ICS Upper Elementary Math Standards

Adopted from NCTM

Numbers and Operations Standards

N1. Understand numbers, ways of representing numbers, relationships among numbers, and number systems

Benchmark	Grade 3	Grade 4	Grade 5
N1a. Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals	1-10,000 Whole numbers	1-100,000	1-1,000,000,000
N1b. Recognize equivalent representations for the same number and generate them by decomposing and composing numbers			
N1c. Develop understanding of fractions as parts of unit wholes, as parts of a collection, as locations on number lines, and as divisions of whole numbers			
N1d. Use models, benchmarks, and equivalent forms to judge the size of fractions			
N1e. Recognize and generate equivalent forms of commonly used fractions, decimals, and percents	Begin to . . .		To millionths
N1f. Explore numbers less than 0 by extending the number line and through familiar applications			
N1g. Describe classes of numbers according to characteristics such as the nature of their factors			

N2. Understand meanings of operations and how they relate to one another

Benchmark	Grade 3	Grade 4	Grade 5
N2a. Understand various meanings of multiplication and division			
N2b. Understand the effects of multiplying and dividing whole numbers			
N2c. Identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems			
N2d. Understand and use properties of operations, such as the distributive property of multiplication over addition	Begin to . . .		

N3. Compute fluently and make reasonable estimates

Benchmark	Grade 3	Grade 4	Grade 5
N3a. Develop fluency with basic number combinations for multiplication and division and use these combinations to mentally compute related problems, such as 3050			
N3b. Develop fluency in adding, subtracting, multiplying, and dividing whole numbers			

N3c. Develop and use strategies to estimate the results of whole-number computations and to judge the reasonableness of such results			
N3d. Develop and use strategies to estimate computations involving fractions and decimals in situations relevant to students' experience			
N3e. Use visual models, benchmarks, and equivalent forms to add and subtract commonly used fractions and decimals			
N3f. Select appropriate methods and tools for computing with whole numbers from among mental computation, estimation, calculators, and paper and pencil according to the context and nature of the computation and use the selected method or tools			

Algebra Standards

A1. Understand patterns, relations, and functions

Benchmark	Grade 3	Grade 4	Grade 5
A1a. Describe, extend, and make generalizations about geometric and numeric patterns			
A1b. Represent and analyze patterns and functions, using words, tables, and graphs			

A2. Represent and analyze mathematical situations and structures using algebraic symbols

Benchmark	Grade 3	Grade 4	Grade 5
A2a. Identify such properties as commutativity, associativity, and distributivity and use them to compute with whole numbers			
A2b. Represent the idea of a variable as an unknown quantity using a letter or a symbol			
A2c. Express mathematical relationships using equations			

A3. Use mathematical models to represent and understand quantitative relationships

Benchmark	Grade 3	Grade 4	Grade 5
A3a. Model problem situations with objects and use representations such as graphs, tables, and equations to draw conclusions			

A4. Analyze change in various contexts

Benchmark	Grade 3	Grade 4	Grade 5
A4a. Investigate how a change in one variable relates to a change in a second variable			

Geometry Standards

G1. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships

Benchmark	Grade 3	Grade 4	Grade 5
G1a. Identify, compare, and analyze attributes of two- and three-dimensional shapes and develop vocabulary to describe the attributes			
G1b. Classify two- and three-dimensional shapes according to their properties and develop definitions of classes of shapes such as triangles and pyramids			
G1c. Investigate, describe, and reason about the results of subdividing, combining, and transforming shapes			
G1d. Explore congruence and similarity			
G1e. Make and test conjectures about geometric properties and relationships and develop logical arguments to justify conclusions			

G2. Specify locations and describe spatial relationships using coordinate geometry and other representational systems

Benchmark	Grade 3	Grade 4	Grade 5
G2a. Describe location and movement using common language and geometric vocabulary			

G2b. Make and use coordinate systems to specify locations and to describe paths			
G2c. Find the distance between points along horizontal and vertical lines of a coordinate system			

G3. Apply transformations and use symmetry to analyze mathematical situations

Benchmark	Grade 3	Grade 4	Grade 5
G3a. Predict and describe the results of sliding, flipping, and turning two-dimensional shapes			
G3b. Describe a motion or a series of motions that will show that two shapes are congruent			
G3c. Identify and describe line and rotational symmetry in two- and three-dimensional shapes and designs		2-D	

G4. Use visualization, spatial reasoning, and geometric modeling to solve problems

