NH Curriculum Framework for Mathematics

Number and Operations

M:N&O:1 – Demonstrates understanding of rational numbers.

M:N&O:2 – Demonstrates understanding of the relative magnitude of numbers.

M:N&O:3 – Demonstrates understanding of mathematical operations.

M:N&O:4 – Accurately solves problems.

M:N&O:5 – Demonstrates understanding of monetary value.

M:N&O:6 – Uses a variety of mental computation strategies to solve problems and determine the reasonableness of answers.

M:N&O:7 – Makes estimates.

M:N&O:8 – Applies properties of numbers and field properties to solve problems and simplify computations.

Geometry and Measurement

M:G&M:1 – Uses properties or attributes to identify, describe, classify, or distinguish among polygons and circles.

M:G&M:2 – Applies theorems or relationships to solve problems.

M:G&M:3 – Uses properties or attributes to identify, compare, or describe three-dimensional shapes.

M:G&M:4 – Demonstrates understanding and applies concepts of congruency.

M:G&M:5 – Demonstrates understanding and applies concepts of similarity.

M:G&M:6 – Demonstrates understanding of one, two, and three-dimensional measurements, including length/height, radius, diameter, circumference, perimeter, area, surface area, volume, and the use of trigonometric formulas to find these measures.

M:G&M:7 – Demonstrates understanding of measurable attributes, measures and uses units of measure appropriately and consistently, and makes accurate conversions when solving problems.

M:G&M:8 – Determines elapsed and accrued time.

M:G&M:9 – Demonstrates understanding of spatial relationships and solves problems using location and position.

M:G&M:10 – Demonstrates conceptual understanding of spatial reasoning and visualization.

Functions and Algebra

M:F&A:1 – Identifies, generalizes, and extends to specific cases a variety of patterns and/or sequences.

M:F&A:2 – Demonstrates understanding of linear and nonlinear relationships and functions.

M:F&A:3 – Demonstrates understanding of algebraic expressions.

M:F&A:4 – Demonstrates conceptual understanding of equality.

Data, Statistics, and Probability

M:DSP:1 – Interprets a given representation to answer questions related to the data, or to analyze the data to formulate conclusions, make predictions, and/or solve problems.

M:DSP:2 – Analyzes patterns, trends, or distributions in data in a variety of contexts.

M:DSP:3 – Organizes and displays data; identifies or describes elements of representations that best display a given set of data or situation.

M:DSP:4 – Uses counting techniques to solve problems.

M:DSP:5 – Solves problems to determine the experimental or theoretical probability of an event.

M:DSP:6 – Decides the most effective method to collect the data necessary to answer a question or hypothesis; collects, organizes and appropriately displays the data; analyzes the data to draw conclusions, and when appropriate makes predictions, asks new questions, and makes connections to real-world situations.

Problem Solving, Reasoning, and Proof

M:PRP:1 – Students will use problem-solving strategies to investigate and understand increasingly complex mathematical content and be able to:

Grades K-2:
- Formulate and solve multi-step problems from everyday and mathematical situations.
- Solve problems using a variety of strategies.
- Verify and interpret results with respect to the original problem.
- Determine if the solution to a problem is reasonable.
- Solve problems using manipulatives, graphs, charts, diagrams, and calculators.
- Demonstrate that a problem may be solved in more than one way.
- Exhibit confidence in their ability to solve problems independently and in groups.
- Display increasing perseverance and persistence in problem solving.

Grades 3-5:
- Determine the reasonableness of solutions to real-world problems.
- Generalize solutions and apply strategies to new problem situations.
- Add to the repertoire of problem-solving strategies, and use those strategies in more sophisticated ways.
- Solve problems with multiple solutions, recognize when a problem has no solution, and recognize problems where more information is needed.
- Translate results of a computation into results that fit the real-world problem.

Grades 6-8:
- Use problem-solving strategies appropriately and effectively for a given situation.
- Determine, collect and organize the relevant information needed to solve real-world problems.
- Apply integrated problem-solving strategies to solve problems in the physical, natural, and social sciences and in pure mathematics.
- Use technology when appropriate to solve problems.
- Reflect on situations and the problem-solving process for a given situation and refine strategies as needed.

High School:
- Expand the repertoire of problem-solving strategies and use those strategies in more sophisticated ways.
- Use technology whenever appropriate to solve real-world problems.
- Formulate and redefine problem situations as needed to arrive at appropriate conclusions.

M:PRP:2 – Students will use mathematical reasoning and proof and be able to:

Grades K-2:
- Use models, known facts, properties, and relationships to explain their thinking.
- Justify solution processes and answers.
- Draw conclusions using inductive reasoning.
- Identify the missing information needed to find a solution to a given story problem.
- Use patterns and relationships to analyze mathematical situations.

