomena</li> </ul>   |