Benchmark	Grade 3	Grade 4	Grade 5
G4a. Build and draw geometric objects			
G4b. Create and describe mental images of objects, patterns, and paths			
G4c. Identify and build a three-dimensional object from two-dimensional representations of that object			
G4d. Identify and draw a two-dimensional representation of a three-dimensional object			

G4e. Use geometric models to solve problems in other areas of mathematics, such as number and measurement			
G4f. Recognize geometric ideas and relationships and apply them to other disciplines and to problems that arise in the classroom or in everyday life			

Measurement Standards

M1. Understand measurable attributes of objects and the units, systems, and processes of measurement

Benchmark	Grade 3	Grade 4	Grade 5
M1a. Understand such attributes as length, area, weight, volume, and size of angle and select the appropriate type of unit for measuring each attribute			
M1b. Understand the need for measuring with standard units and become familiar with standard units in the customary and metric systems			
M1c. Carry out simple unit conversions, such as from centimeters to meters, within a system of measurement			
M1d. Understand that measurements are approximations and how differences in units affect precision			
M1e. Explore what happens to measurements of a two-dimensional shape such as its perimeter and area when the shape is changed in some way			

M2. Apply appropriate techniques, tools, and formulas to determine measurements

Benchmark	Grade 3	Grade 4	Grade 5
M2a. Develop strategies for estimating the perimeters, areas, and volumes of irregular shapes			
M2b. Select and apply appropriate standard units and tools to measure length, area, volume, weight, time, temperature, and the size of angles			
M2c. Select and use benchmarks to estimate measurements			
M2d. Develop, understand, and use formulas to find the area of rectangles and related triangles and parallelograms			
M2e. Develop strategies to determine the surface areas and volumes of rectangular solids			

Data Analysis and Probability Standards

DP1. Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them

Benchmark	Grade 3	Grade 4	Grade 5
DP1a. Design investigations to address a question and consider how data-collection methods affect the nature of the data set			
DP1b. Collect data using observations, surveys, and experiments			

DP1c. Represent data using tables and graphs such as line plots, bar graphs, and line graphs			
DP1d. Recognize the differences in representing categorical and numerical data			

DP2. Select and use appropriate statistical methods to analyze data

Benchmark	Grade 3	Grade 4	Grade 5
DP2a. Describe the shape and important features of a set of data and compare related data sets, with an emphasis on how the data are distributed			
DP2b. Use measures of center, focusing on the median, and understand what each does and does not indicate about the data set			
DP2c. Compare different representations of the same data and evaluate how well each representation shows important aspects of the data			

DP3. Develop and evaluate inferences and predictions that are based on data

Benchmark	Grade 3	Grade 4	Grade 5
DP3a. Propose and justify conclusions and predictions that are based on data and design studies to further investigate the conclusions or predictions			

DP4. Understand and apply basic concepts of probability

Benchmark	Grade 3	Grade 4	Grade 5
DP4a. Describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible			
DP4b. Predict the probability of outcomes of simple experiments and test the predictions			
DP4c. Understand that the measure of the likelihood of an event can be represented by a number from 0 to 1			

Mathematical Process Standards

P1. Develop and use problem solving skills

Benchmark	Grade 3	Grade 4	Grade 5
P1a. Build new mathematical knowledge through problem solving			
P1b. Solve problems that arise in mathematics and in other contexts			
P1c. Apply and adapt a variety of appropriate strategies to solve problems			
P1d. Monitor and reflect on the process of mathematical problem solving			

P2. Develop and use mathematical reasoning and proof

Benchmark	Grade 3	Grade 4	Grade 5
P2a. Recognize reasoning and proof as fundamental aspects of mathematics			
P2b. Make and investigate mathematical conjectures			
P2c. Develop and evaluate mathematical arguments and proofs			
P2d. Select and use various types of reasoning and methods of proof			

P3. Communicate mathematical thinking clearly

Benchmark	Grade 3	Grade 4	Grade 5
P3a. Organize and consolidate their mathematical thinking through communication			
P3b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others			
P3c. Analyze and evaluate the mathematical thinking and strategies of others			
P3d. Use the language of mathematics to express mathematical ideas precisely			

P4. Connect mathematical ideas inside and outside of mathematical contexts

Benchmark	Grade 3	Grade 4	Grade 5
P4a. Recognize and use connections among mathematical ideas			
P4b. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole			
P4c. Recognize and apply mathematics in contexts outside of mathematics			

P5. Represent mathematical ideas clearly

Benchmark	Grade 3	Grade 4	Grade 5
P5a. Create and use representations to organize, record, and communicate mathematical ideas			
P5b. Select, apply, and translate among mathematical representations to solve problems			
P5c. Use representations to model and interpret physical, social, and mathematical phenomena			