Grades 3-5:
- Draw conclusions and solve problems using elementary deductive reasoning and reasoning by analogy.
- Make and defend conjectures and generalizations.
- Use models, known facts, properties, and relationships to explain thinking and to justify answers and solution processes.
- Recognize the pervasive use and power of reasoning as a part of mathematics.

Grades 6-8:
- Draw logical conclusions and make generalizations using deductive and inductive reasoning.
- Formulate, test, and justify mathematical conjectures and arguments.
- Construct and determine the validity of a mathematical argument or a solution.
- Apply mathematical reasoning skills in other disciplines.

High School:
- Expand the repertoire of proof techniques and use those techniques in more sophisticated ways.
- Use formal and informal reasoning and proof to explain and justify conclusions.
- Formalize mathematical arguments through the use of deductive reasoning.
- Use the principal of mathematical induction.
- Use reasoning and proof throughout classroom discussions independent of the mathematical topic being studied.
- Recognize how reasoning and proof influence the structure of mathematics.

Communication, Connections, and Representations

M:CCR:1 – Students will communicate their understanding of mathematics and be able to:

Grades K-2:
- Demonstrate mathematical communication through discussion, reading, writing, listening, and responding, individually and in groups.
- Discuss relationships between everyday language and mathematical language symbols.
- Explain conclusions, thought processes, and strategies in problem-solving situations.
- Discuss, illustrate, and write about mathematical concepts and relationships.
- Draw pictures and use objects to illustrate mathematical concepts.

Grades 3-5:
- Discuss mathematical ideas and write convincing arguments.
- Understand, explain, analyze, and evaluate mathematical arguments and conclusions presented by others.
- Ask clarifying and extending questions related to mathematics they have heard or read about.
- Understand and appreciate the economy and power of mathematical symbolism and its role in the development of mathematics.
- Demonstrate an understanding of mathematical concepts and relationships through a variety of methods.
- Use a variety of technologies to represent and communicate mathematical ideas.

Grades 6-8
- Articulate ideas clearly and logically in both written and oral form.
- Present, share, explain, and justify thinking with others and build upon the ideas of others to solve problems.
- Use mathematical symbols and notation.
- Formulate questions, conjectures, definitions, and generalizations about data, information, and problem situations.

High School:
- Explain and justify their thinking and develop increasingly sophisticated questions for given problem-situations.
- Critique and follow the logic of arguments presented within mathematics and across disciplines.

M:CCR:2 – Students will create and use representations to communicate mathematical ideas and to solve problems and be able to:

Grades K-2:
- Create and use age level appropriate representations to organize, record, and communicate mathematical ideas.
- Select, apply, and translate among mathematical representations to solve problems.
- Link different representations.
- Use representations to model and interpret physical, social, and mathematical phenomena.
- Use conventional and self-generated representations and connect them.
- Realize that any representation is subject to multiple interpretations.

Grades 3-5:
- Use physical models and diagrams to represent important mathematical ideas.
- Use appropriate representations to solve problems or to portray, clarify, or extend a mathematical idea.
- Recognize equivalent representations of concepts and procedures and translate among them as appropriate.

Grades 6-8:
- Use models and technology to develop equivalent representations of the same mathematical concept.
- Use and create representations to solve problems and organize their thoughts and ideas.
- Convert between representations.

High School:
- Choose appropriate representations and mathematical language to present ideas clearly and logically for a given situation.
- See a common structure in mathematical phenomena that come from very different contexts.
- Find representations that model essential features of a mathematical situation.
- Use representations as a primary means for expressing and understanding more abstract mathematical concepts.

M:CCR:3 – Students will recognize, explore, and develop mathematical connections and be able to:

Grades K-2:
- Link conceptual and procedural knowledge.
- Recognize and use mathematics in other curriculum areas.
- Recognize and use mathematics in their daily lives.
- Identify mathematical situations occurring in literature for children.
- Identify examples of geometry in nature, art, and architecture.

Grades 3-5:
- See mathematics as an integrated whole.
- Recognize relationships among different topics in mathematics.
- Recognize and use mathematics in other curriculum areas and in their daily lives.
- Link concepts and procedures.
- Use mathematical skills, concepts, and applications in other disciplines.

Grades 6-8:
- Connect new mathematical ideas to those already studied and build upon them.
- Understand that many real-world applications require an understanding of mathematical concepts.
- Explain in oral and written form the relationships between a real-world problem and an appropriate mathematical model.
- Explain in oral and written form the relationships among various mathematical concepts.

High School:
- Explain in oral or written form how mathematics connects to other disciplines, to daily life, careers, and society.
- Explain multiple approaches that lead to equivalent results when solving problems.