Math Framework Concepts and Skills

Exploratory Concepts & Skills

Number Sense	Patterns, relationship, Algebra	Geometry	Measurement:	Data Analysis, Statistics, and Probability
Understand numbers, ways of representing numbers, relationships among numbers, and number systems • Understand meanings of operations and how they relate to one another • Compute fluently and make reasonable estimates	Understand patterns, relations, and functions • Represent and analyze mathematical situations and structures using algebraic symbols • Use mathematical models to represent and understand quantitative relationships • Analyze change in various contexts	Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships • Specify locations and describe spatial relationships using coordinate geometry and other representational systems • Apply transformations and use symmetry to analyze mathematical situations • Use visualization, spatial reasoning, and geometric modeling to solve problems	Understand measurable attributes of objects and the units, systems, and processes of measurement • Apply appropriate techniques, tools, and formulas to determine measurements	Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them • Select and use appropriate statistical methods to analyze data • Develop and evaluate inferences and predictions that are based on data • Understand and apply basic concepts of probability
Grade K: • Count by ones, beginning from any number in the counting sequence. • Represent quantities using concrete objects, and investigate the partitioning of sets. • Identify equal parts of groups. • Create problems that can be solved using addition and subtraction. **Grade 1-2:** Use concrete materials to investigate situations that lead to multiplication and division. • Develop and use strategies for addition and subtraction of multi-digit whole numbers. Check by estimation.	**Grade K:** Explore skip counting by twos. **Grade 1-2:** Investigate situations with variables as unknowns and as quantities that vary.	**Grade K:** Investigate symmetry of two- and three-dimensional shapes and constructions. **Grade1-2:** Investigate symmetry in two-dimensional shapes with mirrors or by paper folding. • Explore intersecting, parallel, and perpendicular lines. • Create mental images of geometric shapes using spatial memory and spatial visualization. • Recognize and represent shapes from different perspectives. • Recognize geometric shapes and structures in the environment and specify their location. • Identify relative	**Grade K:** Explore and use standard units to measure and compare temperature, length, and time. • Identify positions of events over time, e.g., earlier, later. **Grade 1-2:** Explore measurable attributes of objects, including length, perimeter, weight, area, volume, and temperature. Compare concrete objects using these measures.	**Grade K:** Collect and organize data in lists, tables, and simple graphs. **Grade 1-2:** Investigate more likely, likely, and impossible outcomes by conducting experiments using spinners, counters, and other concrete objects. • List and count the number of possible pairings of objects from two sets.

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• Investigate addition of common fractions, e.g., 1.2 + 1.2 = 1, 1.4 + 1.4 = 1.2. • Understand situations that entail multiplication and division, such as equal groupings of objects and sharing equally.		positions, e.g., closer, farther, higher, lower, etc. • Find and name locations on maps and express simple relationships, e.g., near to, far away from.		

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Grade 3-4: Extend multiplication and division to larger-digit numbers. • Use models to explore multiplication and division with fractions (to twelfths) and decimals. • Investigate number theory concepts, e.g., prime and composite numbers. • Investigate the concept of ratio, e.g., the number of students to the number of teachers. • Use concrete objects and visual models to add and subtract common decimals. • Explore numbers less than zero by extending the number line and by using familiar applications such as temperature. • Investigate the distributive	**Grade3-4:** Use concrete materials to build an understanding of equality and inequality. • Explore properties of equality in number sentences: when equals are added to equals, then the sums are equal; when equals are multiplied by equals, then the products are equal, e.g., if n = 5, then 3 . n = 3 . 5.	**Grade3-4:** Predict and describe results of transformations (e.g., translations, rotations, and reflections) on two-dimensional shapes. • Investigate two-dimensional representations of three-dimensional objects.	**Grade 3-4:** Develop the concepts of area and perimeter by investigating areas and perimeters of regular and irregular shapes created on dot paper, coordinate grids, or geoboards. • Use concrete objects to explore volumes and surface areas of rectangular prisms. • Investigate the use of protractors to measure angles. • Identify common measurements of turns, e.g., 360° in one full turn, 180° in a half turn, and 90° in a quarter turn. • Investigate areas of right triangles. • Understand that measurements are approximations and	**Grade3-4:** Explore the concepts of median, mode, maximum and minimum, and range. • Discuss what data-collection methods are appropriate for various types of investigations. • Explore situations that involve probabilities of equally likely events. • Investigate the construction of simple circle graphs.

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			investigate how differences in units affect precision.	
property of multiplication over addition for single-digit multipliers, e.g., $7 \cdot (10 + 5)$ is equivalent to $7 \cdot 10 + 7 \cdot 5$.				
Grade 5-6: Explore the addition and subtraction of positive and negative fractions. • Investigate the concepts of ratio and proportion. • Investigate the distributive property of multiplication over addition for double-digit multipliers, e.g., $12 \cdot (10 + 3)$ is equivalent to $12 \cdot 10 + 12 \cdot 3$.	**Grade5-6:** Use physical models to investigate and describe how a change in one variable affects a second variable. • Use models to develop understanding of slope as constant rate of change. • Model situations with proportional relationships and solve problems.	**Grade 5-6:** Use manipulative and technology to model geometric shapes. • Investigate tessellations (tiling). • Explore the angles formed by intersecting lines. • Identify and draw shapes and figures from different views/perspectives. • Recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, Such as art, science, and everyday life.	**Grade5-6:** Explore various models for finding the area of a triangle, parallelogram, and trapezoid, and develop strategies for more complex shapes. • Investigate volumes and surface areas of a variety of three-dimensional objects. • Explore volume and surface areas of rectangular prisms, cylinders, and spheres.	**Grade5-6:** Set up and analyze capture-recapture experiments. • 4 Generate and group data, record the data using frequency tables and interpret the tables. • Select, create, and use appropriate graphical representations of data, including histograms, box plots, and scatter plots. • Compare different representations of the same data and evaluate how well each representation shows important aspects of the data.
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